Can a Mobile-App-Based Behavioral Intervention Teach Financial Skills to Youth? Experimental Evidence from a Financial Diaries Study*

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Abstract

We study the impact of a mobile-app-based behavioral intervention on youth's financial literacy and financial behavior. To maximize the chances to reach out-of-school youth, we provided access to a user-friendly budget recording tool coupled with biweekly enumerators' visits and SMSs during a 27-week period. The bundled treatment has positive and significant effects on financial literacy and awareness of market prices. The probability of saving and savings deposits are not affected, but usage of credit increases both at the extensive and intensive margins. Average treatment effects on financial literacy and behavior are driven by youth without previous exposure to financial education, suggesting that the bundled intervention prompted specific subgroups (i.e., youth with lower levels of financial knowledge) to invest more in financial literacy.

Keywords: financial inclusion, financial diaries, financial literacy, youth

JEL Codes: : C93, D90, G41, G53, O12, O16.

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1 Introduction

Youth in developing countries face limited access to economic opportunities, high poverty rates, and low employment levels. In addition, they often lack access to quality and suitable financial services and have insufficient capabilities to navigate an increasingly complex financial system.[1] These barriers to formal financial services perpetuate their poor economic conditions, limiting their investments in education, businesses, and other productive activities. To cope with their credit constraints, youth often turn to inadequate financial services or informal providers, which may put them at risk of debt spirals, with dire consequences on their future access to credit. Recent meta-analysis has shown that financial education not only improves financial skills, but can also have positive impacts on downstream financial behavior (Kaiser and Menkhoff, 2017; Kaiser et al., 2022). While traditional lecture-based formats have proven effective to deliver financial education in the school setting (Kaiser and Menkhoff, 2019; Frisancho, 2019; Bruhn et al., 2016; Frisancho, 2023; Alan and Ertac, 2017), there is limited evidence on how to reach out-of-school youth.

Our study fills this gap by studying the effects of a mobile-app-based behavioral intervention, which comprises a user-friendly budget recording tool, biweekly enumerators' visits, and text messages on youth's financial literacy and behavior. We designed a smartphone application (app, from now on) that enables users to track their daily financial transactions over 27 weeks (more than 6 months), thus creating a financial diary.[2] We randomly assigned students two months away from graduating high school in Peru to a treatment and a control group. The treatment group received access to the financial app, along with the monitoring visits and non-educative nudges via SMSs.[3] One set of biweekly nudges provided tailored information on own past savings, encouraging individuals to save, but without providing any specific rule of thumb or advice to follow. Another stand-alone nudge provided participants' with past information about their spending budget, highlighting their expenditures by category. The control group received access to a placebo app to record daily meals and one monitoring visit.

Keeping frequent records of financial transactions has the potential to develop healthy financial habits and help youth self-assess their level of financial knowledge and skills. Being aware of one's limitations can drive curiosity and interest that leads to searching for helpful financial knowledge in daily life. Thus, our intervention has the potential to affect youth's investments in financial literacy that can subsequently trigger behavioral changes. We hypothesize that our

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[1]Four out of 10 unbanked people are in the age group 15–24 (Demirguc-Kunt et al., 2018). Moreover, the OECD-PISA 2018 financial literacy test results show that 1 in 4 15-year-old students in developing countries cannot make even simple everyday spending decisions (OECD, 2020).

[2]Financial diaries were developed over the past two decades to collect more accurate and high-frequency information on spending and income patterns. Collins et al. (2009) were pioneers in using these data collection strategies, which have since then been used by many to study financial habits among diverse populations. See Somville and Vandewalle (2019) as well as https://bfaglobal.com/portfolio/ and https://www.microfinanceopportunities.org/ for several examples.

[3]The behavioral economics literature defines (non-educative) nudges as "interventions designed to steer people in a particular direction while preserving their freedom of choice" (Hertwig and Grüne-Yanoff, 2017). However, another type of potential intervention are boosts or educative nudges, whose objective is to foster people's competences to make their own choices. Educative nudges target competences, while non-educative nudges target behavior (Hertwig and Grüne-Yanoff, 2017; Isler et al., 2022)

bundled intervention might serve as a behavioral nudge, propelling users to search for financial education content that the treatment did not directly deliver.

Our experimental sample is a subsample of students originally included in a larger randomized controlled trial that evaluated the effects of school-based financial education. We cross-randomize access to the bundled intervention on top of the financial education program. This design allows us to measure complementarity/substitution patterns between the school-based financial education and our mobile-app-based behavioral intervention.

The impact of the treatment is measured using multiple data sources that allow us to measure the immediate and sustained effects of the intervention. We rely on a rich endline survey; a financial literacy test; and credit bureau data. Survey records and financial literacy tests are collected right before the launch of the intervention and two months after the end of it. These data collect sociodemographic characteristics, information on shopping, savings, and consumption habits, as well as market price awareness. In addition, credit bureau data capture credit and delinquency behavior up to eight months after the end of the intervention. Furthermore, financial diaries' data provide us with supporting information on app usage and youth's income, spending, and savings patterns over 27 weeks.

Even though the intervention did not provide financial education content, we find impacts on both literacy and behavior. At endline, the treatment group recorded significant gains in financial literacy test scores (0.09 standard deviations) and knowledge of market prices (0.32 standard deviations). The treatment does not lead to significant changes in shopping strategies, budgeting habits, or savings behavior.

Credit bureau data from eight months after the end of the intervention show that the treatment led to greater levels of inclusion in the formal financial system. In particular, youth in the treatment group deepened their usage of credit financial products both at the extensive (i.e., greater probability of having outstanding debt and increased number of lenders) and intensive margins (size of debt portfolio).

Analysis of heterogeneous treatment effects by previous exposure to financial education suggests that the bundled intervention is effective in improving financial literacy among students who did not receive lessons while in high school. The baseline gap in financial literacy exam scores among those who benefited from financial education content and those who did not was about 0.20 standard deviations. Access to the bundled intervention closed this gap: we record a 0.22 standard deviation increase in financial literacy scores among those who did not take financial education lessons, while those with previous exposure to financial education fail to register any significant learning. This finding signals that our app-based behavioral intervention worked as a substitute to school-based financial education.

Our contribution to the literature on financial education, literacy, and behavior among youth is two-fold. First, we move beyond existing work focusing on school-based financial education (Bruhn et al., 2016; Bover et al., 2018; Frisancho, 2023), voluntary out-of-school programs (Berry et al., 2018), personalized coaching (Modestino et al., 2019), and educative nudges (Isler

et al., 2022). We study a hands-on strategy that relies on basic digital technology as well as in-person visits and text messages to foster responsible financial behavior among hard-to-reach out-of-school youth. Our paper is closer to the scarce literature on financial education delivery through experiential learning (Hinojosa et al., 2009; Batty et al., 2020). However, our paper is also related to the strand of the literature that relies on (non-educative) nudges to foster behavioral changes (Karlan et al., 2016; Drexler et al., 2014). Second, our rich data allow us to measure both the immediate effects of the intervention on financial literacy and behavior (using surveys and financial literacy tests), as well as the persistence of the behavioral effects over time in the medium term using credit reports.

2 Experimental design

2.1 The treatment

We randomly assigned Peruvian high school students two months away from graduating high school to a treatment and a control group. The treatment group received access to a mobile-app-based behavioral intervention, which bundled access to a smartphone app to record daily financial transactions, biweekly visits from an enumerator, and SMSs, which contained tailored non-educative nudges fostering savings and responsible spending. The treatment was delivered between December 9, 2018 and June 16, 2019, for a total of 27 weeks (over 6 months).

The financial app allowed users to easily record their cash flows. When using the app, users needed to first tag each amount recorded within three general categories: income, expenses, and financial tools. Next, depending on the category selected, the app displayed a second list of subcategories to pick from. The income subcategories included: family or friends' allowances, cash gifts, permanent or temporary employment income, and sale of own assets. Expenses were subdivided into food, personal items, health, education, entertainment, clothing, gifts, and cellphone data recharges. Finally, financial tools were classified into: savings deposits, savings withdrawals, lending to third parties, receiving payments on loans to third parties, receiving loans from third parties, and repaying loans to third parties.[4]

Moreover, each individual in the treatment group received biweekly monitoring visits. The visits were conducted by a team of enumerators. These individuals were under 25 years old at the time of the survey, all had completed secondary education, were pursuing technical careers, and had previous field experience. Starting in January 2019, all individuals using the financial app were visited every two weeks to review transactions entered between visits. Each app user was contacted via SMS or Whatsapp in advance to arrange a home visit. During the interview, each interviewer followed a common protocol. First, the enumerator verified that all transactions recorded during the previous weeks were correctly saved. Second, she checked that the net balance of income and expenditures matched the net amount recorded under financial tools.

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[4]Appendix B.1 describes in more detail the intervention materials, including screenshots of the apps installed in the smartphones of the treatment and control groups.

Third, at the users' request, the enumerator added any missing transactions or edited incorrect ones. The enumerators also provided support to solve issues or challenges associated with the usage of the financial app. At the end of the meeting, the enumerator and the participant scheduled a new appointment for the following interview.

To further foster engagement with and usage of the app, we sent three biweekly SMS messages following each visit. The text messages did not deliver formative financial education content. The first message provided a summary of the total inflows and outflows and encouraged students to save. Savings encouragement was always done in a positive way and through a non-educative nudge. More specifically, we retrieved and shared with each participant their savings balance and savings deposits over the past two weeks to make their past behavior more salient. These data was accompanied by a simple encouragement phrase such as "you can do it" or "congratulations". Even though a specific behavior was targeted, savings, no specific informational content was provided. The second SMS was a reminder to continue entering data in the budget-recording app, while the third SMS confirmed the date and time of the next visit. Furthermore, treated youth received one additional personalized nudge regarding spending patterns four months into the intervention period. The SMS included a pie chart that showed the distribution of individual expenditures (see Appendix Figure A.1) and a closing paragraph encouraging responsible spending. Appendix Section B.1.2 presents the scripts of all SMSs used during the intervention period.

The control group received access to a smartphone app to record daily food intake and one monitoring visit. This app was visually similar to the financial app and was used to record all meals eaten by the user, classifying them as breakfast, lunch, dinner, or snacks. The enumerator visit for the control group took place at the beginning of the intervention period to support participants with app installation. The control group also received biweekly SMS reminders to continue entering data.

Finally, we also offered monetary incentives to boost usage of the apps. These incentives were provided to both the treatment and control groups. The transfers were delivered in the form of monthly mobile data recharges and were sustained as long as the participant did not drop out of the study. Each recharge was equivalent to one dollar. In addition, by the second month of the intervention, we introduced monthly raffles giving away smartphones. All active participants, financial and food intake app users, were eligible to participate in the raffles.

One of the advantages of the mobile-app-based behavioral intervention is that it can reach out-of-school-youth in a decentralized manner at a potentially low cost. Table 1 reports the per capita costs of implementation and monitoring for each treatment arm over the 27-week intervention period. Relative to the food intake app, the cost per capita of providing the financial app (adjusted by inflation and discount rates) was US$185.3. An inspection of the cost categories shows that almost 45% of the total costs of implementing the treatment corresponds to the enumerators' salaries and per diem. This is a much higher cost than the US$4.8 per capita spent to deliver the school-based financial education program analyzed in Frisancho (2023). Nevertheless, this is a far from ideal comparison as it does not take into account the scale of

both interventions. The mobile-app-based behavioral intervention was provided to a sample of 203 individuals, while the larger experiment targeted about 31,000 students who received financial education lessons.

The financial app was accompanied by enumerators' visits and SMSs to maximize engagement of out-of-school youth. Enumerators visits became an important nudge to keep users engaged with the financial app (see Section 2.4). However, there is potential to extend the scale of this type of intervention at a low cost, by leveraging the digital component and finding alternative nudges to facilitate transaction recording that are less expensive than enumerators. For instance, it remains to be seen if peer support can be effective to foster usage. Alternatively, costs could be reduced in settings in which youth can be easily in contact with individuals who can play the role of enumerators. For example, in the context of summer youth employment programs, youth could be coached and incentivized to use the app by program administrators.

