

Budget Recording Tools Improve Financial Skills Among Youth: Experimental Evidence from a Financial Diaries Study

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OUTLINE

- 1 Introduction
 - Motivation
 - This Paper
 - Preview of Results
- 2 Experimental Design
 - Design
 - Data
 - Usage of Financial App
- 3 Results
 - The Financial Lives of the Youth
 - Empirical Strategy
 - Intention-To-Treat (ITT) effect
- 4 Conclusions

MOTIVATION

- Low levels of financial inclusion in developing countries
- Even lower for young people (Demirguc-Kunt et al. 2018)
- Challenges for youth's financial inclusion:
 - ▶ Under-prepared youth facing increasingly complex financial systems in developing world
 - ▶ Financial products not designed to meet youth's needs

EXPERIMENTAL EVIDENCE SO FAR

- Large and robust effects of financial education delivered to school-aged children via traditional methods
- Scarce evidence of experiential learning or hands-on delivery methods
 - ▶ Positive effects financial education via games for primary school children (Hinojosa et al. 2009 and Batty et al. 2020)

THIS PAPER

- We study the impact of a phone app (which allows to keep a financial diary) on youth's financial outcomes
- Main contributions:
 - ▶ Experiential learning evidence on financial outcomes for youth
 - ▶ Ability to compare the impact of traditional delivery methods for financial education *vis-à-vis* a financial app
 - ▶ Along the way, we also get a peek at the financial lives of the youth via the financial diaries

PREVIEW OF RESULTS

- Access to the financial app has positive and statistically significant effects on financial literacy scores and awareness of prices
- Among youth without previous exposure to FinEd in school, the effect is comparable to that of traditional school-based FinEd programs that target teenagers

EXPERIMENTAL DESIGN

- Sample stratification by: **Sample Selection**
 - ▶ Internet connectivity
 - ▶ Signed consent during the school year

- Within strata, randomization at the school level:
 - ▶ Treatment:
 - Financial diaries phone app **FinDiaries app**
 - Biweekly individual monitoring visits
 - Text messages encouraging saving **Text Messages**
 - ▶ Control:
 - Daily meals and snack phone app.

- 390 participants (ages 16-18) in 47 schools

Balance

Timeline

- ① Baseline and endline surveys:
 - ▶ Educational/labor aspirations, financial literacy, use of budgets, price knowledge, savings and consumption habits
 - ▶ At endline:
 - Section about the financial diary app (for users)
- ② Baseline and endline financial literacy tests:
 - ▶ Savings skills, best use of savings, appropriateness of borrowing, budgeting
 - ▶ At endline: questions from PISA 2018 Financial Literacy Framework
- ③ Six-month high-frequency financial transactions from the financial app

USAGE OF FINANCIAL APP

- Incentives (monthly recharges and cellphone lotteries) to increase app usage.

	Jan	Feb	Mar	Apr	May	Jun
(A) App usage	79.3	68.5	63.1	65.5	65.5	64.1
(B) Transactions recorded by user (%)	45.9	40.5	24.3	15.4	5.2	3.4
Non-edited transaction (as % of (B))	72.7	66.7	77.7	71.2	65.0	59.7
Edited transactions (as % of (B))	27.3	33.3	22.3	28.8	35.0	40.3
(C) Transactions recorded by enumerator (%)	54.1	59.5	75.7	84.6	94.7	96.6

NOTE: Row (A) shows the fraction of active users 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.

Timeline

THE FINANCIAL LIVES OF THE YOUTH

	All months		Monthly average	
	Fraction of total number of transactions (1)	Fraction of total amount in US\$ (2)	Mean number of transactions (3)	Mean amount in US\$ (4)
Income	38.1%	46.2%	8.6	62.0
Expenditure	52.2%	30.2%	12.5	43.1
Financial tools	9.7%	23.7%	2.7	41.0
Total	100%	100%	7.9	48.9

- Half of the transactions relate to expenditures
- Income transactions represents 46 percent of youth's budgets
- Positive net income flows, 1/3 of monthly income to savings/loans

Income/Expenditures monthly patterns

EMPIRICAL STRATEGY

We focus on Intention-To-Treat (ITT) effects:

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

- where Y_{ij} outcome of interest,
- $T_{ij} = 1$ if individual i in strata j assigned to treatment,
- X_{ij} controls: gender, age, working status at baseline, ratio of household members to bedrooms, and both parents,
- ϕ_j fixed effects at the strata level.

