Psychology and Neurobiology of Poverty

Johannes Haushofer

Princeton


Lay's
Wavy
Coke
TEXAS
Gwaltney

Poverty in numbers

	USA	Sub-Saharan Africa
Life expectancy (years)	79	56
Under-5 mortality (/1000 live births)	7	98

Randomized Controlled Trials for Poverty Alleviation

Approach: random assignment to treatment vs. control groups allows identification and unbiased estimation of treatment effects of social programs

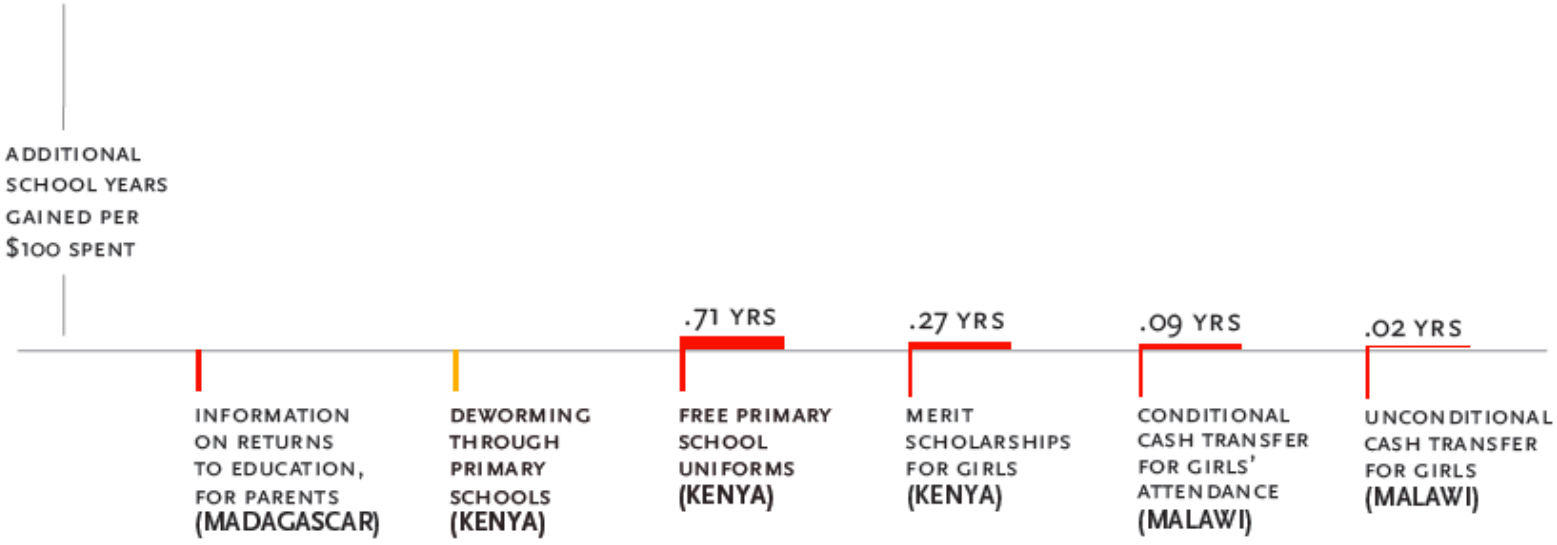
Michael Kremer

Esther Duflo

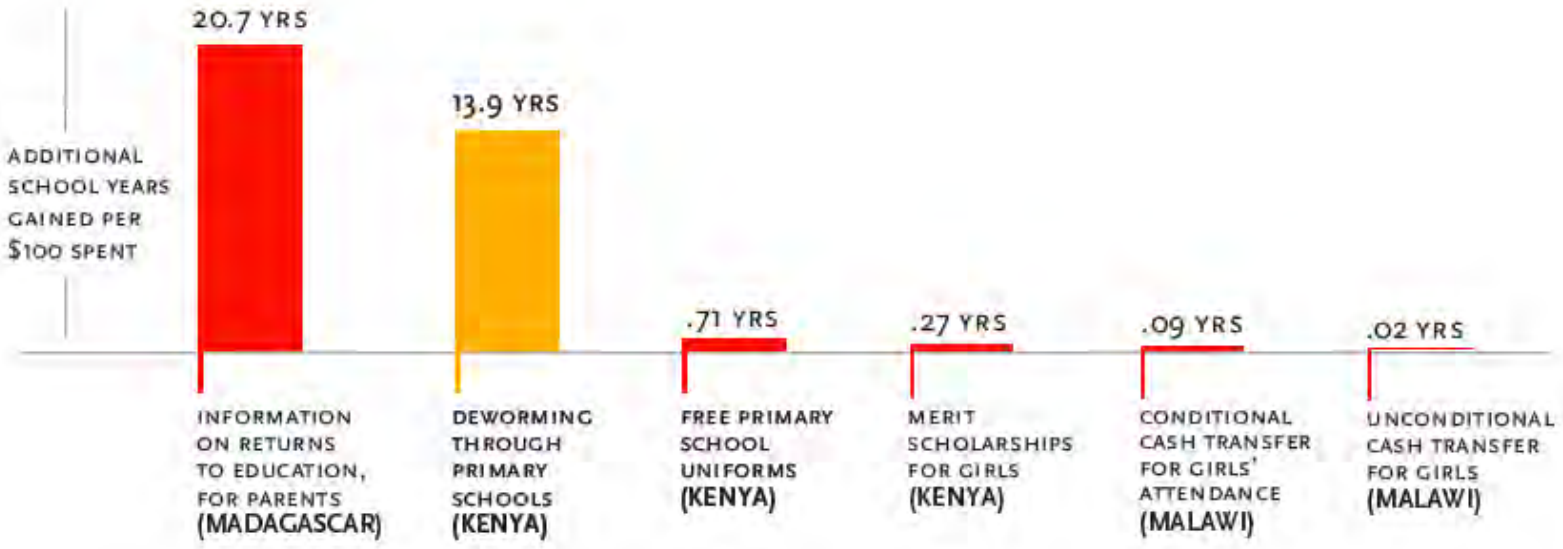
ABDUL LATIF JAMEEL
Poverty Action Lab
TRANSLATING RESEARCH INTO ACTION

ipa
INNOVATIONS FOR POVERTY ACTION

Randomized Controlled Trials



Randomized Controlled Trials



Goals

- Interventions at the behavioral level can have significant welfare benefits

Goals

- Interventions at the behavioral level can have significant welfare benefits
- More systematic use of psychology could...
  - inform design of poverty alleviation programs

Goals

- Interventions at the behavioral level can have significant welfare benefits
- More systematic use of psychology could...
  - inform design of poverty alleviation programs
  - generate insights about cognitive and behavioral architecture of poverty

Goals

- Interventions at the behavioral level can have significant welfare benefits
- More systematic use of psychology could...
  - inform design of poverty alleviation programs
  - generate insights about cognitive and behavioral architecture of poverty
  - extend the scope of psychology to non-WEIRD populations

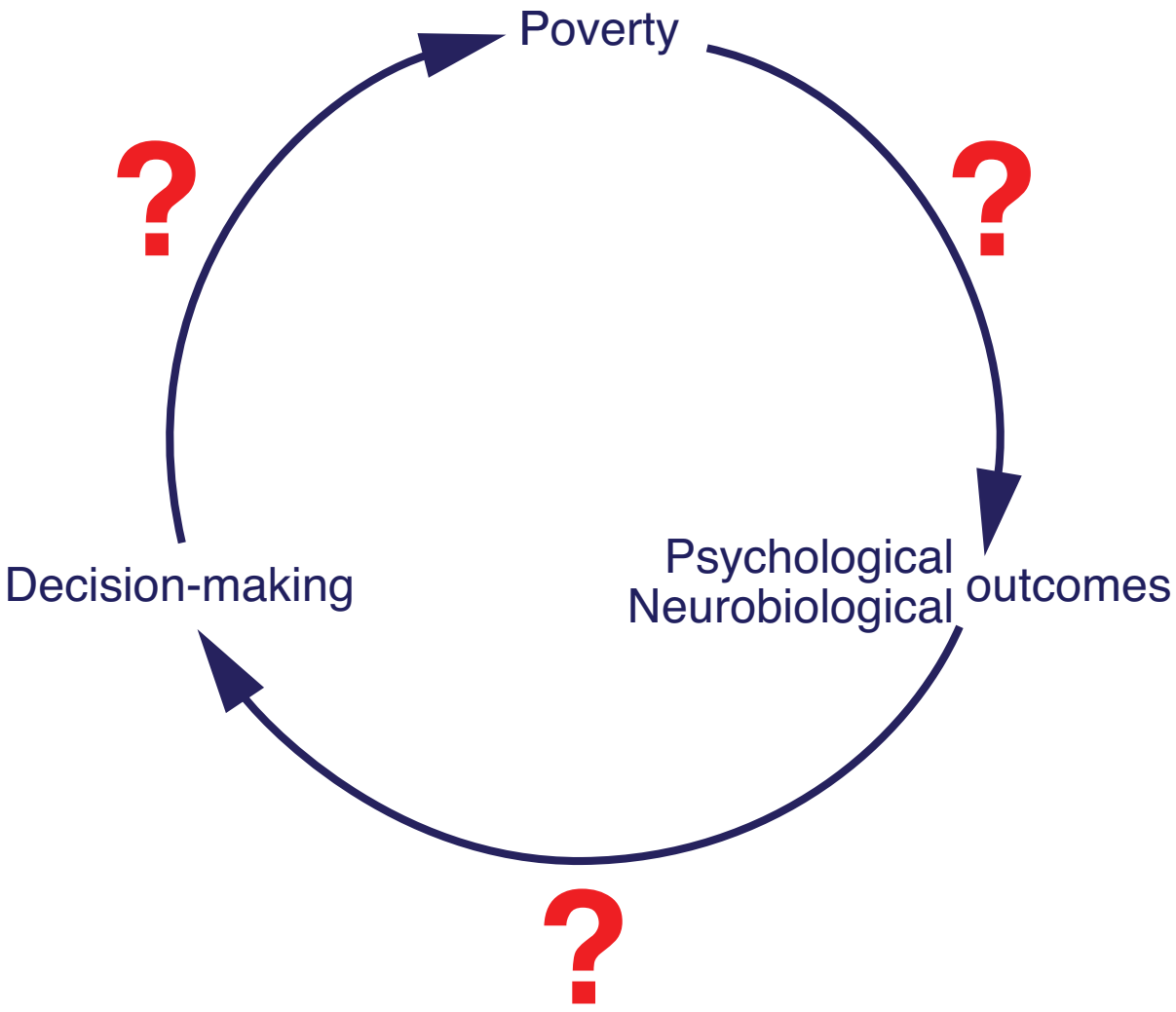
Goals

- Interventions at the behavioral level can have significant welfare benefits
- More systematic use of psychology could...
  - inform design of poverty alleviation programs
  - generate insights about cognitive and behavioral architecture of poverty
  - extend the scope of psychology to non-WEIRD populations
- To achieve these goals, need to "get into the heads of the poor", i.e. understand cognition in poverty

Goals

- Interventions at the behavioral level can have significant welfare benefits
- More systematic use of psychology could...
  - inform design of poverty alleviation programs
  - generate insights about cognitive and behavioral architecture of poverty
  - extend the scope of psychology to non-WEIRD populations
- To achieve these goals, need to "get into the heads of the poor", i.e. understand cognition in poverty
- Best place to start: does poverty itself have psychological consequences? Do these, in turn, affect decision-making?

Working hypothesis



Busara Center for Behavioral Economics, Nairobi, Kenya

Busara Center for Behavioral Economics, Nairobi, Kenya

First step: Does poverty *correlate* with psychological well-being?

World Values Survey: Poverty and Psychological Well-being

- Easterlin Paradox: poverty correlates with happiness within, but not across countries. Problem: only 14 countries.

World Values Survey: Poverty and Psychological Well-being

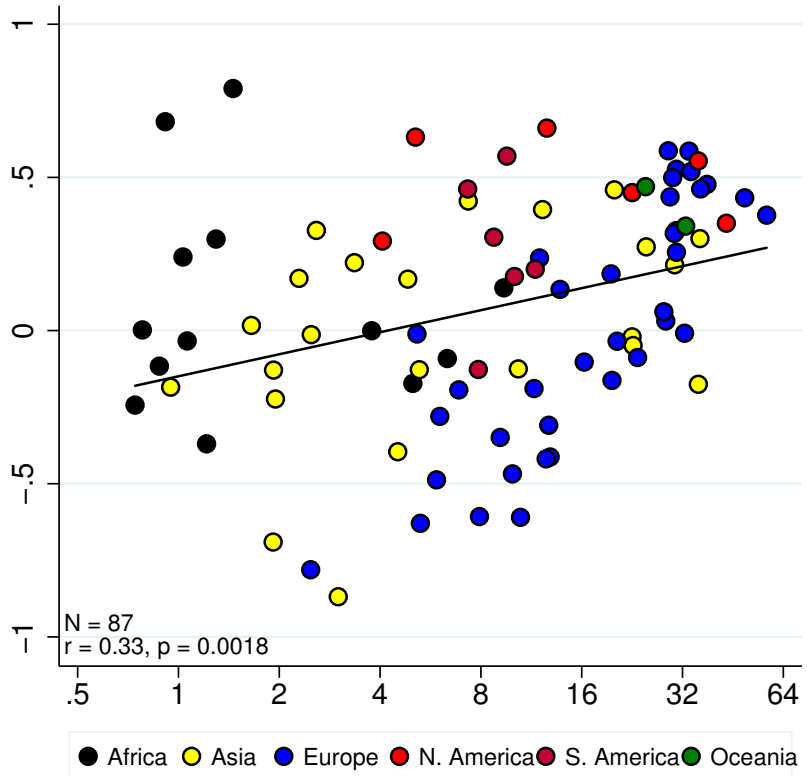
- Easterlin Paradox: poverty correlates with happiness within, but not across countries. Problem: only 14 countries.
- World Values Survey:
  - 114,378 respondents
  - 87 countries
  - Representative samples

World Values Survey: Poverty and Psychological Well-being

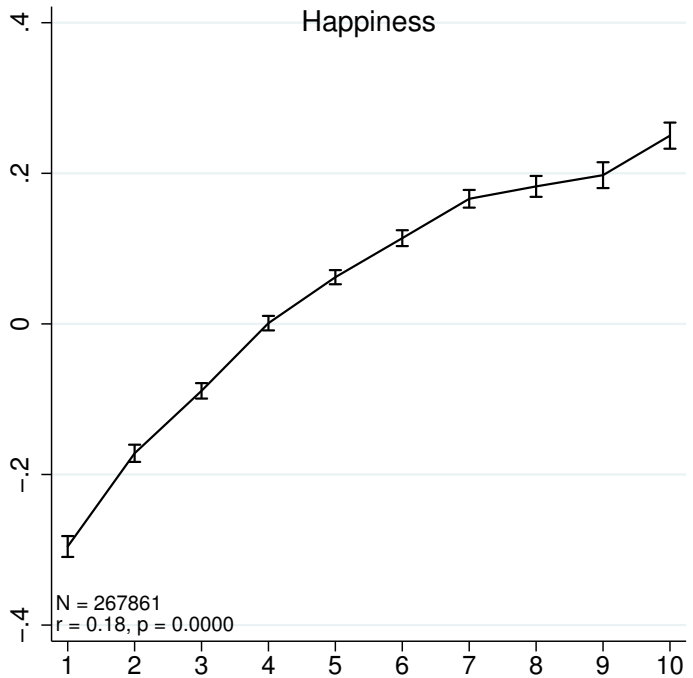
- Easterlin Paradox: poverty correlates with happiness within, but not across countries. Problem: only 14 countries.
- World Values Survey:
  - 114,378 respondents
  - 87 countries
  - Representative samples
- Questions:
  - Happiness: "I am generally happy"
  - Locus of control: "I shape my fate myself"
  - Meaninglessness: "Life is meaningless"
  - Loneliness: "I feel lonely"

Happiness

Across countries



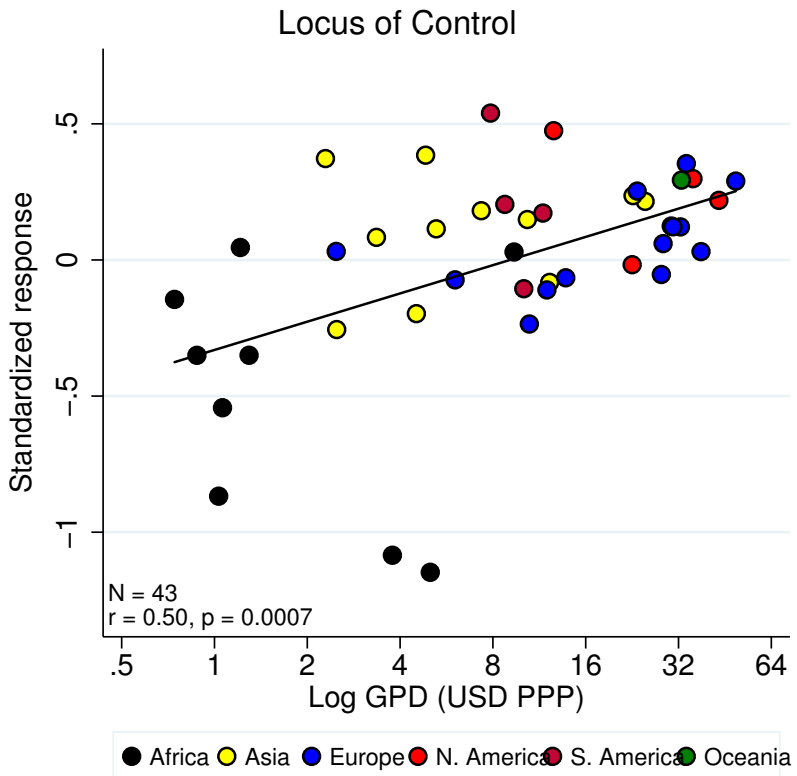
Within countries



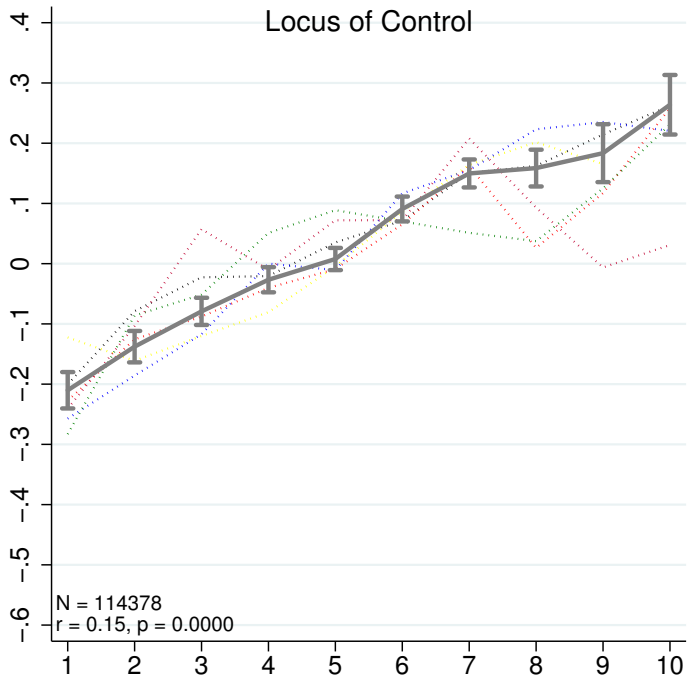
(Haushofer, 2013)

Locus of Control

Across countries



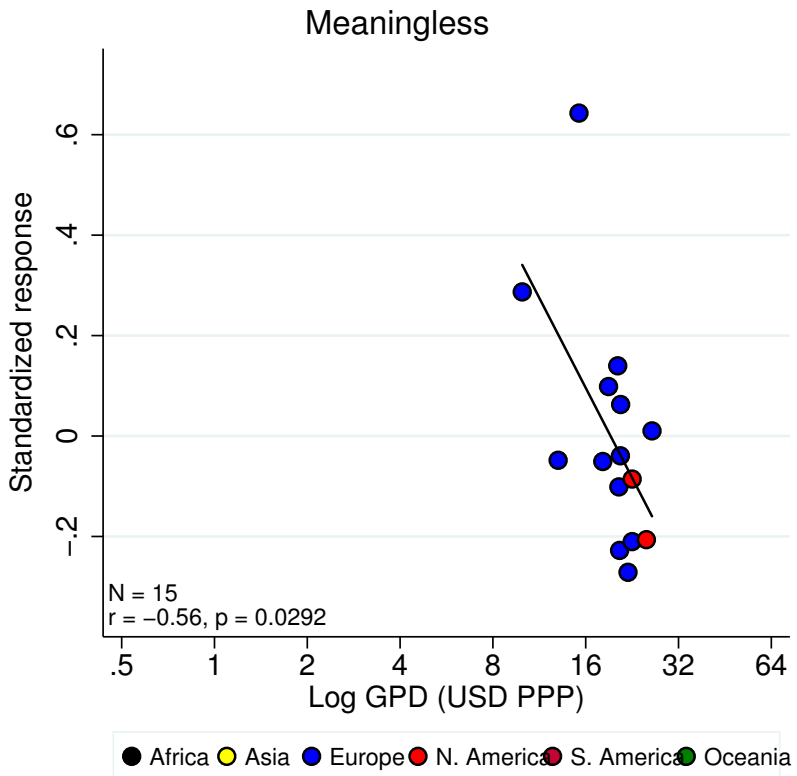
Within countries



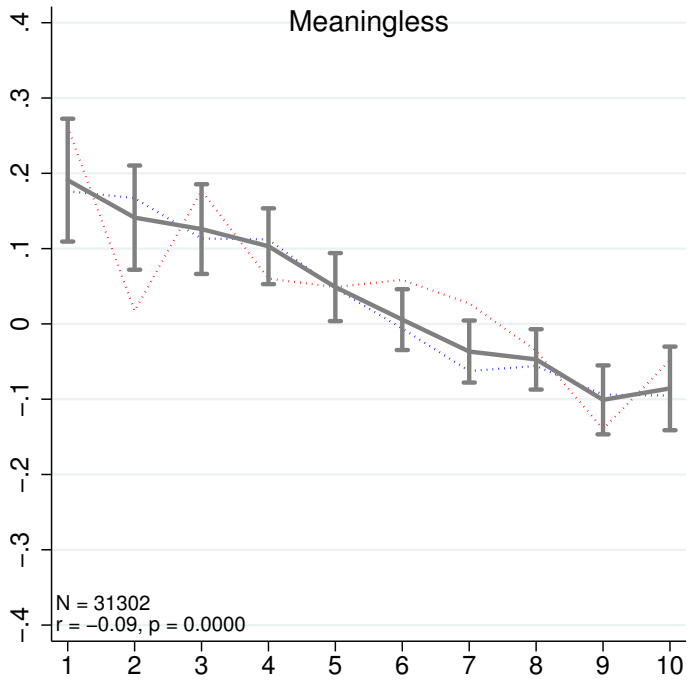
(Haushofer, 2013)

