

Economics 270B
Ph.D. Development Economics

Professor Ted Miguel
Department of Economics
University of California, Berkeley

Lecture 2 – February 2, 2015

Lecture 1: Introduction to Economics 270B

- Lecturer: Prof. Ted Miguel (emiguel@berkeley.edu)
Office hours: Thursday and Friday afternoons. Please email Elisa Cascardi (ecascardi@berkeley.edu) for a slot
- Grader: Felipe Gonzalez (fgonzalez@econ.berkeley.edu) will hold extra discussion sections and office hours. Felipe's office hours are Tuesdays 9-11am in Evans 630.
- bCourses page: syllabus, readings, assignments.

I. Overview of International Economic Development

Lecture 1: Understanding economic growth and development (1/26)

Lecture 1B: Persistence of historical institutions and shocks
(read during holiday week of 2/16)

Lecture 2: The Psychology of Poverty (2/2)

II. Human Capital in Economic Development

Lectures 3-4: Education (2/9, 2/23)

Lectures 5-7: Health and nutrition (3/2, 3/9, 3/16)

III. Political economy

Lectures 8-9: Democracy, Corruption and Development (3/30, 4/6)
(guest lectures by Prof. Fred Finan)

Lecture 10: Ethnic and Social Divisions (4/13)

Lectures 11-12: The Political Economy of Conflict (4/20, 4/27)

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- Prerequisites: Graduate economic theory, econometrics
- Grading:
 - Four referee reports – 40%
 - Report #1 on Schilbach paper
 - due next Monday (2/9) at 2 pm on bCourses
 - Two problem sets – 20%
 - Research proposal – 30%
 - Class participation – 10%
 - No final exam
- All readings are available on bCourses

Any questions?

Lecture 2 outline

- (1) Poverty traps in economic development: Haushofer and Fehr [2014]
- (2) The psychology of poverty: Mani, Mullainathan, Shafir and Zhao [2013]
- (3) Income shocks, stress and psychological well-being Haushofer and Shapiro [2013]
- (4) Rainfall shocks, stress and economic decision making: Chemin, de Laat and Haushofer [2013]
- (5) Next steps in the psychology and development agenda: Mullainathan and Shafir [2013], Cappelen et al [2014], other work

(1) Poverty traps in economic development

- Why are people / societies poor?
- Are the “fundamentals” (i.e., institutions, individual traits) not conducive to earning high incomes?
- In particular (from lecture 1), are historical legacies the key drivers of persistent economic development gaps?
- Or is there something special about poverty itself that makes it a hard condition to exit from?
- The latter point is often expressed as a “**poverty trap**”

(1) Poverty traps in economic development

- Many different types of poverty traps have been proposed in economics and other social sciences
- Some examples:
 - Low savings poverty trap (subsistence consumption)
 - Related: a nutrition poverty trap (Dasgupta-Ray 1986)
 - A conflict poverty trap (P. Collier's The Bottom Billion)
 - Others?
- This week's papers contribute to our understanding of whether there might be a **psychological component**

(1) Poverty traps in economic development

- Important public policy implications of poverty traps
- If people, households, communities, or whole societies are “trapped”, then temporary interventions – e.g., a large one-time asset transfer or cash transfer – could have massive long-run impacts and high rates of return

J. Sachs

(1) Poverty traps in economic development

- Important public policy implications of poverty traps
- If people, households, communities, or whole societies are “trapped”, then temporary interventions – e.g., a large one-time asset transfer or cash transfer – could have massive long-run impacts and high rates of return
- Empirical evidence remains elusive and contested., e.g., Deaton, Srinivasan and others have countered that nutritional poverty traps are implausible since the cost of the calories required for subsistence needs is so low

H. Schufeld

(1) Poverty traps in economic development

- Poverty may affect economic (and other) decision-making in many different ways, including through the channels of:

- ✓ – Depression / low self-esteem (“**negative affect**”)
- Stress \Rightarrow health
- Inattention / inability to focus – Self-control
- Others? – Spillovers
- Cultural norms

- This “poverty mindset” in turn may affect **impatience**, **risk attitudes**, investment choices, diligence, employability, inter-personal relations (on and off the job), social networks, and many other outcomes.

(1) Poverty traps in economic development

- Haushofer and Fehr (2014, *Science*) provide a review of this emerging research field. Succinct summary:

“Poverty causes stress and negative affective states which in turn may lead to short-sighted and risk-averse decision-making, possibly by limiting attention and favoring habitual behaviors at the expense of goal-directed ones. Together, these relationships may constitute a feedback loop that contributed to the perpetuation of poverty.” (p. 862)



Source: Johannes Haushofer

(1) Poverty traps in economic development

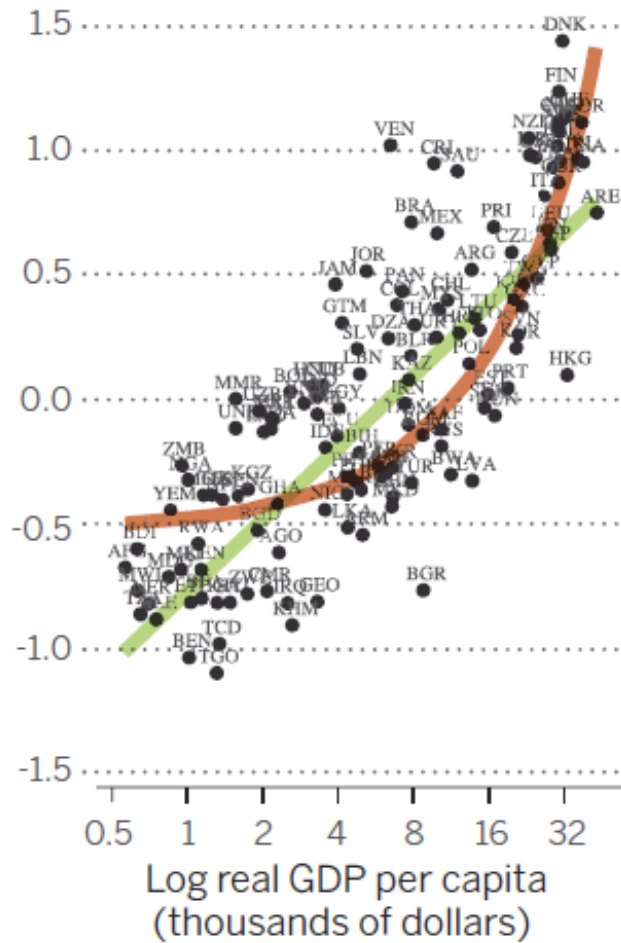
- Other social characteristics may affect mental health / psychological outcomes
- E.g., Berkeley psychologist Sheri L. Johnson and co-authors find strong cross-country links between social inequality (“dominance behavioral systems”) and psychological disorders, including anxiety, depression, narcissism, and bipolarism (and possibly schizophrenia)
- More unequal U.S. states have more depression (controlling for income levels, demographics, etc.)
- Narcissistic traits increased rapidly in the U.S. starting in the late 1980s, when inequality began rising rapidly.

(1) Poverty traps in economic development

- Starting point: is poverty actually associated with lower quality decision-making and more negative affect?
- Haushofer and Fehr (2014) present evidence that it is, drawing on cross-sectional correlations and lab studies.

A

Life satisfaction across countries
(ordered probit index)

**B**

Life satisfaction within countries, less country average
(ordered probit index)

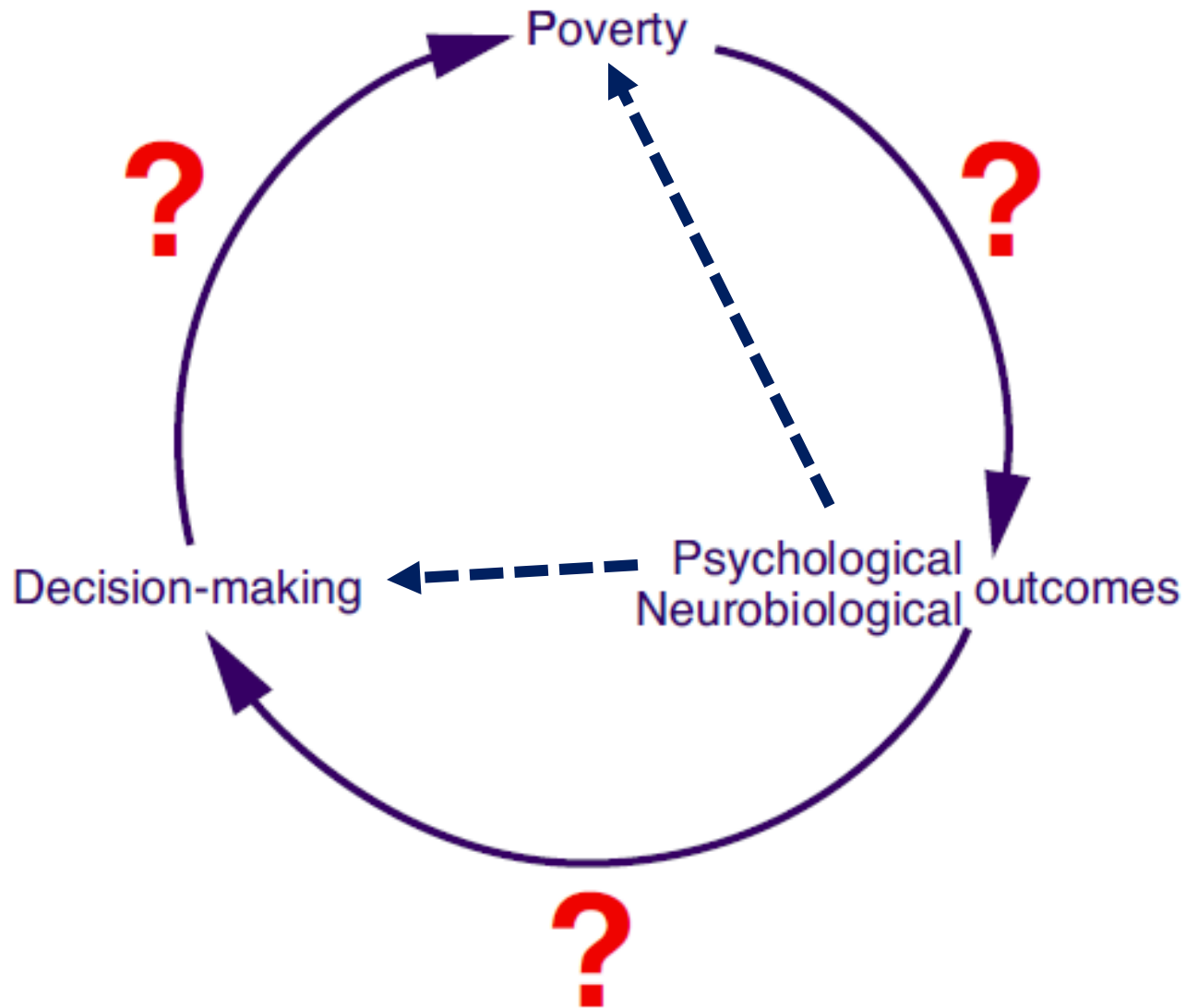


Source: Haushofer and Fehr (2014)

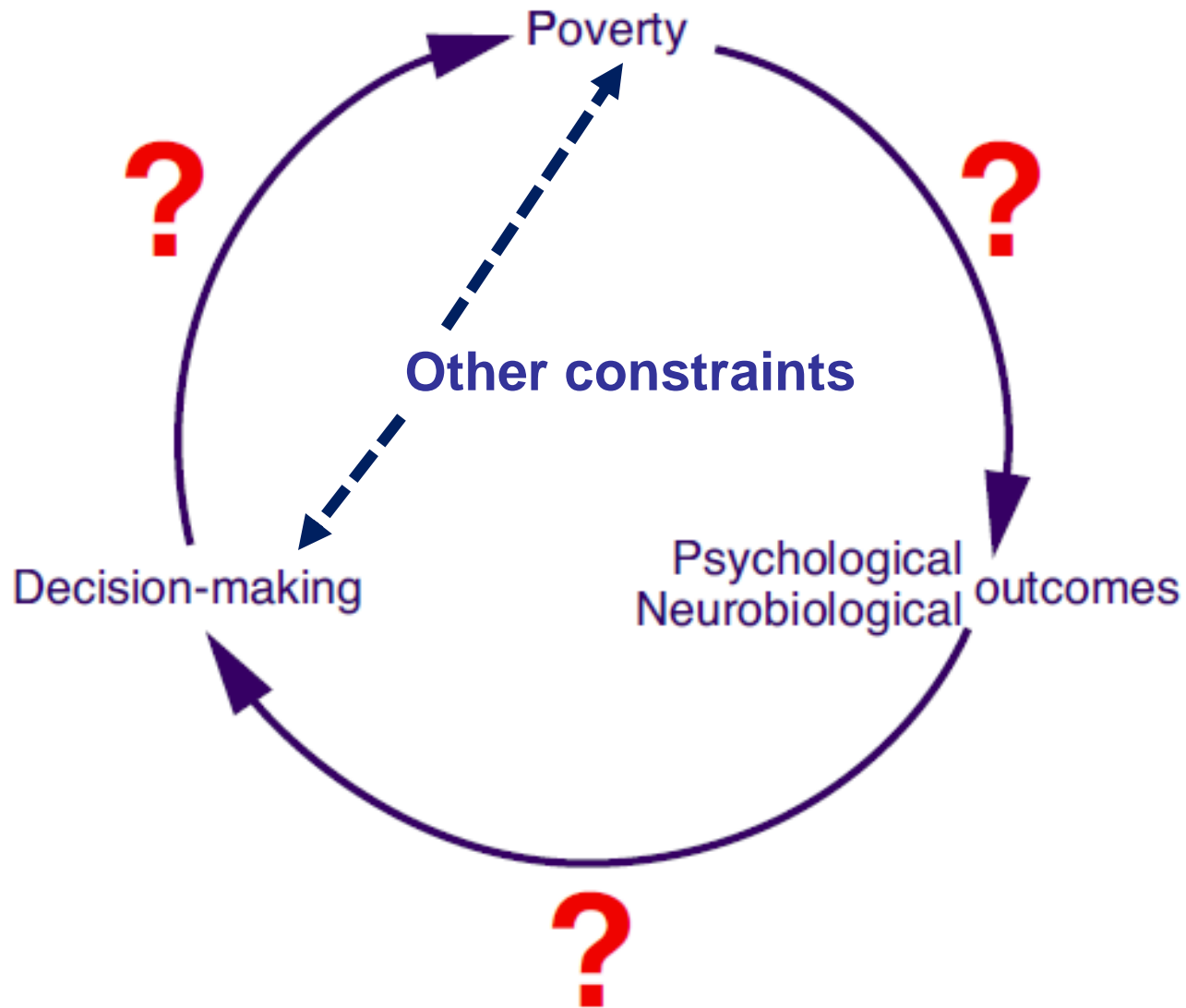
(1) Poverty traps in economic development