2.2 Study sample and timeline

Our study sample consists of graduating students from public high schools in Piura, one of the most populated departments in Peru. Piura is predominantly urban and has a relatively young population. Almost one-third of the households in this region are poor according to official poverty lines, and services such as mobile internet are concentrated in the most densely populated urban areas (see Appendix Figure A.2).

We consider a subsample of 60 schools in Piura. We recruited 11th grade students during the two months before their graduation in 2018. Students were initially provided with an informed consent form, which provided a generic description of the study, but did not provide information on which app would be assigned to the participant. As potential participants were mostly minors when they were first contacted at school, they were asked to take the consent form home so that their legal guardians could review it and provide their signed approval to join the study.

We ranked schools according to the quality of internet connectivity in the area and the number of consents received. Schools were grouped into three strata: 1) areas with high connectivity, independent of the consents received ($N_1 = 31$); 2) areas with moderate-low connectivity but with at least one signed consent ($N_2 = 15$); and 3) areas with low connectivity and no signed consents ($N_3 = 14$). Within each of these strata, we randomized access to the financial app at the school level. Since our intervention depended on smartphone use, we used baseline survey data on smartphone ownership to determine eligibility. The final sample of eligible students consisted of 982 students, of which one-quarter submitted a signed consent form before graduation.

Among eligible participants, the fieldwork team aimed to recruit 400 students by December 2018. Priority was given to students from schools in the first stratum to ensure needed access to the internet to upload the financial diaries data to our server.[5] The fieldwork team was instructed to visit eligible students without a signed consent at their homes to try to obtain a

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[5]Internet access did not restrict daily use of the app to record transactions. Connectivity was only necessary to submit the recorded information to the server and make it accessible to us, researchers.

signed consent from their legal guardians and enroll them in the study. The team was able to recruit 253 students from the first stratum (65%), 79 from the second (20%), and 58 from the third (15%), for a total of 390 students from 47 schools. Forty three percent of the recruited participants resided in districts where more than one-third of the population was under the poverty line, and 20% of them lived in small districts with fewer than 20,0000 households.

Our experiment was overlaid onto the experimental design of a larger randomized controlled trial aiming to evaluate the impact of a school-based financial education program on high school students (Frisancho, 2023). This larger experiment ran between 2016 and 2018 in all six regions of Peru, including Piura.

Access to the bundled treatment was randomized at the school level within strata. As Appendix Table A.1 shows, the randomization process ensured balance between the 203 participants assigned to the treatment group and the 187 assigned to the control group[6]. Even though these strata did not consider prior treatment assignment to the school-based financial education program, the randomization process also yielded balance in prior exposure to this intervention.

Appendix Figure A.3 reports the timeline of our mobile-app-based behavioral intervention (in bold) and the data collection activities (in italics). Notice that the school year in Peru starts in March and ends in December. The baseline survey and the financial literacy test were collected between October and November 2018, toward the end of the 2018 academic year, while participants were still attending school. Participants' recruitment began right after and lasted until early December 2018. Starting in mid-December, after the randomization, enumerators visited recruited participants in both treatment and control groups to help them install the assigned app (i.e., financial diaries or food intake) on their smartphones and train youth to use it. The recording of transactions, the monitoring visits, and the delivery of SMS nudges began in late December 2018 and continued until June 2019. The SMS containing the pie charts was sent out only once around the fourth month of the intervention period. The endline survey and the financial literacy test were collected two months after the intervention was over, between August and September 2019. Since individuals in the sample were already out of school, enumerators visited them at their homes to conduct the survey and financial literacy exam. Finally, credit bureau records were collected in August 2019 and February 2020.

2.3 Data

The study uses four data sources: the baseline and endline surveys; the baseline and endline financial literacy tests; the financial diaries records collected through the app; and individual credit records from a local credit bureau.

The baseline survey collected socioeconomic characteristics as well as parental and household information. Since subjects were still attending school, the questionnaire asked about educational and employment prospects. The survey also collected information on shopping, savings, consumption, and budgeting habits. Additionally, the instrument included a question to measure

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[6]Forty-one individuals were not surveyed in the endline.

knowledge of market prices of goods and services regularly purchased by youth. The endline survey collected the same information but, since the sample had already graduated, it also included two sections about current study/work status. Moreover, the endline survey contained an additional section for financial app users which inquired about one's motivation to keep using the app, any difficulties when using it, and whether individuals would continue to use the app once the intervention ended.

The baseline financial literacy test contained 21 questions covering topics such as financial consumer rights, the best savings options, situations that justify debt, savings objectives, savings/purchasing capacity, spending plans in situations of income constraints, basic financial calculations, and responsible use of credit cards. Both the baseline survey and financial literacy test were administered in the classroom as the sample was still in school. Instead, the endline survey and financial literacy test were administered at each individual's home. The endline test consisted of 12 questions. Four questions were taken from the baseline test and referred to the ability to save, the best use of savings, adequacy of acquiring loans to finance negative net income, and budgeting for future goals.[7] The rest of the questions, borrowed from the PISA 2018 financial literacy assessment, asked respondents to choose the best consumption choices based on the information provided (OECD, 2018).[8]

We also rely on high-frequency data from the financial diaries app, which features 17,204 financial transactions recorded by the treatment group over 27 weeks. For each transaction, the app captures the value in local currency, the type of transaction (income, expense, or financial tools), the date of the transaction, and the date and time of recording.

The high-frequency transaction data captured through the app enable us to identify app usage patterns. These records also allow us to characterize the population under study in terms of their financial lives. Appendix Table A.2 shows that our sample is fairly financially active, despite their young age. Over half of their transactions correspond to expenditures, while 38% are income-related. However, when considering the monetary value of transactions, income-related transactions represent 46% of the total budget. Average monthly income is US$48 while average expenses are US$31. Moreover, average flows in/out of the financial tools account for nearly as much money as allocated to expenditures, signaling that youth engage in sophisticated loans and savings transactions. These data also show that income flows and transactions related to savings and loans seem to be lumpier than expenditures. Finally, while income and savings/loans generate fewer transactions relative to expenditures, the average value mobilized by income and saving/loans transactions corresponds to US$7.2 and US$14.2, respectively, while this number is US$3.4 in the case of expenditures.

Assessing the behavioral effects of the treatment relying on survey data poses two challenges:

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[7]This selection resulted from an Item Response Theory analysis, in Appendix Table B.1, which identified the questions with the greatest variability under the criteria of discrimination and difficulty among the baseline test questions.

[8]Appendix Table B.2 presents the topics included in our endline test and compares them with those covered by the instruments used to measure financial literacy in related studies (Bruhn et al., 2016; Frisancho, 2023; Batty et al., 2015; Hinojosa et al., 2009). Sections B.2.1 and B.2.2 present the baseline and endline financial literacy instruments.

potential biases present in self-reported data and a short period to allow for changes between the end of the intervention and outcome measurement. For these reasons, we complement our data with credit bureau data from EQUIFAX, the leading private credit bureau in Peru, at two points in time: August 2019 and February 2020. EQUIFAX's data capture an individual's credit standing at the time in which her data are retrieved. Loan balances with financial institutions also reflect credit card debt, mostly provided by banks. The search in EQUIFAX's records relied on an algorithm that matched students based on their names and national identification documents. The match rate of the control group with the credit bureau records is 98.9% in August 2019 and February 2020. All debts held by youth in our sample are obligations with formal lenders.[9]

2.4 Compliance and self-reported experience with the financial app

On average, 20% of the control group complied with the food intake app usage. Compliance in the treatment group was 79% during the first month of intervention and it declined to approximately 66% during the remaining five months (see Table A.3, row A).[10] Despite these high compliance rates, students' direct engagement levels decreased over time: at the launch of the intervention, almost half of the transactions were directly recorded by the participants through the app. However, toward the end of the study, most transactions were entered by the enumerators during their visits (see rows B and C in Table A.3).

Within the compliers' group, we can define high- and low-intensity users of the app based on individual recording patterns. We calculate the number of monthly average transactions entered during the whole intervention period without the help of an enumerator and define frequent users as those who enter at least as many transaction as the median student (1.9 transactions per month). Appendix Table A.4 compares several socio-demographic characteristics and baseline financial knowledge and habits among non-frequent and frequent users. The comparison shows some interesting patterns. For instance, students who intensively use the app are less likely to be working at baseline. The lower usage among working individuals could respond to a higher opportunity cost, but it could also be driven by a reduced demand for the app: their engagement with productive activities may have helped them become more financially literate. High-intensity users also exhibit higher levels of self control at baseline. This makes sense, since certain consistency is required to keep entering transactions on a regular basis.

Another salient pattern is that frequent users have relatively lower levels of price knowledge, suggesting that the bundled treatment is more intensively used by individuals with greater baseline financial literacy gaps. Frequent users are also slightly more likely to save before buying something. Nevertheless, this difference is small relative to those who do not use the app that often.

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[9]Other variables such as credit scores were not shared with us due to their proprietary nature.

[10]A recurrent challenge to comply with the treatment was cellphone ownership. A few individuals reported loss, theft, or malfunction of their cellphones. The field team provided notebooks as an alternative to record financial transactions when facing any of these difficulties. At the end of the study, 55 participants (30% of the treatment group) used notebooks to record their transactions.

The endline survey asked youth using the financial app about their experience with it. As shown in Appendix Table A.5, Panel A, almost all app users believe the app helped them better understand diverse financial matters. Even though the bundled intervention did not directly provide educational content or personalized financial advice, users perceived that the recording process helped them better understand the use of money and the need to save more and spend less on some things. Users also reported that the app helped them learn the importance of saving, its challenges, and how to plan their expenses better. Moreover, Panel B shows that users perceived the app as user-friendly and more helpful than other apps installed on their smartphones.

Even though engagement with the app declined over the 27 weeks of the intervention, active participation of the treated participants in the study was always high, fluctuating between 63.1% and 68.5%. Despite enumerators bearing most of the burden of entering the transactions, youth kept attending the monitoring visits and providing detailed information on their financial transactions. One may think that the monetary incentives provided were the main driver of their compliance. However, Panel C in Table A.5 reveals that only 40% of the subjects kept using the app to continue to receive data phone recharges, and 45% did so to participate in the cellphone raffles. The majority, 90% of the users, declared that they continued to use the app because it helped them to better understand their money management.

The endline survey also collected information about app fidelity once the observation period was over and visits and incentives were discontinued. In line with the findings above, 60% of the treatment group continued to use the app at least four times per month (see Figure A.4).

3 Empirical analysis

3.1 Expected impact and outcome variables

We hypothesize that recording transactions through the financial app, with or without the help of an enumerator, generates a self-assessment of the user's level of financial knowledge and skills. Increased financial awareness has the potential to trigger the curiosity and interest to explore and autonomously acquire more financial knowledge. In fact, Hochberg et al. (2018) shows that the use of smartphones as measurement tools during context-based education activities raises curiosity and self-interest to seek more information about related concepts.

Since the mobile-app-based behavioral intervention did not directly provide financial educational content, any improvements in conventional measures of financial literacy yielded by the treatment can be attributed to this channel. In other words, a self-assessment of the level of personal financial knowledge and skills may act as a behavioral nudge and drive the user to seek information that can reduce the knowledge gaps identified. Indeed, the descriptive evidence presented in Section 2.4 supports this: app users reported that recording their financial transactions increased their interest in financial matters and that they were actually able to *learn* more about diverse financial issues.

There is robust evidence showing that financial literacy is closely and causally linked to financial behavior (van Rooij et al., 2012; Bianchi, 2018; Lusardi et al., 2017). Thus, we expect the bundled intervention to foster higher investments in financial literacy that may translate into financial behavior. For instance, the ability to review and reflect on their transactions may help youth to look more critically at previous myopic behavior. Even if treated individuals cannot answer questions about inflation or interest rates correctly, they could still become more conscious and responsible consumers due to the diaries' use. Evidence from the health literature supports the existence of such channel of impact when using self-monitoring apps. Indeed, self-monitoring of dietary intake is strongly correlated with weight-loss and weight-maintenance (Yu et al., 2015; Carter et al., 2013; Dunn et al., 2019).

