Psychological Well-being, Impact Heterogeneity, and Spillovers in a Graduation Program in Paraguay

Marcos Sugastti

University of California, Davis

September 5, 2024

Psycho-social Factors, Impact Heterogeneity, and Graduation Programs

- The graduation program is a multifaceted intervention designed to help households escape poverty
  - Cash transfer for the purchasing of tangible productive assets, relaxing capital constraints
  - Intensive mentoring intended to build intangible psychological assets, life skills, self-confidence, and aspirations, relaxing what we might call psycho-social constraints
  - Relaxing these constraints is meant to facilitate the shift from low, casual wage labor occupations to higher income entrepreneurial ones that require capital and business acumen
- Impact evaluations from several countries show that the program has helped millions of families begin a path out of poverty (Banerjee et al., 2015; Bandiera et al., 2017; Banerjee et al., 2021; Balboni et al., 2022)
- The impressive program treatment effects obscure large heterogeneity (Karlan, 2020)
  - Some of this heterogeneity comes from the baseline psychological state of beneficiaries, among other sources (Correa, 2021; Zheng et al., 2023)
- Focus on psycho-social factors can modify program impacts

Preview of Results

Using a saturation design that randomized exposure to spillovers, we evaluated the graduation program *Tenondera* in Paraguay. At midline:

- Ignoring spillovers, we find that the average treatment effects on key economic variables are positive as *Tenondera* increased treated households' assets, monthly income per capita, and savings by 60%, 7%, and 32%, respectively
- Hiding behind these ATEs there is stark heterogeneity: conditional quantile analysis shows that $\sim$25% of beneficiaries experienced no effect on income, $\sim$10% on assets
- Baseline psychological state may explain some of this heterogeneity, in particular aspirations and self-efficacy could be playing a role
- When we look into these psychological variables as outcomes, we find that they worsen by this stage of the program
- Our saturation analysis reveals that among treated households, higher saturation rates lead to better outcomes, and that the opposite is true for non-treated households

Intervention

- Government-led program *Tenondera* ("onward" in Guarani)
  - First implemented in 2014, currently scaling up
  - Targets beneficiaries of CCT program slated to stop receiving transfers in the next 1 to 3 years
  - CCT beneficiaries are originally families with kids or with members with disabilities
  - Government deploys the program prioritizing regions based on poverty statistics
- Duration is 24 months
  - Induction into the program includes a series of business formation and "life plan" workshops
  - One-time seed capital transfer of USD 390 happening around month 3
  - Mentoring lasts for the duration of the program

Setting and Sample (I)

- 2,864 households in 246 neighborhoods/localities (administrative level 3) within 23 districts (administrative level 2) in Paraguay
  - Mix of urban and rural communities
- Women are in most cases the main program beneficiary on paper, but in practice businesses are commonly run jointly with their partners
- Households were randomly placed on one of three treatment groups following a two-stage procedure (more on this later)
  - Early treatment group received the program Jan 2022–Dec 2023
  - Late treatment group is receiving the program Jan 2023–Dec 2024
  - Control group will receive program starting Jan 2025 (after the end of the study)
- Three survey rounds covering economic and psychological variables
  - Baseline in late 2021
  - Midline in late 2022
  - Endline coming up later this year
- Baseline sample is well-balanced Table

Setting and Sample (II)

- Government largely respected treatment assignment
- Attrition rates within what we expected
- Data comparing early treatment group members 10 months into the program against pool of late treatment group and control members
  - Early treated: 946 hhs
  - Late treated + control: 1,918 hhs
- Treatment assignment was at the individual level, saturation was at community level
  - Different communities have different levels of program coverage by midline

Empirical Strategy

- Standard intent-to-treat (ITT) treatment ANCOVA model with district fixed effects:

$$y_{hd} = \alpha_0 + \alpha_1 y_{hd}^0 + \beta \mathit{Treat}_{hd} + \gamma_d + \varepsilon_{hd},$$

  where y_{hd} is the 2022 outcome variable of interest for household h in district d, y_{hd}^0 is the baseline value of that same variable, and Treat_{hd} is an indicator for assignment to *Tenondera* as part of the early treatment group
- The error term ε_{hd} is clustered at the neighborhood/locality level and γ_d captures district fixed effects
  - State capacity varies across districts in terms of, for instance, the presence of social workers in different areas
- Control group is comprised of households eligible for *Tenondera* assigned to either late treatment or control

Average & Quantile Treatment Effects (USD)