- Starting point: is poverty actually associated with lower quality decision-making and more negative affect?
- Haushofer and Fehr (2014) present evidence that it is, drawing on cross-sectional correlations and lab studies.
- But are differences in choices / affect:
 1. Not meaningfully different? (Cappelen et al 2014)
 2. Driven by other constraints facing the poor (i.e., lack of credit), rather than differences in preferences or decision-making quality? (omitted variables)
 3. Themselves the cause of poverty? (endogeneity)

Endogeneity concerns?



Omitted variables?



(1) Poverty traps in economic development

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 3. Themselves the cause of poverty? (endogeneity)
→ Role for randomized **experiments** to establish causality and investigate mechanisms

(2) Mani et al. (2013, *Science*)

- This paper presents the results of two experiments – one in a “lab in the field” (in a NJ mall), and one a natural experiment among Indian farmers (in Tamil Nadu) – that aim to establish how scarcity affects decision-making
- The claim is that in both settings, which are quite disparate, scarcity leads to much worse decision-making
- If convincing, this study would help to establish that poverty leads to worse decision-making
- But it may not alone establish the precise psychological / neurobiological **channels** (discussed below)

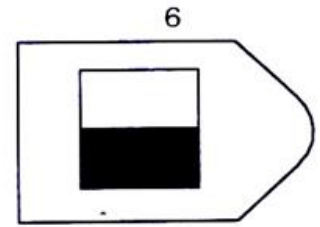
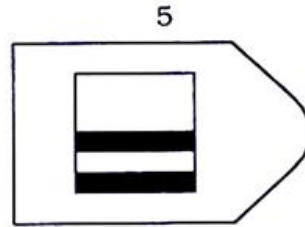
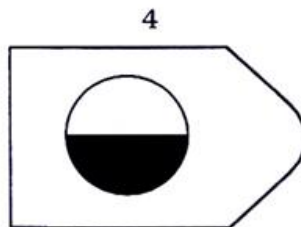
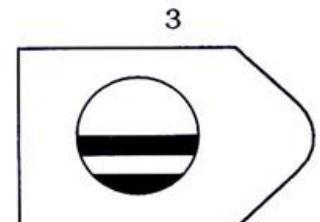
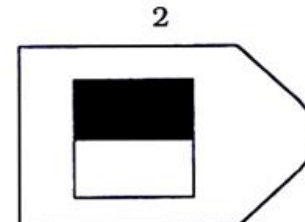
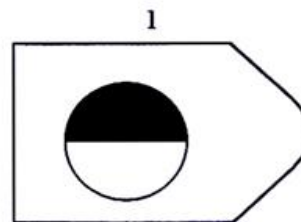
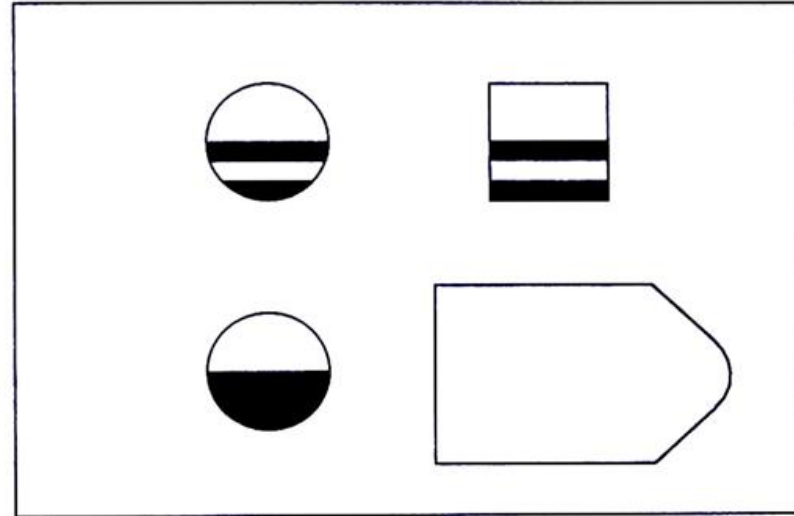
Channel / interpretation?



(2) Mani et al. (2013, *Science*)

- Lab experiments in a NJ mall
- Three closely related experiments presented, each with roughly N=100 subjects
- Two dimensions of cognitive performance measured:
 - 1) Fluid intelligence (Raven's Progressive Matrices)
 - 2) Cognitive control (spatial compatibility task)

Ex., Raven's Progressive Matrices



(2) Mani et al. (2013, *Science*)

- Lab experiments in a NJ mall
- Three closely related experiments presented, each with roughly N=100 subjects
- Two dimensions of cognitive performance measured:
 - 1) Fluid intelligence (Raven's Progressive Matrices)
 - 2) Cognitive control (spatial compatibility task)
- Subjects take the computer-based cognitive function tests after having been “primed” to a situation of financial scarcity (e.g., car needs repairs) – mixed in or at end
- “Easy” condition (\$150 to fix), “Hard” condition (\$1500)
- Subjects divided into Rich/Poor (above/below median income in the sample)

(2) Mani et al. (2013, *Science*)

- Four lab experiments:

1) Standard lab

2) Drops the financial concerns, but keeps the same figures (i.e., \$150, \$1500) to test if “math anxiety” is a cause of the results (which they rule out)

3) Same as 1., but incentivized

4) Same as 1., but all financial scenarios were discussed first and then cognitive performance tests (rather than being mixed throughout)

(2) Mani et al. (2013, *Science*)

- Main result: “rich” subjects’ cognitive performance is roughly unchanged after priming to a “money problem” but poor subjects’ cognitive performance suffers dramatically and significantly
- How large are the magnitudes? Large: equivalent to the impact of losing one night of sleep on cognitive performance, or alcoholics’ average performance versus non-alcoholics (in existing studies), i.e., roughly 13 IQ points
- Are these effects due to stress? Come back to this. (Quick answers: they say no, but maybe so?)

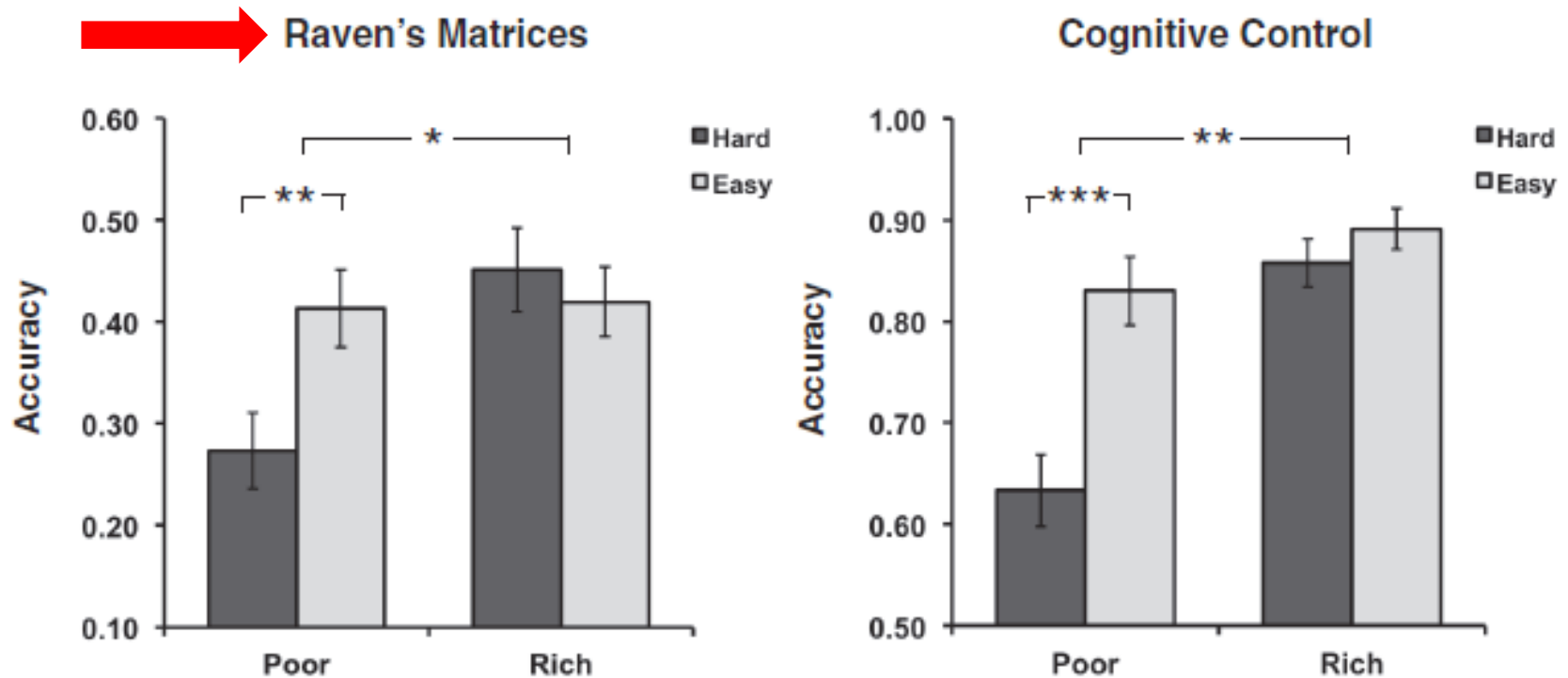


Fig. 1. Accuracy on the Raven's matrices and the cognitive control tasks in the hard and easy conditions, for the poor and the rich participants in experiment 1. (Left) Performance on the Raven's Matrices task. (Right) Performance on the cognitive control task. Error bars reflect ± 1 SEM. Top horizontal bars show two-way interaction (poor versus rich \times hard versus easy). $*P < 0.05$, $P < 0.01$, $***P < 0.001$**