We expect the bundled intervention to foster financial literacy gains through greater financial awareness. In particular, we expect that the treatment effects of providing the financial app, visits, and SMSs will be more salient among youth who start off behind in terms of financial knowledge. These individuals will be more likely to become aware of their own knowledge gaps and actively search for information that can help them close these gaps. To test this hypothesis, we rely on the cross-randomization design of our study and estimate the differential effects of access to the financial diaries app by previous exposure to financial education lessons while in high school. Baseline data show that students not previously exposed to financial education start off behind: the pre-treatment gap in exam scores relative to those who benefited from financial education lessons in the past is about 0.20 standard deviations. Consequently, this subsample should benefit the most from the bundled intervention in terms of financial knowledge gains.

Since financial literacy gains can trickle down and influence financial behavior, we also look at several outcome variables related to youth's financial choices. Once more, we hypothesize differential treatment effects by previous exposure to financial literacy lessons.

Appendix Table B.3 provides details about the definition of all outcome variables. The effect on financial skills is measured at endline, while financial behavior is observed both at endline and eight months after the intervention period is over. To measure the impact on financial literacy, we rely on the test applied at endline and look at the impact on total scores. The total number of correct answers in the test is standardized relative to the control group. To measure the effects on financial behavior, we look at five outcomes at endline: the probability of budgeting, a shopping strategies index that captures consumer savviness,[11] the degree of knowledge about market prices, the probability of saving, and savings deposits.

To measure the degree of knowledge about market prices, we considered a list of items and asked respondents to give their best price guess in each case. A respondent scored higher when the price she reported was within the range of minimum and maximum market prices derived from price data coming from two local retailers.[12] Respondents' total scores were then standardized

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[11]The index summarizes information about five shopping strategies: bargaining, comparing prices, checking prices online, planning purchases, and avoiding impulse purchases. After obtaining the total number of practices applied by each individual, this number is standardized relative to the control group.

[12]The list of items included food staples such as a kilo of rice, a can of evaporated milk, a kilo of potatoes,

relative to the control group. The probability of saving accounts for both formal and informal savings. Savings deposits refer to the amount set apart for savings purposes through formal or informal channels during the month prior to the endline survey. Dollar amounts (using the September 2019 exchange rate as the endline survey was collected in August-September) are then adjusted using the inverse hyperbolic sine transformation, which is convenient due to the skewness of this variable (long right tails).

The credit bureau data allow us to evaluate the effect of the intervention on credit behavior both at endline and eight months after the end of the intervention. We focus on five outcome variables. First, we measure the probability of holding outstanding debt, defined as a binary variable equal to one if an individual has any outstanding debt with at least one financial institution and zero otherwise. Second, we consider the number of financial institutions with whom an individual has outstanding debts as a proxy for the degree of diversification of her sources of financing. Third, we obtain outstanding debt balances (in USD using the August 2019 exchange rate). As in the case of savings, we apply the inverse hyperbolic sine transformation due to the skewness of this variable. Fourth, we define the probability of having debt in arrears as a binary variable equal to one if the individual holds a positive share of her debt in arrears and zero otherwise. Finally, the debt-to-income ratio is constructed by dividing the amount of outstanding debt by income at baseline.[13]

3.2 Estimation strategy

Given the bundled nature of the intervention, we assess the impact of all the treatment components (i.e., access to the recording app, enumerators' visits, and SMS messages) on financial knowledge and behavior by estimating the following OLS regression:

$$Y_{ij} = \alpha + \beta T_{ij} + \delta X_{ij} + \phi_j + \mu_{ij} \tag{1}$$

where Y_{ij} is the outcome of interest and T_{ij} is equal to one whenever individual i in strata j graduated from a school that was randomized into the treatment group and zero otherwise. Regressions include individual- and household-level controls, X_{ij}, and fixed effects at the strata level, ϕ_j. μ_{ij} denotes the error term, which is clustered at the school and strata levels. Controls include gender and age as well as baseline measures of working status, dwelling overcrowding, household assets,[14] and an indicator that both parents live with the participant. The coefficient β captures the Intention-To-Treat (ITT) effect.[15]

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a dozen eggs, a kilo of fish, a kilo of poultry, a liter of oil, and a kilo of sugar, as well as products/services that youth were more likely to demand such as a kilo of ice cream, a movie ticket, a pair of tennis shoes, and 200 MB of mobile data. To benchmark the prices provided by our sample, we consulted the websites https://preciosmundi.com/peru/ and https://www.metro.pe/ at the time of the endline.

[13]Fifteen out of 390 observations have an income of zero. These individuals have no outstanding debt.

[14]Household assets are measured using an asset index obtained from a principal component analysis that relies on data on households' ownership of asset and access to services at baseline: washing machine, refrigerator, microwave, internet, cable TV, laptop or tablet, mobile cell phone, motorcycle, motorcycle cab, car, and access to water, and access to sanitation. The index is then standardized relative to the control group.

[15]Appendix Tables B.6-B.9 present ANCOVA analysis to estimate the treatment effects as an alternative

We also investigate if the bundled treatment had heterogeneous treatment effects depending on participant's previous exposure to school-based financial education by estimating the following extended regression model:

$$Y_{ij} = \alpha + \beta_0 T_{ij} + \delta X_{ij} + \theta F_{ij} + \beta_1 (T_{ij} \times F_{ij}) + \phi_j + \mu_{ij} \tag{2}$$

where F_{ij} is a dummy variable that equals one if the individual was exposed to financial education lessons while in school and zero otherwise. Under this specification, β_0 measures the ITT effect for those with $F_{ij} = 0$, while $(\beta_0 + \beta_1)$ measures the effect for those with $F_{ij} = 1$.

Finally, we estimate Treatment-on-the-Treated (TOT) effects where Z_{ij} denotes effective treatment. The main TOT specification defines Z_{ij} as a binary variable equal to one if the individual was a frequent user of the financial app and zero otherwise. As a robustness check, we alternatively define effective treatment as the average number of transactions per month entered by the user on her own over the whole intervention period. Note that, in our setting, TOT estimates correspond to LATE estimates of the compliers, since there is one-sided non-compliance; i.e., there are no crossovers from the control group.

TOT effects can then be obtained from estimating β^{TOT} by instrumenting Z_{ij} with the random assignment of the treatment:

$$Y_{ij} = \alpha + \beta^{\mathrm{TOT}} \widehat{Z_{ij}} + \delta X_{ij} + \phi_j + \varepsilon_{ij} \tag{3}$$

Following Anderson (2008), sharpened False Discovery Rate (FDR) q-values are computed for each family of outcomes to deal with the potential issue of simultaneous inference. The FDR is the expected proportion of rejections that are type I errors (i.e. false rejections).

4   Results

Table 2 reports the average ITT effects on financial literacy and behavior at endline. As Panel A shows, the treatment had a positive and significant effect on the financial literacy score (0.09 standard deviations). Panel B focuses on behavioral outcomes. The treatment did not lead to significant changes on the probability of budgeting or shopping strategies. Nevertheless, it did induce greater awareness about market prices. Relative to the control group, youth with access to the bundled intervention became savvier when searching for price information, recording a marginal improvement in their knowledge of prices equivalent to a third of a standard deviation. Nevertheless, the bundled intervention did not affect savings behavior on the extensive or the intensive margin.

Next, Table 3 focuses on youth's credit outcomes. Column 2 portrays the effects of the treatment at endline, while column 4 checks the persistence of these effects eight months after the end

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model. In this robustness check, we include the baseline level of the outcome variable as a control whenever the outcome is measured using the survey and financial literacy tests.

of the intervention. At endline, the treatment increased the probability of holding outstanding debt by 1.2 percentage points. This effect is sustained over time, as shown in column 4, though our estimate is noisier (the p-value of the coefficient is 0.11). On top of the modest effect on the extensive margin, the bundled intervention also led to intensive margin effects: eight months after the end of the intervention, outstanding debt increased by 16% among individuals in the treatment group. The treatment also led to greater and sustained diversification in youth's borrowing portfolio: there was a positive and significant effect on the number of lenders both at endline and eight months after the intervention stopped, with the magnitude of the coefficients increasing over time. Overall, the treatment group experienced greater levels of inclusion in the financial system. Over time, youth who had access to the bundled intervention expanded their usage of credit. However, the probability of having a loan in arrears was unaffected and there was no significant effect on the debt-to-income ratio of the treatment group relative to the control.

Heterogeneity in the effective usage of the app allows us to estimate the differential impact of the intervention on high- versus low-intensity users. Those who develop a habit of entering transactions on their own are more likely to experience greater awareness about their own financial lives and thus derive greater gains in terms of financial literacy and behavior. Indeed, the TOT effects reported in Appendix Table A.6 confirm and reinforce the treatment impacts identified for financial literacy and price knowledge. Among high-intensity users, the effect on the financial literacy endline test amounts to 0.17 standard deviations. Similarly, the average effect on price knowledge among high-intensity users increases to 0.60 standard deviations.

The estimates reported in Appendix Table A.7 confirm that the treatment has a stronger impact on high-intensity users' credit outcomes. The probability of holding outstanding debt increases by 2.4 percentage points at endline. In addition, usage of credit eight months after the intervention ended is expanded by 32% among high-intensity users of the app. Importantly, this raise in outstanding debt is not accompanied by any changes in the probability of having a loan in arrears. The additional diversification is starker among high-intensity users: the number of financial institutions increases by 0.02 at endline and by 0.07 in the medium-run (though the latter is not statistically significant). TOT estimates are robust to an alternative definition of effective treatment based on the average number of transactions entered per month over the whole intervention period (see Appendix Tables B.4-B.5).

4.1 Heterogeneous treatment effects by previous exposure to financial education

We also estimate heterogeneous treatment effects by previous exposure to school-based financial education during high school. Recall that our experiment was overlaid onto a larger randomized controlled trial aiming to evaluate the impact of a school-based financial education program on high-school students. Hence, students with access to the bundled intervention who were not previously exposed to financial education start off behind in terms of their financial literacy levels. In fact, the baseline gap in test scores relative to those who benefited from financial

education content is about 0.20 standard deviations. Table 4 shows that the bundled intervention helps close this gap: access to the treatment yields a 0.21 standard deviation increase in financial literacy scores for the subsample of students in the treatment group who did not receive the school-based financial education program.

On the other hand, average gains among youth who were given school-based financial education lessons during high school are null. Similarly, the gains in price knowledge are only robust among those who were not previously exposed to financial education. Nevertheless, as column (5) shows, we cannot reject that any the effects are the same across the subsamples, which may respond to sample size issues.

In line with the previous estimates, Table 5 shows that greater usage of credit appears to be concentrated among those without prior exposure to school-based financial education. The average effect on the probability of having outstanding debt is driven only by participants who did not receive financial education lessons in the past. Similarly, the effect on the intensive margin is also concentrated among this subsample: outstanding debt balances increase by 24% among participants who did not get financial education lessons and by 8% among their counterparts with previous access to financial education content. However, we run into sample size issues: despite the large differences in coefficients, column (5) shows that we cannot reject that any the effects are the same across the subsamples.

4.2 Treatment effect of the pie chart SMS

As part of the bundled intervention, youth in the treatment group received biweekly personalized reminders that encouraged savings. These SMSs focused on providing tailored information about savings deposits and balances every two weeks. By the 20th week of the intervention, we sent an additional personalized SMS that tried to make individual expenditure patterns more salient in order to help participants visualize opportunities to cut non-essential spending. Each participant received a pie chart that displayed individual expenditure patterns by category: education, food, health and home, and entertainment expenditures (see A.1).

Even though we cannot disentangle the effects of each component of the treatment, we can rely on an event study analysis using treatment group data to study the effect of the specific nudge showcasing expenditure patterns on savings behavior. We divide the 27-week period of the intervention in biweekly intervals and define the event (i.e., delivery of the pie charts) at interval zero. Savings balances are estimated from the diaries self-reported data as net income plus savings deposits. Figure 1 shows the results of the event study analysis. We do not find any statistically significant effect of the expenditures nudge on savings balances. The coefficient estimates for all post-event periods hoover around zero and are not statistically significant. Hence, the SMS including the pie chart did not have an effect on savings.[16]

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[16]Note that while the pie chart sent out to the treatment group did not have an effect on savings, it could have increased individuals' availability of liquid funds to repay loans.