We also estimate Treatment-On-Treated (TOT) effects TOT Results

ITT EFFECTS

	Obs. (1)	Control (2)	ITT (3)
(A) EFFECTS ON LITERACY AND EDUCATIONAL CHOICES			
Financial Literacy	349	0.000 (0.076)	0.079* (0.025)
Pr(Tertiary)	349	0.713 (0.036)	-0.053 (0.068)
(B) EFFECTS ON SHOPPING AND SAVINGS HABITS			
Pr(Budgeting)	349	0.413 (0.038)	0.012 (0.029)
Shopping index	349	-0.000 (0.086)	-0.175 (0.120)
Price knowledge	349	-0.000 (0.078)	0.335* (0.081)
Pr(Save)	349	0.497 (0.039)	0.014 (0.017)

- Effect on financial literacy scores and awareness of market prices.

TOT Results

HETEROGENEITY

	FinLit Score	Pr(Budgeting)	Shopping index	Price knowledge	Pr(Save)
	(1)	(2)	(3)	(4)	(5)
(A) ASSET INDEX					
Low assests	-0.064‡ (0.031)	0.058 (0.098)	-0.200 (0.074)	0.127 (0.111)	-0.017 (0.059)
High assets	0.181* (0.054)	-0.025 (0.064)	-0.162 (0.184)	0.494** (0.102)	0.036 (0.043)
(B) FINANCIAL EDUCATION PROGRAM					
FinEd Control	0.218***† † † (0.013)	0.080 (0.040)	-0.178 (0.071)	0.225***† † † (0.013)	0.009 (0.025)
FinEd Treated	-0.108 (0.140)	-0.072 (0.132)	-0.178 (0.299)	0.484 (0.220)	0.023 (0.074)
(C) SEX					
Female	0.117 (0.125)	-0.102 (0.073)	-0.172 (0.207)	0.173*‡‡ (0.058)	-0.153 (0.086)
Male	0.052 (0.107)	0.096* (0.030)	-0.188 (0.069)	0.454* (0.111)	0.135 (0.066)
(D) WORK STATUS					
Not works	0.142 (0.070)	0.015 (0.037)	-0.221 (0.128)	0.352** (0.075)	0.010 (0.045)
Works	-0.087 (0.225)	0.004 (0.199)	-0.077 (0.131)	0.290* (0.094)	0.025 (0.096)

SELF-REPORTED SATISFACTION WITH THE APP

- Positive self-reported evaluation of the financial diary app.
- 90% of the users say using the app helps understanding one's resources and learning that saving is not easy to achieve
- 90% mention the financial app allowed them to understand that they need to save more, spend less and plan their spending better, and save
- 92% considered easy to use and 88% judged more valuable than other apps in their smartphones
- Additional indicator of youth valuing the app: usage continued two months past the intervention for 45% of users

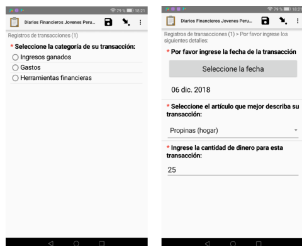
CONCLUSIONS

- Six-month-long financial diaries intervention in Peru to test impact of recording financial transactions on youth's financial skills and behavior
- Access to the app has positive effects on financial literacy and awareness of market prices
- Heterogeneity analysis: effects driven by users without prior exposure to financial education lessons during high school
- Financial diaries data shows active and modestly sophisticated financial lives for youth:
 - ▶ Positive net income flows
 - ▶ A third of monthly income allocated to savings and loans

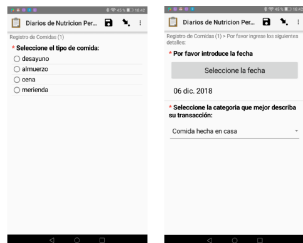
THANK YOU

- We divided the 60 schools into three strata:
 - ① High internet connectivity stratum, independent of the number of consents
 - ② Moderate to low connectivity stratum, with at least one signed consent
 - ③ Low connectivity, with no consents
- Recruiting efforts focused on the first stratum
- When signed consent was not obtained, it was requested in the field