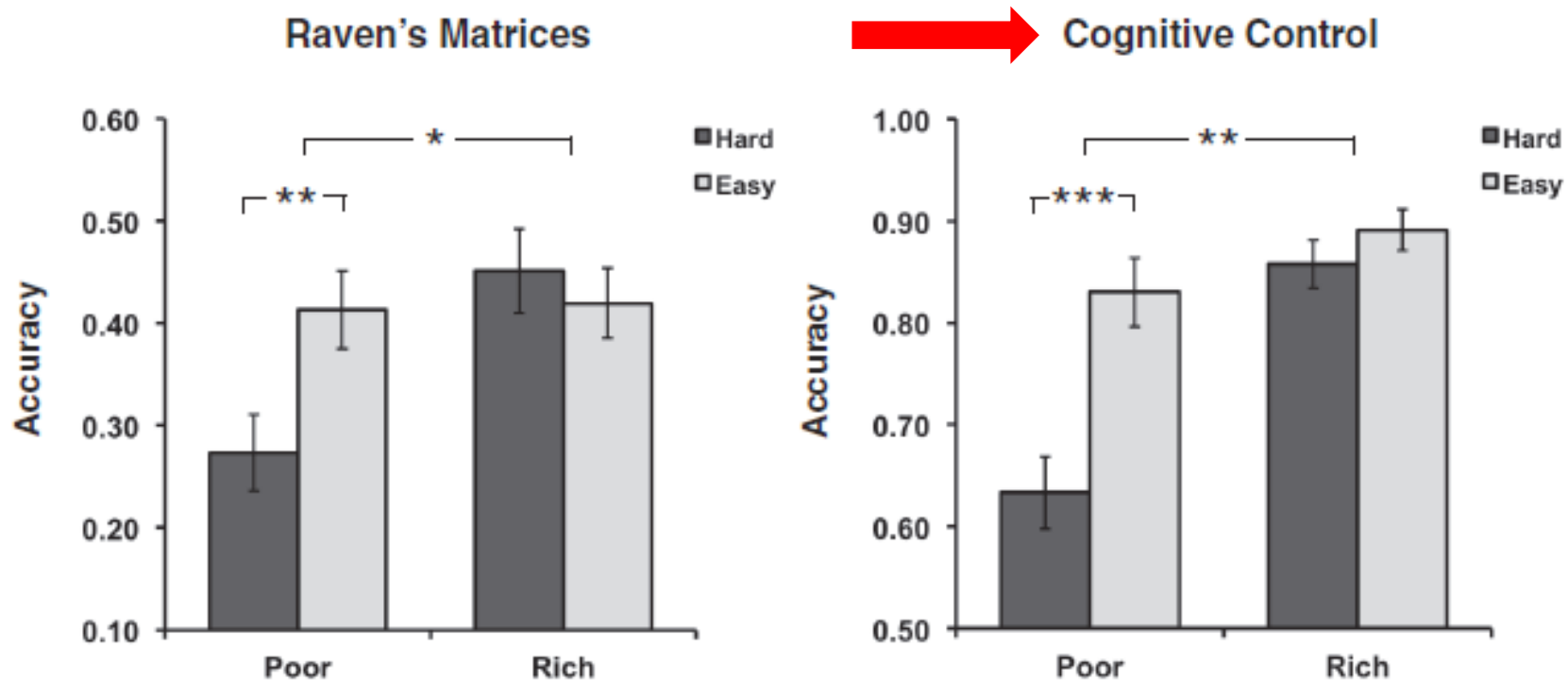
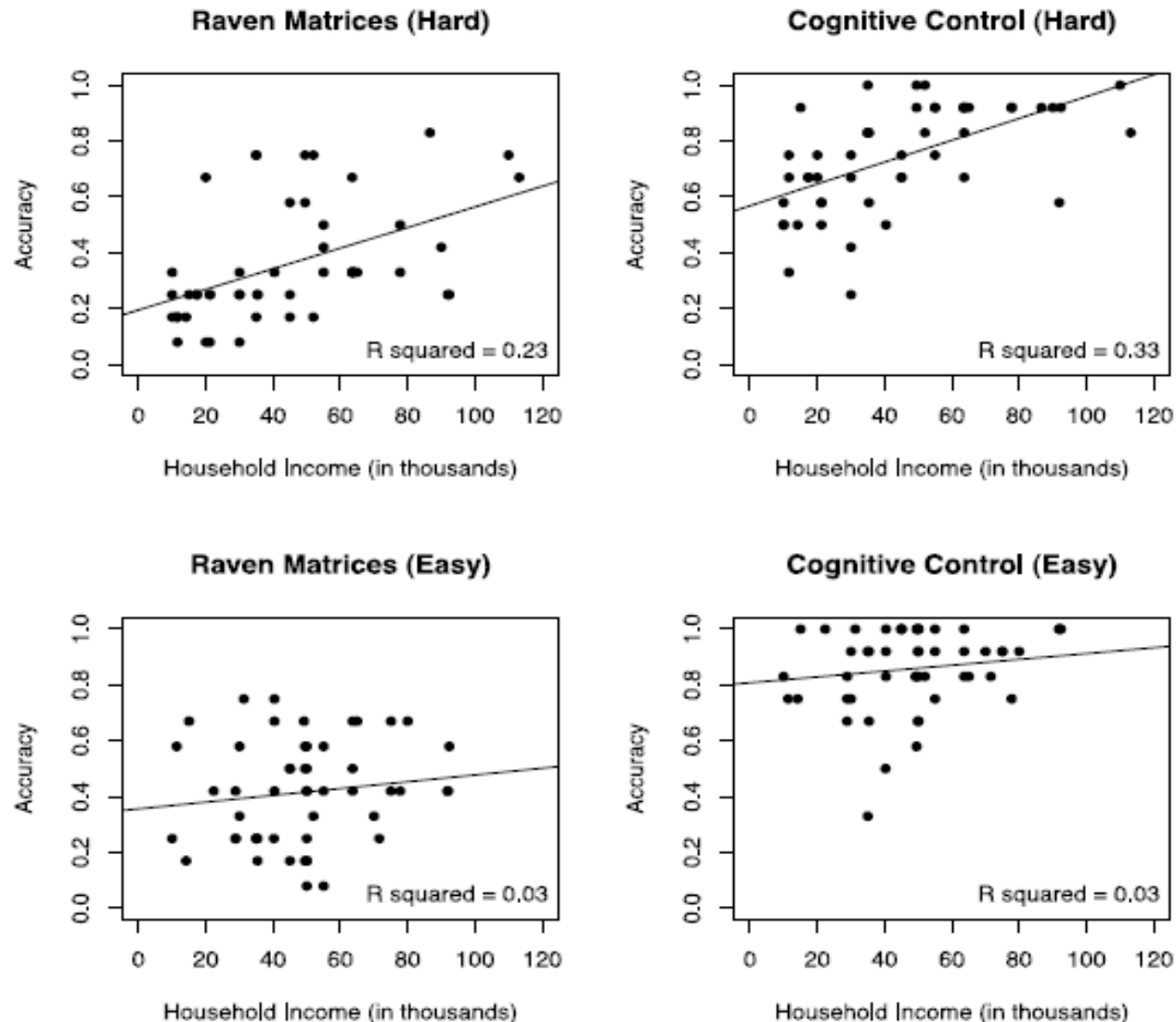


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Raw data (from supplementary appendix) – any concerns?

Fig. S2. Accuracy in the Raven's matrices and cognitive control tasks across participants' household income in the hard and the easy conditions in Experiment 1. The regression line and R^2 of each test in each condition are also presented.



(2) Mani et al. (2013, *Science*)

- In the last few years, academic journals have (finally!) mandated that all datasets and analysis files for published papers be accessible to other scholars
- Why? This allows others to double-check the work for errors, to reproduce the results, and extend the analysis in new directions

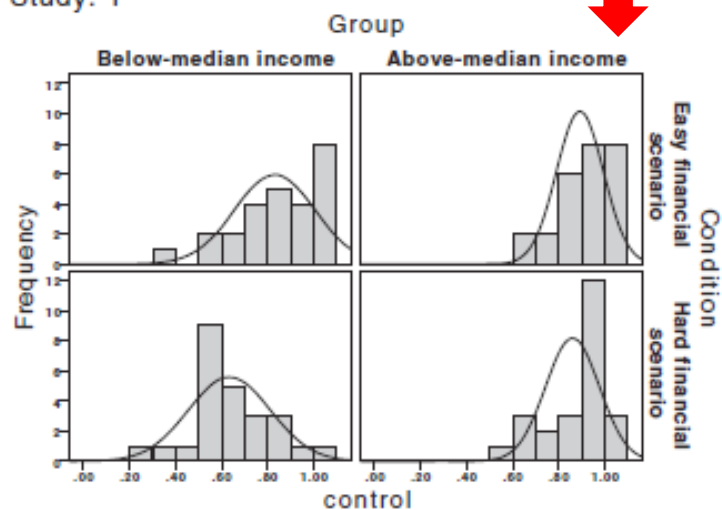
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- Why? This allows others to double-check the work for errors, to reproduce the results, and extend the analysis in new directions
- Wicherts and Scholten (2013) accessed the data, and published a **critique** in *Science* claiming that the interaction between income and test “difficulty” (i.e., a severe financial situation or not) is spurious
- Their main points: i) the interaction fails to hold for a linear income variable, ii) there are “ceiling effects”
- Mani et al (2013) dispute these claims. Your thoughts?

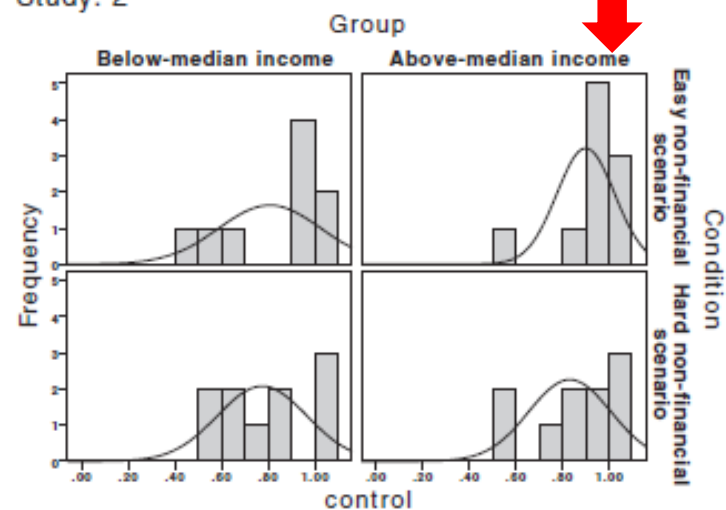
Table 1. Linear regressions of Raven's accuracy on mean-centered income and scenario and the interaction between income and scenario. Income is mean-centered to improve interpretability and avoid multicollinearity. Conditional and unconditional bootstrapping corroborated these results. *B* indicates unstandardized regression weight, with standard error (SE).

Experiment	Predictor	<i>B</i>	SE	<i>t</i>	<i>P</i>
1	Intercept	0.414	0.026	15.98	<0.001
	Hard scenario	−0.042	0.037	−1.13	0.260
	Family income (centered)	0.001	0.001	1.18	0.242
	→ Scenario X family income	0.002	0.001	1.75	0.084
2	Intercept	0.411	0.036	11.40	<0.001
	Hard scenario	−0.032	0.050	−0.63	0.535
	Family income (centered)	0.000	0.002	−0.05	0.964
	→ Scenario X family income	0.002	0.002	1.04	0.308
3	Intercept	0.416	0.033	12.68	<0.001
	Hard scenario	−0.098	0.046	−2.16	0.033
	Family income (centered)	0.001	0.001	1.26	0.209
	→ Scenario X family income	0.002	0.001	0.99	0.323
4	Intercept	0.449	0.031	14.54	<0.001
	Hard scenario	−0.085	0.045	−1.91	0.060
	Family income (centered)	0.001	0.001	1.26	0.211
	→ Scenario X family income	0.002	0.001	1.40	0.164

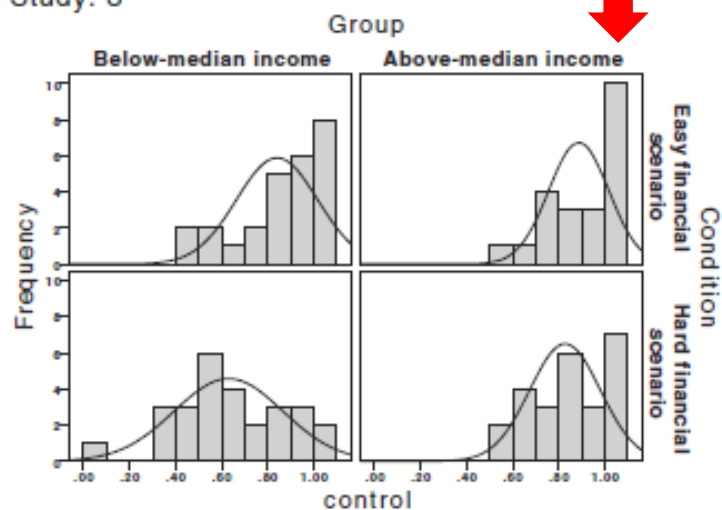
Study: 1



Study: 2



Study: 3



Study: 4

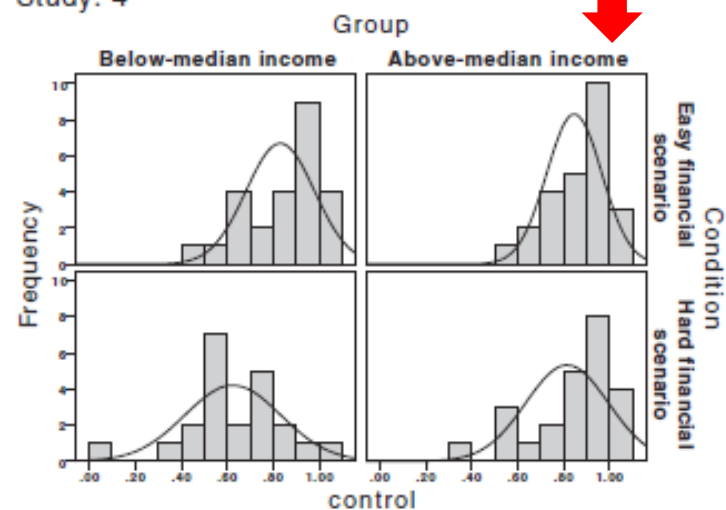


Fig. 1. Histograms of scores on the Cognitive Control test scores for easy and hard scenarios and the above- and below-median income groups in studies 1 to 4 from Mani *et al.*

Mani et al. show that the interaction with linear income is still statistically significant once they pool data across their three “core” experiments (#1, 3, 4).

Table 1. Regression of Raven's accuracy on income and condition. B indicates unstandardized regression weight, with standard error (SE).

Predictor	<i>B</i>	SE	<i>t</i>	<i>P</i>
Intercept	0.358	0.044	8.12	<.001
Condition	−0.181	0.051	−3.55	<.001
Income	0.001	0.001	2.15	0.03
Condition*Income	0.002	0.001	2.35	0.019
Experiment	0.0005	0.009	0.05	0.96

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Was the replication exercise valuable here, or just a waste of everyone’s time? Is there “social value” to the replication even beyond this particular study, i.e., general equilibrium effects?