5   Discussion

Our results from Table 2 show that the treatment improved financial literacy and promoted greater awareness of market prices. These finding suggest that the bundled intervention, which did not deliver any financial education content, triggered a search for improvement in financial skills. The treatment made participants more aware of their personal budgets, which seems to have nudged users to seek more information to plan future expenditures.

In fact, self-reported experience by users signals that the mobile-app-based behavioral intervention increased interest in financial matters among youth. Moreover, youth declared that they were actually able to learn more about diverse financial issues that were not targeted by the intervention. Furthermore, treated youth reports said that the most important reason to stay as an active participant in the study was that the recording exercise helped them to better understand their own money management.

In addition, the estimates from Table 3 signal that the bundled intervention contributed to the financial inclusion of youth in local credit markets, without leading to overindebtedness or increased difficulty to repay their loans. Findex data for Peru shows that only 10.5% of individuals aged 15-24 rely on usage of formal loans (Demirguc-Kunt et al., 2018). This is often the case in developing economies, as youth are at a stage in their lives in which they have not accumulated assets or a solid credit history. Our results show that the mobile-app-based behavioral intervention enables youth in Peru to deepen their usage of credit, while diversifying their lending sources.

Although the SMSs aimed at encouraging savings, the intervention was unable to increase savings neither on the extensive nor on the intensive margin. Since savings and credit are potentially alternative ways to finance investments or expenditures, the lack of impact on savings should not be interpreted as a negative result. Moreover, the null impact on savings, measured at the end of the intervention, could be explained by the fact that savings are noisy and take time to build up. In fact, if some of the loans are used for productive purposes, the probability of saving and/or savings deposits may increase in the future.

Regarding the potential mechanisms, we can use the estimation of heterogeneous effects by previous access to financial education content to explore what is driving the average treatment impacts. Table 4 shows that the average financial literacy gains estimated can be attributed to those who did not receive the school-based financial education program but subsequently received access to the mobile-app-based behavioral intervention. Within this subsample, access to the treatment yields a 0.21 standard deviation increase in financial literacy scores. This effect is economically important and similar or even higher than the effects triggered by school-based financial education programs targeting youth (Bruhn et al., 2016; Bover et al., 2018; Frisancho, 2023).

Overall, the intervention seems to have led youth to search for financial knowledge, particularly in the cases in which larger pre-treatment gaps were present. This is in line with Hochberg

et al. (2018) who show that the use of smartphones during context-based education activities (i.e., use of real-life or fictitious examples to facilitate learning through practical experience) arouses curiosity and interest in seeking more information about the concepts studied. Our findings support this channel: the financial literacy and behavioral effects triggered by the treatment were not targeted by the app-based behavioral intervention. Moreover, the effects of the intervention are concentrated among those who did not receive school-based financial education, i.e., youths who were previously unaware of the importance of financial skills and faced larger knowledge gaps. Hence, our evidence suggests that recording daily transactions might raise awareness among those lagging behind in financial literacy, making them realize their shortage of financial knowledge and motivating them to invest in acquiring additional skills.

Our findings are also in line with French et al. (2020) who provided four bundled smartphone apps (i.e. a loan interest comparison app, an expenditure comparison app, a cash calendar app, and a debt management app) to adults in Ireland to improve financially capable behaviours. Their treatment increased financial knowledge, understanding and basic skills, as well as attitudes and motivations. In addition, individuals receiving access to the bundled intervention were more likely to keep track of their income and expenditure and proved to be more resilient when faced with a financial shock.

We argue that the evidence presented suggests that this cognitive channel might be at play, especially since the interaction with enumerators or the nudges were void of any financial education content or specific guidelines aimed at improving credit usage. An alternative mechanism could be that the actual interaction with the enumerator transferred financial knowledge to the treated individuals. However, this is highly unlikely for at least two reasons. Enumerators were only trained by us to follow a very strict protocol (described in Section 2.1). Moreover, even if they wanted to "leak" financial education content, they were not provided with resources to actually guide students. Enumerators were all enrolled in tertiary education programs, but they were also young adults who did not have any prior training on personal finances.

5.1 Limitations and future research

We acknowledge that the bundled nature of the treatment imposes a limitation as the role of each individual component (i.e., app, visits, and SMSs) cannot be isolated. We knowingly made this choice when designing the intervention to maximize our chances of reaching out-of-school youth, who were disperse as opposed to geographically accessible at a reduced number of places (i.e., via schools). Reaching this segment of population is particularly important as many of them start their productive lives and become more financially active.

Future research could help fine-tune the delivery of effective mobile-app-based behavioral interventions aimed at improving financial literacy and behavior for youth. Understanding which components of our bundled treatment matter the most can guide policy makers in the search for a cost-effective way to reach out-of-school youth.

Our findings provide suggestive evidence hinting that a self-assessment of the level of personal financial knowledge and skills may act as a behavioral nudge and drive the user to seek information that can reduce observed knowledge gaps. Nevertheless, future studies could provide direct evidence on this cognitive mechanism by directly measuring participants' information acquisition in a more controlled and verifiable way. For example, future mobile-app-based behavioral interventions could include incentivized in-app quizzes to promote compliance while measuring progressive changes in knowledge.

6 Conclusions

Financial education has become a popular prescription for fostering financial inclusion strategies in developing countries. In recent years, a focus on youth has shown promising and robust effects on financial literacy and downstream behavior. However, most interventions rely on lecture-based formats while youth are still in school. We study the impact of a mobile-app-based behavioral intervention intended to foster habit formation and financial awareness on out-of-school youth's financial literacy and behavior.

We randomize access to a mobile app to record daily financial transactions, coupled with enumerator monitoring visits and non-educative nudges via SMSs, among recent high school graduates in Peru. We find that the bundled intervention had positive and statistically significant effects on financial literacy scores and market price awareness, outcomes not directly targeted by the intervention. Moreover, relative to the control group, youth in the treatment group experienced significant improvement in the usage of formal credit and in diversification of their borrowing portfolios in terms of the number of lenders. These effects persist eight months after the end of the intervention.

Since the mobile-app-based behavioral intervention did not directly provide financial educational content, we argue that any improvements in conventional measures of financial literacy yielded by the treatment can be attributed to greater awareness of the level of personal financial knowledge and skills, which may act as a behavioral nudge and drive the user to seek information that can reduce knowledge gaps. To test this channel, we look at the treatment effects by previous exposure to school-based financial education and find that average financial literacy gains can be attributed to those who did not receive the financial education program while in high school, but subsequently received access to the bundled intervention. In line with these results, greater credit usage appears to be concentrated among those without prior exposure to school-based financial education.

Our findings suggest that the mobile-app-based behavioral intervention helped certain groups deprived of financial education realize their knowledge gaps and motivated them to search for financial information. Ultimately this process led to the observed effects on financial behavior. Our bundled intervention is a potentially effective way to reach young people who can no longer be targeted at school. This is particularly important as it is a more suitable strategy to reach dropouts or school graduates than traditional financial education programs.

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Figure 1: Effect of Pie Chart SMS
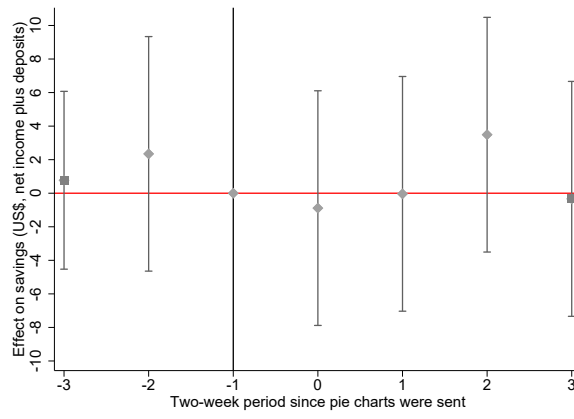
NOTE: To conduct the event study, we split the 27 weeks of the intervention in two-week periods. The event, delivery of the pie chart, is set at time 0 and the coefficients are estimated with three lag periods and three lead periods around the event. The line in (-1) specifies the reference period, which is an omitted category of reference.

Table 1: Cost Analysis of the Mobile-app-based Behavioral Intervention

Cost	Food intake app N=187 (1)	Financial app N=203 (2)	
	Amount in US$		
(A) App development	$ 3,300.00	$ 3,300.00	
(B) Data storage and transfer	$ -	$ 23,530.00	
(C) Fieldwork staff	$ 7,634.00	$ 22,792.00	
(D) SMS reminders	$ -	$ 255.26	
(E) Data credits	$ 1,840.80	$ 1,840.80	
(F) Total cost	$ 12,774.80	$ 51,718.06	Differential (2)-(1)
(G) Per capita cost	$ 68.31	$ 254.77	$ 186.5
(H) Per capita cost (adjusted by inflation)	$ 69.7	$ 260.1	$ 190.4
(I) Per capita cost (adjusted by inflation and intertemporal discount rates)	$ 67.9	$ 253.2	$ 185.3

NOTE: Source: Authors' calculations. Inflation and inter-bank interest rates extracted from the Central Reserve Bank of Peru (BCRP) for the January-June 2019 period.

Table 2: ITT Effects on Financial Literacy and Behavior

	Control mean (1)	ITT Effect (2)
Panel A: Financial Literacy		
Total score	0.000	0.087*
	(0.078)	(0.022)
Panel B: Financial Behavior		
Probability of budgeting	0.413	−0.005
	(0.038)	(0.026)
Shopping strategies	−0.000	−0.207
	(0.086)	(0.099)
Price knowledge	−0.000	0.319*
	(0.078)	(0.085)
Probability of saving	0.497	0.019
	(0.039)	(0.011)
Savings deposits	1.886	−0.079
	(0.159)	(0.161)

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.

Table 3: ITT Effects on Credit Outcomes

	At endline		8 months later	
	Control mean (1)	ITT Effect (2)	Control mean (3)	ITT Effect (4)
Probability of having outstanding debt	0.021	0.012*	0.043	0.019
	(0.011)	(0.004)	(0.016)	(0.007)
Number of lenders	0.021	0.012*	0.043	0.038*
	(0.011)	(0.004)	(0.019)	(0.011)
Outstanding debt	0.122	0.071	0.261	0.145*
	(0.064)	(0.039)	(0.101)	(0.040)
Probability of having debt in arrears	0.005	0.002	0.011	0.002
	(0.005)	(0.001)	(0.007)	(0.008)
Debt/income ratio	0.277	−0.121	0.517	0.265
	(0.127)	(0.127)	(0.229)	(0.129)

NOTE: Total number of observations $N = 390$. All outcome variables are constructed using EQUIFAX data from August 2019 and February 2020. The probability of having outstanding debt is a binary outcome equal to one if an individual has any outstanding debt with at least one financial institution and zero otherwise. The number of lenders is the number of financial institutions with which an individual has outstanding debts. The outstanding debt variable measures an individual's debt balance (in USD, using the August 2019 exchange rate) and is then transformed using the inverse hyperbolic sine. The probability of having debts in arrears is a binary outcome equal to one if the individual holds a positive share of her debt in arrears and zero otherwise. The debt-to-income ratio is constructed by dividing the amount of outstanding debt by the reported baseline income (15 of 390 observations have an income of zero. These 15 individuals also have no outstanding debt). The treatment effect specifications include a set of controls: gender, age, currently working, ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values.

Table 4: ITT Effects on Financial Literacy and Behavior, by Previous Exposure to School-Based Financial Education

| | Exposure to School-based FinEd in 2016 | | | | |
| | Control | | Treated | | P-value |
	Control mean (1)	ITT Effect (2)	Control mean (3)	ITT Effect (4)	difference (2)-(4) (5)
Panel A: Financial Literacy					
Total score	0.007	0.210**	−0.008	−0.082	0.183
	(0.107)	(0.044)	(0.115)	(0.105)	
Panel B: Financial Behavior					
Probability of budgeting	0.337	0.081	0.500	−0.111	0.395
	(0.052)	(0.058)	(0.056)	(0.131)	
Shopping strategies	−0.027	−0.197	0.030	−0.212	0.972
	(0.118)	(0.107)	(0.126)	(0.285)	
Price knowledge	0.016	0.215***††	−0.019	0.457	0.356
	(0.107)	(0.016)	(0.114)	(0.218)	
Probability of saving	0.506	0.026	0.487	0.012	0.907
	(0.053)	(0.032)	(0.057)	(0.072)	
Savings deposits	1.945	−0.058	1.819	−0.099	0.936
	(0.219)	(0.126)	(0.234)	(0.403)	

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.