Variable	N	ATEs (OLS)	Conditional Quantile Treatment Effects Q10	Q25	Q50	Q75	Q90
Monthly Income Per Capita Baseline value: 58.75	2584	4.00* (2.39)	-1.11 (1.02)	-0.32 (1.76)	4.41* (2.64)	8.21** (4.14)	10.79** (4.97)
Household Business Assets Baseline value: 427.60	2584	255.71*** (33.93)	4.52 (6.49)	48.38*** (14.13)	173.30*** (26.25)	324.18*** (48.91)	463.63*** (77.94)
Household Savings Baseline value: 9.49	2584	3.06* (1.72)					
District FEs				✓			

Notes: Regressions include baseline levels of the dependent variable. Standard errors in parentheses are clustered at the neighborhood/locality level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Psychological Outcomes

- Depression, as captured by the CES-D 10 scale (Radloff, 1977)
  - Ten questions that refer to the emotions and general well-being experienced by the respondent throughout the week prior to the survey
- Aspirations
  - Index based on a series of statements about a person's satisfaction with their current scenario and their plans for business growth or improvement (Lybbert and Wydick, 2019)
- Self-efficacy
  - Index based on series of statements about a person's perception of their capabilities and ability to reach their goals (adapted from IFPRI's pro-WEAI)
- Locus of control, which comprises three subscales (Levenson, 1981)
  - *Internality* measures how confident a person is in their own abilities and the capacity to control their own life
  - *Powerful others* captures the extent to which a person feels that their life is controlled by people with advantages over them
  - *Chance* assesses how much a person uses luck to explain situations in their life

Impact Heterogeneity by Baseline Psychological Variables

- We can try to identify program impacts on two sub-populations according to their baseline psychological variable:

$$y_{hd} = \alpha_0 + \alpha_1 y_{hd}^0 + \beta\, Treat_{hd} + P_{hd} \times [\delta_0 + \delta_1\, Treat_{hd}] + \gamma_d + \varepsilon_{hd},$$

where the new binary indicator P_{hd} switches on for respondents with a low level of a given psychological variable at baseline (e.g., depressed at baseline)

Impact Heterogeneity by Baseline Psychological Variables: ITT Estimates

Baseline Variable	Coefficient	Monthly Income Per Capita (USD) Mean	SE	Household Business Assets (USD) Mean	SE
Depression	β	4.31	(2.78)	251.10***	(39.29)
	δ_1	-2.21	(5.01)	14.93	(63.04)
	$\delta_0 + \delta_1$	-5.80	(4.08)	-65.21	(55.79)
Aspirations	β	5.00*	(2.78)	266.75***	(36.93)
	δ_1	-4.32	(4.36)	-43.52	(55.40)
	$\delta_0 + \delta_1$	-8.78**	(3.87)	-3.54	(46.90)
Self-efficacy	β	4.05	(2.77)	236.79***	(33.34)
	δ_1	-0.25	(5.09)	88.96	(69.76)
	$\delta_0 + \delta_1$	-4.23	(4.74)	148.77**	(60.61)
Internality	β	4.04*	(2.43)	256.72***	(35.10)
	δ_1	0.08	(5.61)	-6.23	(66.42)
	$\delta_0 + \delta_1$	-4.54	(4.71)	4.44	(58.75)
Observations		2584		2584	
District FEs		✓		✓	

Notes: Regressions include baseline levels of the dependent variable. Standard errors in parentheses are clustered at the neighborhood/locality level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Psychological Outcomes: ATEs

Variable	Mean	SE
CES-D 10 score	0.57***	(0.20)
Aspirations	-0.12**	(0.06)
Self-efficacy	-0.22***	(0.06)
Internality	-0.99***	(0.29)
Powerful Others	0.23	(0.28)
Chance	-0.75**	(0.31)
Depressed (pp)	6.11***	(1.94)
Low Aspirations (pp)	4.29*	(2.38)
Low Self-efficacy (pp)	8.75***	(2.54)
Low Internality (pp)	6.83**	(2.74)
Observations	2584	
District FEs	✓	

Notes: Baseline values are 20.67% depressed respondents (10 point cutoff), 25.52% with low aspirations, 20.84% with low self-efficacy, and 18.58% with low internality (15 point cutoff). Regressions include baseline levels of the dependent variable. Standard errors in parentheses are clustered at the neighborhood/locality level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Sources of Spillovers

- There are a number of mechanisms by which an asset-building graduation program could generate spillovers and influence others
- Spillovers could be pecuniary, where increases in the number of beneficiaries influence the returns that other individuals receive from the economic activities of beneficiaries
  - These could be negative (congestion/competition) or positive (agglomeration)
- They might also be psycho-social, especially since non-tangible "psychological assets" are shareable, non-rival goods
- We measure these spillovers in our context by exploiting our saturation design