(2) Mani et al. (2013, *Science*)

- Study sugar cane farmers in Tamil Nadu, India (N=464)
- Simple research design: survey the farmers pre-harvest (when financial anxieties appear to be very high, based on the questionnaire) versus post-harvest
- Why is this not a simple a calendar effect? Due to the crushing capacity of the local sugar cane plants, farmers **stagger their sugar cane crops** throughout the year, allowing Mani et al to include month of year controls
- Use Raven's Matrices for fluid intelligence, and a numeric Stroop task for cognitive control (easier in the field since no computers for data collection)

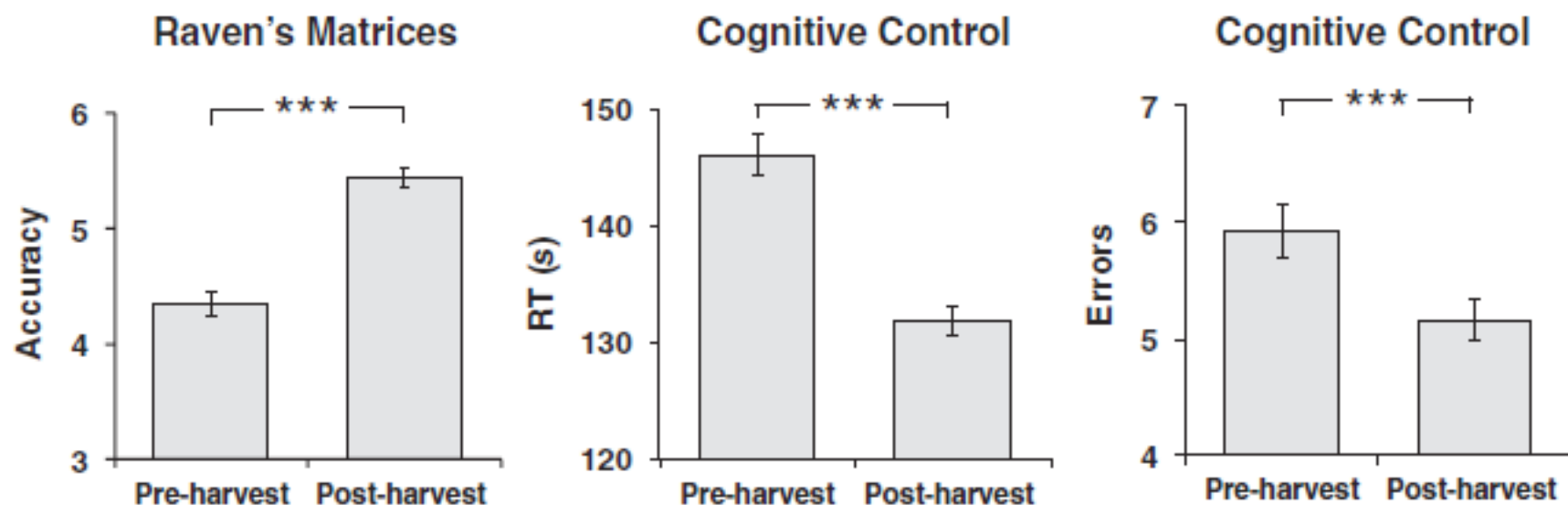


Fig. 4. Accuracy on the Raven's matrices and the cognitive control tasks for pre-harvest and post-harvest farmers in the field study. (Left) Performance on Raven's matrices task. **(Middle and Right)** Stroop task (measuring cognitive control) response times (RT) and error rates, respectively; error bars reflect ± 1 SEM. Top horizontal bars show test for main effect of pre- versus post-harvest ($***P < 0.001$).

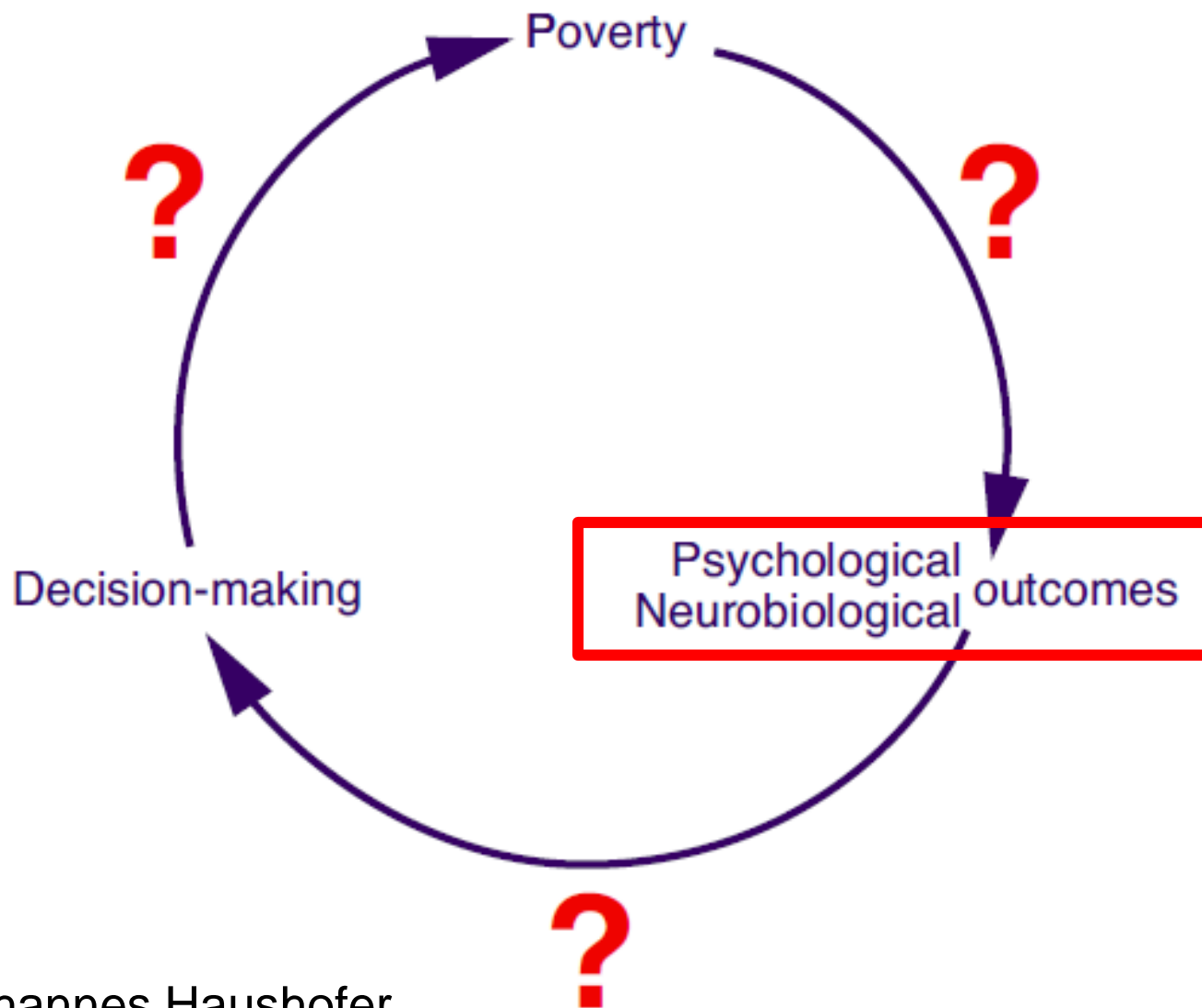
Study #2: Farmers in Tamil Nadu, post-harvest effect (γ):

$$y_{it} = \alpha_i + \beta_t + \gamma \text{PostHarvest}_{it} + \varepsilon_{it}$$

Dependent variable	Full sample: Household + time fixed effects	Subsample: Farmers who completed harvest, but had not received payment
Panel B		
Raven's accuracy (Min = 0; max = 10)	Column 1 1.367*** [0.256]	Column 2 1.321*** [0.274]
Observations	920	624
Mean: 4.9 (4.35 pre-harvest, 5.45 post-harvest)		
Stroop-time taken (In seconds)	-30.582*** [5.923]	-32.319*** [6.208]
Observations	904	618
Mean: 138.94 (146.05 pre, 131.83 post-harvest)		
Stroop-number of errors	-1.818*** [0.566]	-1.937*** [0.588]
Observations	906	620
Mean: 5.55 (5.93 pre, 5.16 post-harvest)		

(2) Mani et al. (2013, *Science*)

- What mechanism is behind these results? Critical for the study, but not fully resolved.



Source: Johannes Haushofer

(2) Mani et al. (2013, *Science*)

- What mechanism is behind these results? Critical for the study, but not fully resolved. Possibilities:
 - 1) Nutritional status (recorded food consumption)
 - 2) Anxiety over crop yield (resolved pre-payment?)
 - 3) Current physical exertion (resolved pre-payment?)
 - 4) Stress (proxies: heart rate, blood pressure – sufficient?)
 - 5) Training effects on the tests (subgroup without baseline)

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- ~~5) Training effects on the tests (subgroup without baseline)~~
- 6) Affective state
- 7) Attentional capture (their preferred explanation)**
- 8) Other channels?

indirect evidence

(2) Mani et al. (2013, *Science*)

- What are the implications of these findings?
- Governments and NGOs should be more careful about imposing “cognitive taxes” on the poor, given that they are already over-stretched on this dimension
- Programs with simple forms, defaults, reminders, and help enrolling can be particularly effective
- When more cognitively demanding tasks are needed (i.e., learning about new agricultural technologies), their introduction should be carefully timed to when individuals have more “peace of mind”, i.e., post-harvest.
- Other implications?

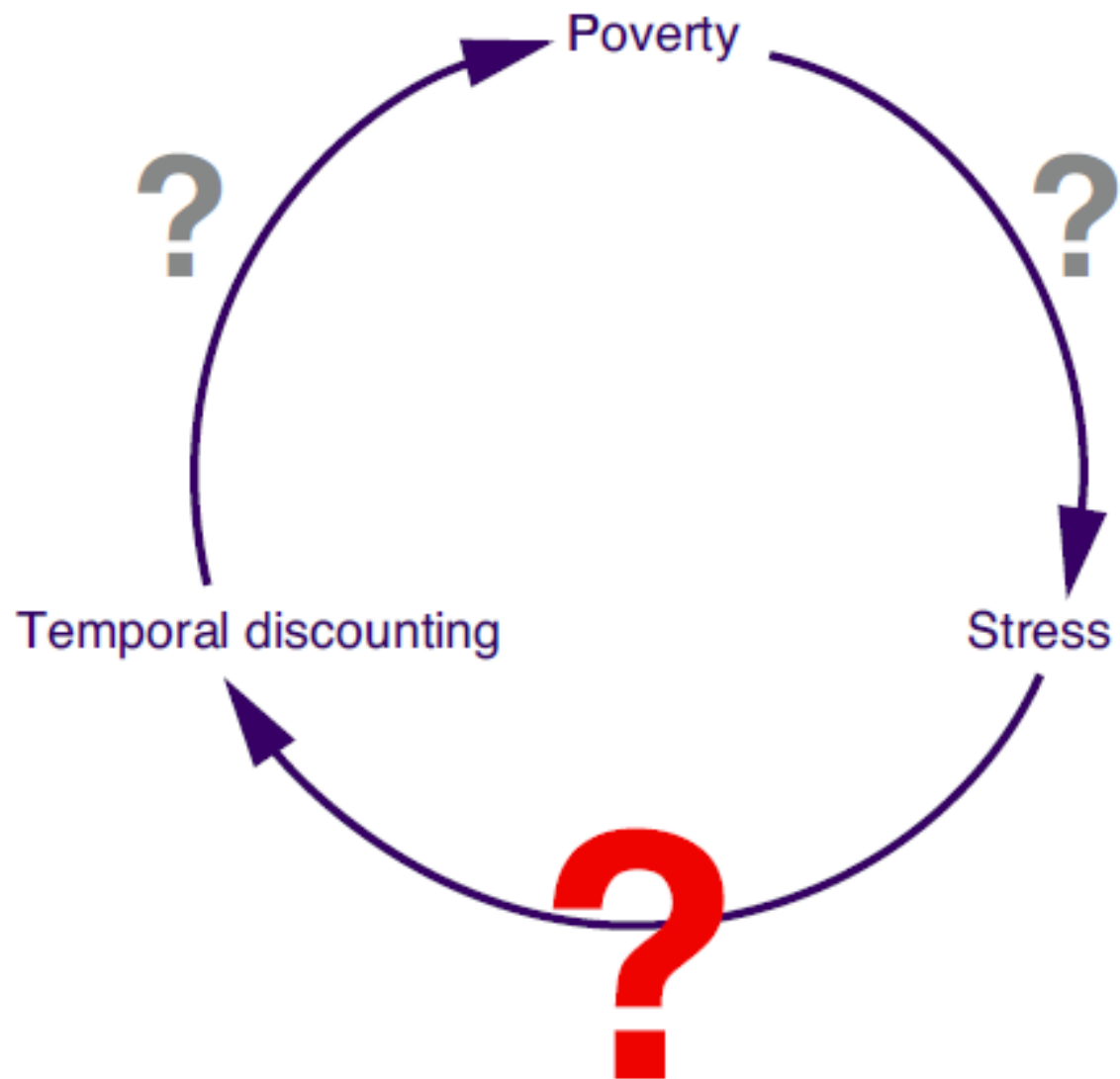
(3) Haushofer and Shapiro (2013, working paper)

- Focus on **stress** as a possible channel linking poverty to poor economic decision-making
- Measured through both **cortisol** (a biomarker, not subject to experimenter demand effects) and a detailed survey assessment (the Cohen Perceived Stress Scale)
- Elevated cortisol correlates with depression, and may also have adverse long-run health consequences