Table 5: ITT Effects on Credit Outcomes, by Previous Exposure to School-Based Financial Education

| | Exposure to School-based FinEd in 2016 | | | | P-value |
| | Control | | Treated | | |
	Control mean (1)	ITT Effect (2)	Control mean (3)	ITT Effect (4)	difference (2)-(4) (5)
Probability of having outstanding debt	0.021 (0.022)	0.035* (0.012)	0.067 (0.023)	0.002 (0.014)	0.317
Number of lenders	0.021 (0.027)	0.044* (0.014)	0.067 (0.028)	0.035* (0.009)	0.453
Outstanding debt	0.127 (0.140)	0.214 (0.073)	0.405 (0.145)	0.078 (0.073)	0.443
Probability of having debt in arrears	−0.000 (0.010)	0.009 (0.006)	0.022 (0.011)	−0.005 (0.026)	0.716
Debt/income ratio	0.099 (0.318)	0.573* (0.165)	0.969 (0.330)	−0.058 (0.063)	0.108

NOTE: Total number of observations $N = 390$. All outcome variables are constructed using EQUIFAX data from February 2020. The probability of having outstanding debt is a binary outcome equal to one if an individual has any outstanding debt with at least one financial institution and zero otherwise. The number of lenders is the number of financial institutions with which an individual has outstanding debts. The outstanding debt variable measures an individual's debt balance (in USD, using the August 2019 exchange rate) and is then transformed using the inverse hyperbolic sine. The probability of having debts in arrears is a binary outcome equal to one if the individual holds a positive share of her debt in arrears and zero otherwise. The debt-to-income ratio is constructed by dividing the amount of outstanding debt by the reported baseline income (15 of 390 observations have an income of zero. These 15 individuals also have no outstanding debt). The treatment effect specifications include a set of controls: gender, age, currently working, ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values.

A   Appendix
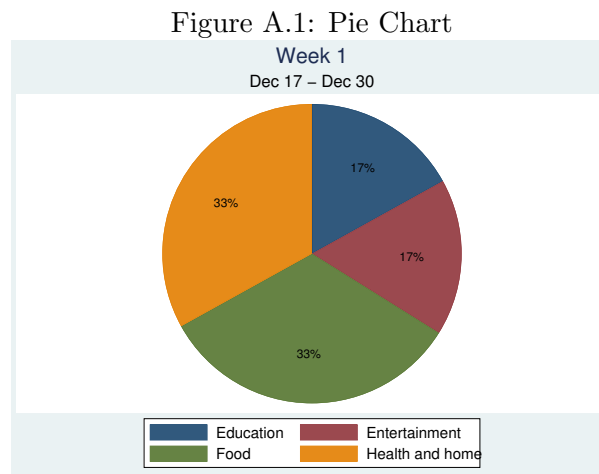
Figure A.1: Pie Chart

NOTE: Example of a personalized pie chart sent out during the tenth week of the intervention period. Each color represented the share of each subcategory of expenditures (education, food, health and home, and entertainment.)

Figure A.2: Geographical Distribution of Poverty, Mobile Internet Coverage, and Sample in Piura

(a) Monetary Poverty (% of households)

(b) Mobile Internet Coverage

(c) Sample Distribution
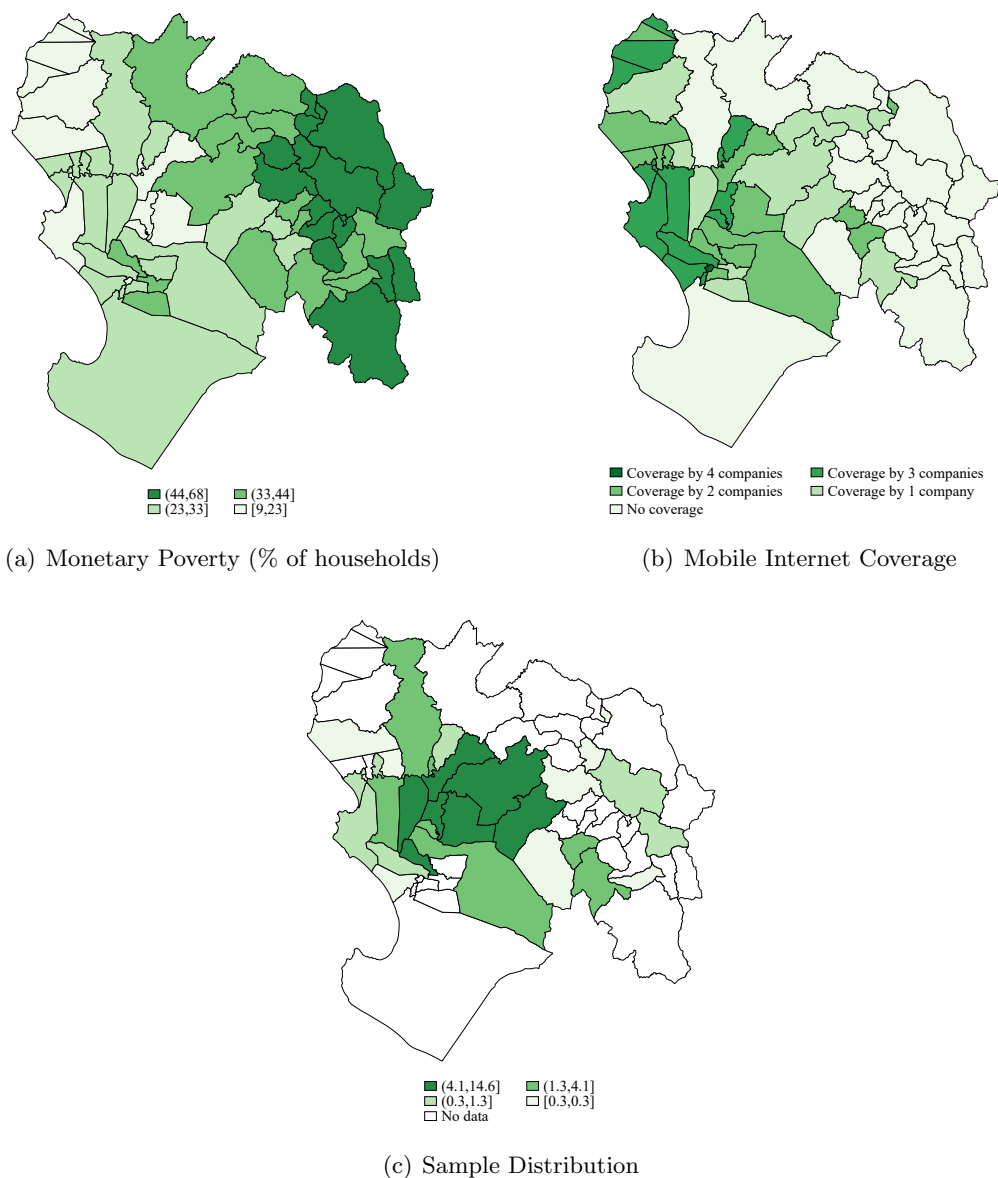
NOTE: Author's elaboration. Panel (a) uses data from the Poverty Map INEI (2018). Panel (b) relies on data from the Supervisory Authority for Private Investment in Telecommunications (OSIPTEL) that records mobile internet signal coverage for the top four providers in the country: Claro, Bitel, Movistar and Entel. The map reflects the median number of companies with coverage in the localities of each district in Piura, according to the last access to OSIPTEL in June 2021. Panel (c) uses data from the experimental data.

Figure A.3: Study Timeline
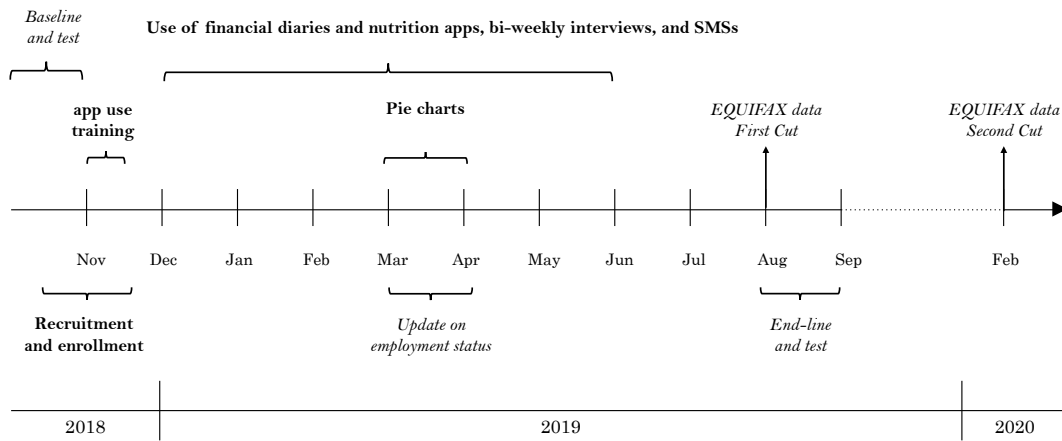
NOTE: Intervention activities in **bold** and data collection activities in *italics*.

Figure A.4: App Usage After the Recording Period
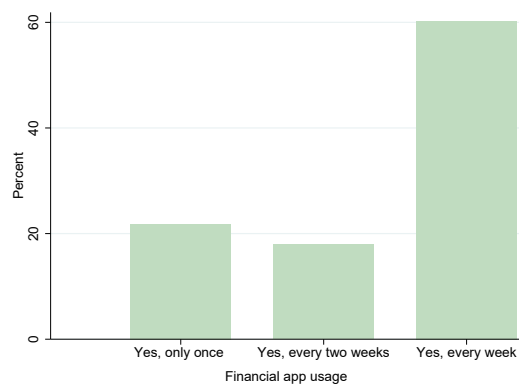
NOTE: The figure plots data from an endline survey questions that read: *"Did you use the app during August (two months after the end of the monitors' visits)? How often?"*. The bars show the response of 78 out of 182 financial app users who responded to the endline survey and who continued to use the app on their own.

Table A.1: Balance Check

Variable	Control mean	T-C
Male	0.567	0.059
	[0.497]	[0.056]
Age	16.572	-0.055
	[0.873]	[0.101]
Works	0.209	0.151
	[0.407]	[0.067]**
Ratio of household members to bedrooms	2.059	-0.024
	[1.080]	[0.132]
Lives with both parents	0.690	0.059
	[0.464]	[0.049]
Asset index	-0.000	-0.119
	[1.000]	[0.197]
High level of parental supervision	0.813	-0.079
	[0.391]	[0.053]
Has dinner with parents 7 days a week	0.374	0.025
	[0.485]	[0.055]
Financial autonomy (0-100)	49.385	-0.213
	[11.396]	[1.220]
Time inconsistency: hyperbolic	0.235	0.065
	[0.425]	[0.044]
Risk averse	0.701	0.014
	[0.459]	[0.054]
Self-control	-0.000	0.050
	[0.858]	[0.123]
Impulsiveness: planning	0.000	0.105
	[0.813]	[0.103]
Financial literacy raw score (0-15)	12.123	0.128
	[2.937]	[0.405]
Price knowledge (0-9)	6.176	-0.196
	[1.645]	[0.225]
Prepares a personal budget	0.719	0.006
	[0.451]	[0.059]
Saves	0.615	0.040
	[0.488]	[0.059]
Bargains on purchases	0.733	-0.033
	[0.444]	[0.051]
Saves to buy something unaffordable	0.930	-0.004
	[0.255]	[0.027]
Compares prices before shopping	0.722	-0.082
	[0.449]	[0.062]
Buys something not planned for	0.283	0.052
	[0.452]	[0.058]
Total expenditures last month (US$)	95.211	32.156
	[115.106]	[16.440]*
Total earnings last month (US$)	32.250	15.000
	[43.864]	[6.389]**
Financial education program	0.481	-0.003
	[0.501]	[0.165]

NOTE: Total observations $N = 390$, except for "Ratio of household members to bedrooms" ($N = 386$) and for "Prepares a personal budget" ($N = 381$). Significance levels (* 10%; ** 5%; *** 1%) captured through OLS estimation with standard errors (in brackets) clustered at the school level.