Meaninglessness

Across countries



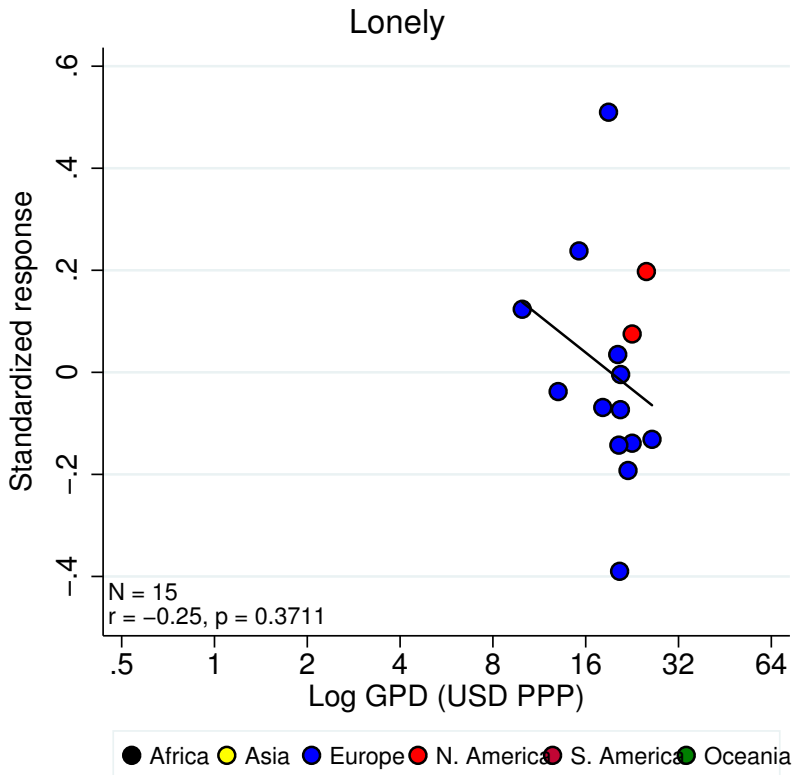
Within countries



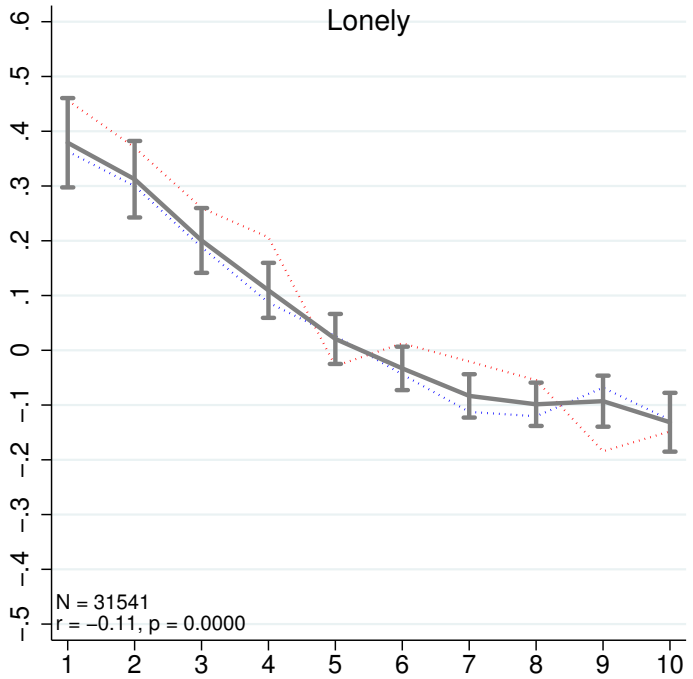
(Haushofer, 2013)

Loneliness

Across countries



Within countries

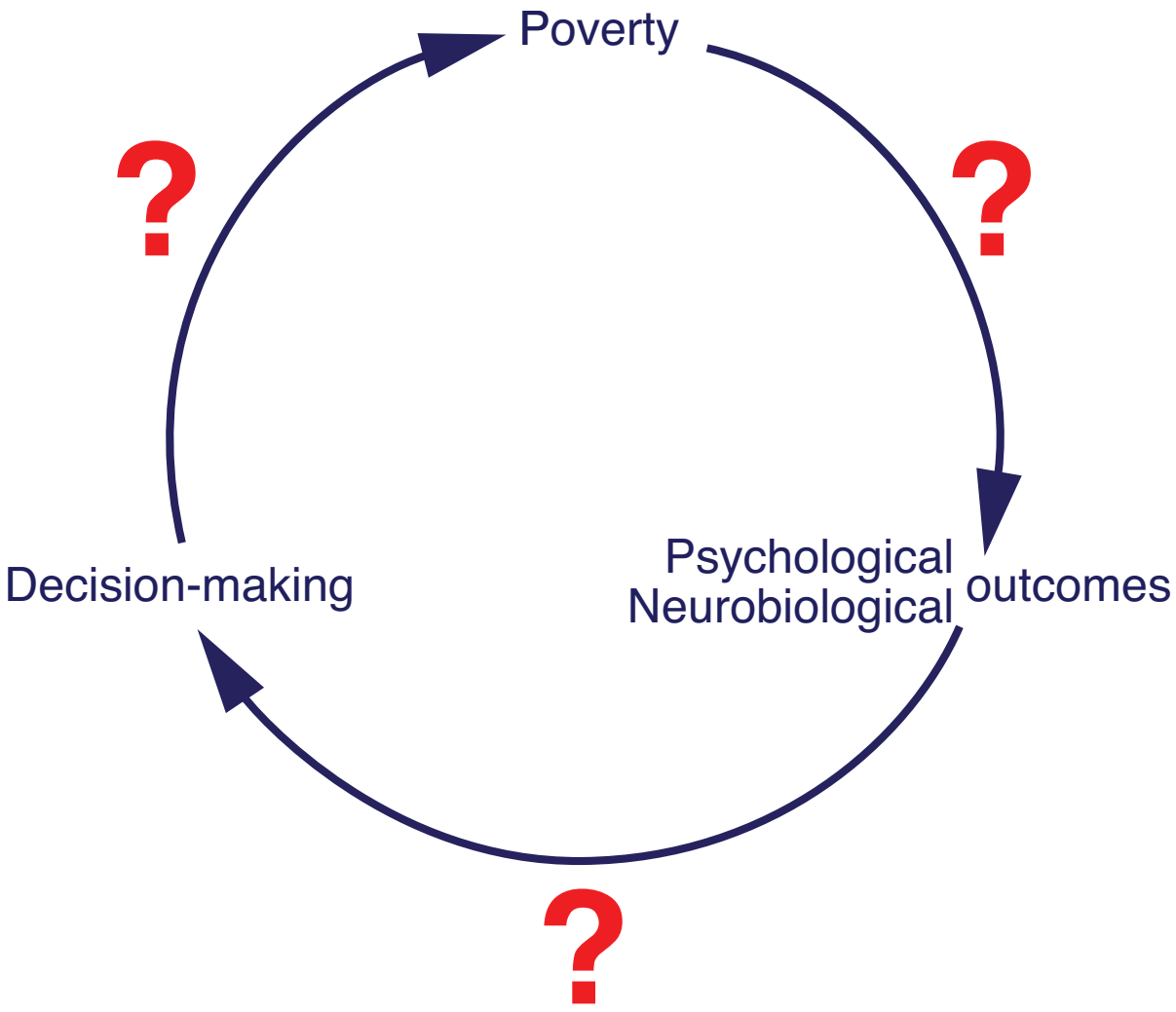


(Haushofer, 2013)

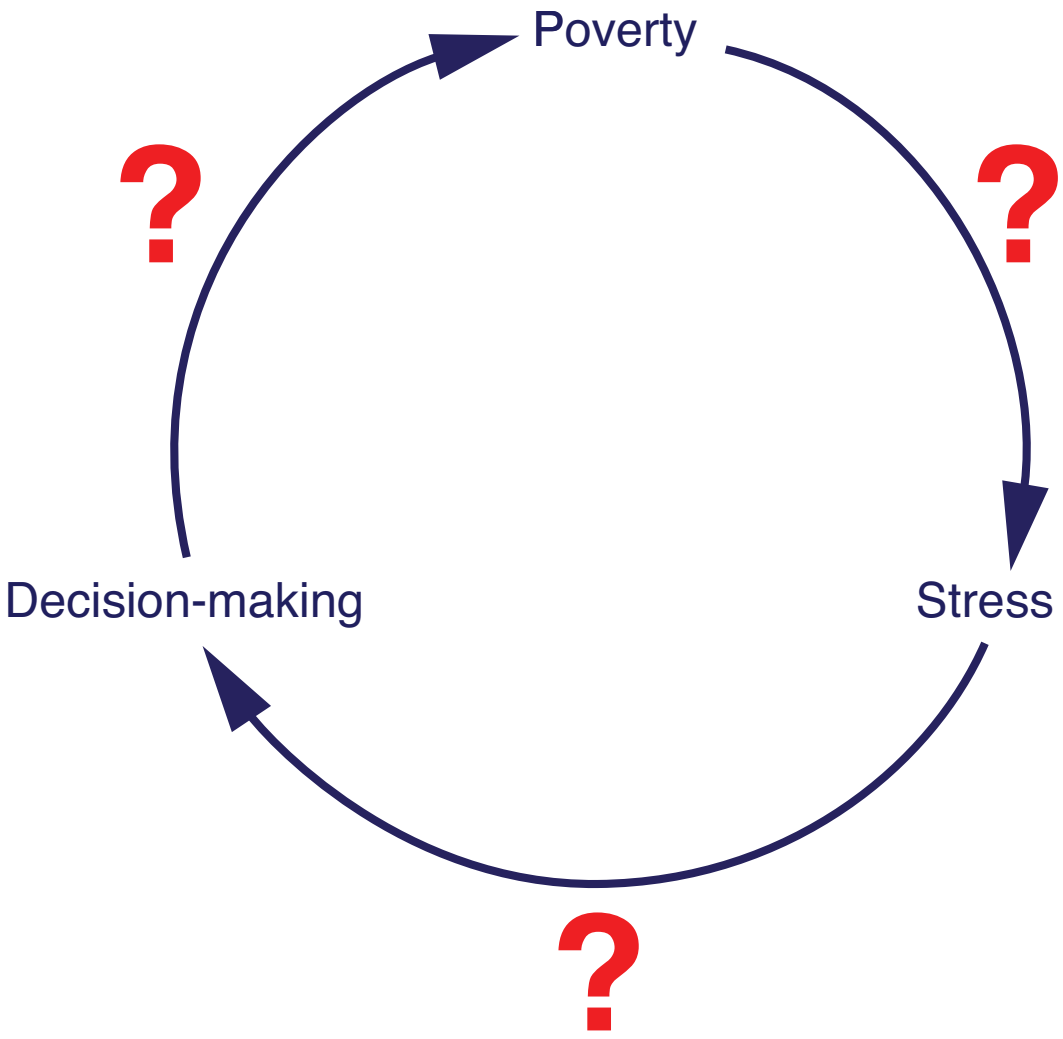
Poverty is associated with unhappiness, external locus of control, feelings of meaninglessness and loneliness

Poverty is associated with unhappiness, external locus of control, feelings of meaninglessness and loneliness
Underlying theme: stress

Working hypothesis



Working hypothesis



Stress

Environmental demands that exceed an organisms ability to cope, and the organism's response

How to measure stress?

- Questionnaire measure: Cohen Stress Scale (validated for Kenya)

How to measure stress?

- Questionnaire measure: Cohen Stress Scale (validated for Kenya)
- Cortisol levels

Why is cortisol useful?

- Product of one of two major stress pathways in the body (HPA axis)

Why is cortisol useful?

- Product of one of two major stress pathways in the body (HPA axis)
- Correlates with self-reported stress, depression, unhappiness

Why is cortisol useful?

- Product of one of two major stress pathways in the body (HPA axis)
- Correlates with self-reported stress, depression, unhappiness
- Objective measure, not subject to experimental demand effects

Why is cortisol useful?

- Product of one of two major stress pathways in the body (HPA axis)
- Correlates with self-reported stress, depression, unhappiness
- Objective measure, not subject to experimental demand effects
- Better indicator of chronic stress than e.g. α-amylase (norepinephrine)

Why is cortisol useful?

- Product of one of two major stress pathways in the body (HPA axis)
- Correlates with self-reported stress, depression, unhappiness
- Objective measure, not subject to experimental demand effects
- Better indicator of chronic stress than e.g. α-amylase (norepinephrine)
- Long-term health consequences of chronically elevated cortisol

How we measure cortisol

- Salivary cort:
  - Correlates well with central levels
  - Stable for several weeks after collection

How we measure cortisol

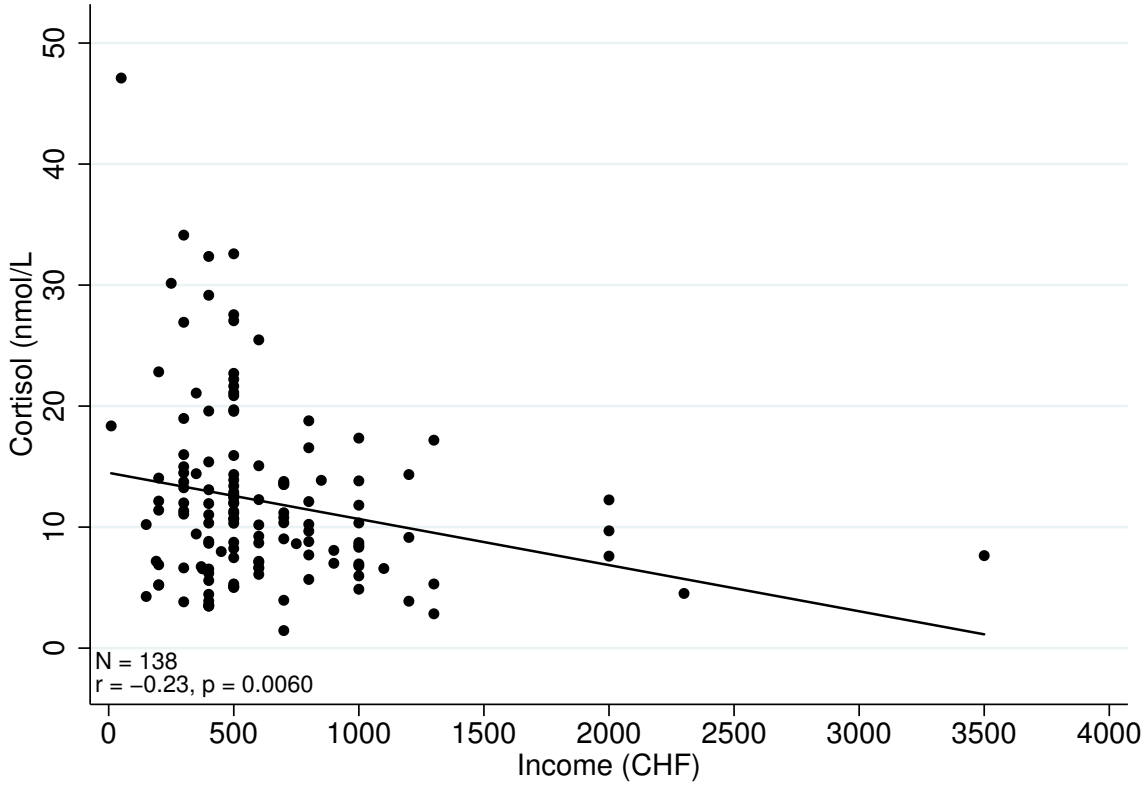
- Salivary cort:
  - Correlates well with central levels
  - Stable for several weeks after collection
- Confounds: eating, drinking, nicotine, alcohol, physical exertion
  - Raw levels
  - Clean variable after regressing out dummies for confounds

How we measure cortisol

- Salivary cort:
  - Correlates well with central levels
  - Stable for several weeks after collection
- Confounds: eating, drinking, nicotine, alcohol, physical exertion
  - Raw levels
  - Clean variable after regressing out dummies for confounds
- Diurnal profile:
  - Raw levels
  - Clean variable after differencing against mean levels in hourly bins

Do cortisol levels reflect poverty?

Cortisol and Income



(Haushofer et al., 2011)

Does poverty *cause* stress? (Surprisingly, we don't know.)

Does poverty *cause* stress? (Surprisingly, we don't know.)
Need a (quasi-)random increase in poverty

Does poverty *cause* stress? (Surprisingly, we don't know.)
Need a (quasi-)random increase in poverty
Weather shocks are random and affect the incomes of farmers in Kenya

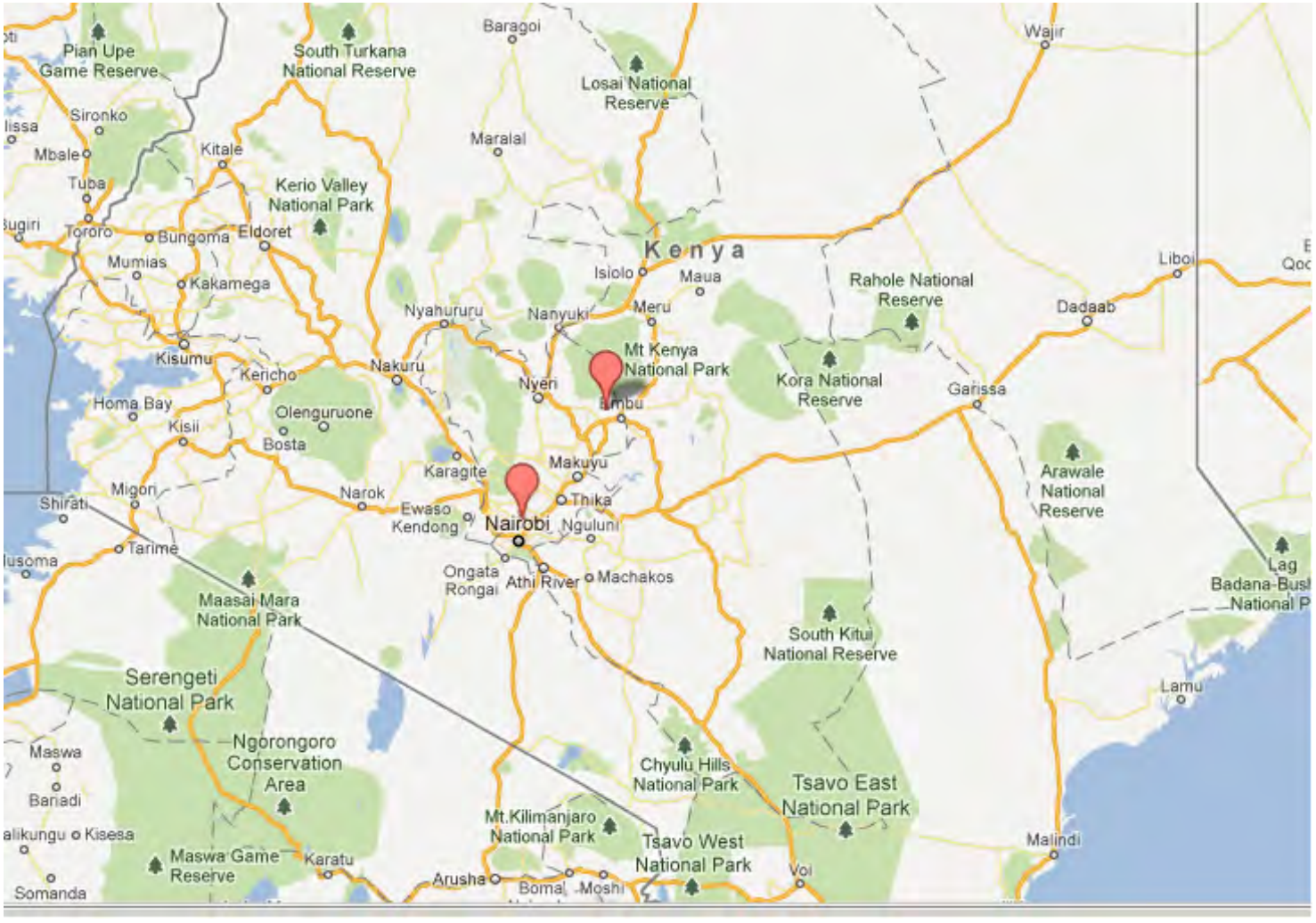
Does poverty *cause* stress? (Surprisingly, we don't know.)
Need a (quasi-)random increase in poverty
Weather shocks are random and affect the incomes of farmers in Kenya
Predictions:

- Lack of rainfall leads to elevated cortisol levels among farmers

Does poverty *cause* stress? (Surprisingly, we don't know.)
Need a (quasi-)random increase in poverty
Weather shocks are random and affect the incomes of farmers in Kenya
Predictions:

- Lack of rainfall leads to elevated cortisol levels among farmers
- No effect among non-farmers (or significantly smaller than among farmers)

Rainfall and Cortisol in Kenya



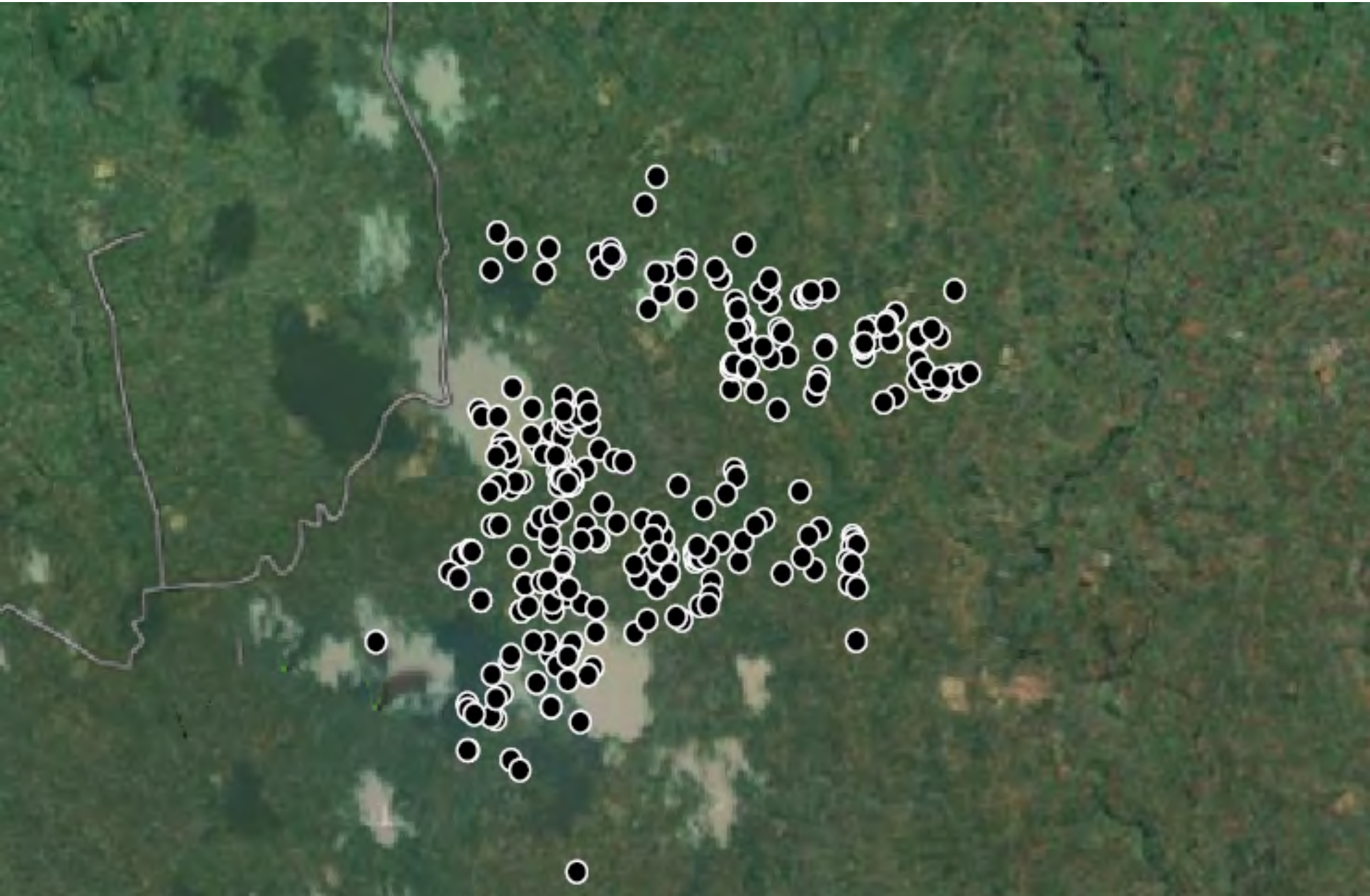
(Chemin, de Laat, Haushofer, 2013)