(3) Haushofer and Shapiro (2013, working paper)

- Focus on **stress** as a possible channel linking poverty to poor economic decision-making
- Measured through both **cortisol** (a biomarker, not subject to experimenter demand effects) and a detailed survey assessment (the Cohen Perceived Stress Scale)
- Elevated cortisol correlates with depression, and may also have adverse long-run health consequences
- Two interesting and open research questions:
 - 1) **Does poverty cause stress / elevated cortisol?**
 - 2) Does elevated cortisol affect decision-making? (another study by Haushofer and co-authors)





(3) Haushofer and Shapiro (2013)

- Randomized experiment of impact of an unconditional cash transfer, through NGO “GiveDirectly” on a range of economic and psychological outcomes in rural Kenya
- GiveDirectly has been high-profile in recent years for their approach of using mobile money applications to transfer cash to poor households

(3) Haushofer and Shapiro (2013)

- Notable study features:

1. Medium sample size (N=1,440 households) *2,000 people*
2. Two transfer levels, “small” US\$404 (3 months earnings), large US\$1,520 (10 months earnings)
3. Design allows for estimation of “spillover” effects among untreated households in treatment villages

(3) Haushofer and Shapiro (2013)

T C

Treatment
villages

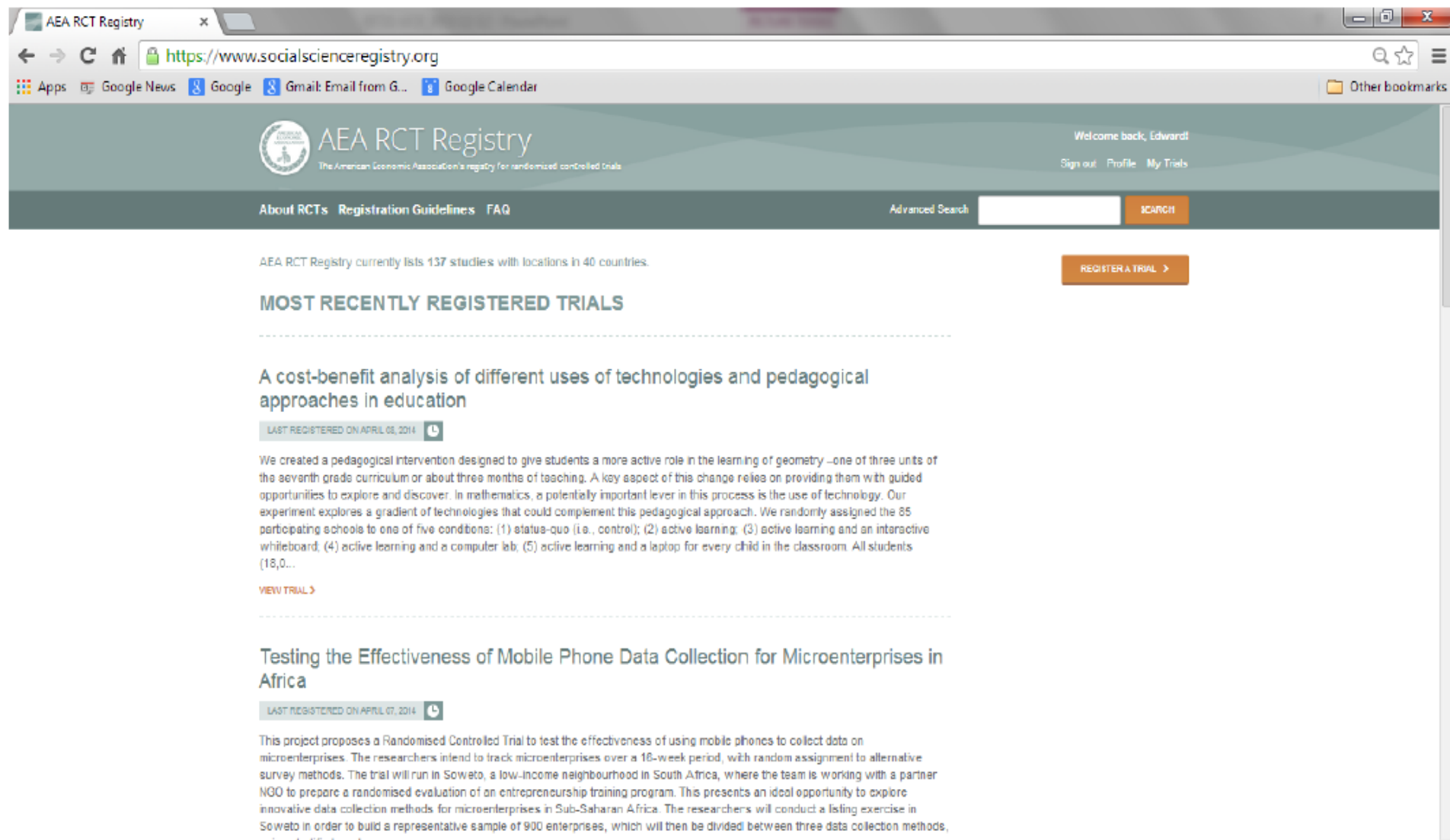
Control
villages



(3) Haushofer and Shapiro (2013)

- Notable study features:
 1. Medium sample size (N=1,440 households)
 2. Two transfer levels, “small” US\$404 (3 months earnings), large US\$1,520 (10 months earnings)
 3. Design allows for estimation of “spillover” effects among untreated households in treatment villages
 4. High take-up of treatment (as expected) and low attrition rates over time
 5. Very rich collection of stress biomarker data (cortisol) for a field study, as well as survey data
 6. Unusual feature: publicly registered a **pre-analysis plan** before analyzing data. Why? With so many outcomes, concern about a focus on false positives.

(3) Haushofer and Shapiro (2013)



The screenshot shows the AEA RCT Registry website in a web browser. The browser's address bar displays the URL <https://www.socialscienceregistry.org>. The website header includes the AEA RCT Registry logo and the text "The American Economic Association's registry for randomized controlled trials". A navigation bar contains links for "About RCTs", "Registration Guidelines", and "FAQ". A search bar with the text "Advanced Search" and a "SEARCH" button is also present. The main content area features a "MOST RECENTLY REGISTERED TRIALS" section. The first trial listed is "A cost-benefit analysis of different uses of technologies and pedagogical approaches in education", which was last registered on April 03, 2014. The description of this trial mentions a pedagogical intervention for seventh-grade mathematics. The second trial listed is "Testing the Effectiveness of Mobile Phone Data Collection for Microenterprises in Africa", last registered on April 07, 2014. The description of this trial mentions a Randomised Controlled Trial to test the effectiveness of using mobile phones for data collection in South Africa.

AEA RCT Registry currently lists 137 studies with locations in 40 countries.

[REGISTER A TRIAL >](#)

MOST RECENTLY REGISTERED TRIALS

A cost-benefit analysis of different uses of technologies and pedagogical approaches in education

LAST REGISTERED ON APRIL 03, 2014

We created a pedagogical intervention designed to give students a more active role in the learning of geometry—one of three units of the seventh grade curriculum or about three months of teaching. A key aspect of this change relies on providing them with guided opportunities to explore and discover. In mathematics, a potentially important lever in this process is the use of technology. Our experiment explores a gradient of technologies that could complement this pedagogical approach. We randomly assigned the 85 participating schools to one of five conditions: (1) status-quo (i.e., control); (2) active learning; (3) active learning and an interactive whiteboard; (4) active learning and a computer lab; (5) active learning and a laptop for every child in the classroom. All students (18,0...

[VIEW TRIAL >](#)

Testing the Effectiveness of Mobile Phone Data Collection for Microenterprises in Africa

LAST REGISTERED ON APRIL 07, 2014

This project proposes a Randomised Controlled Trial to test the effectiveness of using mobile phones to collect data on microenterprises. The researchers intend to track microenterprises over a 18-week period, with random assignment to alternative survey methods. The trial will run in Soweto, a low-income neighbourhood in South Africa, where the team is working with a partner NGO to prepare a randomised evaluation of an entrepreneurship training program. This presents an ideal opportunity to explore innovative data collection methods for microenterprises in Sub-Saharan Africa. The researchers will conduct a listing exercise in Soweto in order to build a representative sample of 900 enterprises, which will then be divided between three data collection methods,

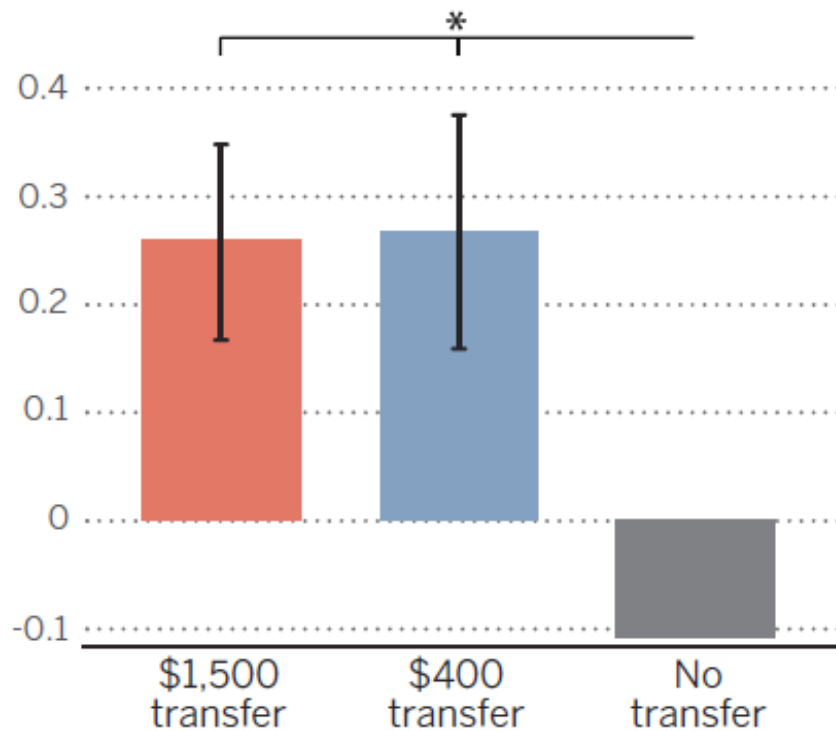
(3) Haushofer and Shapiro (2013)

- Unsurprisingly, total consumption increased dramatically among households receiving the income transfers
- No increase in “vice” goods, such as purchases of alcohol or tobacco (actually slight declines), and a drop in reported domestic violence
- On the psychological dimension, consistent gains across multiple measures of mental wellbeing

(3) Haushofer and Shapiro (2013)

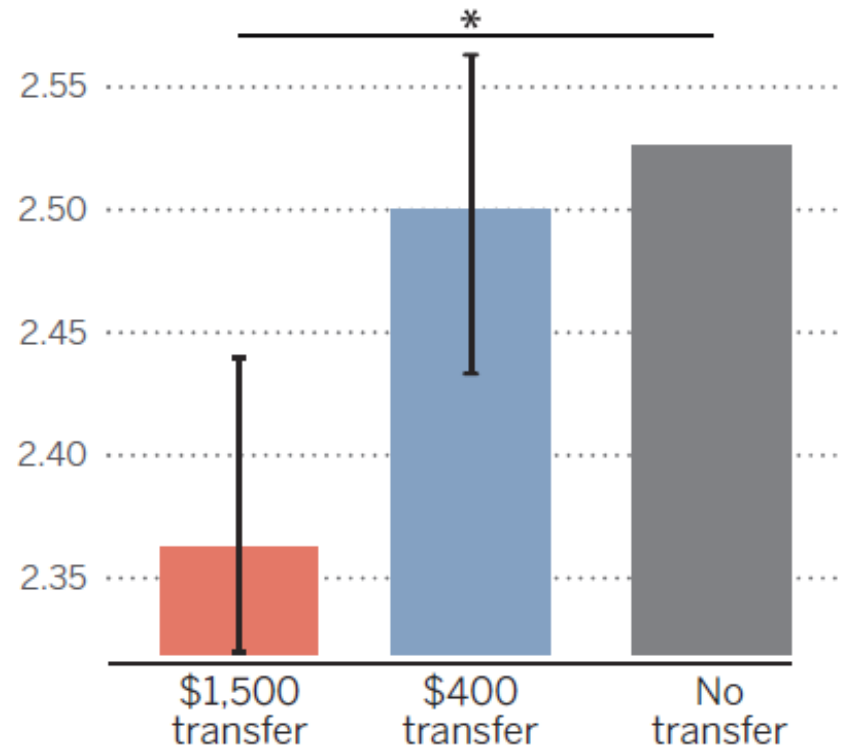
C

Happiness (z-score)