Figure: Treatment and Control Group Apps Illustrations



(a) Treatment



(b) Control

The text messages contained a very general first part about the last visit. Then, a second part, had three types of messages:

- 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 0 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:

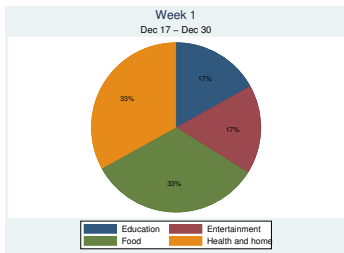
"... and you saved 0 soles. Your current savings balance is 170 soles. Congratulations!"

- 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!"

- We also sent pie charts that summarized participants' expenditure patterns by category
- This tool intended to highlight non-essential expenditures as a potential margin to adjust and redirect resources towards savings
- The pie charts were sent with an encouraging message

Figure: Example of a Pie Chart Sent



BALANCE CHECK (I)

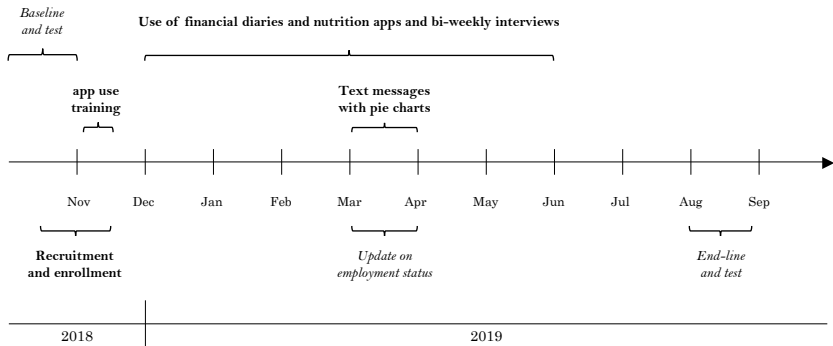
Variable	Control mean (1)	T-C (2)	N (3)
Male	0.567 [0.497]	0.059 [0.056]	390
Age	16.572 [0.873]	-0.055 [0.101]	390
Works	0.209 [0.407]	0.151 [0.067]**	390
Ratio of household members to bedrooms	2.059 [1.080]	-0.024 [0.132]	386
Lives with both parents	0.690 [0.464]	0.059 [0.049]	390
Asset index	-0.000 [1.000]	-0.119 [0.197]	390
High level of parental supervision	0.813 [0.391]	-0.079 [0.053]	390
Has dinner with parents 7 days a week	0.374 [0.485]	0.025 [0.055]	390
Financial autonomy (0-100)	49.385 [11.396]	-0.213 [1.220]	390
Time inconsistency: hyperbolic	0.235 [0.425]	0.065 [0.044]	390
Risk averse	0.701 [0.459]	0.014 [0.054]	390
Self-control	-0.000 [0.858]	0.050 [0.123]	390
Impulsiveness: Planning	0.000 [0.813]	0.105 [0.103]	390

Note: Significance levels (* 10%; ** 5%; *** 1%) captured through OLS estimation with robust standard errors. Standard errors(deviations) of coefficients(control means) are in brackets.

BALANCE CHECK (II)

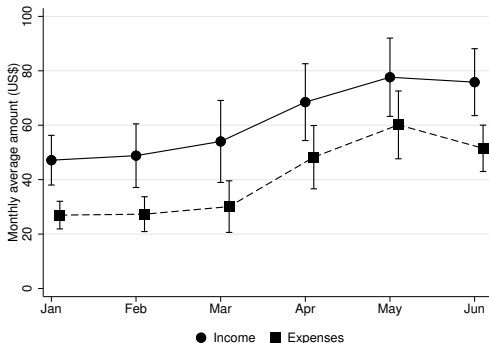
Variable	Control mean (1)	T-C (2)	N (3)
Financial literacy raw score (0-15)	12.123 [2.937]	0.128 [0.405]	390
Price knowledge (0-9)	6.176 [1.645]	-0.196 [0.225]	390
Prepares a personal budget	0.719 [0.451]	0.006 [0.059]	381
Saves	0.615 [0.488]	0.040 [0.059]	390
Bargains	0.733 [0.444]	-0.033 [0.051]	390
Saves to buy something unaffordable	0.930 [0.255]	-0.004 [0.027]	390
Compares prices before shopping	0.722 [0.449]	-0.082 [0.062]	390
Buys something not planned for	0.283 [0.452]	0.052 [0.058]	390
Total expenditures in last month (USD)	95.211 [115.106]	32.156 [16.440]*	390
Total earnings in last month (USD)	32.250 [43.864]	15.000 [6.389]**	390
Financial Education Program	0.481 [0.501]	-0.003 [0.165]	390