Farmers, Kianyaga

Metal workers, Nairobi

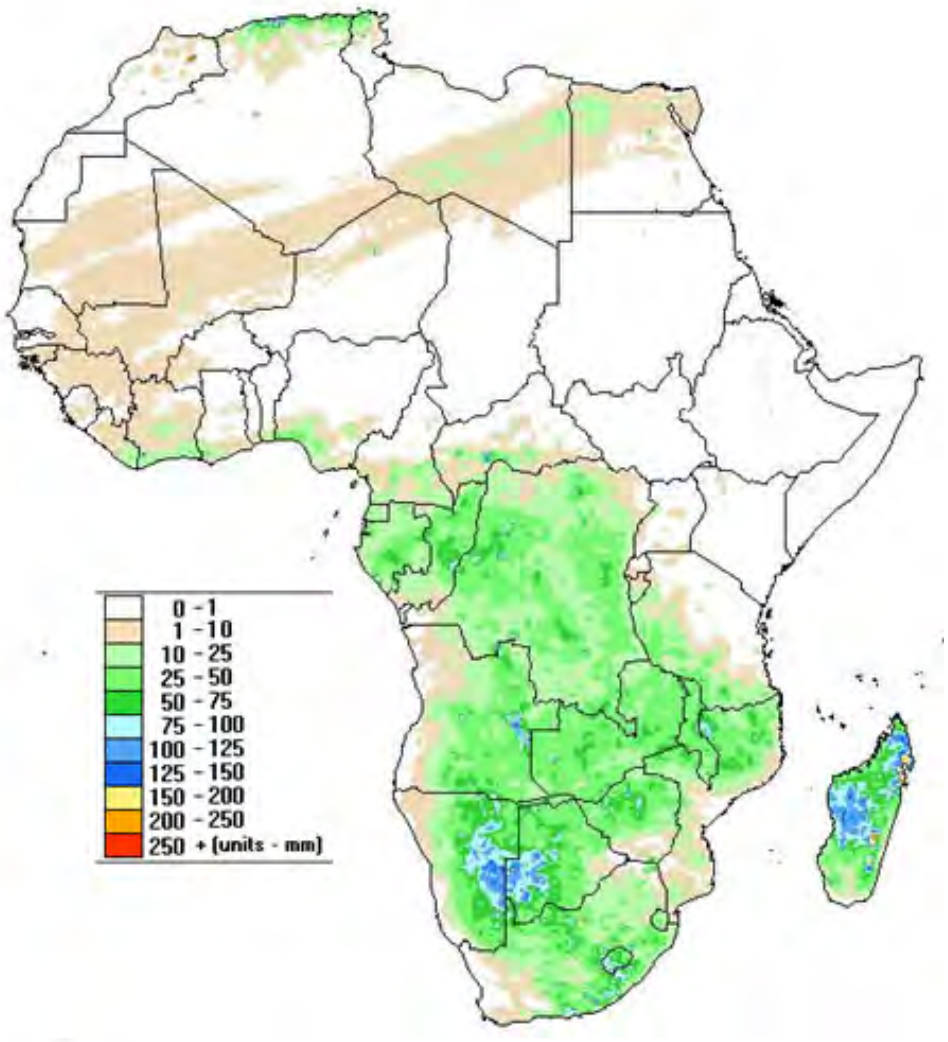
Ingredient 1: Income survey and cortisol measurement

Ingredient 2: GPS data on household locations



Ingredient 3: Rainfall data

Dekadal high-resolution infrared satellite rainfall index
(FEWSnet, 0.1 deg x 0.1 deg = 10 km x 10 km)



Methods

- Representative sample, N=1200 (based on power calculation)

Methods

- Representative sample, N=1200 (based on power calculation)
- 100% response rate

Methods

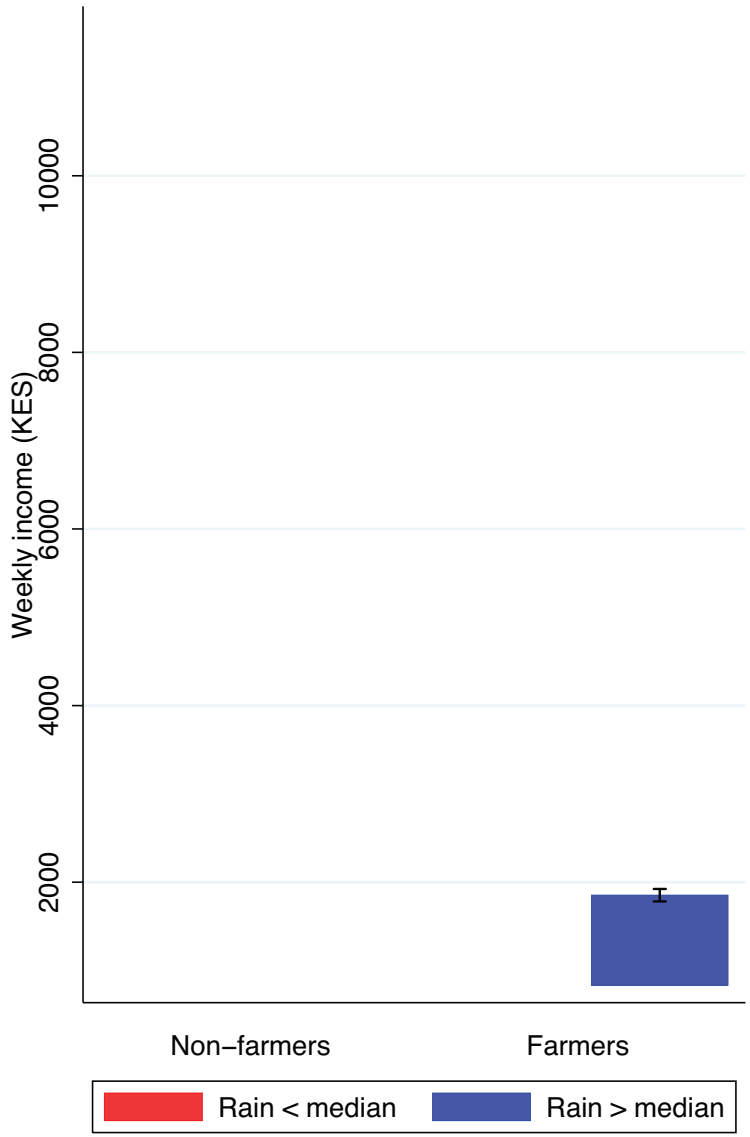
- Representative sample, N=1200 (based on power calculation)
- 100% response rate
- Allowing for spatial correlation in rainfall data:
  - Standard errors clustered at the sublocation level
  - Conley standard errors
  - Cameron-Gelbach-Miller bootstrap clustered standard errors (small number of clusters)

Is the absence of rain really an income shock?

Is the absence of rain really an income shock?

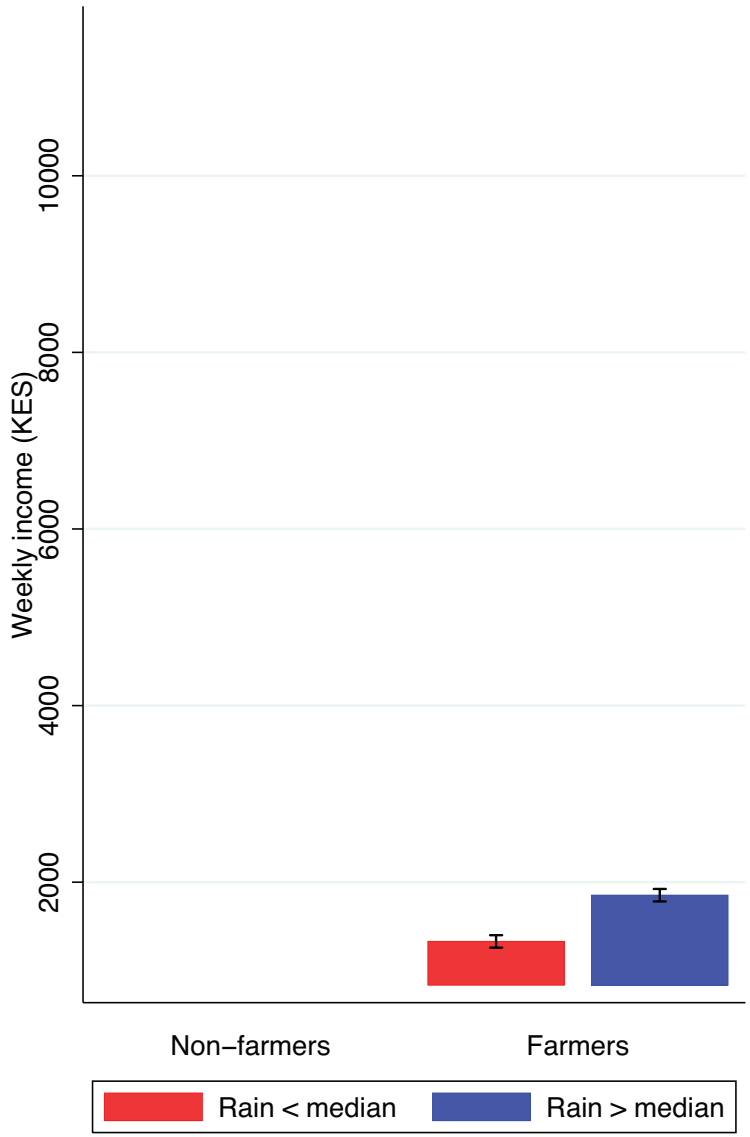
- Does income depend on rain among farmers?
- Is this effect larger among farmers than non-farmers?

Rain raises income levels among farmers



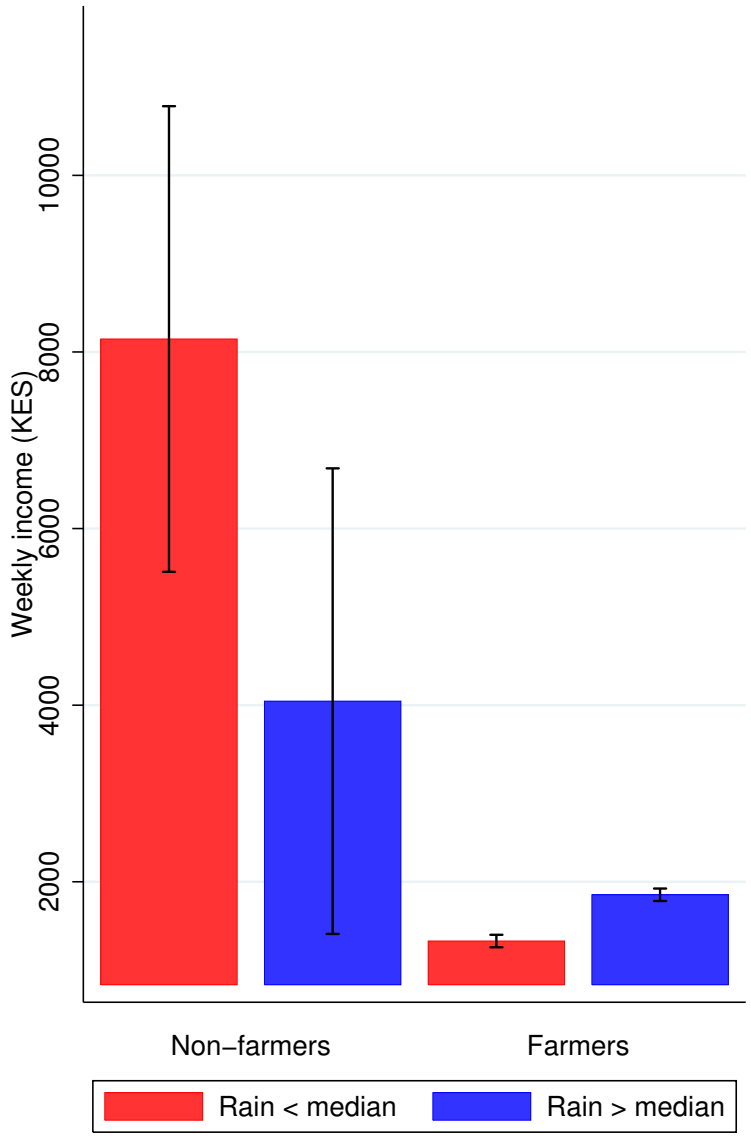
(Chemin, de Laat, Haushofer, 2013)

Rain raises income levels among farmers



(Chemin, de Laat, Haushofer, 2013)

Rain raises income levels among farmers

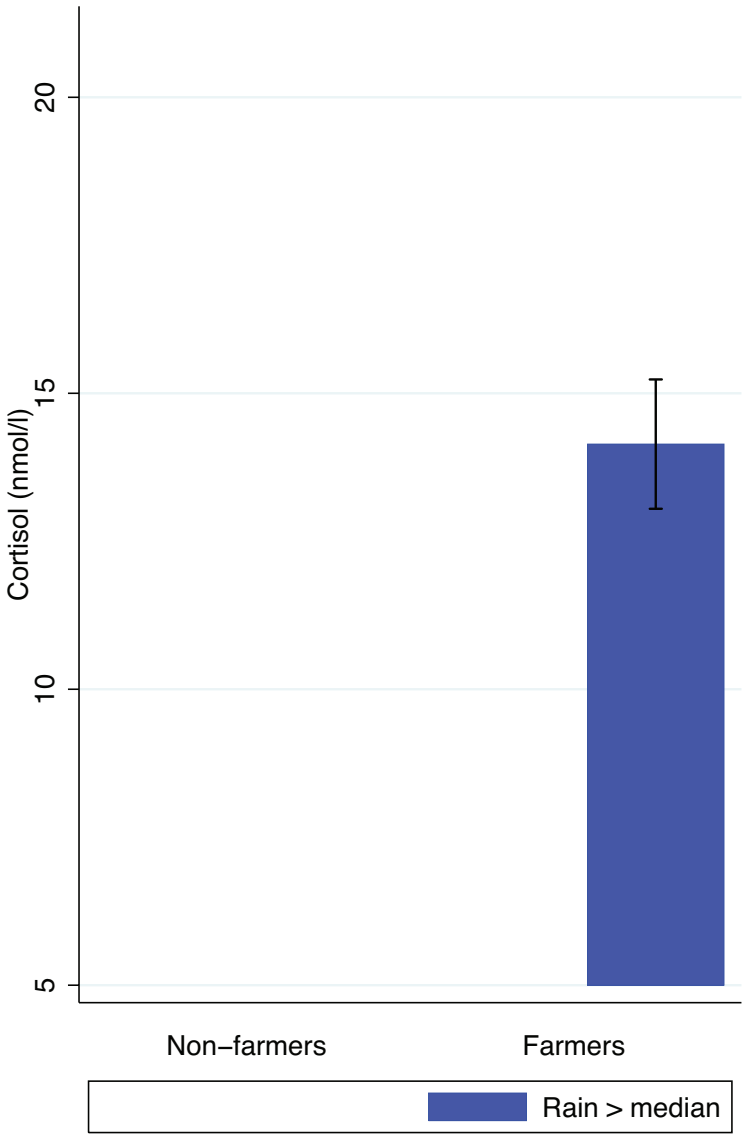


Interaction: $p<0.05$

Income levels depend on rain among farmers. No effect among non-farmers (significant interaction).

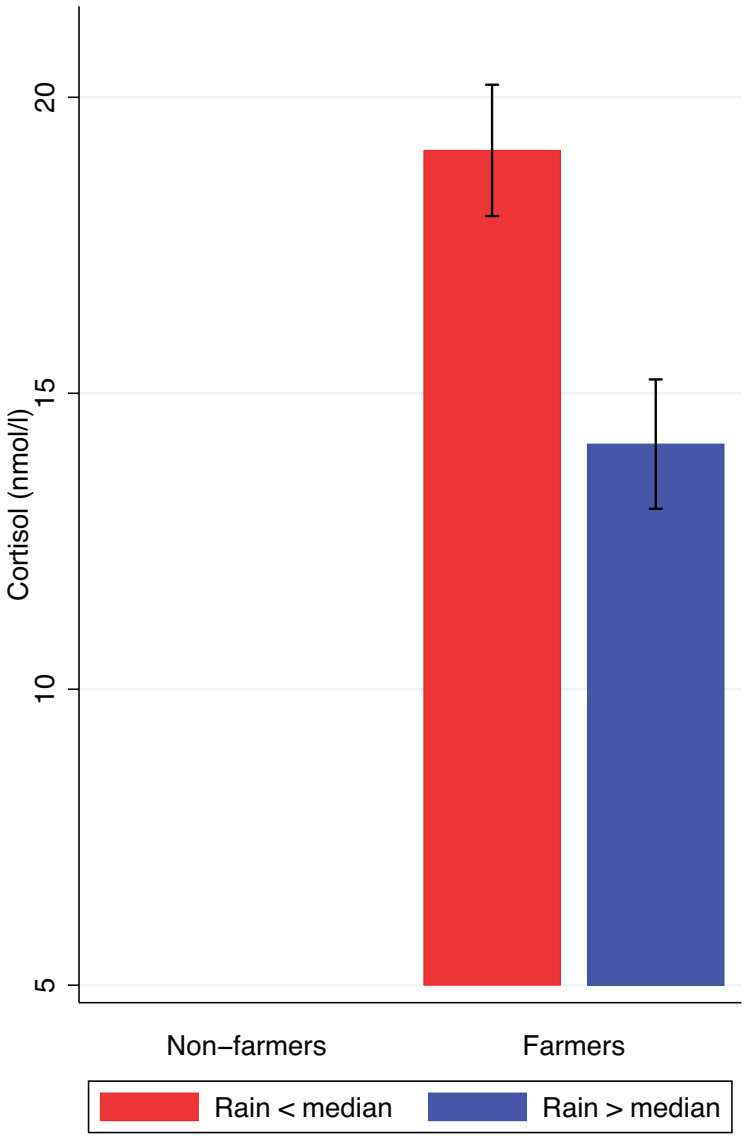
Income levels depend on rain among farmers. No effect among non-farmers (significant interaction).
Do *cortisol* levels depend on rain among farmers? Is this effect larger among farmers than non-farmers?

Lack of rain raises cortisol levels among farmers



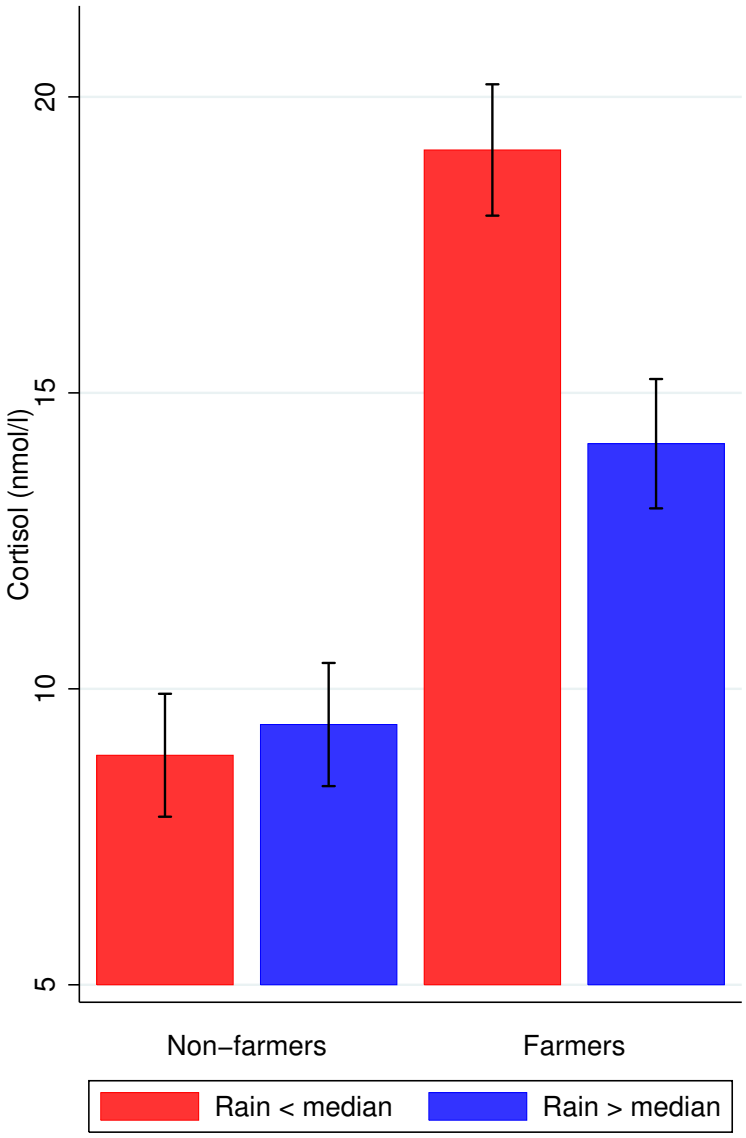
(Chemin, de Laat, Haushofer, 2013)

Lack of rain raises cortisol levels among farmers



(Chemin, de Laat, Haushofer, 2013)

Lack of rain raises cortisol levels among farmers



Interaction: $p<0.05$

Lack of rain raises cortisol levels among farmers. No effect among non-farmers, significant interaction

Lack of rain raises cortisol levels among farmers. No effect among non-farmers, significant interaction
Sample of farmers:

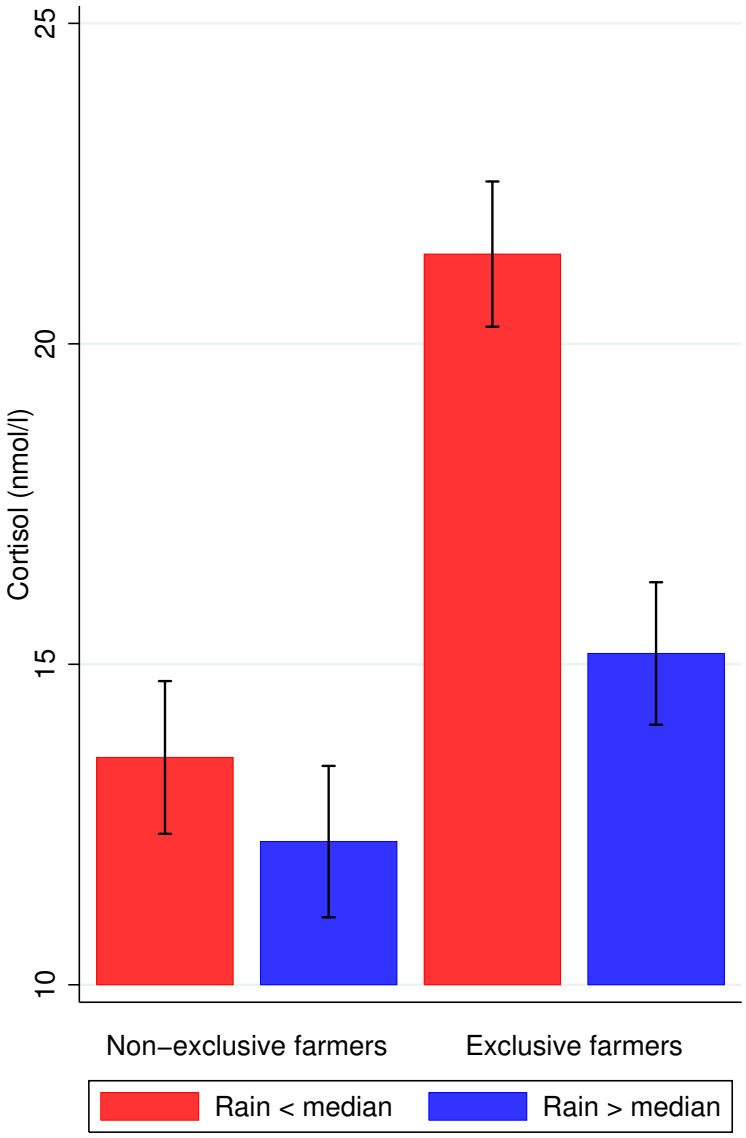
- "Exclusive farmers": Farming is the only source of income
- "Non-exclusive farmers": Also have other sources of income

Lack of rain raises cortisol levels among farmers. No effect among non-farmers, significant interaction
Sample of farmers:

- "Exclusive farmers": Farming is the only source of income
- "Non-exclusive farmers": Also have other sources of income

Does cortisol depend *more* on rain among exclusive farmers than non-exclusive farmers?