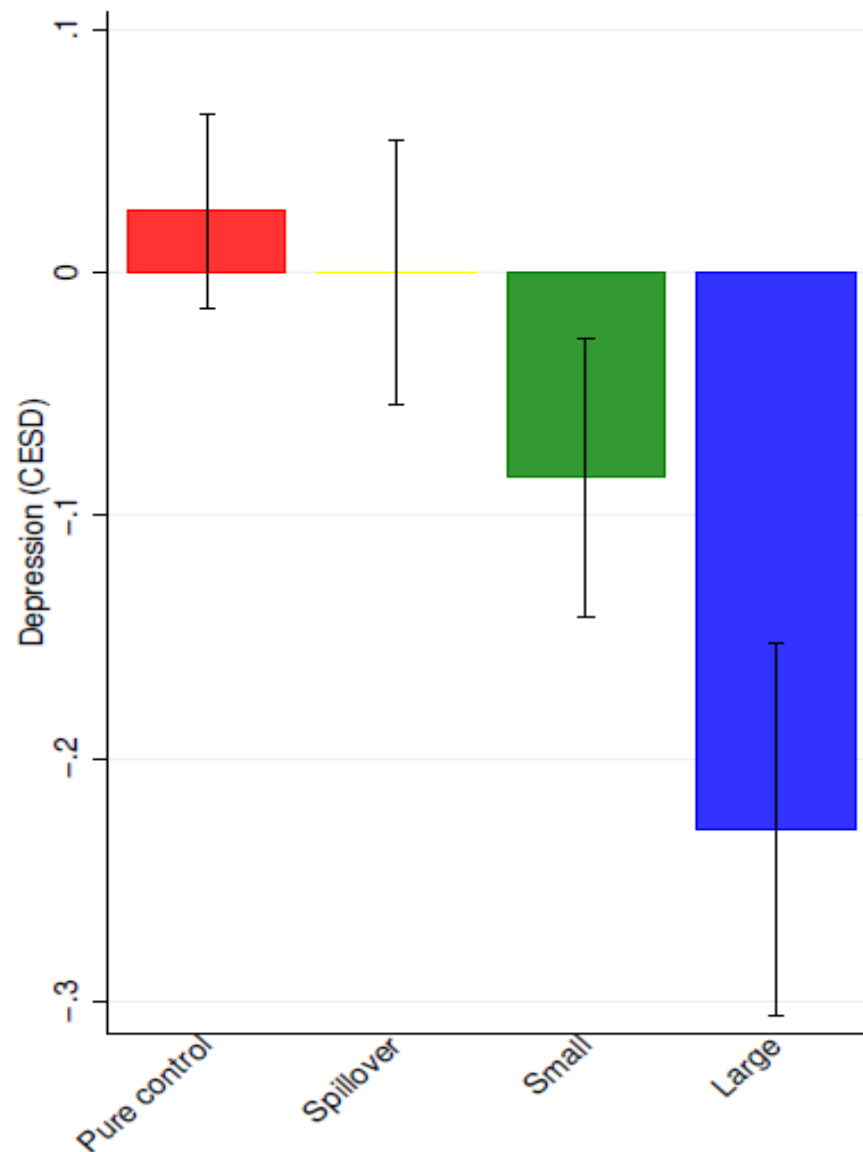
D

Cortisol (log nmol/l)



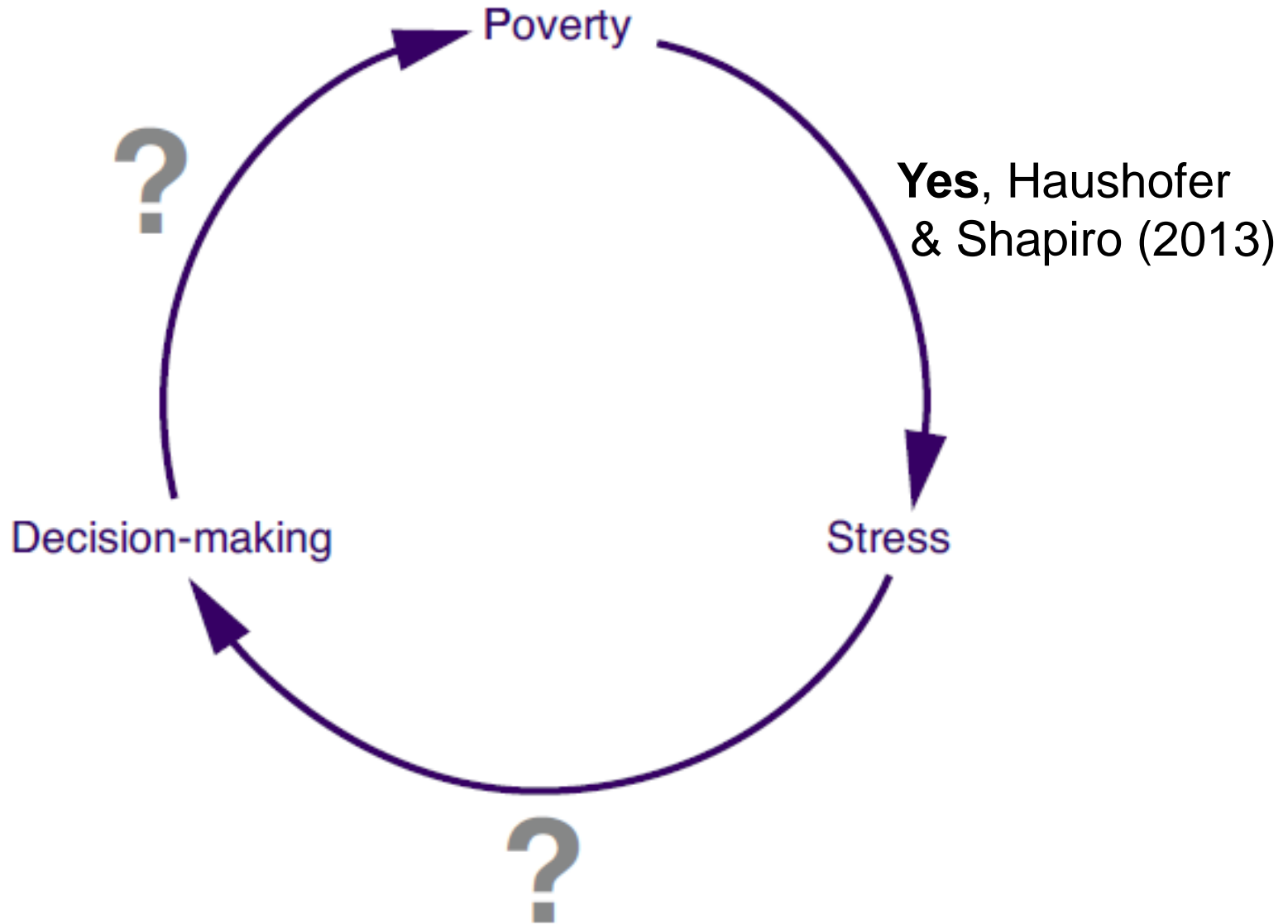
Source: Haushofer and Fehr (2014)

(3) Haushofer and Shapiro (2013)



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- On the psychological dimension, consistent gains across multiple measures of mental wellbeing
- The bottom line: an experimentally induced reduction in household poverty leads to large increases in individual affect and reductions in stress.



(4) Chemin et al. (2013, working paper)

- Study related question also in Kenya, using variation in **rainfall as a natural experiment** that greatly affects farmer incomes. Farmers who rely solely on agriculture (N=203), farmers with other income sources (N=77)
- As a placebo check, test whether rainfall variation also affects cortisol / stress among non-farmers (i.e., could weather simply affect mood, affect?). Urban informal workers in Nairobi (N=897)
- Use disaggregated high-resolution satellite rainfall data (from FEWSNet)

(4) Chemin et al. (2013, working paper)

- Methodology:

First, to assess the impact of annual rainfall on the Kianyaga sample relative to the Nairobi sample, we estimate the following equation:

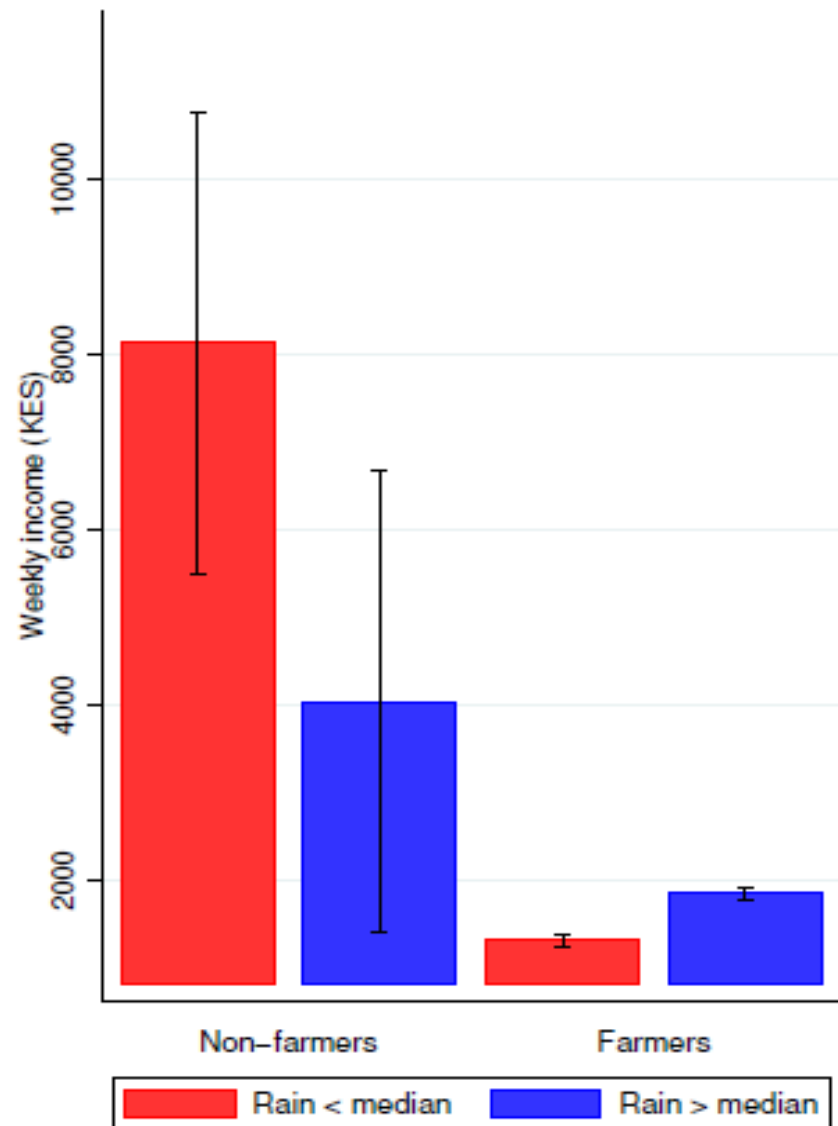
$$\ln(cort)_{it} = \beta_0 + \beta_1 R_{it-1} \times K_i + \beta_2 R_{it-1} + \beta_3 K_i + \gamma \mathbf{X}_{it} + \alpha_s + \theta_t + \varepsilon_{it} \quad (3)$$

where R_{it-1} is annual past rainfall for individual i , K_i is a dummy variable indicating whether individual i is a Kianyaga respondent (=1) or not, and \mathbf{X}_{it} is a set of individual characteristics that affect cortisol levels. Salivary cortisol levels are subject to a number of confounds; in particular, eating, drinking coffee, tea, or alcohol, consuming miraa (khat), and engaging in strenuous physical activity can bias cortisol levels; we therefore control for these variables in each of the estimations. To this end, participants answered whether they engaged in any of these activities earlier on the day of the interview, and a dummy variable was created for each activity. Further, α_s captures sublocation fixed effects and θ_t captures month fixed effects.

(4) Chemin et al. (2013, working paper)

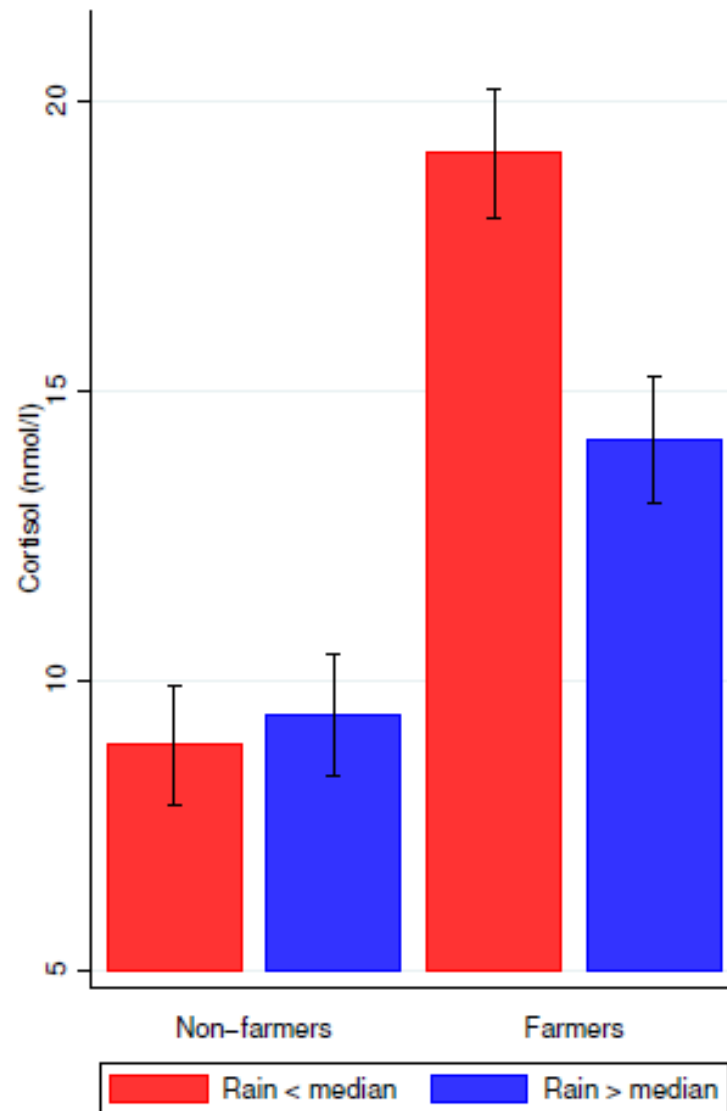
- Methodology:
- Limitation: lack of panel data on individuals.
- Instead rely on cross-sectional variation, with location and time fixed effects, and individual controls (e.g., gender, age, education)
- How convincing is this identification strategy?
- Any advantages over the GiveDirectly evaluation?