Table A.2: Frequency and Value of Transactions by Category

	All months		Monthly average	
	Fraction of total number of transactions (1)	Fraction of total amount in USD (2)	Mean number of transactions (3)	Mean amount in USD (4)
Income	0.381	0.462	6.6	47.5
Expenditures	0.522	0.302	8.9	30.6
Financial tools	0.097	0.237	1.8	25.6
Total	1.000	1.000	5.8	34.6

NOTE: The first two columns reflect the percentages of the totals recorded during the months of January – June 2019. The last two columns show the average between the six monthly averages.

Table A.3: Compliance with the Treatment

	Jan	Feb	Mar	Apr	May	Jun
(A) Compliance	0.793	0.685	0.631	0.655	0.641	0.665
(B) Transactions recorded by user	0.459	0.405	0.243	0.154	0.052	0.034
Non-edited transaction (as % of (B))	0.727	0.667	0.777	0.712	0.650	0.597
Edited transactions (as % of (B))	0.273	0.333	0.223	0.288	0.350	0.403
(C) Transactions recorded by enumerator	0.541	0.595	0.757	0.846	0.947	0.966

NOTE: Row (A) shows the percentage of compliers over the total number of treated. Rows (B) and (C) shows the fraction of monthly transactions recorded by the user and those recorded by the surveyor, respectively.

Table A.4: Comparison Between Frequent and Non-Frequent App Users

Variable	Non-frequent	Frequent - Non-frequent	N
Male	0.602	0.048	203
	[0.492]	[0.058]	
Age	16.592	-0.152	203
	[0.810]	[0.123]	
Works	0.447	-0.177	203
	[0.500]	[0.074]**	
Ratio of household members to bedrooms	2.060	-0.049	200
	[1.115]	[0.135]	
Lives with both parents	0.718	0.062	203
	[0.452]	[0.063]	
Asset index	0.000	0.143	203
	[1.000]	[0.135]	
High level of parental supervision	0.718	0.032	203
	[0.452]	[0.055]	
Has dinner with parents 7 days a week	0.359	0.081	203
	[0.482]	[0.082]	
Financial autonomy (0-100)	49.010	0.330	203
	[10.762]	[1.265]	
Time inconsistency: hyperbolic	0.272	0.058	203
	[0.447]	[0.059]	
Risk averse	0.689	0.051	203
	[0.465]	[0.063]	
Self-control	-0.047	0.198	203
	[0.875]	[0.095]**	
Impulsiveness: Planning	0.198	-0.188	203
	[0.915]	[0.137]	
Financial literacy raw score (0-15)	12.117	0.273	203
	[2.922]	[0.363]	
Price knowledge (0-9)	6.146	-0.336	203
	[1.623]	[0.204]*	
Prepares a personal budget	0.700	0.050	196
	[0.461]	[0.056]	
Saves	0.689	-0.069	203
	[0.465]	[0.056]	
Bargains	0.68	0.04	203
	[0.469]	[0.079]	
Saves to buy something unaffordable	0.903	0.047	203
	[0.298]	[0.026]*	
Compares prices before shopping	0.612	0.058	203
	[0.490]	[0.063]	
Buys something not planned for	0.379	-0.089	203
	[0.487]	[0.083]	

NOTE: We define frequent users as individuals with a monthly average of user-entered transactions that meets or exceeds the median of all users' monthly averages. The monthly average of user-entered transactions is determined by totaling the number of transactions made by the user during the period of use and dividing that total by 6.3 months, which represents the span between December 9, 2018, and June 16, 2019. Significance levels (* 10%; ** 5%; *** 1%) captured through OLS estimation with standard errors (in brackets) clustered at the school level.

Table A.5: Self-Reported Experience with the Financial App

| | Overall (N=182) | |
	Mean (1)	S.D. (2)
Panel A: Experiential learning		
Helped to better understand money usage	0.890	(0.314)
Understood the need to save more money	0.934	(0.249)
Understood the need to spend less on some things	0.923	(0.267)
Learned the importance of saving	0.918	(0.276)
Learned that saving is not so easy	0.885	(0.320)
Learned how to better plan expenses	0.923	(0.267)
Made think about savings use	0.929	(0.258)
Panel B: App feedback		
Easy to keep track of income/expenses	0.918	(0.276)
More useful than other installed apps	0.885	(0.320)
App user-friendly and easy to use	0.896	(0.307)
Panel C: Reasons to keep using the app		
To better understand one's money use	0.896	(0.307)
Monthly cell-phone raffle	0.445	(0.498)
Peer motivation	0.291	(0.456)
Monetary incentives every two weeks	0.390	(0.489)
Other	0.060	(0.239)

NOTE: The information reported in this table comes from the responses to the last section of the follow-up survey. This section was conducted only with users of the financial diaries app to capture users' perceptions of what they learned from the app and their reasons for continuing to use it after the end of the study, and 182 responses were collected. Standard deviation reported in parentheses.

Table A.6: TOT Effects on Financial Literacy and Behavior

	Non-frequent users mean (1)	TOT Effect (2)
Panel A: Financial Literacy		
Total score	0.023	0.165*
	(0.063)	(0.042)
Panel B: Financial Behavior		
Probability of budgeting	0.401	−0.009
	(0.031)	(0.048)
Shopping strategies	−0.085	−0.385
	(0.069)	(0.186)
Price knowledge	0.079	0.593*
	(0.063)	(0.187)
Probability of saving	0.514	0.036
	(0.031)	(0.019)
Savings deposits	1.922	−0.146
	(0.128)	(0.307)

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. Compliance is defined as a dummy variable that takes the value of one for individuals with a monthly average of user-entered transactions that meets or exceeds usage of the median user and zero otherwise. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.

Table A.7: TOT Effects on Credit Outcomes

	At endline		8 months later	
	Non-frequent users mean	TOT Effect	Non-frequent users mean	TOT Effect
	(1)	(2)	(3)	(4)
Probability of having outstanding debt	0.024	0.024*	0.055	0.037
	(0.009)	(0.006)	(0.013)	(0.016)
Number of lenders	0.024	0.024*	0.059	0.073
	(0.009)	(0.006)	(0.015)	(0.028)
Outstanding debt	0.136	0.135	0.347	0.277*
	(0.051)	(0.064)	(0.081)	(0.095)
Probability of having debt in arrears	0.003	0.004	0.010	0.004
	(0.004)	(0.002)	(0.006)	(0.014)
Debt/income ratio	0.216	−0.232	0.705	0.506
	(0.102)	(0.256)	(0.184)	(0.286)

NOTE: Total number of observations $N = 390$. Compliance is defined as a dummy variable that takes the value of one for individuals with a monthly average of user-entered transactions that meets or exceeds usage of the median user and zero otherwise. All outcome variables are constructed using EQUIFAX data from August 2019 and February 2020. The probability of having outstanding debt is a binary outcome equal to one if an individual has any outstanding debt with at least one financial institution and zero otherwise. The number of lenders is the number of financial institutions with which an individual has outstanding debts. The outstanding debt variable measures an individual's debt balance (in USD, using the August 2019 exchange rate) and is then transformed using the inverse hyperbolic sine. The probability of having debts in arrears is a binary outcome equal to one if the individual holds a positive share of her debt in arrears and zero otherwise. The debt-to-income ratio is constructed by dividing the amount of outstanding debt by the reported baseline income (15 of 390 observations have an income of zero. These 15 individuals also have no outstanding debt). The treatment effect specifications include a set of controls: gender, age, currently working, ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values.

B   Appendix

B.1   Intervention materials

B.1.1   Smartphone apps

Individuals in the treatment group recorded their daily financial transactions in the financial app, entering as many transactions as they had each day. The app was organized into three main categories of transactions: income, expenses, and financial tools, as seen in Panel (a) of Figure B.1. On the other hand, individuals in the control group just recorded their daily meals in the app, entering as many meals as they had each day. The app was organized into four categories: breakfast, lunch, dinner, and snacks, as seen in Panel (b) of Figure B.1.

Figure B.1: Treatment and Control Groups apps Illustrations

(a) Treatment   (b) Control
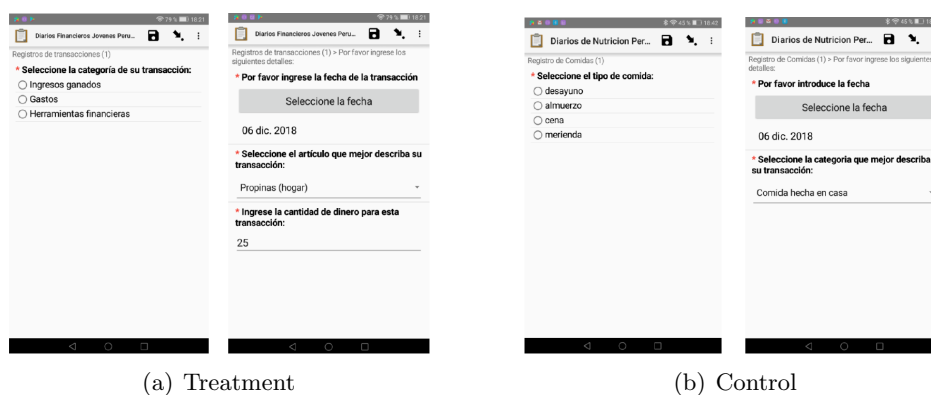
B.1.2   Personalized text messages to encourage savings

During the last two weeks of the intervention, we sent SMS messages trying to discourage superfluous spending and encouraging savings. The first type of personalized messages tried to encourage savings. The message contained general information analyzed in the last visit:

> "Hello, thank you for recording your daily transactions in the Financial Diaries app. You are doing it very well. Let me remind you of the information you shared in our last meeting. During the past two weeks you earned 203 soles and spent 147 soles..."

but it also provided individualized encouragement depending on the youth's situation in the previous two weeks. The messages were always positively framed, avoiding shaming that could backfire. Depending on the different scenarios, three types of messages were delivered:

a) Users who did not save in the last two weeks and had cumulative savings equal to zero were encouraged to save:

> "... and you saved zero soles. We encourage you to try hard and start developing the habit of saving. You can do it!"

b) Users who did not save in the last two weeks, but had a positive balance of cumulative savings, were reminded of their total balance:

> *"... and you saved zero soles. Your current savings balance is 170 soles. Congratulations!"*

c) Users who saved something in the last two weeks were told how much they would get if they were to keep saving at the same rate:

> *"... and you saved 7 soles. If you keep saving the same amount until the end of May, you will have 35 soles. Your current savings balance is 13 soles. Congratulations!"*

In addition to the text messages fostering savings, we also sent pie charts that summarized participants' expenditure patterns by category (see example in Figure A.1). This tool intended to highlight non-essential expenditures as a potential margin to adjust and redirect resources towards savings. The pie charts were jointly sent with the following message:

> *"Hello. We send you this graph with the detail of your expenses in the past two weeks. It is essential to know what we are spending on and to have some reasonable control over our financial lives. This graph is the first step in building a budget that can help you meet your needs and could guide you in deciding whether to spend less on some items and thus save more. During our next meeting, we can comment and discuss any questions you have about the graph. See you soon!"*

B.2 Financial literacy test

Table B.1: IRT Analysis: Baseline Financial Literacy Test

Subscore	Item	Difficulty Parameter - Control	Discriminatory Parameter - Control	Difficulty Parameter - Treatment	Discriminatory Parameter - Treatment
Financial Literacy	3	-1.349***	1.585***	-1.421***	1.356***
	5	-0.353***	0.825***	-0.551***	1.125***
	7	0.261	0.746***	-0.570***	0.996***
	14	-1.943***	0.580***	-3.500***	0.444***

NOTE: The table shows the baseline test questions with the highest degree of difficulty and discrimination based on an IRT estimate using a two-parameter model. Significance levels * 10%, ** 5%, *** 1%.