Lack of rain raises cortisol levels among exclusive farmers

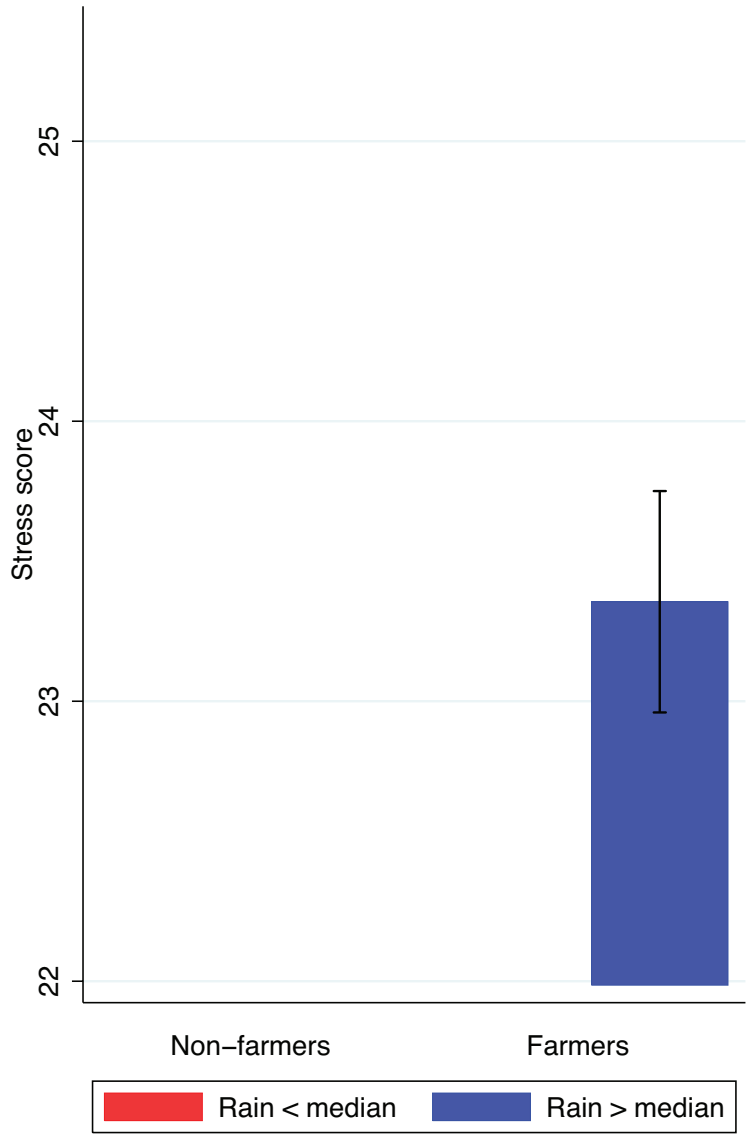


Interaction: $p<0.05$

Lack of rain raises cortisol levels more among exclusive farmers. No effect among non-exclusive farmers, significant interaction

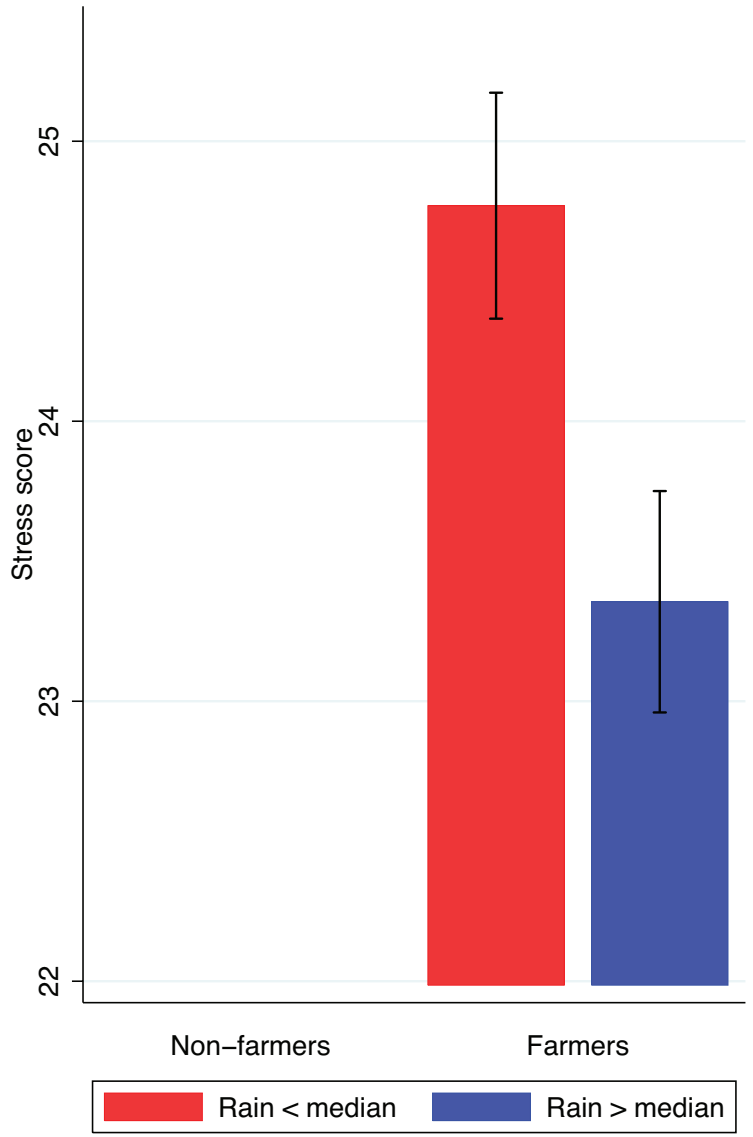
Lack of rain raises cortisol levels more among exclusive farmers. No effect among non-exclusive farmers, significant interaction
Do elevated cortisol levels really reflect stress?

Lack of rain raises stress levels among farmers



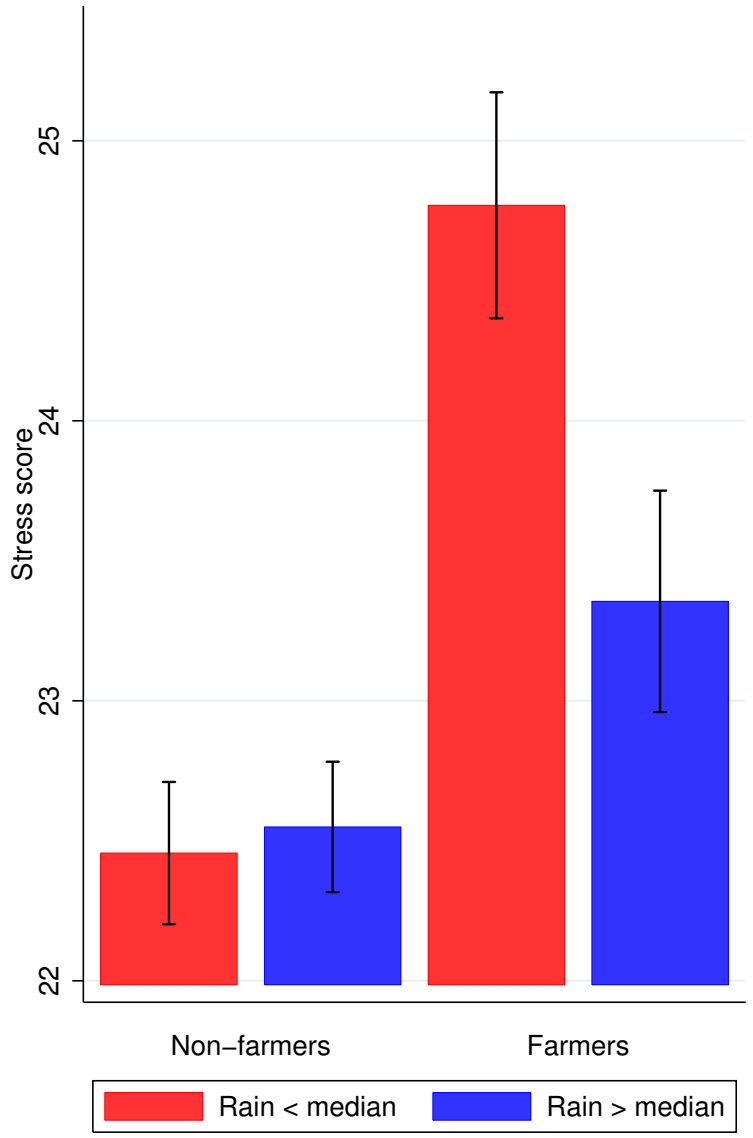
(Chemin, de Laat, Haushofer, 2013)

Lack of rain raises stress levels among farmers



(Chemin, de Laat, Haushofer, 2013)

Lack of rain raises stress levels among farmers



Interaction: $p<0.05$

Lack of rain raises stress levels among farmers. No effect among non-farmers, significant interaction

A random increase in poverty, induced by negative rainfall shocks, increases levels of cortisol and self-reported stress.

Working hypothesis

Does poverty *alleviation reduce* stress?

Detour: Unconditional Cash Transfers

GiveDirectly

give now

overview

values

how it works

FAQs

financials

evidence

contact

team

blog | f

news by email:

address

sign up

introducing a radical new way to give: directly

1. You donate through our webpage
2. We locate poor households in Kenya
3. We transfer your donation electronically to a recipient's cell phone
4. The recipient uses the transfer to pursue his or her own goals

latest news

GiveDirectly worked with Innovations for Poverty Action to complete a randomized control trial of direct cash transfers. The results are in, and they're exciting.

GiveWell's first full update on GiveDirectly is an in-depth report on GiveDirectly's work in Kenya, our expansion into a second country, and our long-term outlook.

npr

Episode 494: What Happens When You Just Give Money To Poor People?

The New York Times

What If We Just Gave the Poor Money?

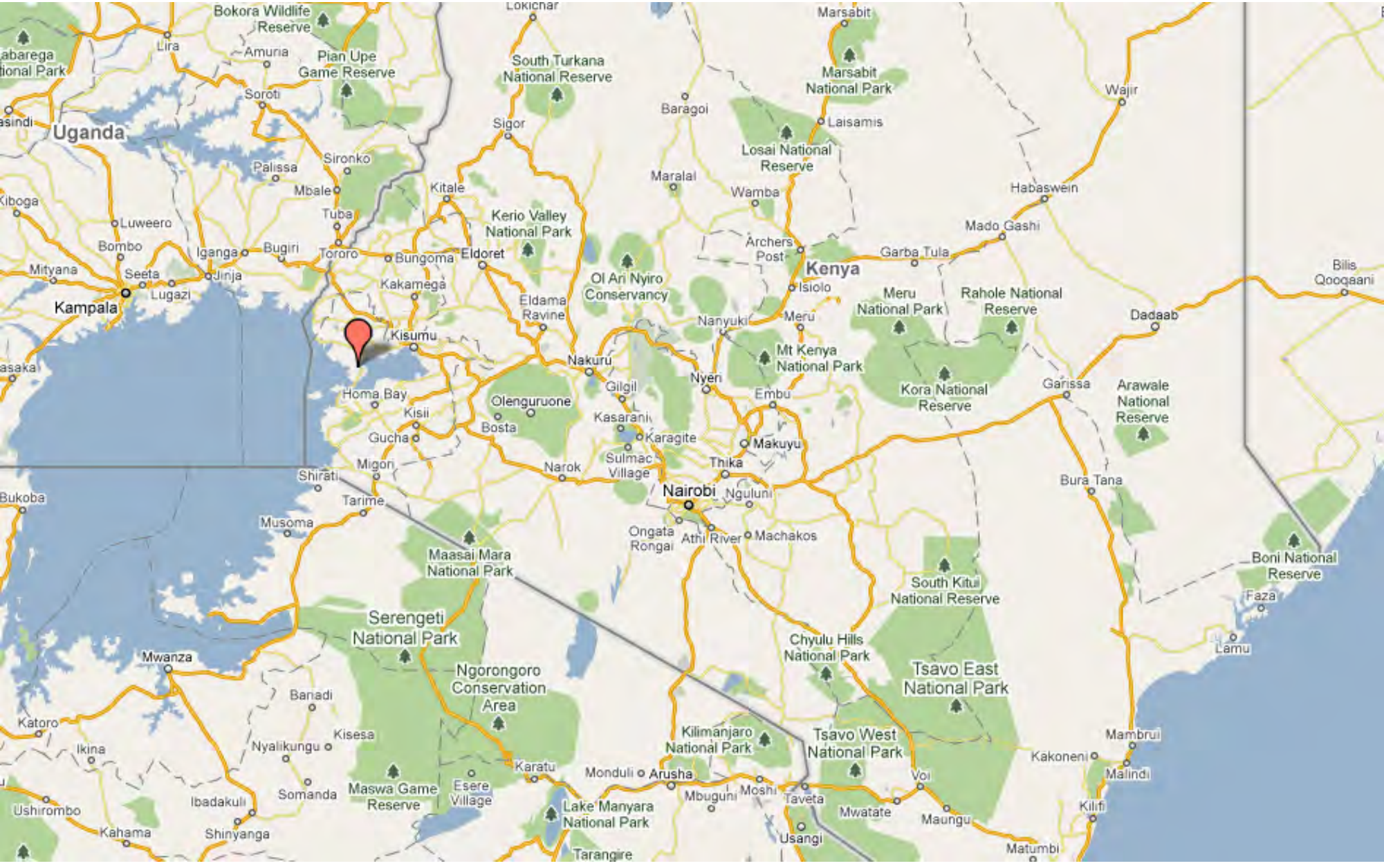
Counterarguments

"Cigarettes, alcohol, weapons, gambling it away, all the kinds of things that you don't want to have happen with money that you just find in your pocket" (Carol Bellamy, former head of UNICEF)

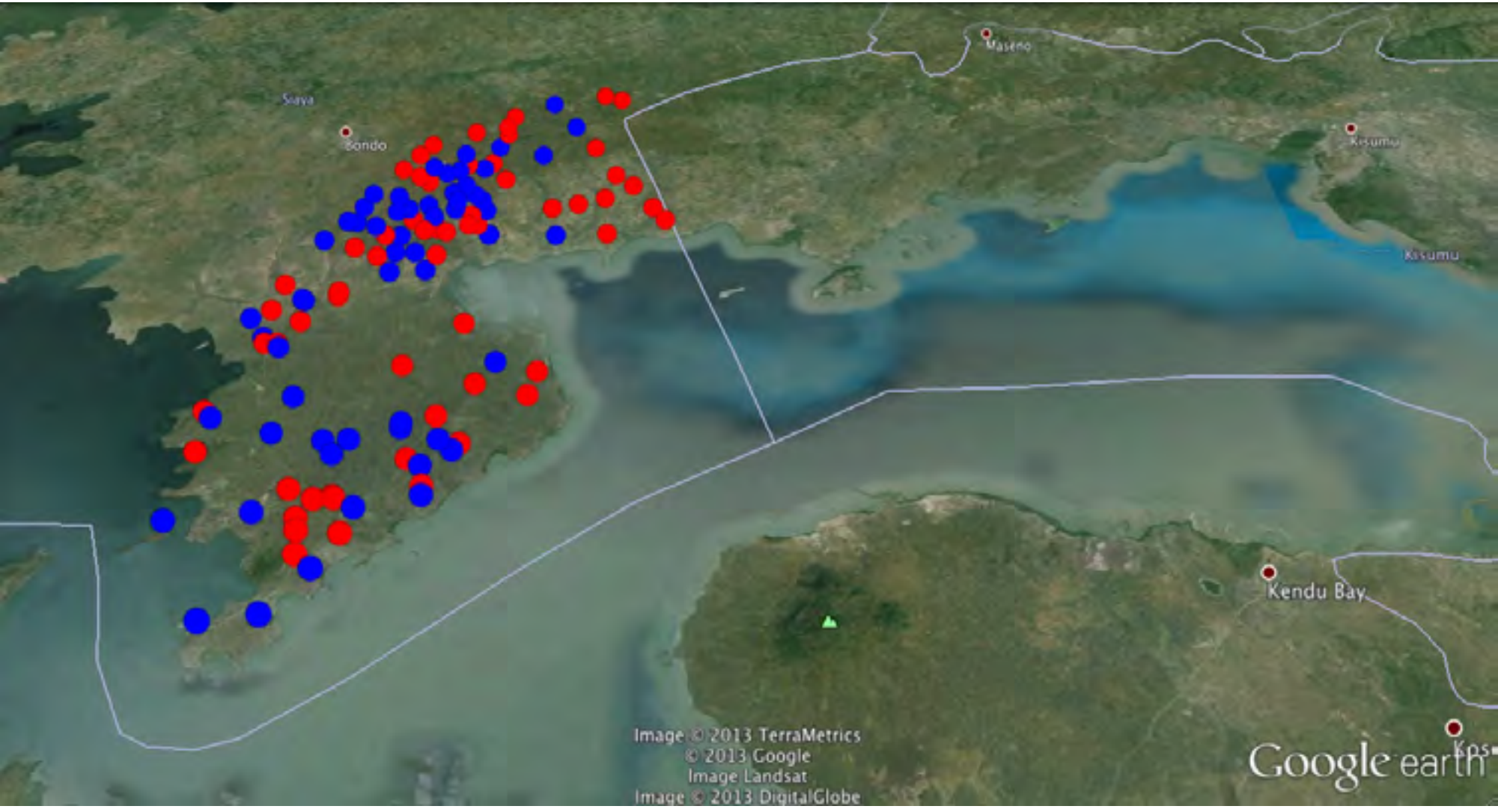
- Randomized Controlled Trial in Western Kenya on GiveDirectly Unconditional Cash Transfer program

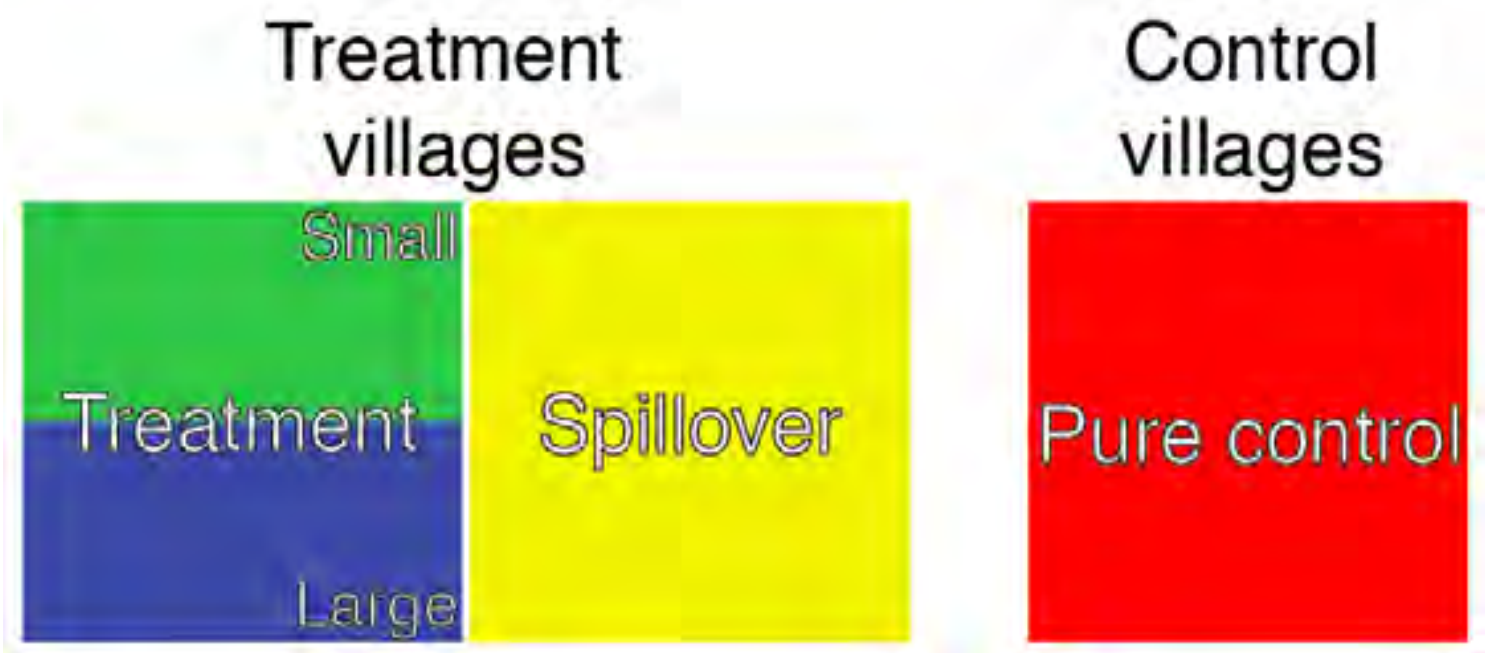
- Randomized Controlled Trial in Western Kenya on GiveDirectly Unconditional Cash Transfer program
- 1440 households: 503 Treatment, 937 Control

- Randomized Controlled Trial in Western Kenya on GiveDirectly Unconditional Cash Transfer program
- 1440 households: 503 Treatment, 937 Control
- Treatment group: Unconditional Cash Transfer, USD 720 (4.6 months of control group consumption)
  - Small transfers: USD 404 (2.6 months)
  - Large transfers: USD 1520 (9.7 months)


Bokora Wildlife Reserve
Lokichar
Marsabit
Lira
Amuria
Pian Upe Game Reserve
South Turkana National Reserve
Marsabit National Park
Soroti
Baragoi
Wajir
Uganda
Sigor
Laisamis
Losai National Reserve
Palissa
Sironko
Maralal
Habaswein
Mbale
Kitale
Wamba
Tuba
Kerio Valley National Park
Mado Gashi
Luweero
Archers Post
Bombo
Iganga
Bugiri
Tororo
Bungoma
Eldoret
Garba Tula
Kenya
Mityana
Seeta
Jinja
Kakamega
Ol Ari Nyiro Conservancy
Isiolo
Bilis Qooqaani
Lugazi
Kampala
Eldama Ravine
Meru National Park
Rahole National Reserve
Nanyuki
Meru
Dadaab
Kisumu
Mt Kenya National Park
Nakuru
Nyeri
Gilgil
Kora National Reserve
Garissa
Arawale National Reserve
Homa Bay
Olenguruone
Embu
Kisii
Kasarani
Bosta
Karagite
Gucha
Makuyu
Migori
Sulmac Village
Narok
Thika
Shirati
Nairobi
Nguluni
Bura Tana
Bukoba
Tarime
Musoma
Ongata Rongai
Athi River
Machakos
Maasai Mara National Park
Boni National Reserve
South Kitui National Reserve
Faza
Serengeti National Park
Chyulu Hills National Park
Lamu
Mwanza
Ngorongoro Conservation Area
Tsavo East National Park
Bariadi
Katoro
Kisesa
Kilimanjaro National Park
Tsavo West National Park
Mambrui
Ikina
Nyalikungu
Kakoneni
Karatu
Monduli
Arusha
Malindi
Maswa Game Reserve
Esere Village
Somanda
Mbuguni
Moshi
Voi
Ushirombo
Ibadakuli
Taveta
Mwatate
Kilifi
Lake Manyara National Park
Maungu
Kahama
Shinyanga
Usangi
Tarangire
Matumbi

Treatment and Control Villages




Treatment villages
Control villages
Small
Treatment
Large
Spillover
Pure control

Methods: Surveying

- Representative sample, 2124 individuals, 1440 households

Methods: Surveying

- Representative sample, 2124 individuals, 1440 households
- A priori choice of sample size based on power calculation

Methods: Surveying

- Representative sample, 2124 individuals, 1440 households
- A priori choice of sample size based on power calculation
- Baseline: 2011; transfers: 2011-2012; endline: 2012

Methods: Surveying

- Representative sample, 2124 individuals, 1440 households
- A priori choice of sample size based on power calculation
- Baseline: 2011; transfers: 2011-2012; endline: 2012
- 6-hour survey in each household at each baseline and endline, administered by 30 trained surveyors, both husband and wife

Methods: Surveying

- Representative sample, 2124 individuals, 1440 households
- A priori choice of sample size based on power calculation
- Baseline: 2011; transfers: 2011-2012; endline: 2012
- 6-hour survey in each household at each baseline and endline, administered by 30 trained surveyors, both husband and wife
- 8 cortisol samples from each household, random time of day

Methods: Analysis

- Takeup "only" 96.5%: "intent-to-treat" (conservative)

Methods: Analysis

- Takeup "only" 96.5%: "intent-to-treat" (conservative)
- Dealing with attrition (<10%): Lee bounds

Methods: Analysis

- Takeup "only" 96.5%: "intent-to-treat" (conservative)
- Dealing with attrition (<10%): Lee bounds
- Standard errors clustered at household level

Methods: Analysis

- Takeup "only" 96.5%: "intent-to-treat" (conservative)
- Dealing with attrition (<10%): Lee bounds
- Standard errors clustered at household level
- Multiple hypothesis testing:
  - Pre-analysis plan before analysis
  - Correction for multiple inference during analysis

Pre-Analysis Plan

Welfare Effects of Unconditonal Cash Transfers: Pre-Analysis Plan*

Johannes Haushofer†, Jeremy Shapiro‡

June 27, 2013

Abstract

This document describes the analysis plan for the randomized controlled trial (RCT) evaluating the Unconditional Cash Transfer (UCT) of GiveDirectly, Inc. Between June 2011 and January 2013, GiveDirectly distributed unconditional cash transfers to 500 randomly selected poor rural households in Western Kenya. The transfers were sent to recipients' mobile phones using the M-Pesa technology. The present RCT includes three treatments: First, the transfers were randomly chosen to be sent to either the primary female or the primary male member of the household. Second, the transfers were randomly assigned to be sent as either a large lump-sum payment, or a series of nine monthly installments of the same total amount. Third, the magnitude of the total transfer to each treatment household was randomly chosen to be either $300 or $1,100. The present document outlines the outcome variables and econometric methods we will use to assess the effect of the program on consumption, food security, assests, income and enterprise activity, intrahousehold bargaining, domestic violence, education, health, and preferences, as well as psychological well-being and neurobiological measures of stress.