Low rainfall has a much more adverse effect among farmers than non-farmers in Kenya



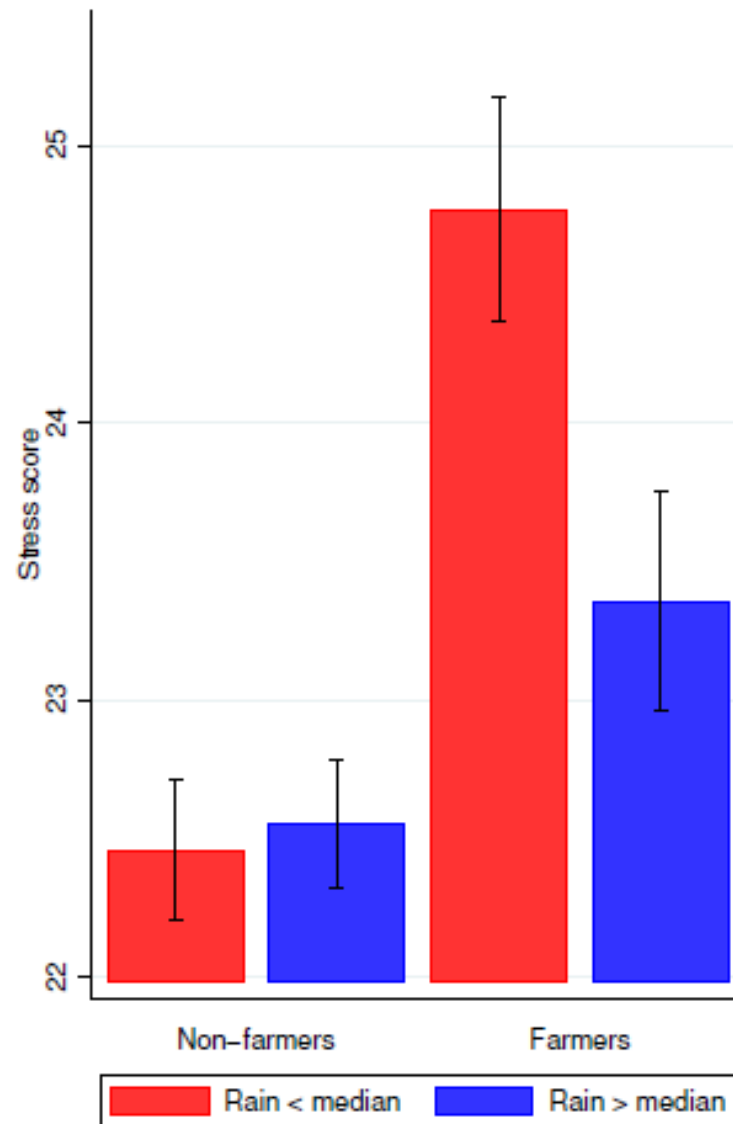
Interaction: $p < 0.05$

Low rainfall raises cortisol levels among farmers but not among non-farmers in Kenya



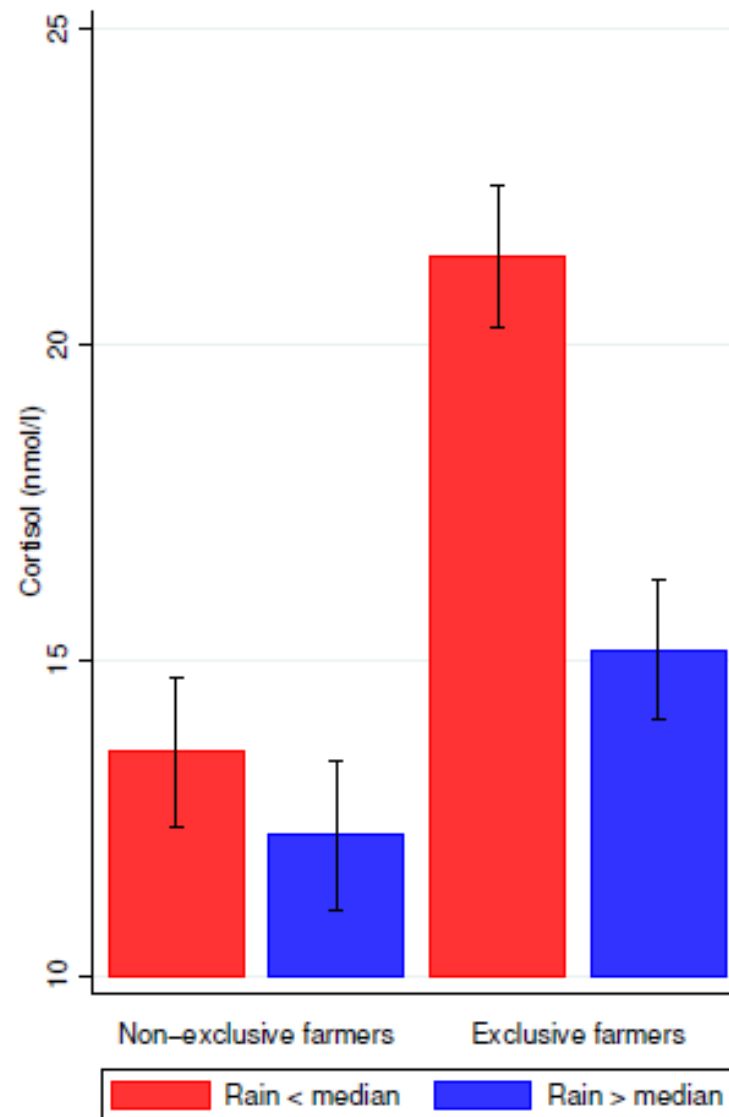
Interaction: $p < 0.05$

Low rainfall raises stress levels as captured in surveys among farmers but not among non-farmers in Kenya



Interaction: $p < 0.05$

Low rainfall raises cortisol levels more among exclusive farmers than among non-exclusive farmers



Interaction: $p < 0.05$

(4) Chemin et al. (2013, working paper)

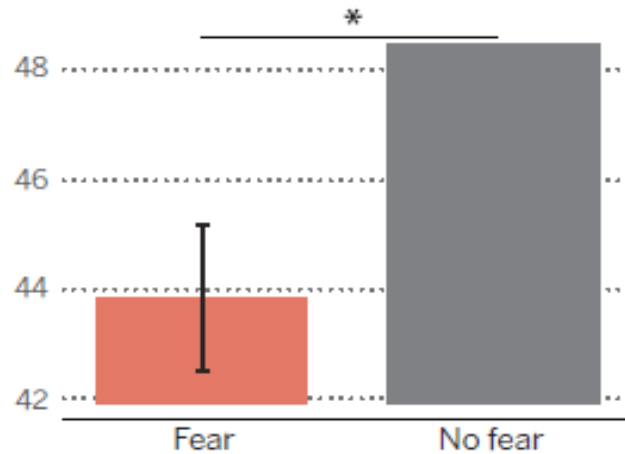
- This is a “narrow” study – but it is a further step forward (together with Haushofer and Shapiro 2013) in building evidence on the link between poverty and a potentially key psychological channel, stress
- The use of biomarkers (cortisol) together with rich survey assessments of stress in both studies is exceptional

(5) Next steps

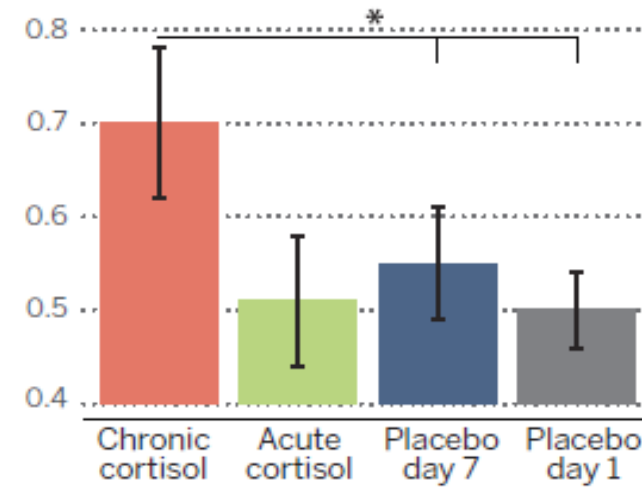
- These studies have started to fill in some of the causal “arrows” on the original diagram
- Recent work is filling in other gaps:
- Pharmacological elevation of cortisol levels (associated with stress) in the lab increases inter-temporal discounting (Cornelisse, van Ast, Haushofer et al., 2013)
- Other work shows that manipulation of cortisol levels affects risk attitudes, and that inducing feelings of fear or sadness also affect discount factors and risky investment choices

A

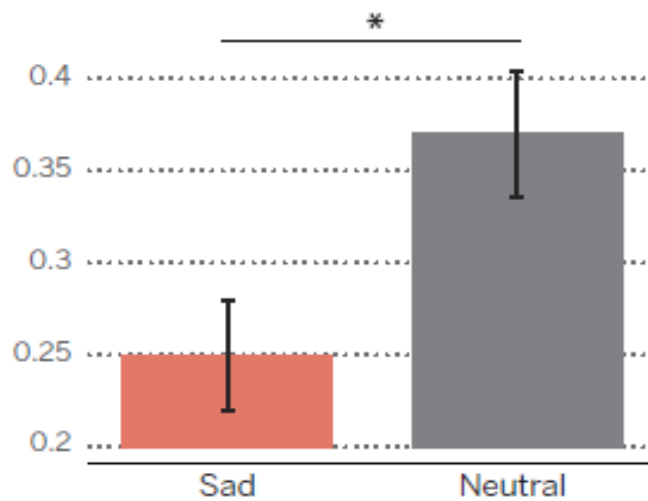
Risky investment

**B**

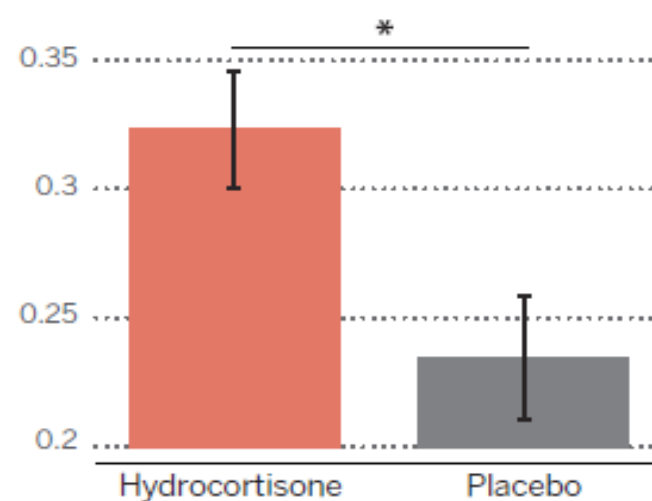
Coefficient of relative risk aversion

**C**

Discount factor

**D**

Impatient choices



Source: Haushofer
and Fehr (2014)



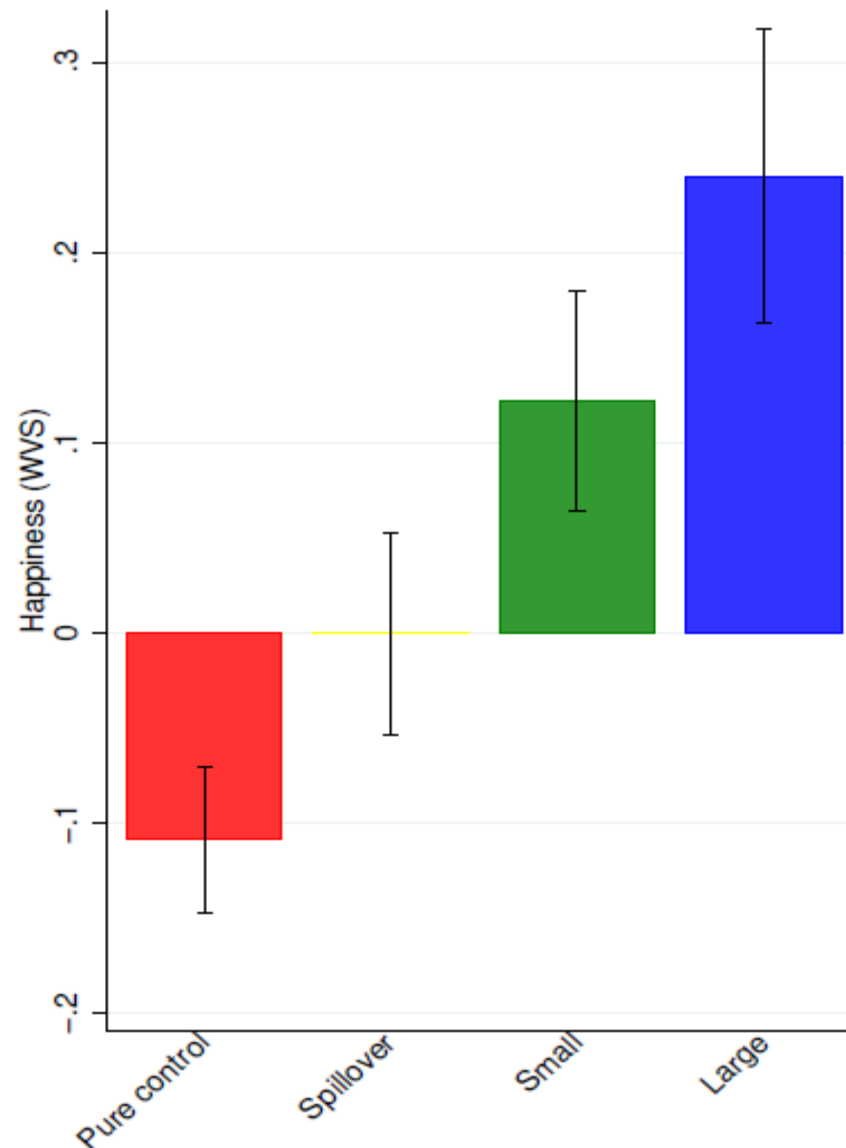
Yes, Haushofer and Fehr (2014)