Saturation Design

Scheme	Share of communities	Share of households in Early treatment	Share of households in Late treatment	Share of households in Control
A	9%	100%	0%	0%
B	9%	80%	20%	0%
C	8%	20%	80%	0%
D	8%	0%	80%	20%
E	9%	0%	20%	80%
F	9%	0%	0%	100%
G	24%	67%	33%	0%
H	24%	0%	33%	67%

- Community-level saturation means that the number of treatment and control units in each community is not balanced by design
- Distinction between saturation sample (schemes A–F, mid-sized communities) and non-saturation sample (schemes G–H, mix of small and large communities)
- Econometrically, these saturation measures are perfectly correlated with community fixed effects (we have been controlling for district fixed effects instead)

Measuring Spillovers using Saturation Design

- We classify communities based on their assigned saturation rate at midline (within each community, # of hhs assigned to treatment / # of hhs in the sample) into a zero, a low, a medium, and a high saturation group
- To measure the ITT impact of assignment to *Tenondera* and the spillover effects on both treated and non-treated households, we estimate the following modified version of our ANCOVA ITT equation (following Baird et al., 2018):

$$y_{hd} = \alpha_0 + \alpha_1 y^0_{hd} + \beta\, Treat_{hd} + \Sigma_{s\in(Zero,Low,Medium,High)} S_s \times [\theta_{0,s} + \theta_{1,s}\, Treat_{hd}] + \gamma_d + \varepsilon_{hd},$$

where S_s represents a set of indicator variables that turn on when household h is in a community that belongs to a given saturation group

- The estimated spillover effect for a household assigned to control located in a community corresponding to the saturation category s can be represented as $\theta_{0,s}$
- The estimated direct impact on a household assigned to treatment located in the same community is $\beta + \theta_{1,s}$

Saturation Estimates compared to Communities in High Saturation Group

Full Sample

	Monthly Income Per Capita (USD)		Household Business Assets (USD)	
	Mean	SE	Mean	SE
Treated	12.30**	(5.46)	297.79***	(68.77)
Zero Saturation	9.89*	(5.85)	34.01	(54.60)
Low Saturation	12.86*	(7.35)	132.57*	(69.40)
Medium Saturation	14.42**	(6.91)	-33.39	(60.83)
Low Saturation × Treated	-13.91*	(7.15)	-107.29	(113.93)
Medium Saturation × Treated	-8.80	(7.16)	18.00	(84.57)
Baseline Level of Outcome	0.00***	(0.00)	0.00***	(0.00)
Constant	30.89***	(5.84)	171.08***	(55.18)
Observations	2584		2584	
District FEs	✓		✓	

▸ Saturation sample
▸ Comparison to Zero

Notes: Share of households in each saturation group are 51% for zero, 9% for low, 22% for medium, and 18% for high. Standard errors in parentheses are clustered at the neighborhood/locality level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Discussion

- Overall impact of the program on key economic variables is positive, but clearly not everyone benefits
  - Change targeting? Strengthen mentoring?
- Some evidence that impacts take place through psychological channels
- Treated and non-treated households react differently to the saturation rate present in their communities
  - Would we expect such spillovers to be pecuniary? Or psycho-social?
  - Economic and psychological outcomes reinforcing each other?
- Endline will allow us to answer several questions
  - Do economic impacts decline, persist, or grow after graduation?
  - Do psychological outcomes bounce back from the hit they take by midline?
  - Is the role of psychological variables as a source of heterogeneity more prominent at graduation?

Thank you!

marcosms@ucdavis.edu

marcosms.com

References I

Baird, S., Bohren, J. A., McIntosh, C., and Özler, B. (2018). Optimal design of experiments in the presence of interference. *Review of Economics and Statistics*, 100(5):844–860.

Balboni, C. A., Bandiera, O., Burgess, R., Ghatak, M., and Heil, A. (2022). Why do people stay poor? *The Quarterly Journal of Economics*.

Bandiera, O., Burgess, R., Das, N., Gulesci, S., Rasul, I., and Sulaiman, M. (2017). Labor markets and poverty in village economies. *The Quarterly Journal of Economics*, 132(2):811–870.

Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., Shapiro, J., Thuysbaert, B., and Udry, C. (2015). A multifaceted program causes lasting progress for the very poor: Evidence from six countries. *Science*, 348(6236).