JEL Codes: C93, D13, I15, I25, O12

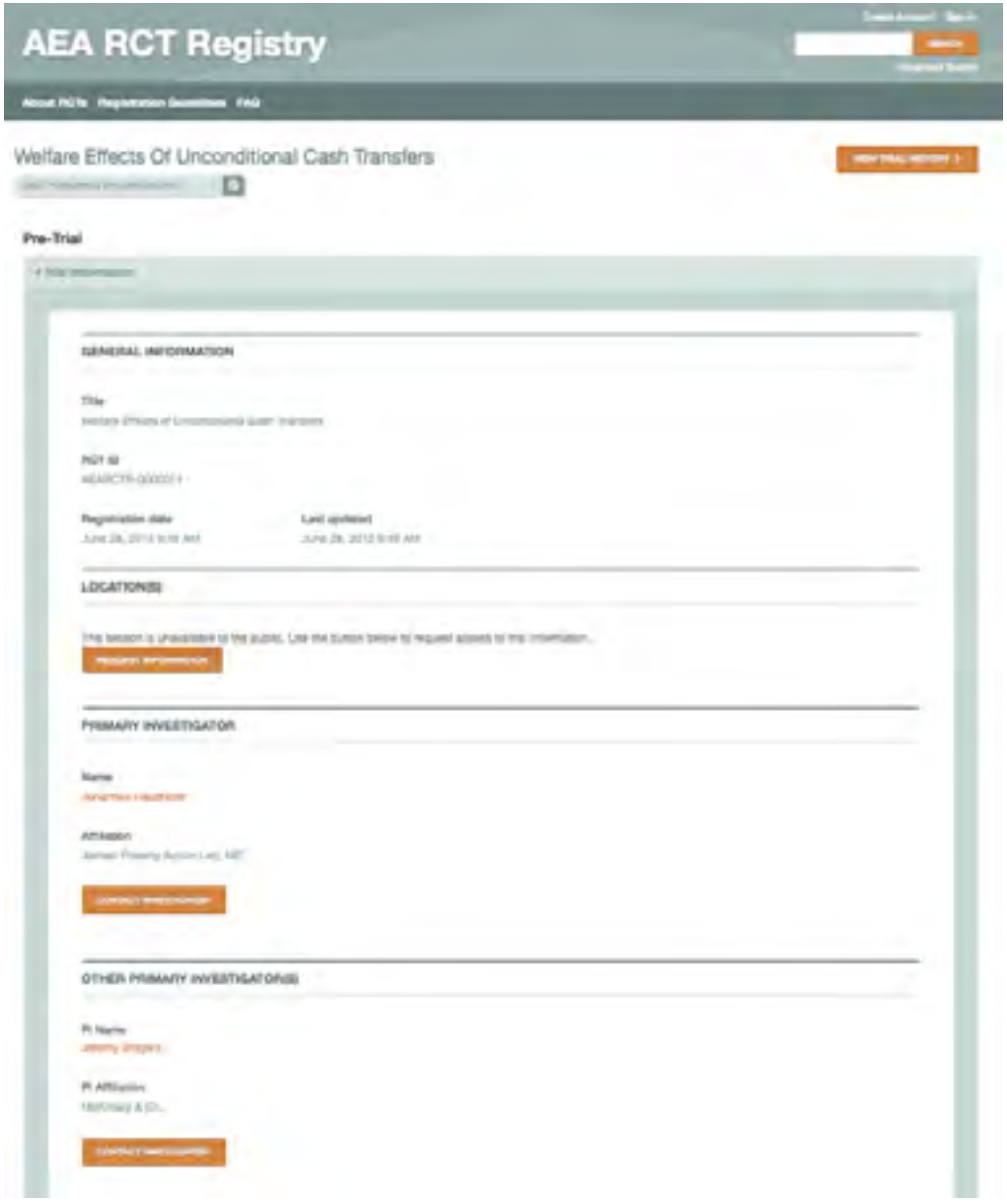
Keywords: unconditional cash transfers, randomized controlled trial, impact evaluation.

*We thank Marie Collins, Faizan Diwan, Chaning Jang, Bena Mwongeli, Joseph Njoroge, Kenneth Okumu, James Vancel, and Matthew White for excellent research assistance, the team of GiveDirectly (Piali Mukhopadhyay, Paul Niehaus, Raphael Gitau) for collaboration, and Petra Persson for designing the intra-household bargaining and domestic violence module. We are grateful for comments to Arun Chandrasekhar, Simon Galle, Ben Golub, Anna Folke Larsen, and Emma Rothschild. This research was supported by Cogito Foundation Grant R-116/10 and NIH Grant R01AG039297 to Johannes Haushofer.

†Abdul Latif Jameel Poverty Action Lab, MIT, E53-379, 30 Wadsworth St., Cambridge, MA 02142. joha@mit.edu

‡McKinsey & Co., San Francisco, CA. jeremyshapiro@gmail.com

www.socialscienceregistry.org



Multiple comparisons

- Index variables (Kling et al., 2007)

Multiple comparisons

- Index variables (Kling et al., 2007)
- Family-wise error rate correction (Efron & Tibshirani, 1993)

Multiple comparisons

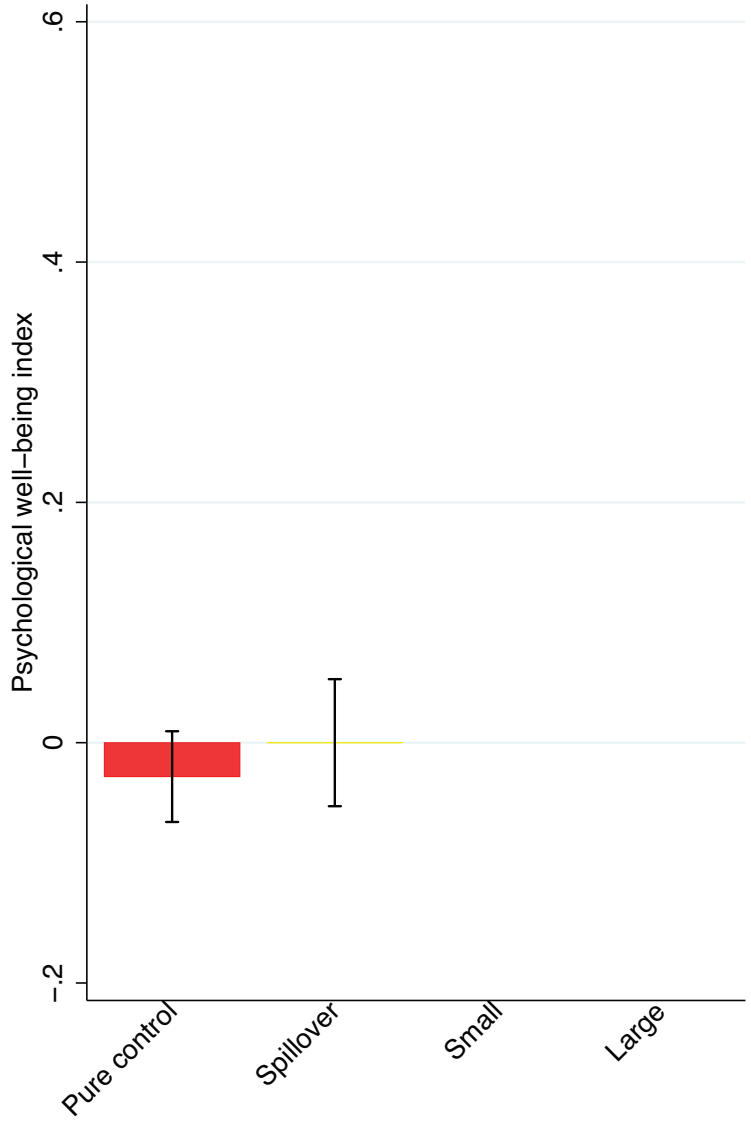
- Index variables (Kling et al., 2007)
- Family-wise error rate correction (Efron & Tibshirani, 1993)
- Seemingly Unrelated Regression for joint significance of coefficients in each outcome group (Kling et al., 2007)

Does poverty *alleviation reduce* stress?

How we measure stress and psychological well-being

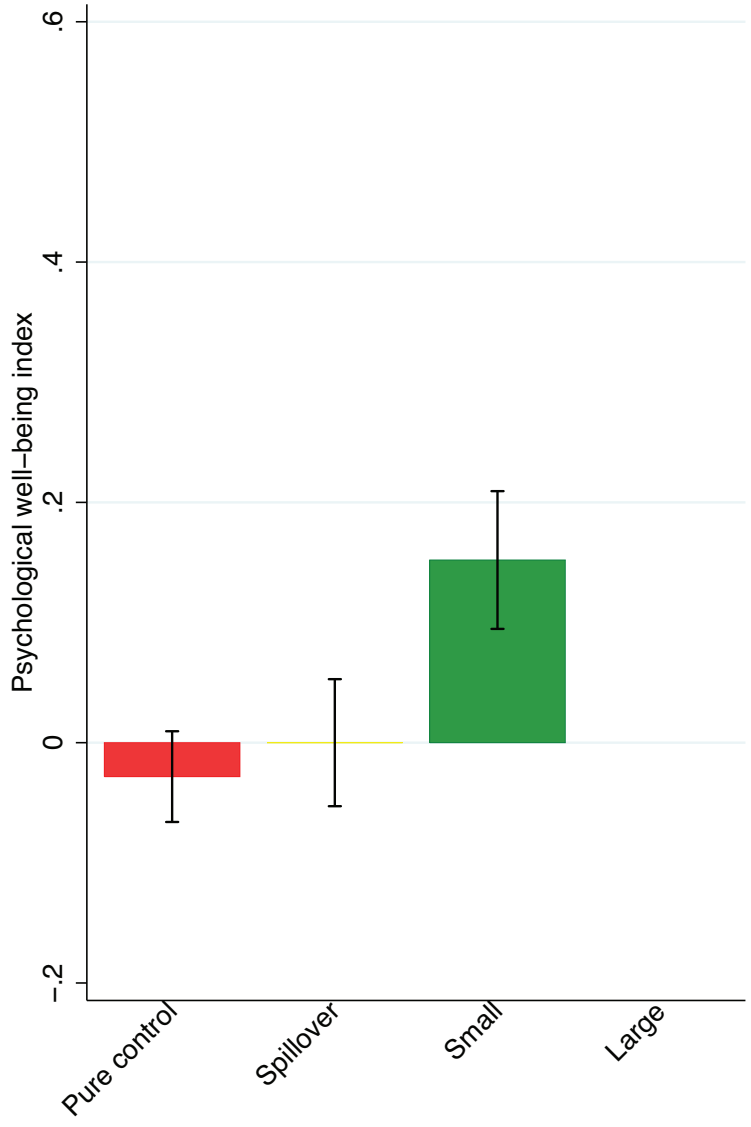
- Happiness (from WVS)
- Stress (Cohen)
- Depression (CESD)
- Cortisol levels
- Index: standardized weighted average of the above
- Endline: 4 months after last transfer

Psychological well-being



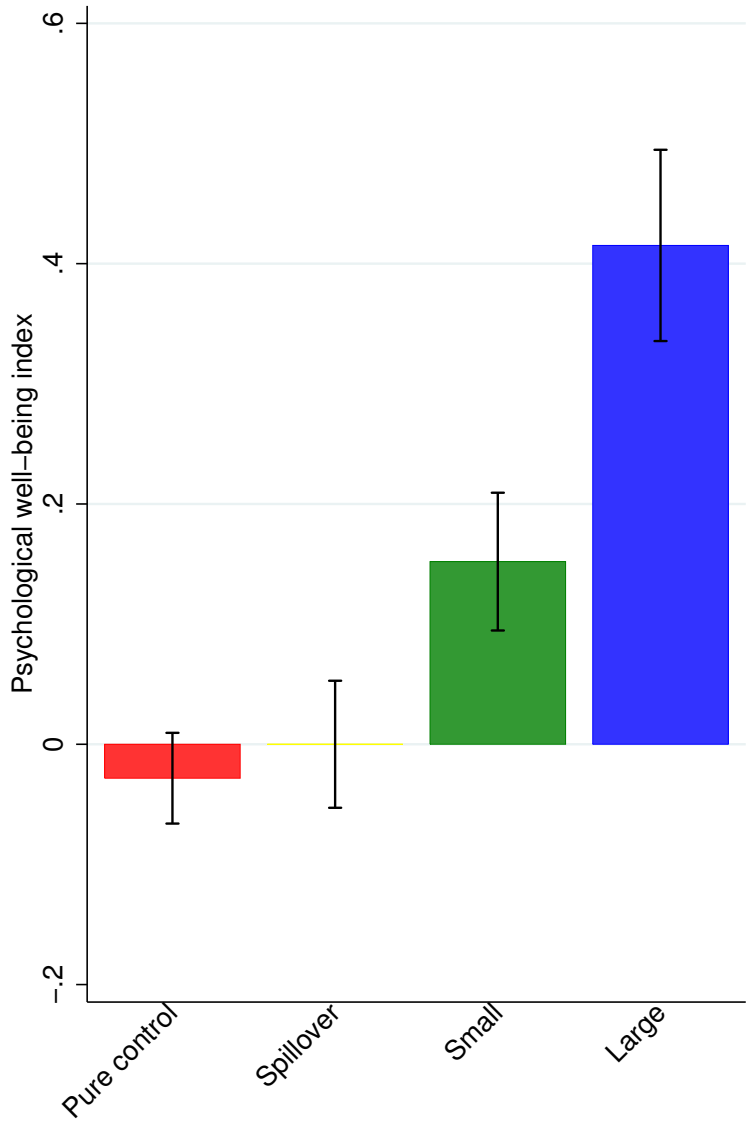
(Haushofer & Shapiro, 2013)

Psychological well-being



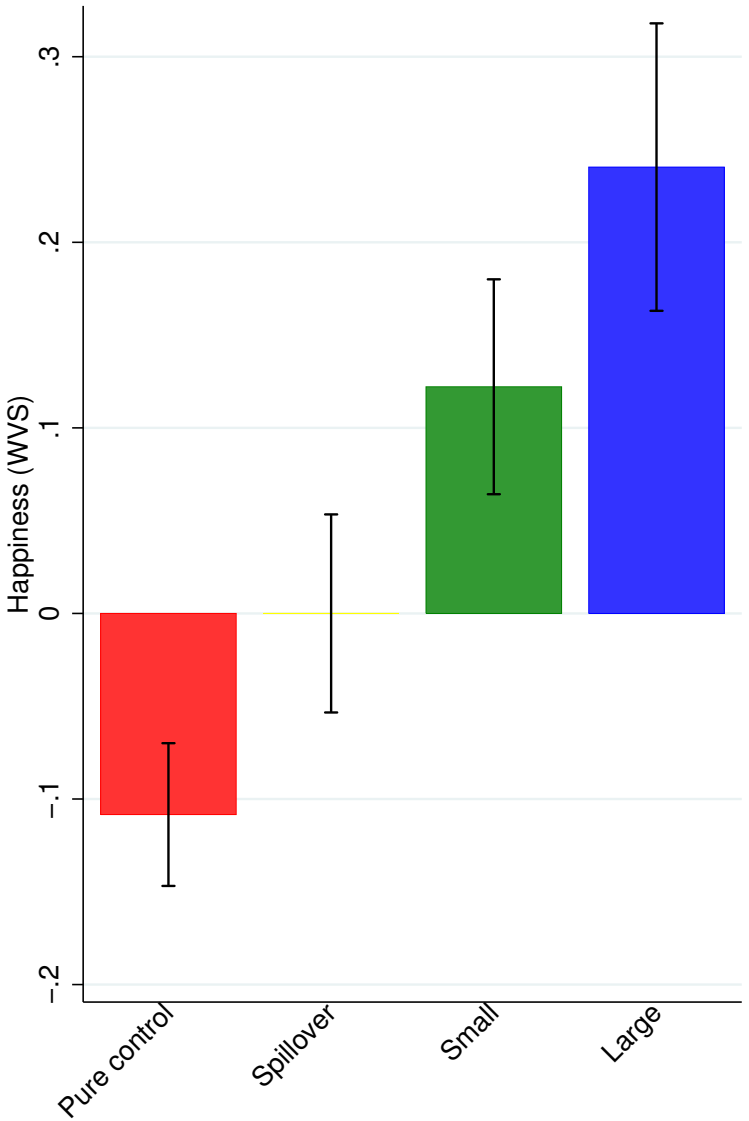
(Haushofer & Shapiro, 2013)

Psychological well-being



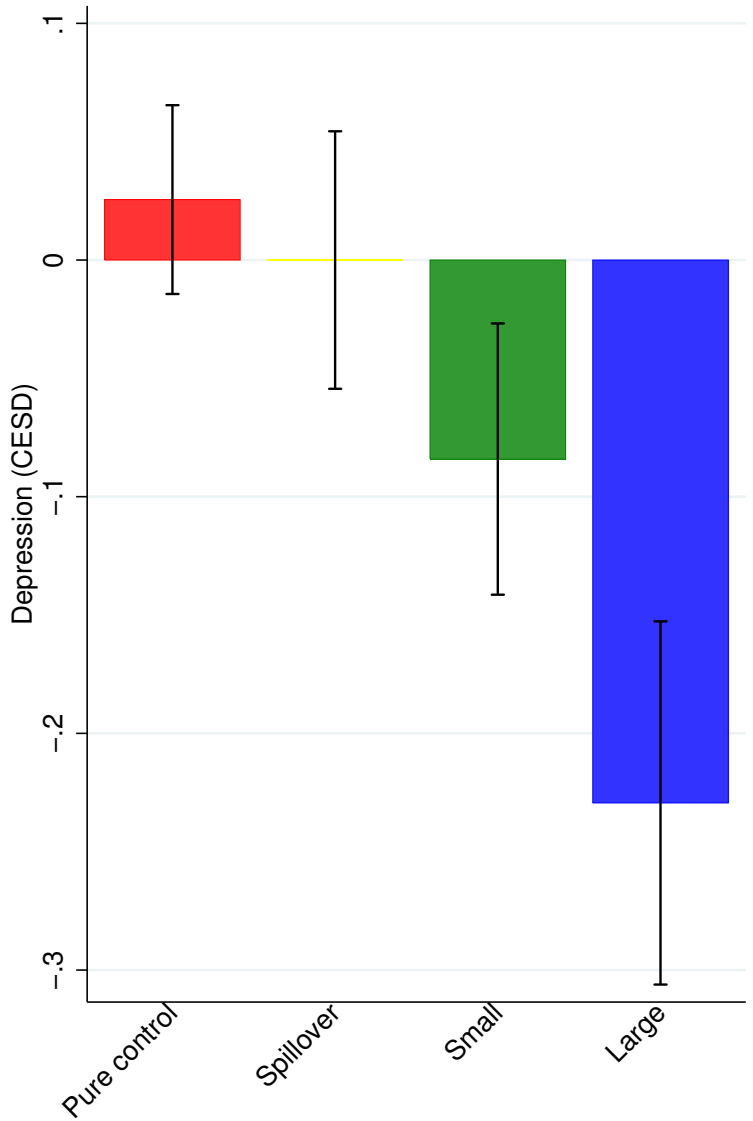
(Haushofer & Shapiro, 2013)

Happiness



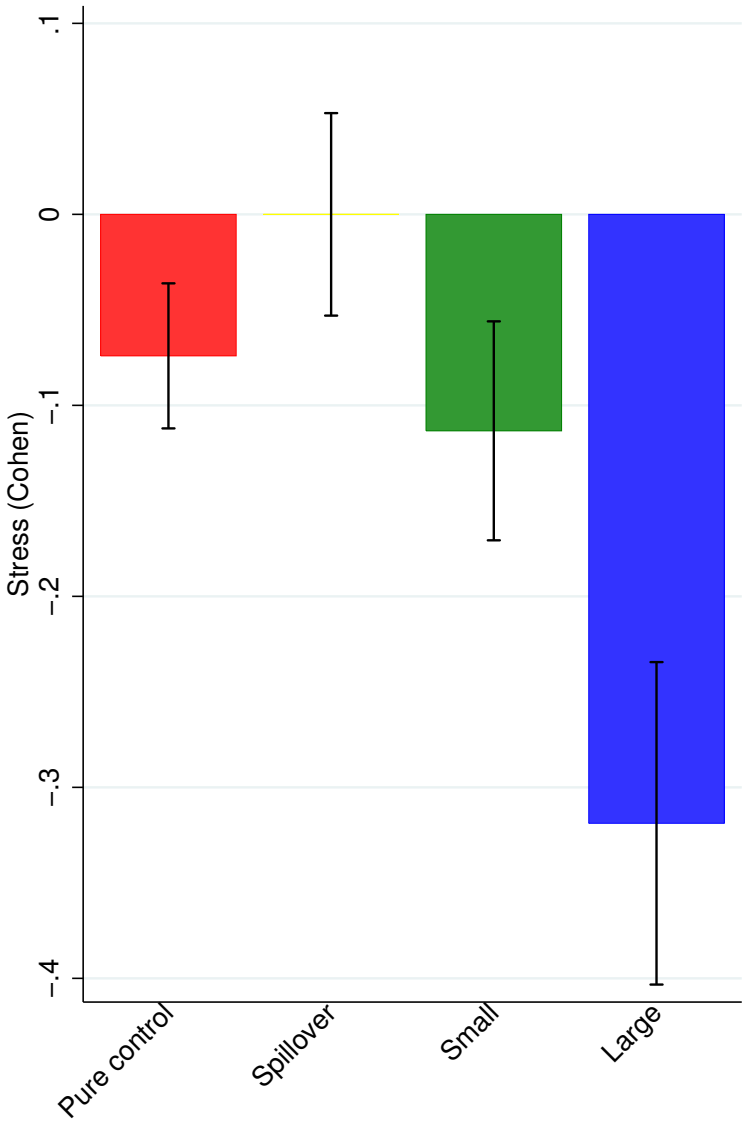
(Haushofer & Shapiro, 2013)

Depression



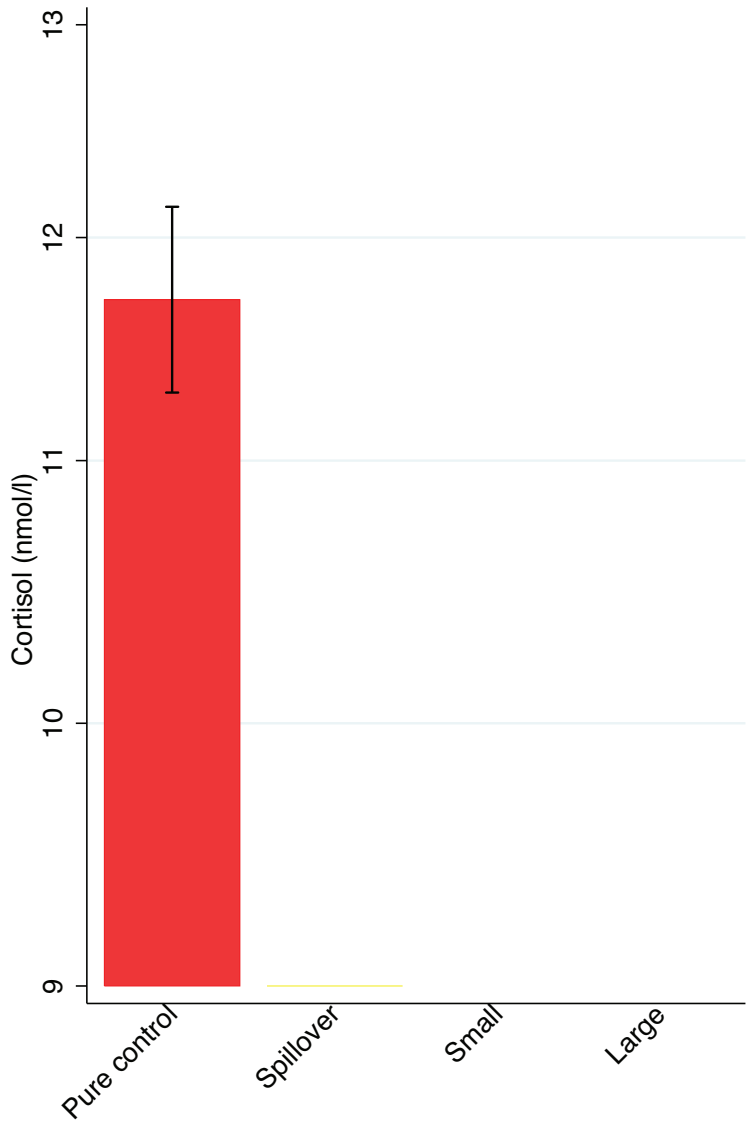
(Haushofer & Shapiro, 2013)