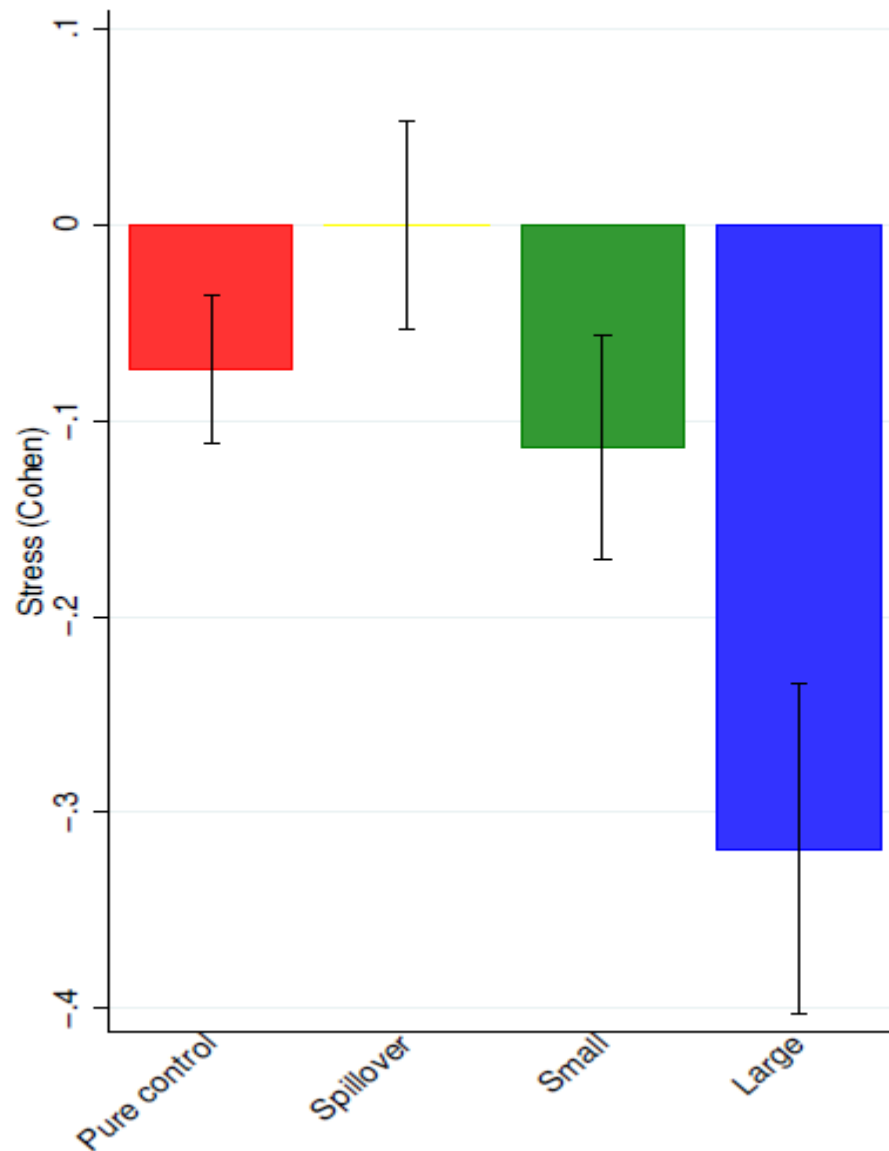
Source: Johannes Haushofer

Whiteboard

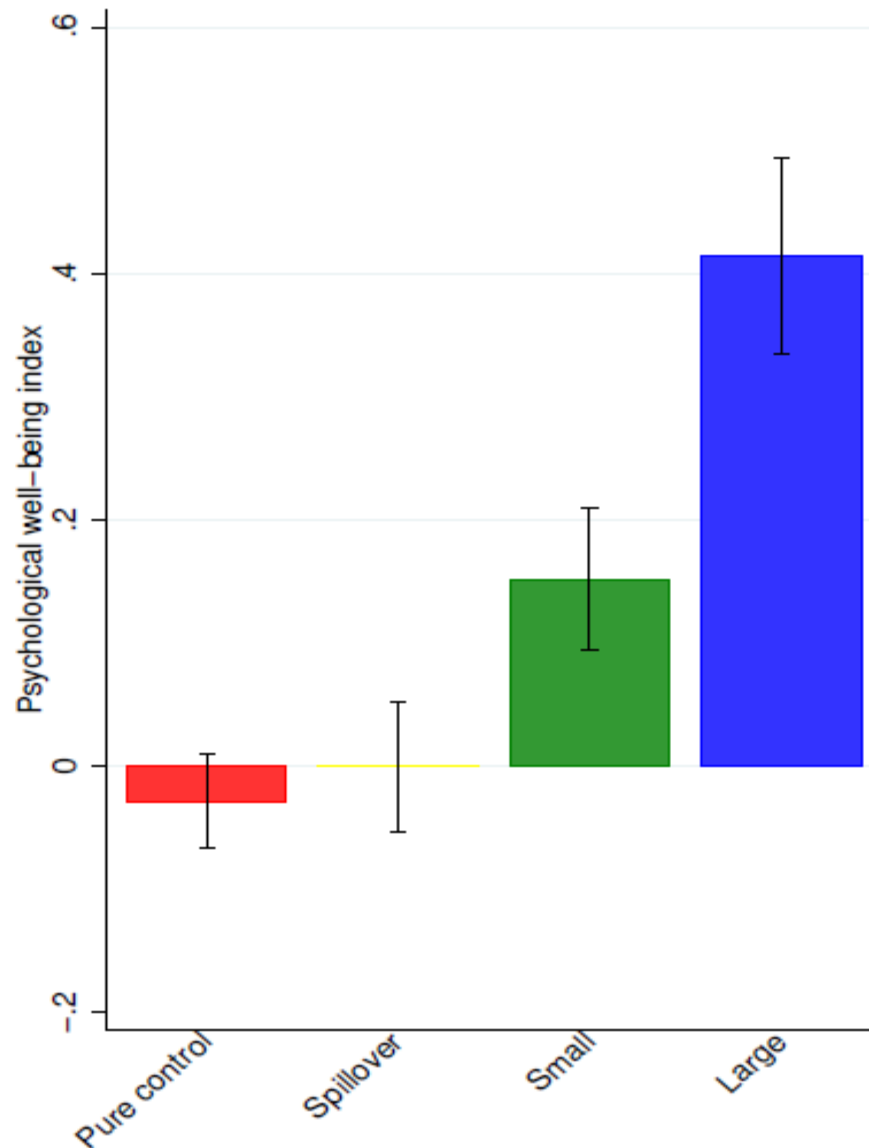
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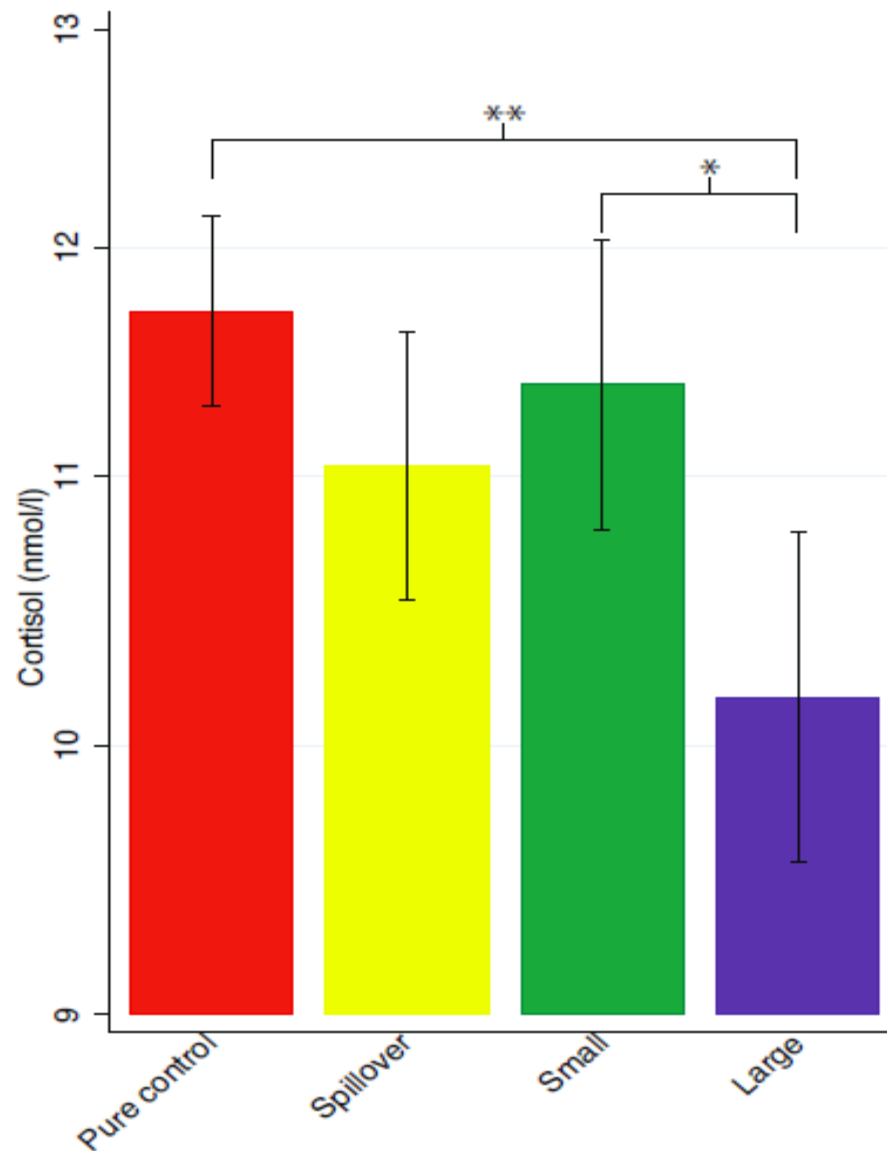


Table 4: Effect of past annual rainfall on cortisol levels: Kianyaga & Nairobi samples

	Naive & CGM p-values		Conley p-values	
	(1)	(2)	(3)	(4)
→ Past annual rainfall x Kianyaga	-0.008** (0.002)	-0.009** (0.002)	-0.009*** (0.003)	-0.009*** (0.001)
Past annual rainfall (mm)	0.002 (0.002)	0.002 (0.002)	0.002** (0.001)	0.002** (0.001)
Cortisol controls	No	Yes	Yes	Yes
Farmer controls	No	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Sublocation FE	Yes	Yes	Yes	Yes
Observations	1176	1172	1172	1172
Cluster level	Sublocation	Sublocation	Conley	Conley
No. of clusters or Conley cutoff	6	6	.1 deg	1 deg
Wild cluster bootstrap p-value	0.055	0.072		

Notes: OLS estimates of effect of rainfall on cortisol levels in Kianyaga and Nairobi. * significant at 10%; ** significant at 5%; *** significant at 1%. In all columns, the dependent variable is the natural log of cortisol levels (in nmol/l), taken at a random time of day. Cortisol controls include dummies for recent eating, smoking, drinking coffee or tea, performing intense physical activity, taking medication, chewing miraa earlier on the same day, and time since waking. Farmer control variables are: household size, acres of land, fraction of land irrigated, land inputs (KES), days of work on plot, household head owner of plot (1=Yes). Month fixed effects and sublocation fixed effects are always included. In columns (1) and (2), standard errors are heteroskedasticity-robust and clustered at the sublocation level; the Nairobi sample is considered a single sublocation. Because the specifications in columns (1) and (2) have a small number of clusters, we computed wild bootstrap clustered p -values following Cameron et al. (2008), using 1000 iterations for each p -value. These p -values are shown in the last row of the table for these specifications. In columns (3)-(4), we instead compute Conley spatial standard errors to account for spatial correlation in the data; column (3) uses a cutoff of .1 deg, which at this distance from the equator corresponds to 11 km; column (4) uses 1 degree or 110 km.



Next week

- For next week's lecture, please focus on the Jensen (2010), Duflo (2001), and Krueger and Lindahl (2001) articles.
- The first referee report is due next week (February 9th), on the Frank Schilbach article.