Table B.2: Topics Covered by Financial Literacy Tests Used in This Study and Other Studies

General Topics	This paper	Bruhn et al. (2016)	Frisancho (2023)	Batty et al. (2015)	Hinojosa et al. (2009)
Account balance	X	X	X	X	
Basic financial computations	X	X	X	X	X
Budgeting	X	X	X	X	
Basic economics concepts	X	X	X	X	X
Credit cards	X	X	X		
Family´s financial well-being		X			
Financial consumer's rights			X		
Investment strategies	X	X	X		X
Savings strategies	X	X	X		
Owning and renting	X	X	X	X	
Purchasing strategies	X	X			

NOTE: own elaboration.

B.2.1 Baseline Financial Literacy Test

1. Rebeca has saved S/. 10,000 in a piggy bank at home. Her plan is to use all the money to pay for an English course. She wants to enroll next year and in the meantime she needs to save the money. What is the safest place to keep this money?

  a) A closet in Rebecca's room.

  b) A savings account in a bank

  c) Storing it at a friend's house

  d) Buying jewelry that she can sell later

2. In which case would it be more beneficial and advisable for you to go into debt to buy something today and pay for it in the future?

  a) If you want to give your parents a trip to Europe as a gift

  b) If you want to buy a video game

  c) If you want to buy a motorcycle that will allow you to get a job as a pizza delivery man

d) If you want to buy fashionable clothes

3. David found a job where he earns S/. 2,000 net every month. His expenses are: S/. 1,000 in rent, S/. 150 in food, S/.250 in transportation and S/.300 in going out to the movies and restaurants. How many months would it take him to save S/.600?

a) 1 month

b) 2 months

c) 3 months

d) 4 months

4. José and Manolo work in the finance department of the same company earning the same salary. Manolo spends his free time taking specialization and computer courses while Jose spends his free time hanging out with friends and going to the gym. After 5 years, which of these situations do you think will occur?

a) Jose will earn more than Manolo because he is more sociable.

b) José will earn more than Manolo because it is very likely that Manolo will be fired.

c) Manolo is going to earn more than José because Manolo is more valuable to the company

d) Jose and Manolo will earn the same salary.

5. Nicolás earns S/. 1,800, spends S/. 1,400 to cover his basic needs and sets aside S/. 100 to save. Each month, Nicolas knows that he has S/. 300 left over to treat himself. Today Nicolás passed by a music store and saw a guitar that cost S/. 200 and wants to buy it because he has wanted to learn to play the guitar since he was a child. What would you tell Nicolás?

a) That he has the ability to pay to buy the guitar.

b) That he can buy the guitar but that he will not be able to save this month

c) That he should not buy the guitar because it is not something he had planned in his budget.

d) That he should not buy the guitar because it will hurt his finances.

6. Credit cards are useful for people because they allow them to meet certain needs when they don't have the money and pay for them later. What is another benefit of using a credit card responsibly?

a) Having a good credit history, which later allows access to better credit.

b) Having a significant level of savings, which allows you to cover unexpected expenses.

c) To have an intangible fund in case of being unemployed for some time.

d) To have a means of payment to use on a daily basis without having to carry money.

7. Piero earns S/. 1,200 per month, of which he spends at least S/. 1,000 to meet his basic needs. He recently saw a television that he liked, but it costs a lot. Piero has found out that he can get a loan immediately and without paperwork, but it obliges him to pay S/. 400 a month for 12 months. What would you recommend to Piero?

  a) That he should not take on this debt, since at this moment he does not have the capacity to pay it.

  b) That he can assume that debt but then he should start looking for another job or ask for a raise.

  c) That he should not take on the debt, since a television is not a good investment.

  d) That she can take on the debt because her income is higher than the monthly payment.

8. Melissa needs to send some money to her uncle who is abroad. She sees an advertisement in the newspaper for a bank that allows her to send money abroad charging a fixed commission of S/. 2 for any amount. When Melisa goes to the bank, she is informed that she will be charged S/. 10 for the remittance, since the S/. 2 fee is only for those who have an account at the bank. She looks at the advertisement again and confirms that this condition is not specified anywhere. Do you think that Melisa's rights as a financial consumer are being violated?

  a) Yes, because the bank is using misleading advertising by omitting important information.

  b) Yes, because the bank is offering preferential treatment to those who have an account.

  c) No, since she does not have an account, she simply cannot access the offer.

  d) No, because finally they do inform her that they are charging her S/. 10 and not S/. 2.

9. In which situation is it advisable to make the minimum payment on a credit card?

  a) Always, so you can have more cash available.

  b) In case of an emergency that prevents you from paying the full month's installment.

  c) In a month when you want to indulge yourself

  d) In a month when we have extra income.

10. Three months ago, Brenda purchased a credit card from a bank. She made sure to read all the clauses of the contract before signing it, and since then she has been using her card responsibly. However, this month's statement shows a charge for insurance that she never requested or authorized. She knows that her consumer rights have been violated and she wants to file a claim. Which of the following is an appropriate way to do so?

  a) Submitting her claim directly to the financial institution.

  b) Submitting her claim to the National Institute for the Defense of Competition and Protection of Intellectual Property (INDECOPI).

  c) By submitting your claim to the Superintendence of Banking and Insurance (SBS).

d) By submitting your complaint to the Peruvian Banking Association (ASBANC).

11. Rodrigo took out a loan from bank A a year ago and this month he finishes paying it off without having any arrears in his monthly payments. Rodrigo needs another loan, so he approaches Bank B. Bank B checks his credit history by looking up Rodrigo's credit report in a credit bureau. When Rodrigo finds out that they found him in the credit bureau, he gets worried because he thinks that now bank B will not give him the loan. What would you tell Rodrigo?

a) That he shouldn't worry because if he paid his loan with bank A without any problems, he has a good credit history that will help him get a loan with bank B.

b) That he should complain to INDECOPI because he should not be reported in the credit bureau.

c) That he should not worry because bank B does not use the information from the credit bureau and only consults it to comply with a procedure.

d) That bank A made a mistake and you should approach them and ask them to remove your information from the credit bureau.

12. Indicate which of the following institutions is in charge of the regulation and supervision of financial institutions, insurance companies and the private pension system:

a) Superintendency of Banking and Insurance (SBS).

b) National Institute for the Defense of Competition and the Protection of Intellectual Property (INDECOPI).

c) Central Reserve Bank of Peru (BCRP)

d) Association of Peruvian Banks (ASBANC).

13. After many years of saving under the mattress, Susana deposited her savings in a bank. Unfortunately, the bank failed a few months later and Susana does not know what to do because she is afraid of losing the S/. 30,000 she had deposited. What would you tell Susana?

a) That she should not worry because the government will return her money.

b) That she should not worry because her savings are protected by the Deposit Insurance Fund (FSD).

c) That it is a risk that was taken and unfortunately he will lose his savings.

d) That all is not lost because you will be able to recover 20% of your savings.

14. Roberto is going to move and is looking for an apartment to rent for two years. He recently found a place he likes, but his salary is not enough to pay for it and he has no savings. Given this, Roberto thinks that he could take out money each month using his credit card to pay the rent. What would you tell Roberto?

a) That he won't be able to do it because withdrawing cash using a credit card is not allowed.

b) That it is not advisable for him to do so because he does not have the ability to pay and it is very costly to get into debt by withdrawing money from the credit card.

c) That he/she should do so because the purpose of a credit card is to cover expenses when the monthly income is not sufficient.

d) He should do it because he will not be charged interest.

15. Alberto has incurred expenses with his credit card that exceeded his ability to pay. The bank that gave him the card has prevented him from continuing to use it and does not want to give him any other type of loan. Alberto knows that he already has a lot of debt, but he does not understand why he is not allowed to continue obtaining credit because, according to him, he is the only one who is being harmed. What would you tell Alberto?

a) That the irresponsible use of his credit card is also hurting the companies, since they will not receive payment for the products Alberto bought.

b) That the irresponsible use of his credit card also harms the financial system, since the bank has made a series of expenses that it cannot now recover.

c) That the irresponsible use of his credit card also harms his children because now they will have fewer opportunities due to the debts he has taken on

d) That he is right, no one else is harmed by his situation.

Next, we will ask you some questions based on the payment slip below:

16. Why was this slip sent to Franco?

a) Because Franco has to pay money to Ropa Bemol

b) Because Ropa Bemol has to pay money to Franco

c) Because Franco has paid money to Ropa Bemol

d) Because Ropa Bemol has paid money to Franco.

17. How much has Ropa Bemol charged Franco for shipping the clothes?

a) 130 soles

b) 153 soles

c) 13 soles

d) Bemol has not charged Franco anything.

18. Franco notices that Bemol Clothing made a mistake on the invoice: Franco ordered and received two polo shirts, not three. The shipping cost is a fixed charge. What will be the total of the new bill?

a) 22 soles

b) 153 soles

c) 20 soles

d) 131 soles

19. Last year, Esteban's motorcycle was insured with POSURA insurance company. The insurance policy covered damages to the motorcycle due to accidents and theft. Esteban plans to renew his insurance with POSURA this year, but a number of factors in his life have changed since last year. Indicate which of the following factors will NOT affect the cost of his insurance.

a) Esteban replaced his old motorcycle with a much more powerful motorcycle.

b) Esteban has painted his motorcycle a different color.

c) Esteban was responsible for two traffic accidents last year.

d) Esteban is going to add his brother as a motorcycle driver.

20. Each month, Marta's employer puts money into her bank account. This is Marta's pay slip for July: EMPLOYEE SALARY: MARTA RAMIREZ Position: Manager July 1 to July 31 Gross salary 2800 soles Deductions 300 soles Liquid salary 2500 soles Gross salary to date 19600 soles How much money did the employer put in Marta's bank account on July 31?

a) 300 soles

b) 2500 soles

c) 2800 soles

d) 19600 soles

21. David's bank is ZedBank. He receives this e-mail. What would be good advice for David?

a) Reply to the e-mail message and provide his Internet banking details.

b) Contact his bank to inquire about the e-mail.

c) Click on the link and follow the instructions

d) None of the above

B.2.2 Endline Financial Literacy Test

1. David found a job where he earns 2,000 soles net each month. His expenses are 1,000 soles in rent, 150 soles in food, 250 soles in transportation and 300 soles in going out to the movies and restaurants. How many months would it take him to save 600 soles?

   a) 1 month

   b) 2 months

   c) 3 months

   d) 4 months

2. Nicolás earns 1,800 soles, spends 1,400 soles to cover his basic needs and sets aside 100 soles to save. Each month, Nicolás knows that he has 300 soles left to treat himself. Today Nicolás passed by a music store and saw a guitar that cost 200 soles and wants to buy it because he has wanted to learn to play the guitar since he was a child. What would you tell Nicolás?

   a) That he can afford to buy the guitar.

   b) That he can buy the guitar, but he will not be able to save this month

   c) That he should not buy the guitar because it is not something he had planned in his budget.

   d) That she should not buy the guitar because it will hurt her finances.

3. Piero earns 1,200 soles a month, of which he spends at least 1,000 soles to satisfy his basic needs. He recently saw a television that he liked, but it costs a lot. Piero has found out that he can get a loan immediately and without paperwork, but it obliges him to pay 400 soles a month for 12 months. What would you recommend to Piero?

   a) That he should not take on this debt, since at this moment he does not have the capacity to pay it.

   b) That he can assume the debt, but then he should start looking for another job or ask for a raise.

   c) That he should not take on the debt, since a television is not a good investment.

   d) That she can take on the debt because her income is higher than the monthly payment.

4. Roberto is moving and is looking for an apartment to rent for two years. He recently found a place he likes, but his salary is not enough to pay for it and he has no savings. Roberto thinks that he could borrow money each month from friends and family to pay the rent. What would you tell Roberto?

   a) That he should do it because it is his favorite apartment and his family or friends will not charge him interest.

b) That he will not be able to do it because it is not certain that he will be able to find someone to lend him money each month.

c) That it is not advisable for him to do it because he does not have the capacity to pay and it is very problematic to get into debt.

d) That he should do it because his friends and family will help him cover expenses when his monthly income is not enough.

5. Imagine that you have to choose between two internet plans for your cell phone.

PLAN 1:

- Pay the amount at the end of the month.

- The amount is the cost of internet usage plus a fixed monthly fee for the service.

PLAN 2:

- Purchase credit in advance

- The credit lasts for a maximum of one month or until all the credit has been used.

Which plan would you choose? Why?