Stress



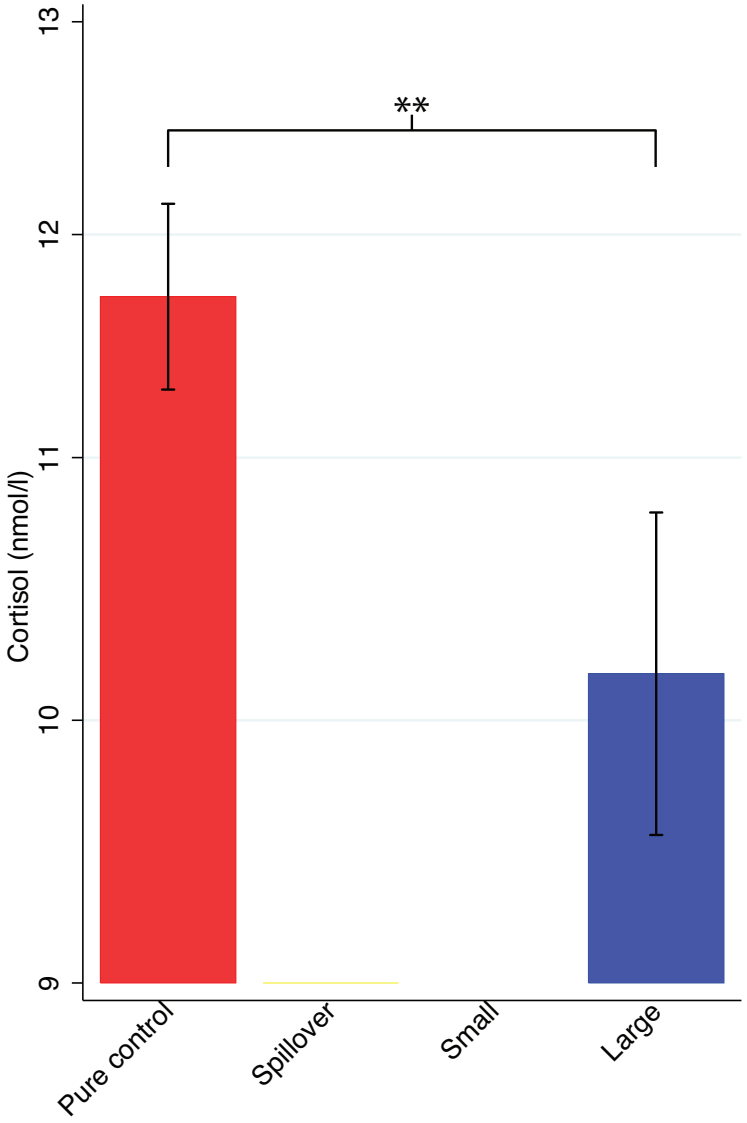
(Haushofer & Shapiro, 2013)

Cortisol levels



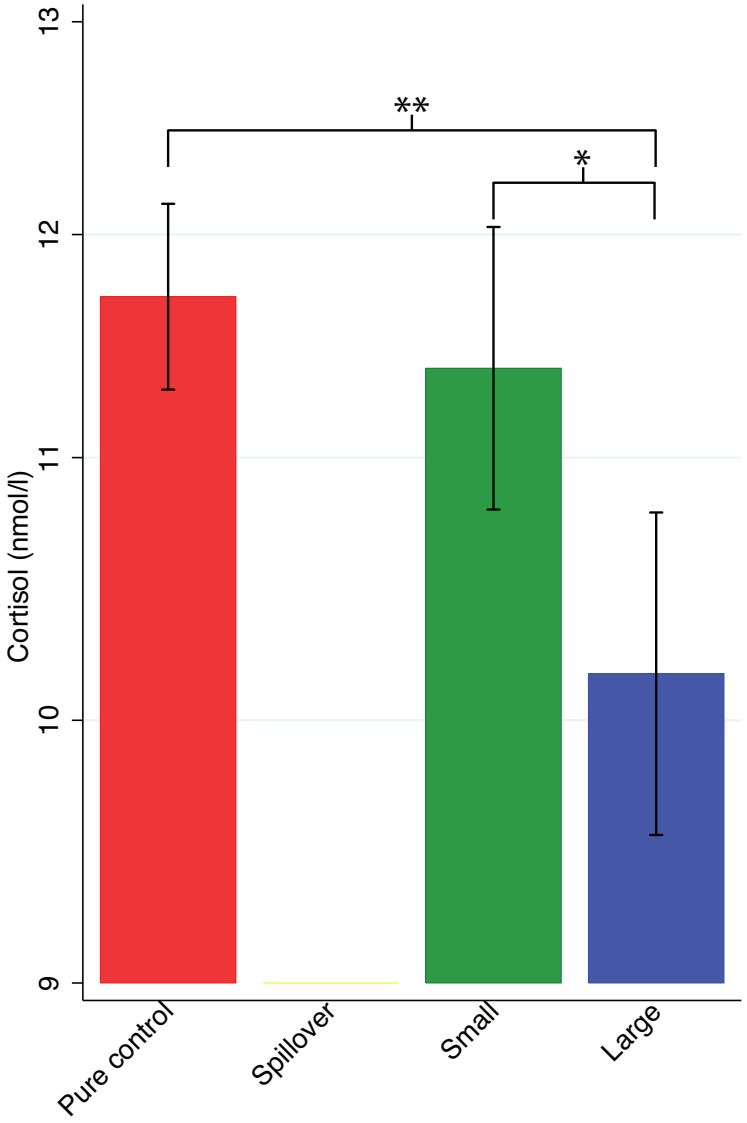
(Haushofer & Shapiro, 2013)

Cortisol levels



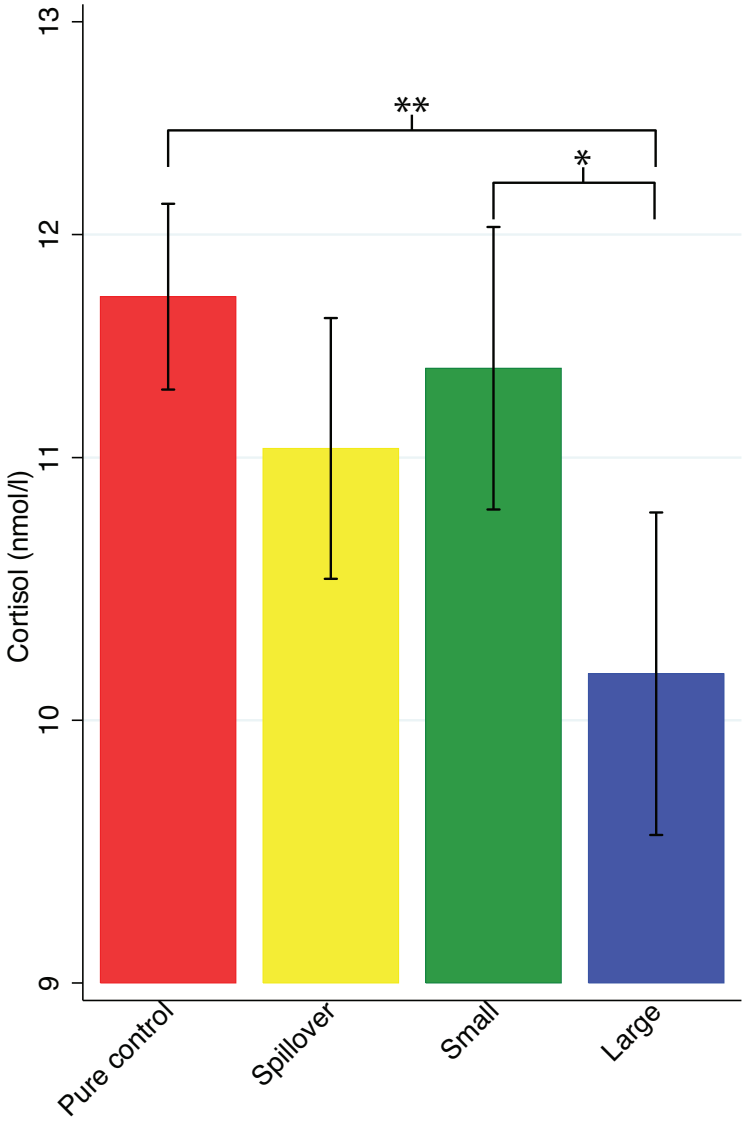
(Haushofer & Shapiro, 2013)

Cortisol levels



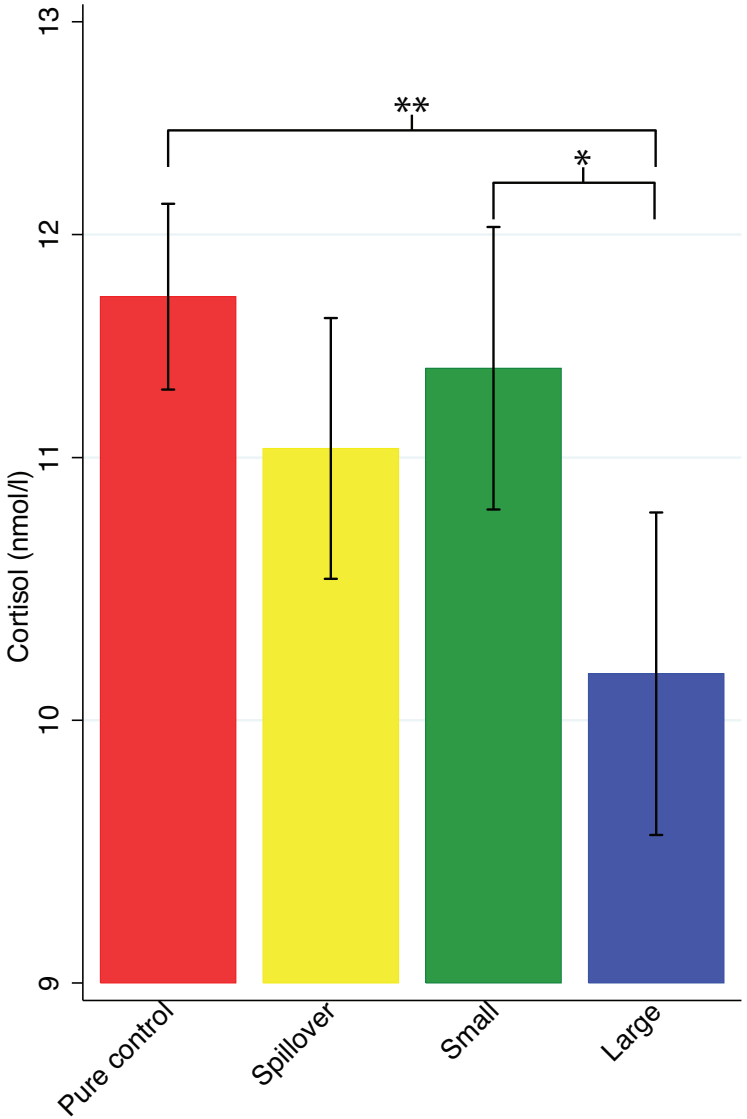
(Haushofer & Shapiro, 2013)

Cortisol levels



(Haushofer & Shapiro, 2013)

Cortisol levels



Depressed patients vs. controls: 2.58 nmol/l difference (Knorr et al., 2010)

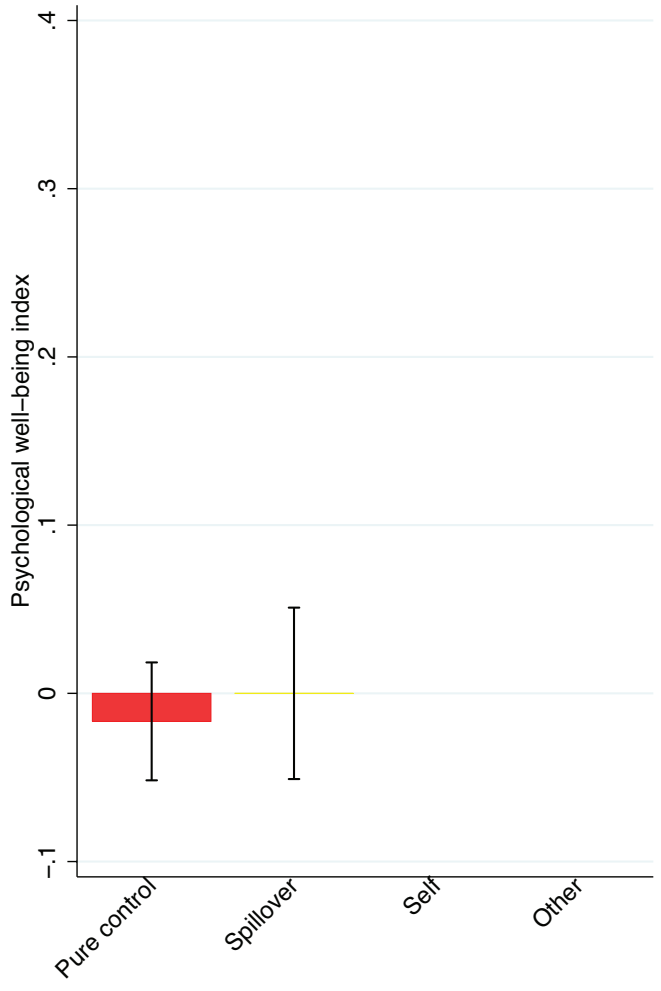
Poverty alleviation reduces self-reported stress and cortisol levels

Poverty alleviation reduces self-reported stress and cortisol levels
Results on assets, consumption, income, health, education, domestic violence, intrahousehold bargaining: cf. paper

Negative externalities of transfers?

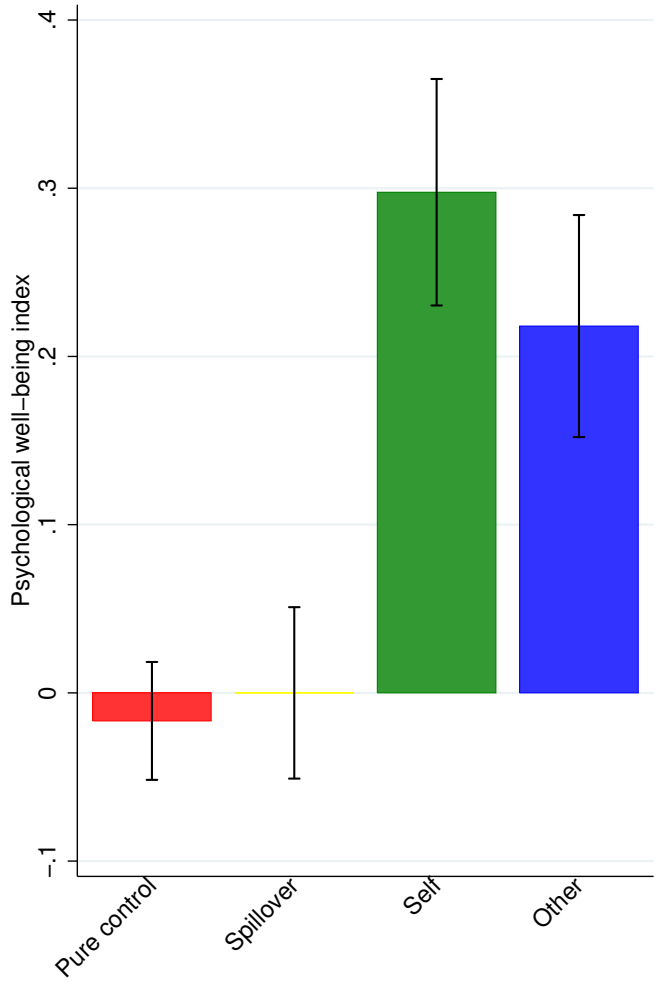
- On family members?
- On others in the village?

Negative psychological externalities of transfers?



(Haushofer & Shapiro, 2013)

Negative psychological externalities of transfers?



(Haushofer & Shapiro, 2013)

Interim summary

- Poverty is associated with low psychological well-being (Haushofer, 2013) and high cortisol levels (Haushofer et al., 2011)

Interim summary

- Poverty is associated with low psychological well-being (Haushofer, 2013) and high cortisol levels (Haushofer et al., 2011)
- Increases in poverty through negative income shocks lead to increases in levels of cortisol and stress (Chemin, de Laat, Haushofer, 2013)

Interim summary

- Poverty is associated with low psychological well-being (Haushofer, 2013) and high cortisol levels (Haushofer et al., 2011)
- Increases in poverty through negative income shocks lead to increases in levels of cortisol and stress (Chemin, de Laat, Haushofer, 2013)
- Decreases in poverty through unconditional cash transfers lead to decreases in levels of cortisol and stress (Haushofer & Shapiro, 2013)

Does recipient gender affect psychological well-being and cortisol levels?

Does recipient gender affect psychological well-being and cortisol levels?

- No significant recipient gender effects on economic outcomes; might predict no effect of gender on psychological well-being

Does recipient gender affect psychological well-being and cortisol levels?

- No significant recipient gender effects on economic outcomes; might predict no effect of gender on psychological well-being
- But if psychological well-being reflects tension in the household, might see effects

Economic effects: Female vs. male

Economic effects: Female vs. male

	Control mean (SD)	Female recipient	Male recipient	Difference (p-value)
Value of non-land assets (USD)	477.66	333.56***	387.85***	0.16
	(389.23)	(39.90)	(42.69)	
Non-durable expenditure (USD)	157.40	19.79**	26.46**	0.79
	(82.18)	(9.42)	(11.80)	
Total revenue, monthly (USD)	48.98	8.33	9.56	0.62
	(90.52)	(9.55)	(8.74)	
Food security index	0.00	0.27***	0.23***	0.60
	(1.00)	(0.09)	(0.09)	
Health index	0.00	-0.01	-0.13	0.28
	(1.00)	(0.09)	(0.09)	
Education index	0.00	0.16*	0.05	0.58
	(1.00)	(0.08)	(0.10)	

Domestic violence: Female vs. male

	Control mean (SD)	Female recipient	Male recipient	Difference (p-value)
Physical violence				
Slapped you	0.24	.	.	.
(dummy, last 6 months)	(0.43)	.	.	
Kicked, dragged, beat you	0.11	.	.	.
(dummy, last 6 months)	(0.31)	.	.	
Sexual violence				
Forced sexual intercourse	0.09	.	.	.
(dummy, last 6 months)	(0.29)	.	.	
Forced sexual acts	0.06	.	.	.
(dummy, last 6 months)	(0.23)	.	.	
Female empowerment index	0.00	.	.	.
	(1.00)	.	.	

Domestic violence: Female vs. male

	Control mean (SD)	Female recipient	Male recipient	Difference (p-value)
Physical violence				
Slapped you	0.24	-0.13***	-0.10***	0.52
(dummy, last 6 months)	(0.43)	(0.04)	(0.04)	
Kicked, dragged, beat you	0.11	-0.08***	-0.09***	0.54
(dummy, last 6 months)	(0.31)	(0.03)	(0.03)	
Sexual violence				
Forced sexual intercourse	0.09	-0.07**	-0.03	0.37
(dummy, last 6 months)	(0.29)	(0.03)	(0.03)	
Forced sexual acts	0.06	-0.06***	-0.03	0.29
(dummy, last 6 months)	(0.23)	(0.02)	(0.03)	
Female empowerment index	0.00	0.29***	0.10	0.12
	(1.00)	(0.10)	(0.11)	

Psychological well-being & cortisol: Female vs. male

	Control mean (SD)	Overall effect	Female recipient	Male recipient	Difference (p-value)
Log cortisol (clean) (log nmol/l)	0.00 (1.00)	-0.06 (0.06)	-0.15** (0.07)	0.02 (0.08)	0.02**
Linear cortisol (clean) (nmol/l)	11.7 (4.23)	-0.70 (0.70)	-1.76** (0.82)	0.23 (0.92)	0.02**
Psychological well-being index	0.00 (1.00)	0.39*** (0.09)	0.38*** (0.10)	0.19** (0.09)	0.09*

Psychological well-being & cortisol: Female vs. male

	Control mean (SD)	Overall effect	Female recipient	Male recipient	Difference (p-value)
Log cortisol (clean) (log nmol/l)	0.00 (1.00)	-0.06 (0.06)	-0.15** (0.07)	0.02 (0.08)	0.02**
Linear cortisol (clean) (nmol/l)	11.7 (4.23)	-0.70 (0.70)	-1.76** (0.82)	0.23 (0.92)	0.02**
Psychological well-being index	0.00 (1.00)	0.39*** (0.09)	0.38*** (0.10)	0.19** (0.09)	0.09*

Driven by women: significant reduction in women, but not men, for transfers to women

Treatment effect on psychological well-being and cortisol is greater when women receive the transfer. Possibly driven by effect on domestic violence.

Does transfer timing (monthly vs. lump-sum) affect cortisol and psychological well-being?

Does transfer timing (monthly vs. lump-sum) affect cortisol and psychological well-being?

- Monthly recipient households have higher food security at endline than lump-sum recipient households. Prediction: lower stress levels among monthly transfer recipients than lump-sum transfer recipients

Food security

	Control mean (SD)	Monthly transfer	Lump-sum transfer	Difference (p-value)
Beg because not enough food (last month)	0.31 (0.8)	-0.17** (0.07)	-0.11 (0.08)	0.50
Enough food for tomorrow? (dummy)	0.36 (0.48)	0.10* (0.05)	-0.01 (0.04)	0.04**
Respondent slept hungry (last week, dummy)	0.23 (0.42)	-0.06* (0.04)	0.00 (0.04)	0.09*
Food security index	0.00 (1.00)	0.40*** (0.12)	0.12 (0.10)	0.02**

Cortisol and well-being: Lump-sum vs. monthly

	Control mean (SD)	Overall effect	Monthly transfer	Lump-sum transfer	Difference (p-value)
Log cortisol (clean) (log nmol/l)	0.00 (1.00)	-0.06 (0.06)	0.15* (0.07)	-0.16** (0.08)	0.01***
Linear cortisol (clean) (nmol/l)	11.70 (4.23)	-0.70 (0.70)	1.76* (0.82)	-1.87** (0.94)	0.01***
Psychological well-being index	0.00 (1.00)	0.39*** (0.09)	0.25* (0.13)	0.42** (0.17)	0.30

Does transfer timing (monthly vs. lump-sum) affect cortisol and psychological well-being?

Does transfer timing (monthly vs. lump-sum) affect cortisol and psychological well-being?

- Lump-sum recipient households are wealthier at endline than monthly recipient households (they invest in assets).
  Prediction: lowered stress levels among lump-sum recipients

Does transfer timing (monthly vs. lump-sum) affect cortisol and psychological well-being?

- Lump-sum recipient households are wealthier at endline than monthly recipient households (they invest in assets). Prediction: lowered stress levels among lump-sum recipients

- Monthly recipient households appear credit- and savings-constrained: they don't borrow against the transfer, or save it (despite M-Pesa access). This inability to save may be stressful. Prediction: higher stress levels among monthly transfer recipients

Does transfer timing (monthly vs. lump-sum) affect cortisol and psychological well-being?

- Lump-sum recipient households are wealthier at endline than monthly recipient households (they invest in assets). Prediction: lowered stress levels among lump-sum recipients

- Monthly recipient households appear credit- and savings-constrained: they don't borrow against the transfer, or save it (despite M-Pesa access). This inability to save may be stressful. Prediction: higher stress levels among monthly transfer recipients

- Alternative account: The end of a stream of payments is stressful. Prediction: higher stress levels among monthly transfer recipients

Investment in assets

	Control mean (SD)	Monthly transfer	Lump-sum transfer	Difference (p-value)
Value of non-land assets (USD)	477.66 (389.23)	170.32*** (34.55)	245.29*** (33.95)	0.08*
Has non-thatched roof (dummy)	0.16 (0.37)	0.11*** (0.04)	0.23*** (0.04)	0.01**

- Lower cortisol levels in lump-sum recipient households than control; possibly due to increase in asset holdings

- Lower cortisol levels in lump-sum recipient households than control; possibly due to increase in asset holdings
- (Moderately) higher cortisol levels in monthly recipient households; possibly due to inability to save. Alternative account: end of a stream of payments is stressful.