Banerjee, A., Duflo, E., and Sharma, G. (2021). Long-term effects of the targeting the ultra-poor program. *American Economic Review: Insights*, 3(4):471–486.

References II

Correa, J. S. (2021). The impact of psychological asset building on the effectiveness of peru's haku wiñay. Working paper, University of California-Davis.

Karlan, D. (2020). Multi-faceted social protection: Can it work? yes. now ask why and how. Presentation to IPA Graduation Program Research Seminar at Northwestern University.

Levenson, H. (1981). *Research with the Locus of Control Construct*. Academic Press.

Lybbert, T. and Wydick, B. (2019). Hope as aspirations, agency, and pathways: Poverty dynamics and microfinance in oaxaca, mexico. In Barrett, C. B., Carter, M. R., and Chavas, J.-P., editors, *The Economics of Poverty Traps*, chapter 1, pages 223–256. The University of Chicago Press, Chicago.

Radloff, L. S. (1977). The ces-d scale: A self report depression scale for research in the general population. *Applied Psychological Measurements*, 1:385–401.

Zheng, G., Carter, M., Jensen, N., and Krovetz, L. (2023). Psychosocial constraints, impact heterogeneity and spillovers in a multifaceted graduation program in kenya. Technical report, National Bureau of Economic Research.

Randomization Balance at Baseline

Variable	N	(1) Control Mean/SE	N	(2) Treatment Mean/SE	T-test P-value (1)-(2)
Monthly income per capita	1918	59.50 [1.01]	946	57.24 [1.37]	0.19
Household business assets	1918	415.41 [18.01]	946	452.32 [22.95]	0.22
Household savings	1918	9.18 [0.98]	946	10.10 [1.49]	0.60
CES-D 10 score	1918	6.33 [0.11]	946	6.24 [0.15]	0.63
Depressed	1918	0.21 [0.01]	946	0.19 [0.01]	0.13
Aspirations score	1918	0.10 [0.02]	946	0.15 [0.03]	0.18
Low aspirations	1918	0.26 [0.01]	946	0.24 [0.01]	0.22
Self-efficacy score	1918	0.14 [0.02]	946	0.17 [0.03]	0.28
Low self-efficacy	1918	0.21 [0.01]	946	0.21 [0.01]	0.91
Internality score	1918	17.81 [0.09]	946	17.95 [0.13]	0.39
Low internality	1918	0.19 [0.01]	946	0.18 [0.01]	0.32

Back

Notes: F-stat for F-test of joint significance is 1.26. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Saturation Estimates compared to Communities in Zero Saturation Group

Full Sample

	Monthly Income Per Capita (USD)		Household Business Assets (USD)	
	Mean	SE	Mean	SE
Treated	-1.61	(4.63)	190.50**	(92.43)
Low Saturation	2.97	(4.92)	98.57*	(52.76)
Medium Saturation	4.53	(4.05)	-67.40*	(39.63)
High Saturation	-9.89*	(5.85)	-34.01	(54.60)
Medium Saturation × Treated	5.12	(6.53)	125.29	(104.99)
High Saturation × Treated	13.91*	(7.15)	107.29	(114.93)
Baseline Level of Outcome	0.00***	(0.00)	0.00***	(0.00)
Constant	40.78***	(2.00)	205.09***	(33.00)
Observations	2584		2584	
District FEs	✓		✓	

▸ Comparison to High

Notes: Share of households in each saturation group are 51% for zero, 9% for low, 22% for medium, and 18% for high. Standard errors in parentheses are clustered at the neighborhood/locality level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Saturation Estimates compared to Communities in High Saturation Group

Saturation Sample

	Monthly Income Per Capita (USD)		Household Business Assets (USD)	
	Mean	SE	Mean	SE
Treated	13.59**	(6.43)	359.39***	(67.99)
Zero Saturation	7.85	(6.90)	129.63*	(65.42)
Low Saturation	5.82	(7.64)	182.28***	(68.35)
Medium Saturation	21.41	(32.71)	-99.06	(84.46)
Low Saturation × Treated	-8.49	(8.56)	-123.85	(130.40)
Medium Saturation × Treated	20.95	(52.83)	-558.50***	(137.64)
Baseline Level of Outcome	0.00***	(0.00)	0.00***	(0.00)
Constant	26.11***	(6.95)	101.90*	(55.36)
Observations	1187		1187	
District FEs	✓		✓	

▸ Full sample

Notes: Share of households in each saturation group are 51% for zero, 9% for low, 22% for medium, and 18% for high. Standard errors in parentheses are clustered at the neighborhood/locality level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.