6. Imagine you choose Plan 1 and you have the following phone company offers (amounts in soles):

	Company A	Company B	Company C	Company D
Fixed monthly amount (soles)	20	20	30	30
Cost per megabyte (soles)	0.27	0.25	0.30	0.25
Free megabytes per months	60	60	30	30
Cost of text messages (soles)	0.02	0.02	gratis	0.01
Free text messages per month	200	100	unlimited	200

What do you think is the most convenient plan for someone who uses mobile internet frequently, but rarely sends text messages? Why?

7. Imagine the following situation. A friend of yours wants to buy a stereo system and takes out a loan from her bank in the amount of 2000 soles. Your friend has the option of repaying the loan in two years or alternatively in three years. The annual interest rate in both cases is the same. These would be the amounts required, if the payment is made in two years:

Payment period	Monthly payment (soles)	Total payment (soles))	Total interest paid (soles)
2 years	91.67	2200.08	200.08

If your friend decides to pay over three years, will the monthly interest payments be higher than paying over two years? Yes/No

8. Angelica receives a monthly salary of 1,500 soles. She has decided that she will save 100 soles per month. Based on this, what should she look for in her monthly planning?

a) That her monthly expenses do not exceed 1,400 soles.

b) That her expenses do not exceed 1,500 soles.

c) That your income should increase by 100 soles

d) That your savings exceed 1,500 soles.

9. Andrea has a new job and loves to walk early in the mornings on the direct route to work. Before starting her day, Andrea makes a few purchases: she stops by the newspaper, gets a coffee, buys credit for her cell phone, and walks to a park that is just past the building where she works, while she finishes her coffee. The newsstand is 1000 meters from Andrea's house and the first coffee shop is 150 meters from the newsstand. The cell phone recharge store is 250 meters from the coffee shop and the park is 300 meters from the building where she works. The distance between Andrea's work and the recharge store is 300 meters. How many meters away is the building where Andrea works from her home?

    a) 1500 meters

    b) 1700 meters

    c) 1900 meters

    d) 2000 meters

10. Mauricio's parents give him S/. 40 a week for his expenses. From Monday to Friday he spends S/. 10 on tickets, S/. 7.5 on soda and candy, and S/. 3 on photocopies. On Friday afternoons Mauricio teaches math to a classmate for which he is paid S/. 10. How much money does he have left over to go out and have fun with his friends on the weekend?

    a) 29.5 LCU

    b) 9.5 soles

    c) 19.5 soles

    d) 40 soles

11. Which of the following is an example of an investment?

    a) Diana is going to start a clothing sales business with her savings.

    b) Diana is going to save half of her salary in the bank.

    c) Diana is going to buy an insurance policy that will allow her to be prepared for any unforeseen event.

    d) Diana is going to give her savings to her sister who has lost her job.

12. Norma has prepared her monthly budget as follows:

TOTAL INCOME 1800 soles; TOTAL EXPENSES 1700 soles; SAVINGS 200 soles

What error do you identify in Norma's budget?

    a) Her income is greater than her expenses

    b) What she is allocating to savings is a very small amount.

    c) Her expenses and savings are higher than her income

    d) Her income and savings exceed her expenses.

Table B.3: Definition of Outcome Variables

Variables	Definition
Panel A: Survey Outcomes	
Financial literacy total score	The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group.
Probability of budgeting	The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise.
Shopping strategies	Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group.
Price knowledge	Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group.
Probability of saving	The probability to save is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise.
Savings deposits	Dollar amount (using the September 2019 exchange rate) that individuals report setting aside for personal savings in the month prior to the endline survey. This amount is then transformed using the inverse hyperbolic sine function.
Panel B: Credit Outcomes	
Probability of having outstanding debt	The probability of holding outstanding debt is a binary outcome equal to one if an individual has any outstanding debt with at least one financial institution and zero otherwise.
Number of lenders	The number of institutions is the number of financial institutions with which an individual has outstanding debts.
Outstanding debt	The outstanding debt variable measures an individual's outstanding debt (in USD using the August 2019 exchange rate) and is then transformed using the inverse hyperbolic sine.
Probability of having debt in arrears	The probability of having debt in arrears is a binary outcome equal to one if the individual holds a positive share of her debt in arrears and zero otherwise.
Debt/income ratio	The debt-to-income ratio variable is constructed by dividing the amount of outstanding debt by the reported baseline income (15 of 390 observations have an income of zero. These 15 individuals also have no outstanding debt).

Note: own elaboration.

Table B.4: TOT Effects on Financial Literacy and Behavior

	Non-frequent users mean (1)	TOT Effect (2)
Panel A: Financial Literacy		
Total score	0.023	0.019*
	(0.063)	(0.005)
Panel B: Financial Behavior		
Probability of budgeting	0.401	−0.001
	(0.031)	(0.006)
Shopping strategies	−0.085	−0.047
	(0.069)	(0.024)
Price knowledge	0.079	0.072*
	(0.063)	(0.022)
Probability of saving	0.514	0.004
	(0.031)	(0.002)
Savings deposits	1.922	−0.018
	(0.128)	(0.037)

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. Compliance is a continuous variable equivalent to the monthly average of user-entered transactions over the 27 weeks of the intervention. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.

Table B.5: TOT Effects on Credit Outcomes

	At endline		8 months later	
	Non-frequent users mean	TOT Effect	Non-frequent users mean	TOT Effect
	(1)	(2)	(3)	(4)
Probability of having outstanding debt	0.024	0.003*	0.055	0.004
	(0.009)	(0.001)	(0.013)	(0.002)
Number of lenders	0.024	0.003*	0.059	0.009*
	(0.009)	(0.001)	(0.015)	(0.003)
Outstanding debt	0.136	0.016	0.347	0.033*
	(0.051)	(0.008)	(0.081)	(0.009)
Probability of having debt in arrears	0.003	0.001	0.010	0.001
	(0.004)	(0.000)	(0.006)	(0.002)
Debt/income ratio	0.216	−0.027	0.705	0.060
	(0.102)	(0.030)	(0.184)	(0.031)

NOTE: Total number of observations $N = 390$. Compliance is a continuous variable equivalent to the monthly average of user-entered transactions over the 27 weeks of the intervention. All outcome variables are constructed using EQUIFAX data from August 2019 and February 2020. The probability of having outstanding debt is a binary outcome equal to one if an individual has any outstanding debt with at least one financial institution and zero otherwise. The number of lenders is the number of financial institutions with which an individual has outstanding debts. The outstanding debt variable measures an individual's debt balance (in USD, using the August 2019 exchange rate) and is then transformed using the inverse hyperbolic sine. The probability of having debts in arrears is a binary outcome equal to one if the individual holds a positive share of her debt in arrears and zero otherwise. The debt-to-income ratio is constructed by dividing the amount of outstanding debt by the reported baseline income (15 of 390 observations have an income of zero. These 15 individuals also have no outstanding debt). The treatment effect specifications include a set of controls: gender, age, currently working, ratio of household members to bedrooms, lives with both parents, assets index, and strata fixed effects. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values.

Table B.6: Effects on financial literacy and habits (Robustness: Baseline Levels as Control)

	Control mean (1)	ITT (2)
Panel A: Effects on financial literacy		
Total score	0.000	0.079
	(0.078)	(0.030)
Panel B: shopping and savings habits		
Probability of budgeting	0.413	0.004
	(0.038)	(0.028)
Shopping strategies	−0.000	−0.175
	(0.086)	(0.120)
Price knowledge	−0.000	0.335*
	(0.078)	(0.081)
Probability of saving	0.497	0.014
	(0.039)	(0.017)
Savings deposits	1.886	−0.123
	(0.159)	(0.196)

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, strata fixed effects, and the value of the dependent variable level at baseline. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the breakdown of the total score by topic and also to the set of outcomes in Panel B.

Table B.7: ITT Effects on Financial Literacy and Behavior, by Previous Exposure to School-Based Financial Education (Robustness: Baseline Levels as Control)

| | Exposure to School-based FinEd in 2016 | | | | |
| | Control | | Treated | | P-value |
	Control mean (1)	ITT Effect (2)	Control mean (3)	ITT Effect (4)	difference (2)-(4) (5)
Panel A: Effects on financial literacy					
Total score	0.007	0.217***	−0.008	−0.114	0.170
	(0.107)	(0.018)	(0.115)	(0.146)	
Panel B: shopping and savings habits					
Probability of budgeting	0.337	0.067	0.500	−0.071	0.480
	(0.052)	(0.050)	(0.056)	(0.122)	
Shopping strategies	−0.027	−0.172	0.030	−0.172	0.999
	(0.118)	(0.069)	(0.126)	(0.289)	
Price knowledge	0.016	0.225***††	−0.019	0.484	0.345
	(0.107)	(0.013)	(0.114)	(0.220)	
Probability of saving	0.506	0.009	0.487	0.023	0.896
	(0.053)	(0.025)	(0.057)	(0.074)	
Savings deposits	1.945	−0.131	1.819	−0.105	0.957
	(0.219)	(0.103)	(0.234)	(0.421)	

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, strata fixed effects, and the value of the dependent variable level at baseline. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.

Table B.8: TOT Effects on Financial Literacy and Behavior (Robustness: Baseline Levels as Control)

	Non-frequent users mean (1)	TOT Effect (2)
Panel A: Financial Literacy		
Total score	0.023	0.151
	(0.063)	(0.053)
Panel B: Financial Behavior		
Probability of budgeting	0.401	0.007
	(0.031)	(0.052)
Shopping strategies	−0.085	−0.322
	(0.069)	(0.226)
Price knowledge	0.079	0.627*
	(0.063)	(0.186)
Probability of saving	0.514	0.026
	(0.031)	(0.029)
Savings deposits	1.922	−0.226
	(0.128)	(0.371)

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. Compliance is defined as a dummy variable that takes the value of one for individuals with a monthly average of user-entered transactions that meets or exceeds usage of the median user and zero otherwise. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, strata fixed effects, and the value of the dependent variable level at baseline. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels (†10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.

Table B.9: TOT Effects on Financial Literacy and Behavior (Robustness: Baseline Levels as Control)

	Non-frequent users mean (1)	TOT Effect (2)
Panel A: Financial Literacy		
Total score	0.023	0.018
	(0.063)	(0.007)
Panel B: Financial Behavior		
Probability of budgeting	0.401	0.001
	(0.031)	(0.006)
Shopping strategies	−0.085	−0.039
	(0.069)	(0.028)
Price knowledge	0.079	0.075*
	(0.063)	(0.021)
Probability of saving	0.514	0.003
	(0.031)	(0.004)
Savings deposits	1.922	−0.027
	(0.128)	(0.044)

NOTE: $N = 340$ observations in Panel A, and $N = 349$ observations in Panel B. Compliance is a continuous variable equivalent to the monthly average of user-entered transactions over the 27 weeks of the intervention. All outcomes were measured during the endline survey. The total score is the number of correct answers to the twelve questions administered in the endline financial literacy test, which is then standardized relative to the control group. The probability of budgeting is a binary outcome equal to one if the individual claims to have made a personal budget in the months before the endline survey and zero otherwise. Shopping strategies refers to the number of shopping strategies a person claims to apply from a list of five options, including bargaining, comparing prices, checking online prices, planning purchases, and avoiding impulse purchases; the total number is then standardized relative to the control group. Price knowledge assesses the awareness of market prices by having respondents evaluate the price of twelve different items. It is considered a hit if their guess falls within the minimum and maximum prices obtained from two local retailers. The total number of hits is then standardized relative to the control group. The probability of saving is a binary outcome equal to one if the individual reports having a savings amount greater than zero in the month before the endline survey, zero otherwise. Savings deposits are expressed in dollars (using the September 2019 exchange rate) and refer to the amount set apart during the month prior to the endline survey. The amount is then transformed using the inverse hyperbolic sine function. The treatment effect specifications include a set of controls: gender, age, currently working, the ratio of household members to bedrooms, lives with both parents, assets index, strata fixed effects, and the value of the dependent variable level at baseline. Standard errors clustered at the strata and school level are reported in parentheses. Stars denote significance levels (* 10%; ** 5%; *** 1%) based on unadjusted p-values. Dags denote significance levels († 10%, †† 5%, ††† 1%) based on sharpened FDR q-values, which applies only to the set of outcomes in Panel B.