Note: Significance levels (* 10%; ** 5%; *** 1%) captured through OLS estimation with robust standard errors. Standard errors(deviations) of coefficients(control means) are in brackets.



- Baseline:
 - ▶ Survey: educational/labor aspirations, experience with financial education, savings, use of budgets, consumption habits, and price knowledge
 - ▶ Test: questions and cases about the best savings alternatives, justifications for acquiring debt, basic calculations, time management, savings capacity, and consumer rights
- Endline:
 - ▶ Survey: builds on baseline but expands the section on employment/educational status and aspirations and includes a section on using the financial diary app
 - ▶ Test: questions about savings skills, best use of savings, appropriateness of borrowing, budgeting. We added questions from PISA 2018 Financial Literacy Framework
- High-frequency financial transactions recorded for six months in the Financial Diaries app

Figure: Average Monthly Income and Expenditure



NOTE: Round (square) markers depict monthly average income (expenditures) while the lines are 95% CI.

Table: Treatment-On-Treated (TOT) Effects

	Observations (1)	Control (2)	TOT (3)
(A) EFFECTS ON LITERACY AND EDUCATIONAL CHOICES			
Financial Literacy	349	0.000 (0.076)	0.130* (0.035)
Pr(Tertiary)	349	0.713 (0.036)	-0.087 (0.110)
(B) EFFECTS ON SHOPPING AND SAVINGS HABITS			
Pr(Budgeting)	349	0.413 (0.038)	0.020 (0.047)
Shopping index	349	-0.000 (0.086)	-0.287 (0.203)
Price knowledge	349	-0.000 (0.078)	0.555* (0.163)
Pr(Save)	349	0.497 (0.039)	0.023 (0.026)

NOTE: All specifications include a set of controls: gender, age, currently working, ratio of household members to bedrooms, lives with both parents, district fixed effects, and the value of the dependent variable level at baseline. Standard errors clustered at the district and school level are reported in parentheses. Dummy on frequently high app use instrumented by random treatment assignment used for TOT effect estimation. Stars denote significance levels (* 10%; ** 5%; *** 1%).

Table: Heterogeneous Treatment-On-Treated (TOT) Effects

	FinLit Score	Pr(Budgeting)	Shopping index	Price knowledge	Pr(Save)
	(1)	(2)	(3)	(4)	(5)
(A) ASSET INDEX					
Low assets	-0.116‡ ‡ ‡ (0.052)	0.105 (0.181)	-0.349 (0.143)	0.216‡ ‡ ‡ (0.184)	-0.030 (0.108)
High assets	0.285* (0.085)	-0.039 (0.098)	-0.254 (0.287)	0.782** (0.167)	0.056 (0.065)
(B) FINANCIAL EDUCATION PROGRAM					
FinEd Control	0.392***‡ ‡ ‡ (0.032)	0.142 (0.072)	-0.311 (0.113)	0.391*** (0.039)	0.015 (0.047)
FinEd Treated	-0.177 (0.208)	-0.114 (0.201)	-0.268 (0.464)	0.745 (0.350)	0.036 (0.115)
(C) SEX					
Female	0.216 (0.244)	-0.194‡ (0.146)	-0.316 (0.400)	0.314‡ ‡ ‡ (0.128)	-0.284‡ ‡ ‡ (0.150)
Male	0.077 (0.164)	0.150* (0.045)	-0.285 (0.103)	0.702* (0.203)	0.209 (0.098)
(D) WORK STATUS					
Not works	0.225 (0.126)	0.024 (0.066)	-0.348 (0.223)	0.560* (0.159)	0.016 (0.072)
Works	-0.161 (0.404)	0.007 (0.361)	-0.142 (0.230)	0.538* (0.179)	0.047 (0.182)