- Lower cortisol levels in lump-sum recipient households than control; possibly due to increase in asset holdings
- (Moderately) higher cortisol levels in monthly recipient households; possibly due to inability to save. Alternative account: end of a stream of payments is stressful.
- Future work: continuous surveying before and after end of transfers.

Summary

Summary

- Unconditional cash transfers lead to large increases in consumption and asset holdings 4 months after the end of transfers

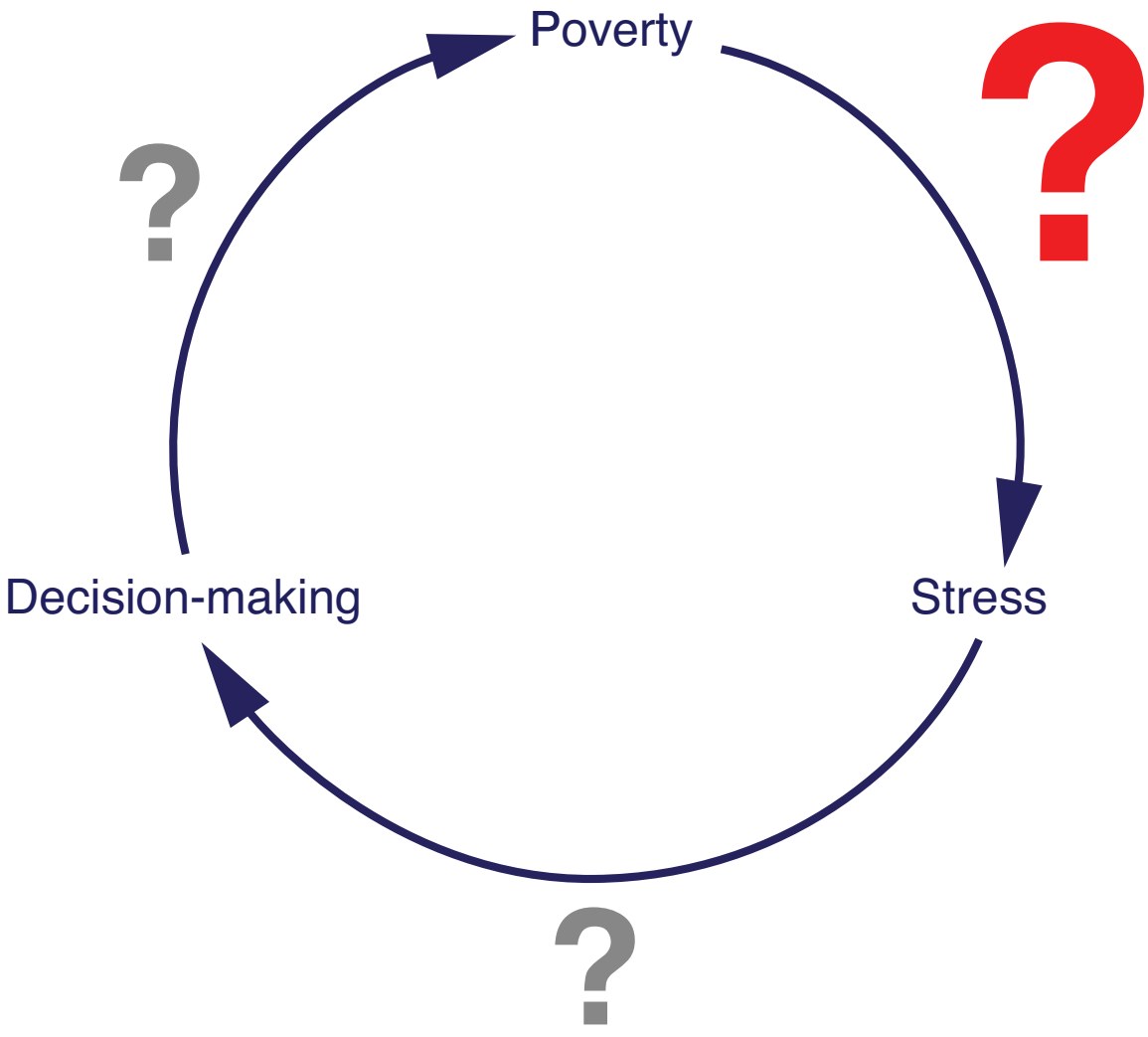
Summary

- Unconditional cash transfers lead to large increases in consumption and asset holdings 4 months after the end of transfers
- Large unconditional cash transfers lead to decreases in levels of cortisol and stress

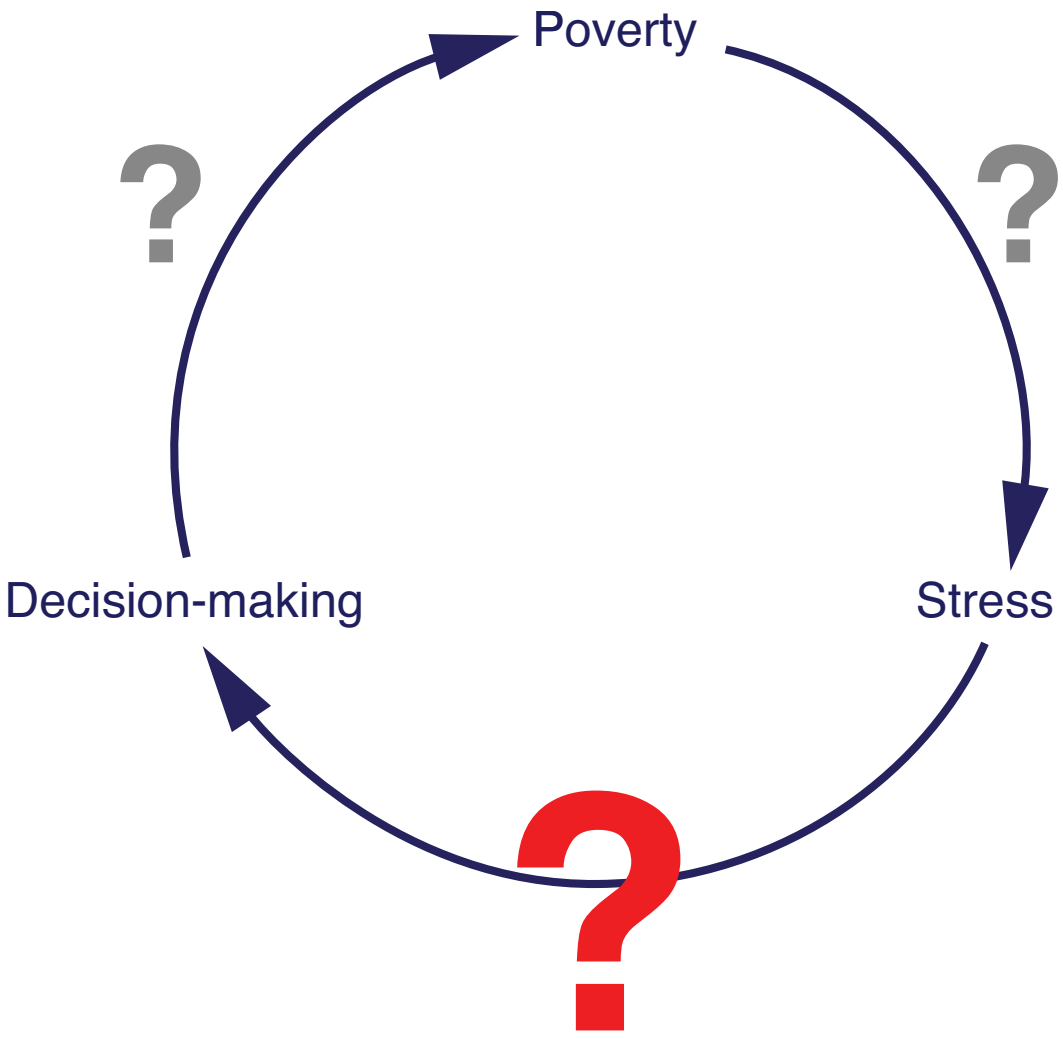
Summary

- Unconditional cash transfers lead to large increases in consumption and asset holdings 4 months after the end of transfers
- Large unconditional cash transfers lead to decreases in levels of cortisol and stress
- Not all transfers are created equal: Large transfers, transfers to the female, and lump-sum transfers are more effective in reducing stress and cortisol

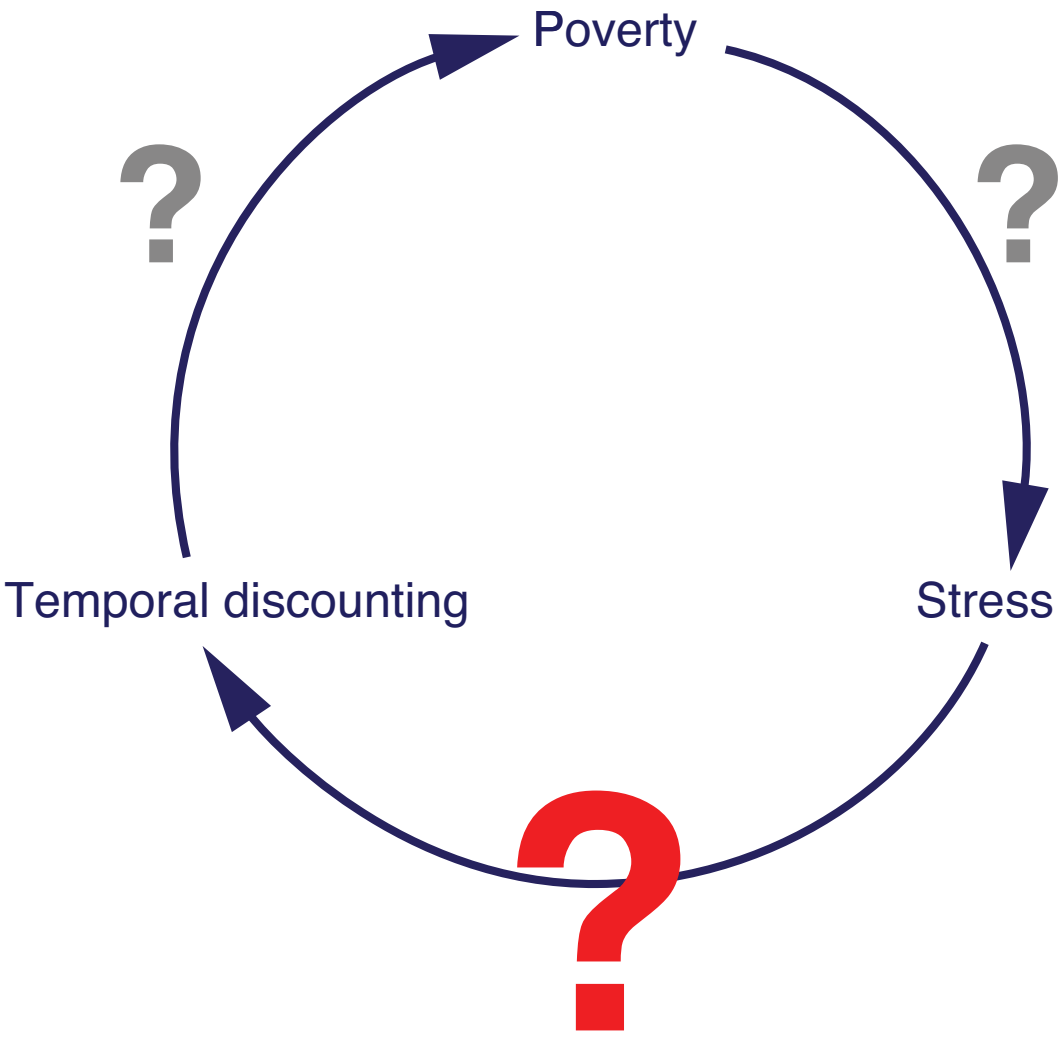
Does poverty affect stress?



Does stress affect decision-making?



Does stress affect decision-making?



What is temporal discounting?

Temporal discounting is the decrease in subjective value of a reward as it is delayed

What is temporal discounting?

Temporal discounting is the decrease in subjective value of a reward as it is delayed

Lowers attractiveness of long-term investments by decreasing the subjective value of their returns (e.g. health, education)

Why discounting breeds poverty

Why discounting breeds poverty

Significant welfare improvements by nudging people to discount (procrastinate) less

Why discounting breeds poverty

Significant welfare improvements by nudging people to discount (procrastinate) less

- Ashraf et al. (2006): commitment savings device in the Philippines (voluntary lock on bank account) increases household savings rate by 81 percentage points over 1 year

Why discounting breeds poverty

Significant welfare improvements by nudging people to discount (procrastinate) less

- Ashraf et al. (2006): commitment savings device in the Philippines (voluntary lock on bank account) increases household savings rate by 81 percentage points over 1 year
- Duflo et al. (2009): offering discounts on fertilizer at time of highest liquidity increases fertilizer use by 46%

Why discounting breeds poverty

Significant welfare improvements by nudging people to discount (procrastinate) less

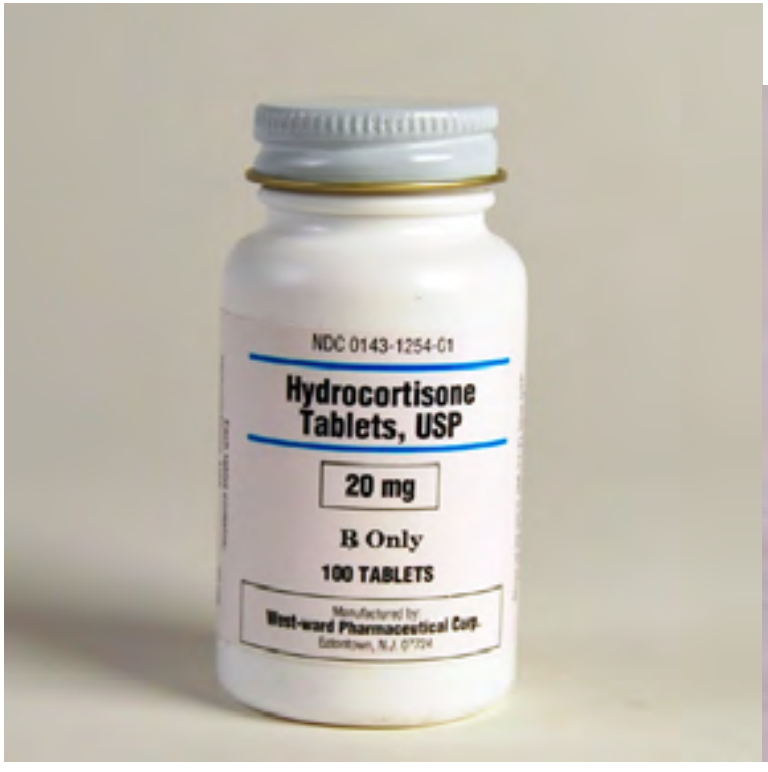
- Ashraf et al. (2006): commitment savings device in the Philippines (voluntary lock on bank account) increases household savings rate by 81 percentage points over 1 year

- Duflo et al. (2009): offering discounts on fertilizer at time of highest liquidity increases fertilizer use by 46%

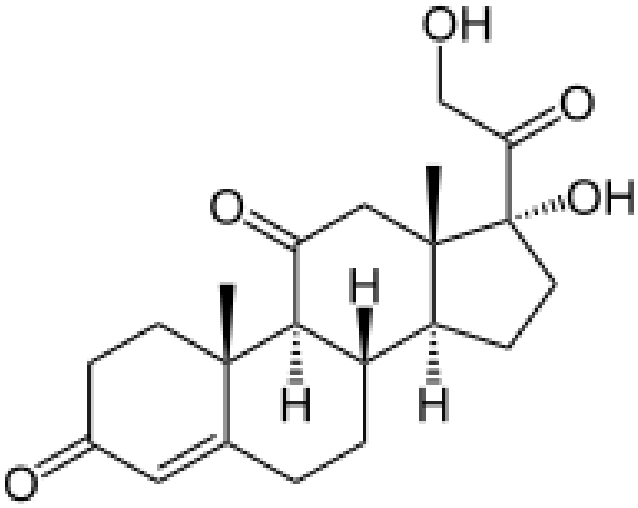
$\Longrightarrow$ Preference for commitment suggests that people have self-control problems (and they know it)

Do high cortisol levels increase temporal discounting?

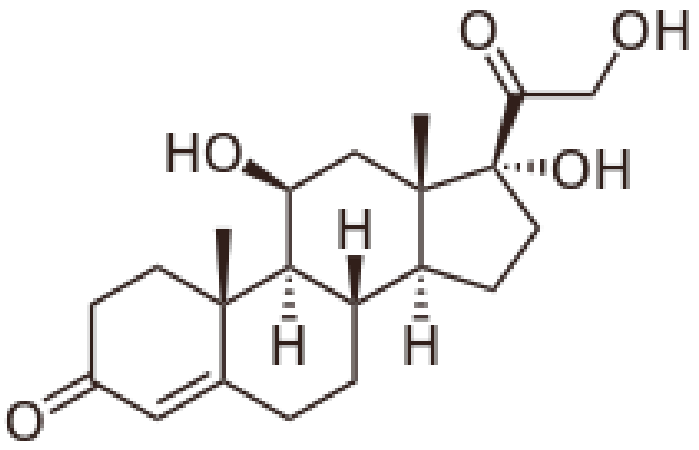
How to manipulate cortisol levels?



How to manipulate cortisol levels?

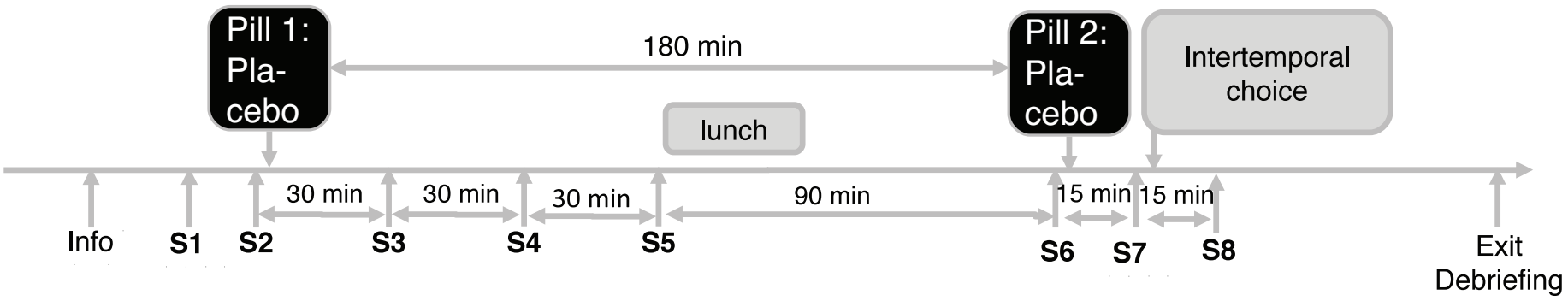


Cortisone

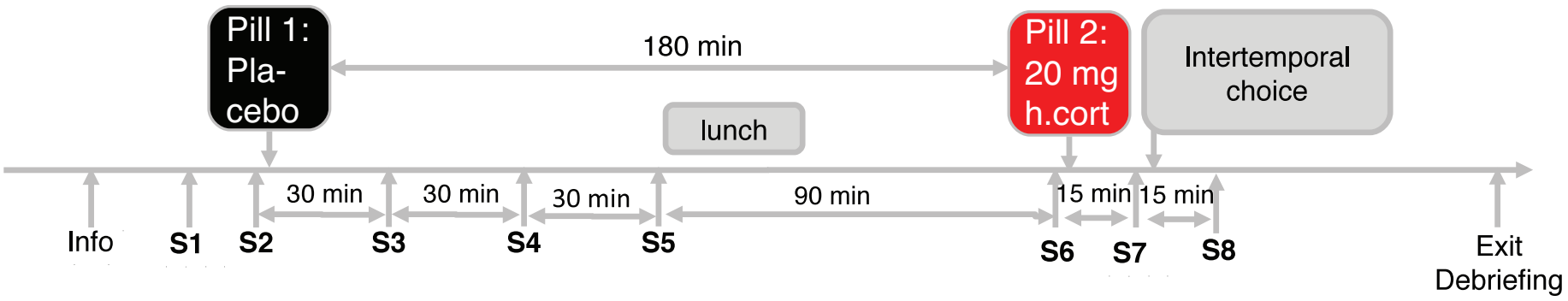


Cortisol

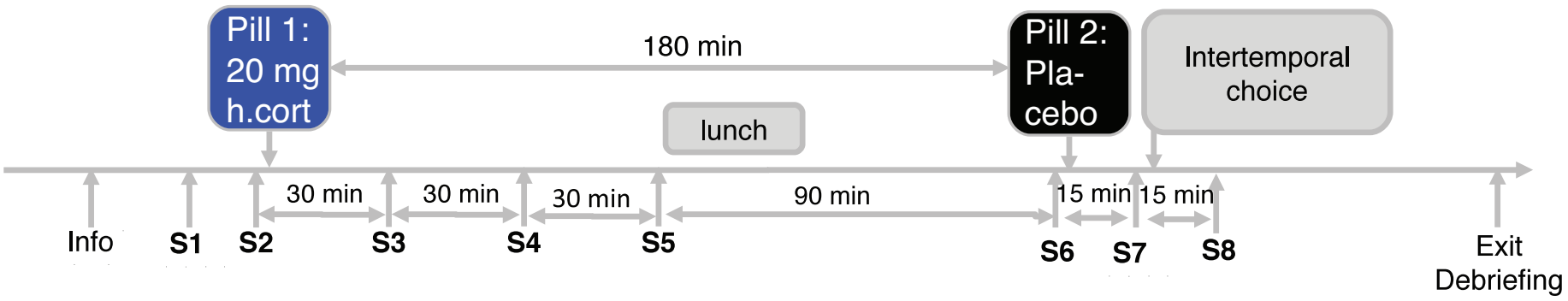
Timeline: Placebo group



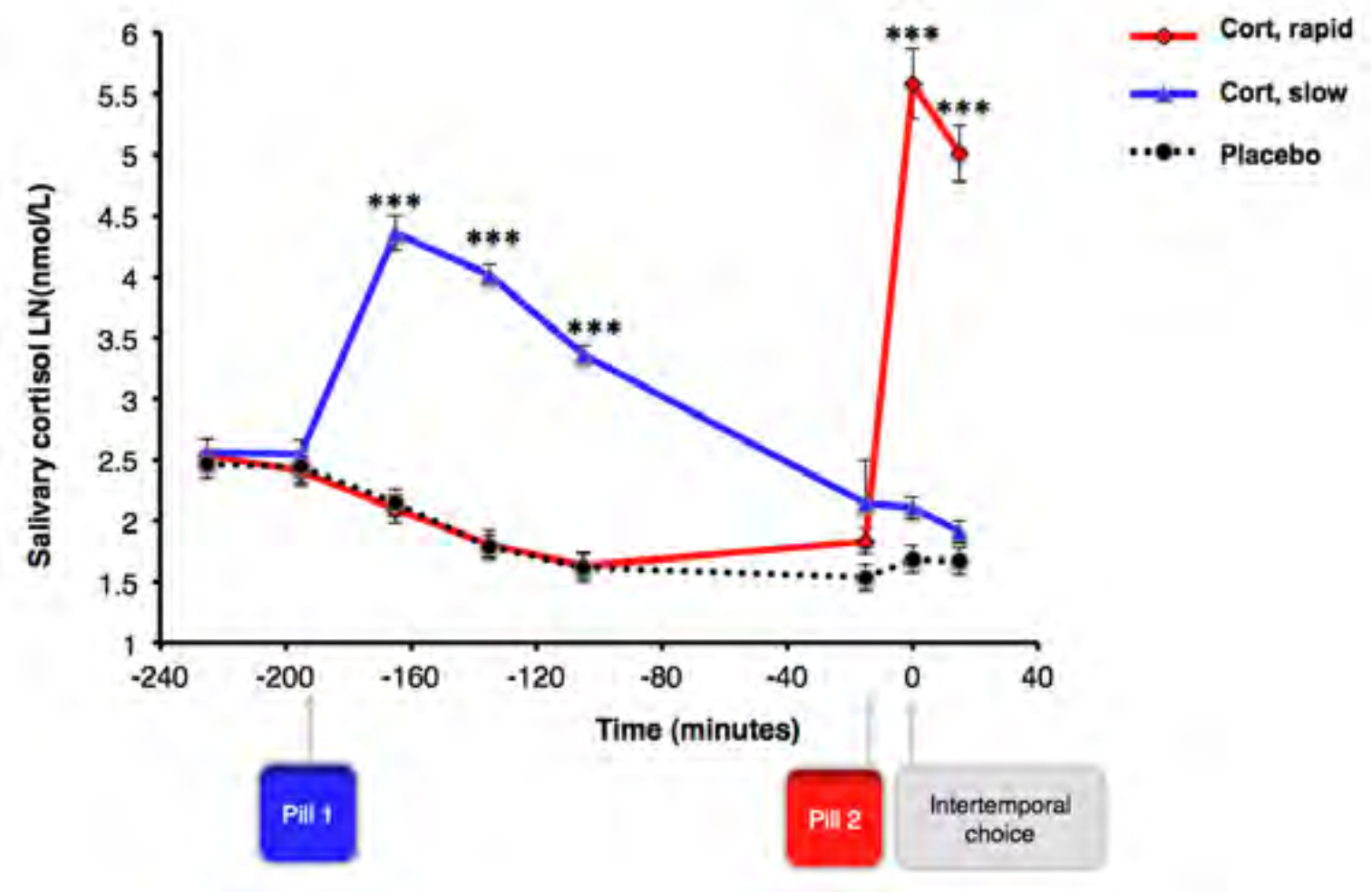
Timeline: "Rapid cort" group



Timeline: "Slow cort" group



Timeline


Cort, rapid
Cort, slow
Placebo
Salivary cortisol LN(nmol/L)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
***
***
***
***
***
-240
-200
-160
-120
-80
-40
0
40
Time (minutes)
Pill 1
Pill 2
Intertemporal choice

How do we measure temporal discounting?

You receive
$10
tomorrow

You receive
$20
in 3 months

How do we measure temporal discounting?

You receive
$15
tomorrow

You receive
$20
in 3 months

How do we measure temporal discounting?

You receive
$17.50
tomorrow

You receive
$20
in 3 months

How do we measure temporal discounting?

You receive
$16.25
tomorrow

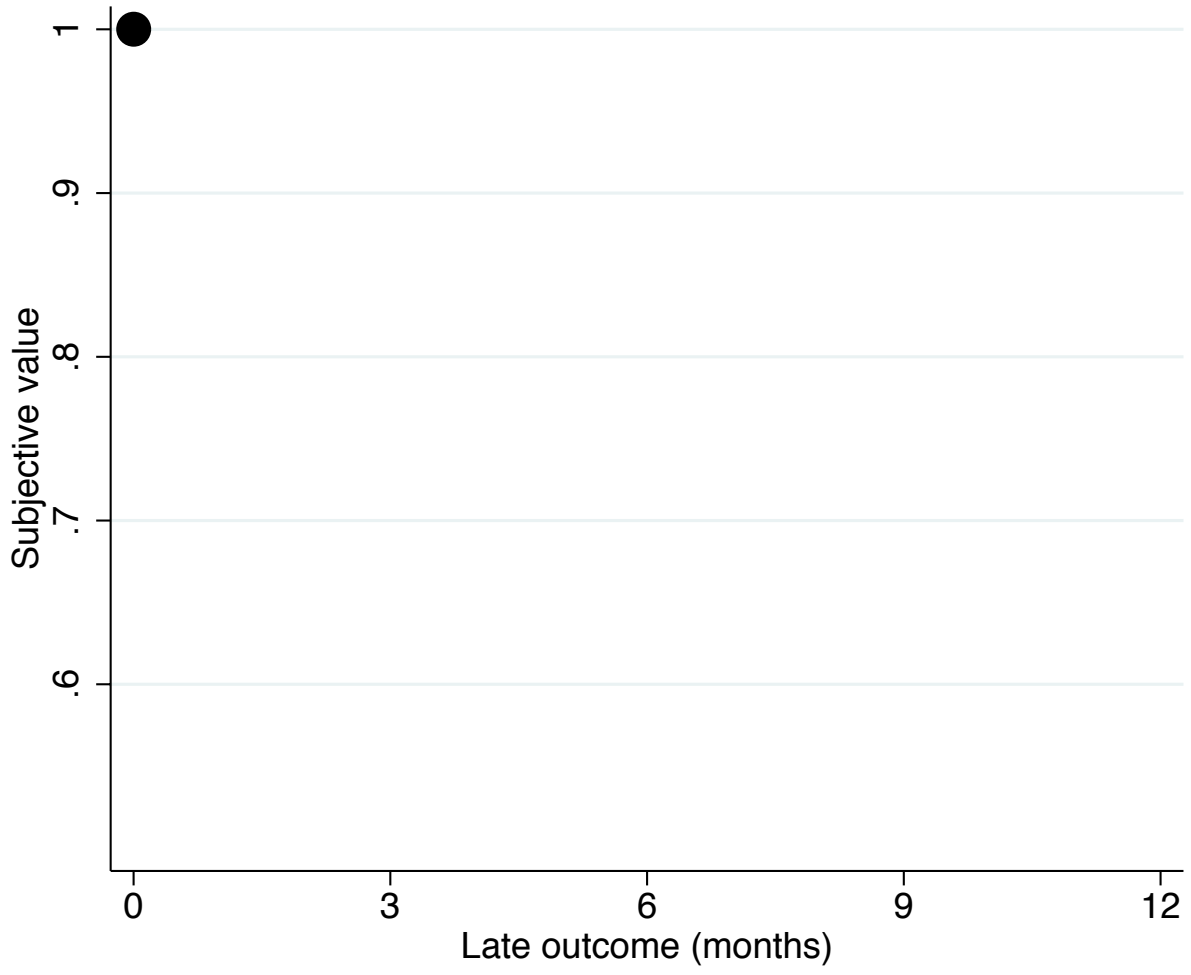
You receive
$20
in 3 months

How do we measure temporal discounting?

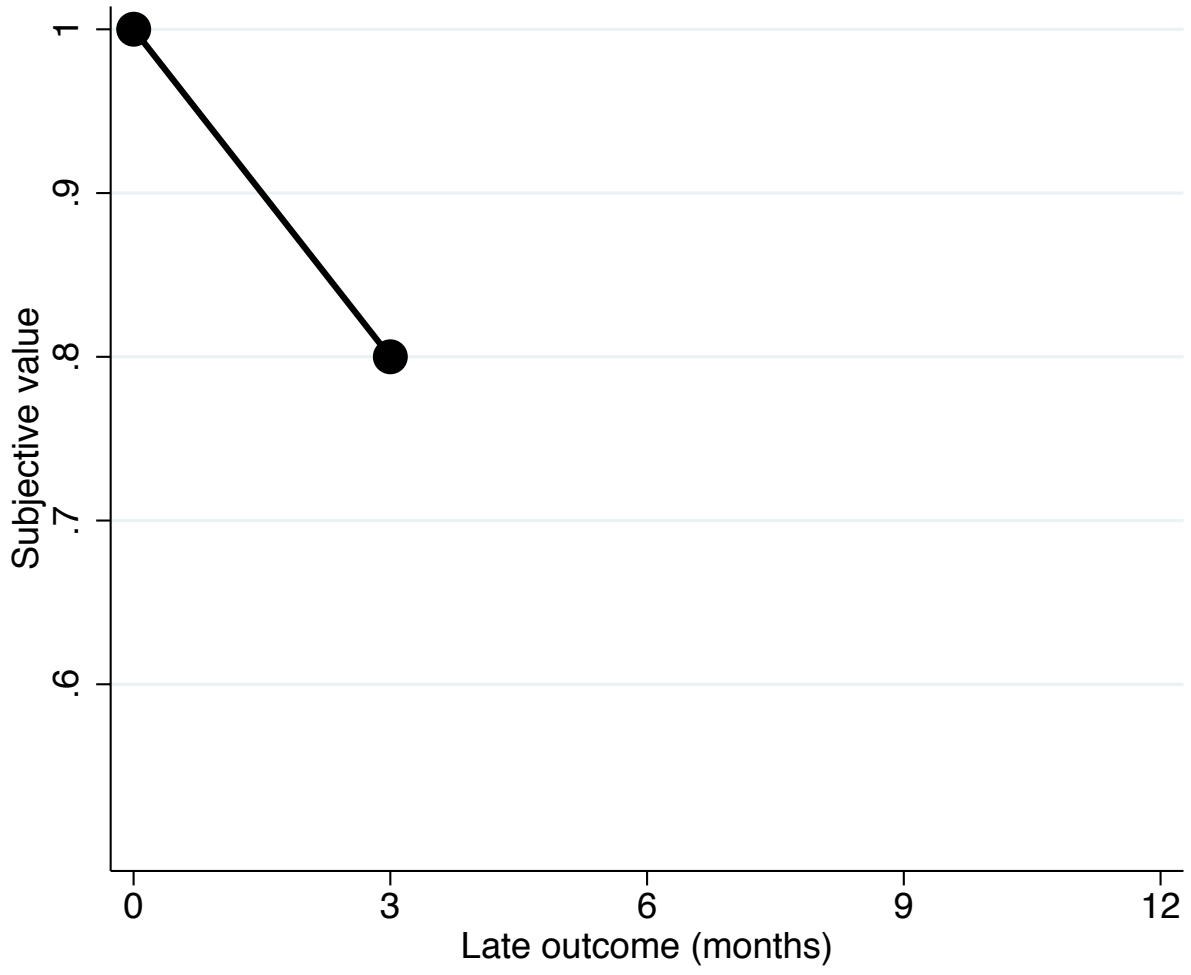
You receive
$16.88
tomorrow

You receive
$20
in 3 months

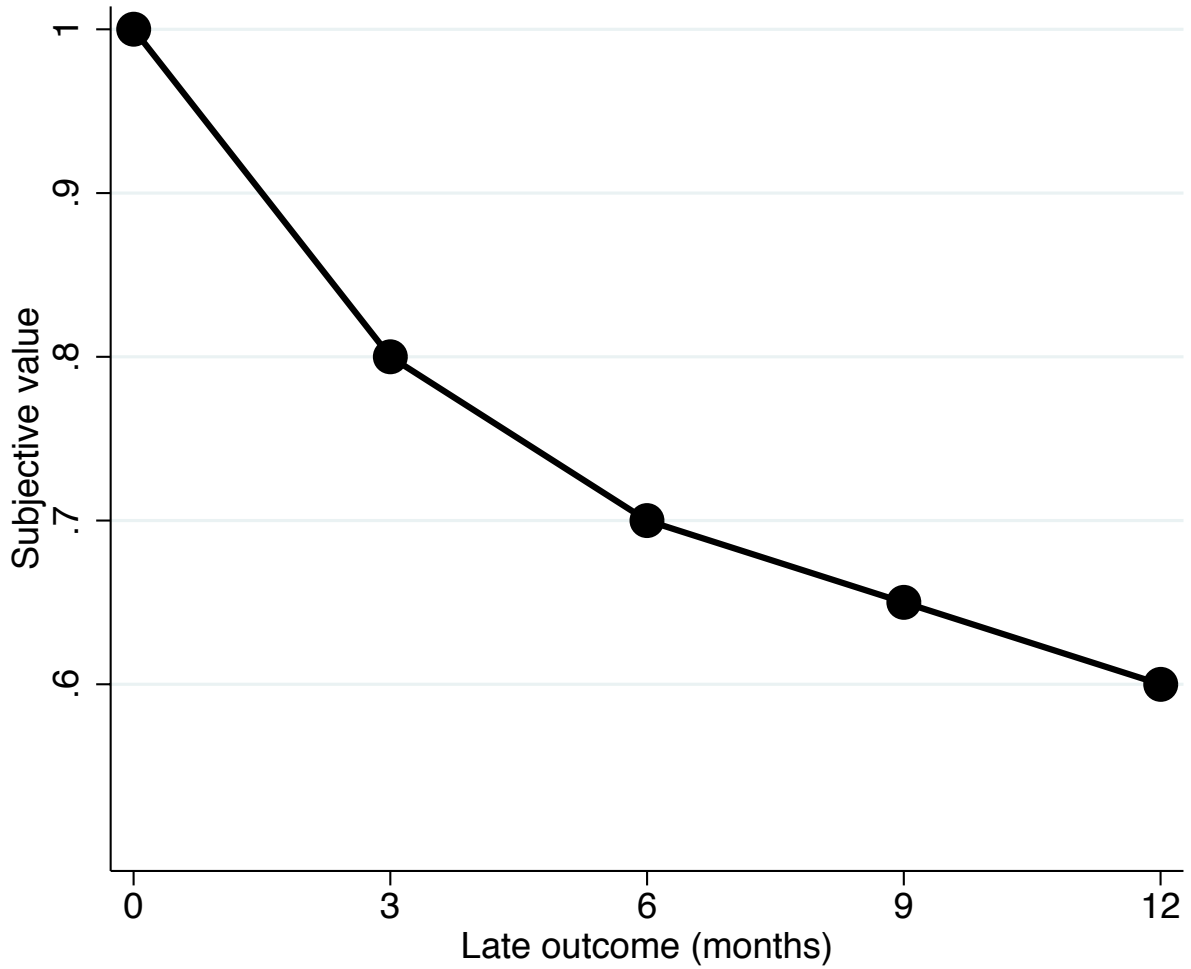
How do we measure temporal discounting?



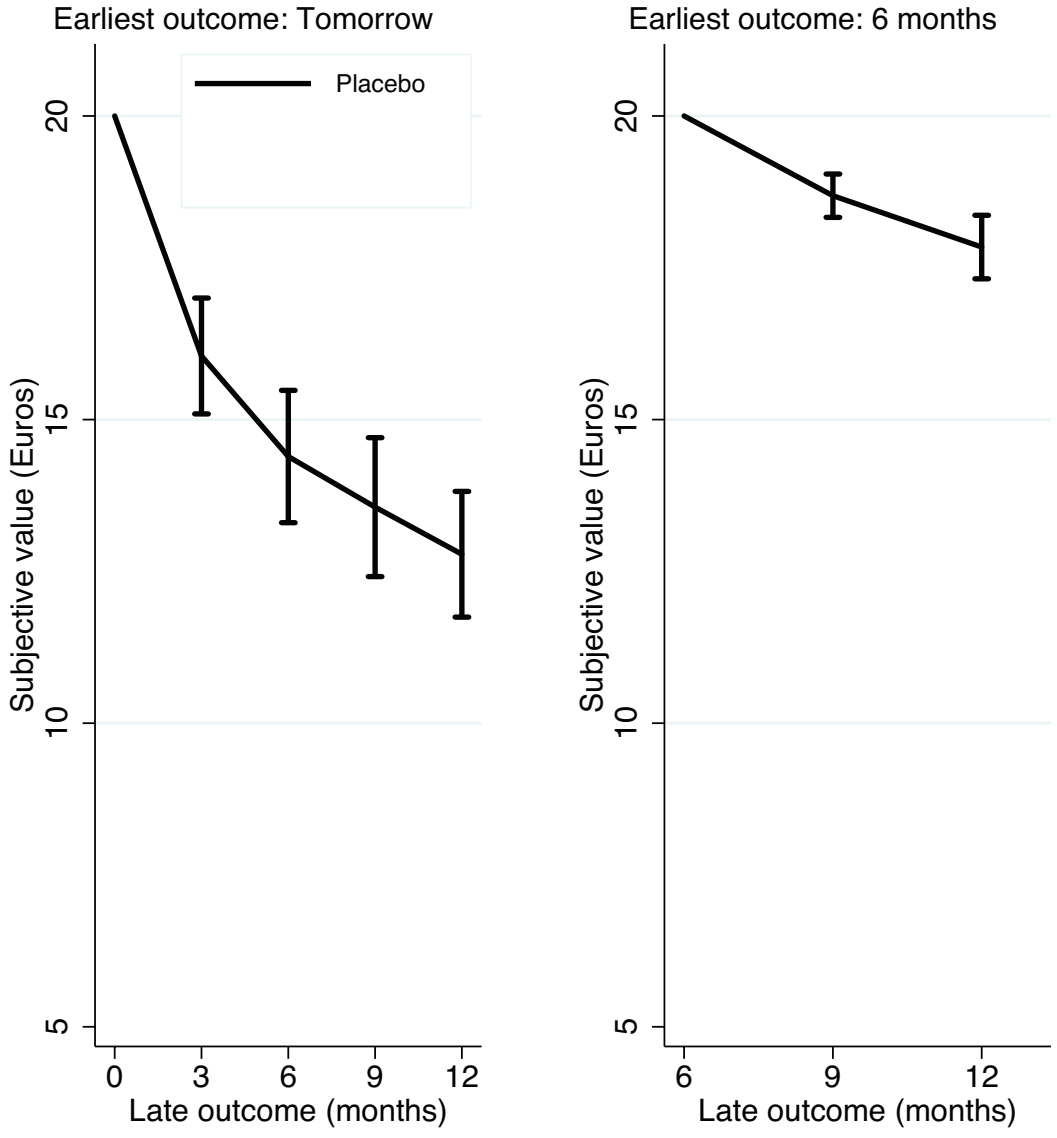
How do we measure temporal discounting?



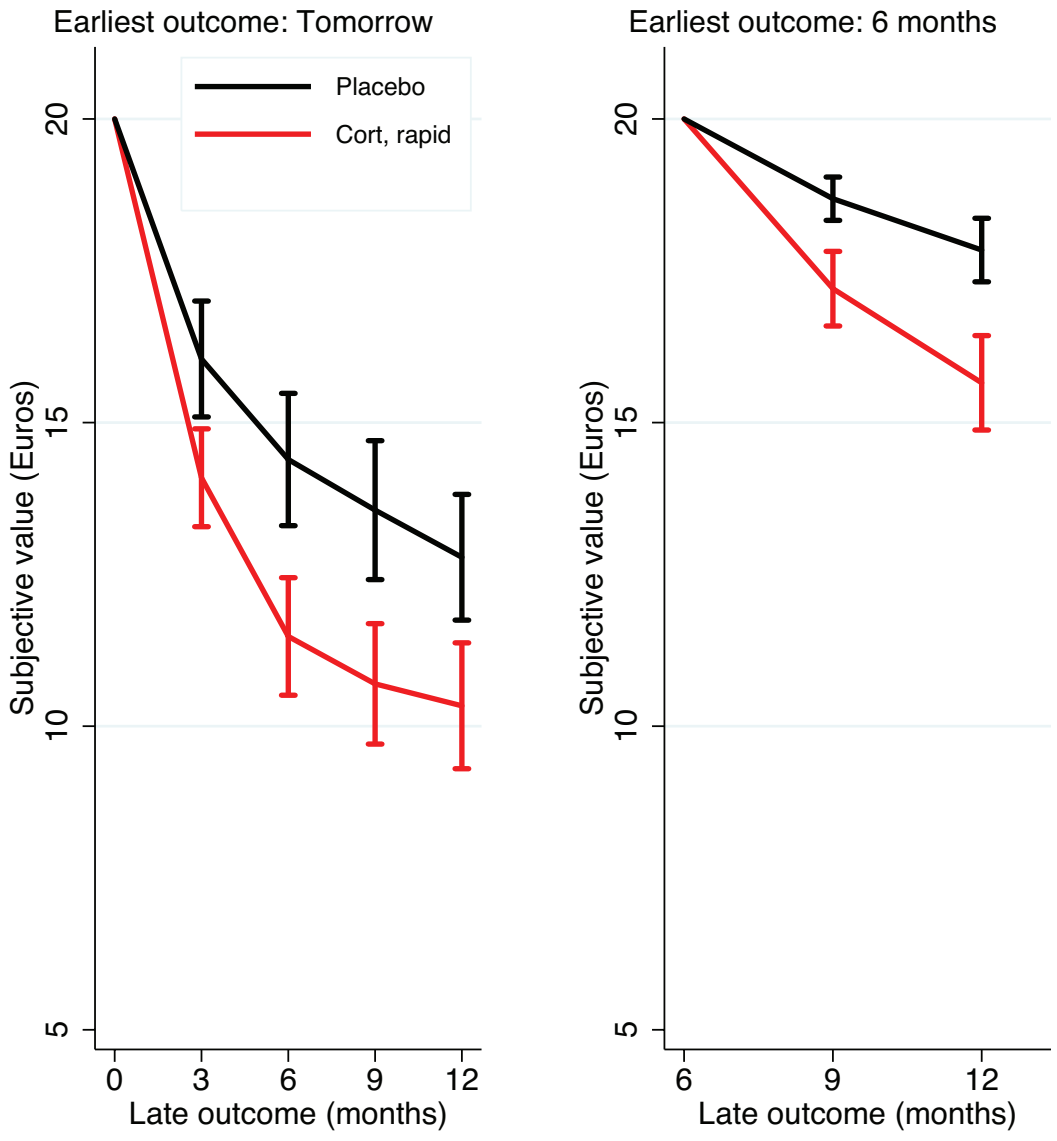
How do we measure temporal discounting?



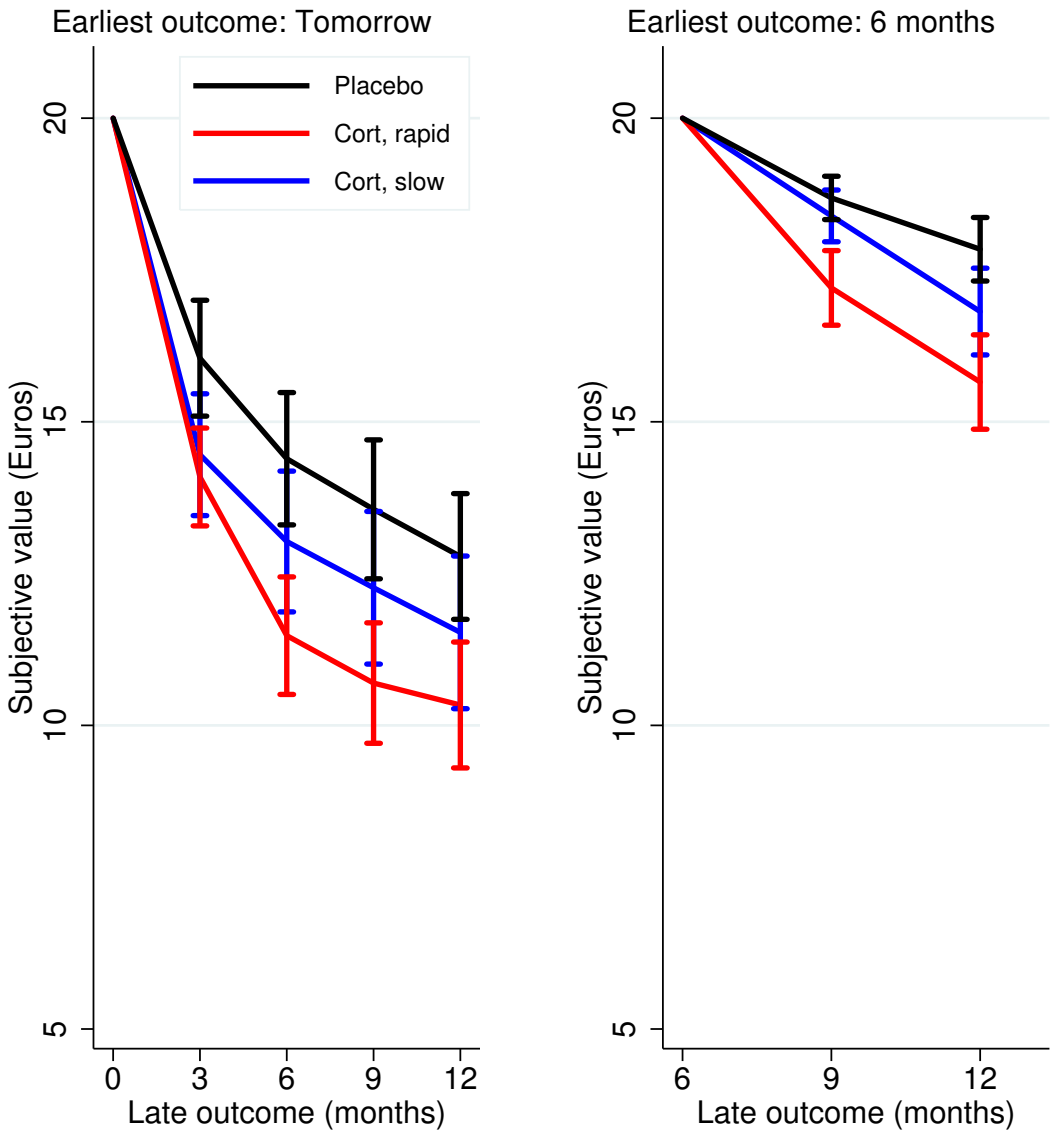
Hydrocortisone administration increases discounting



Hydrocortisone administration increases discounting



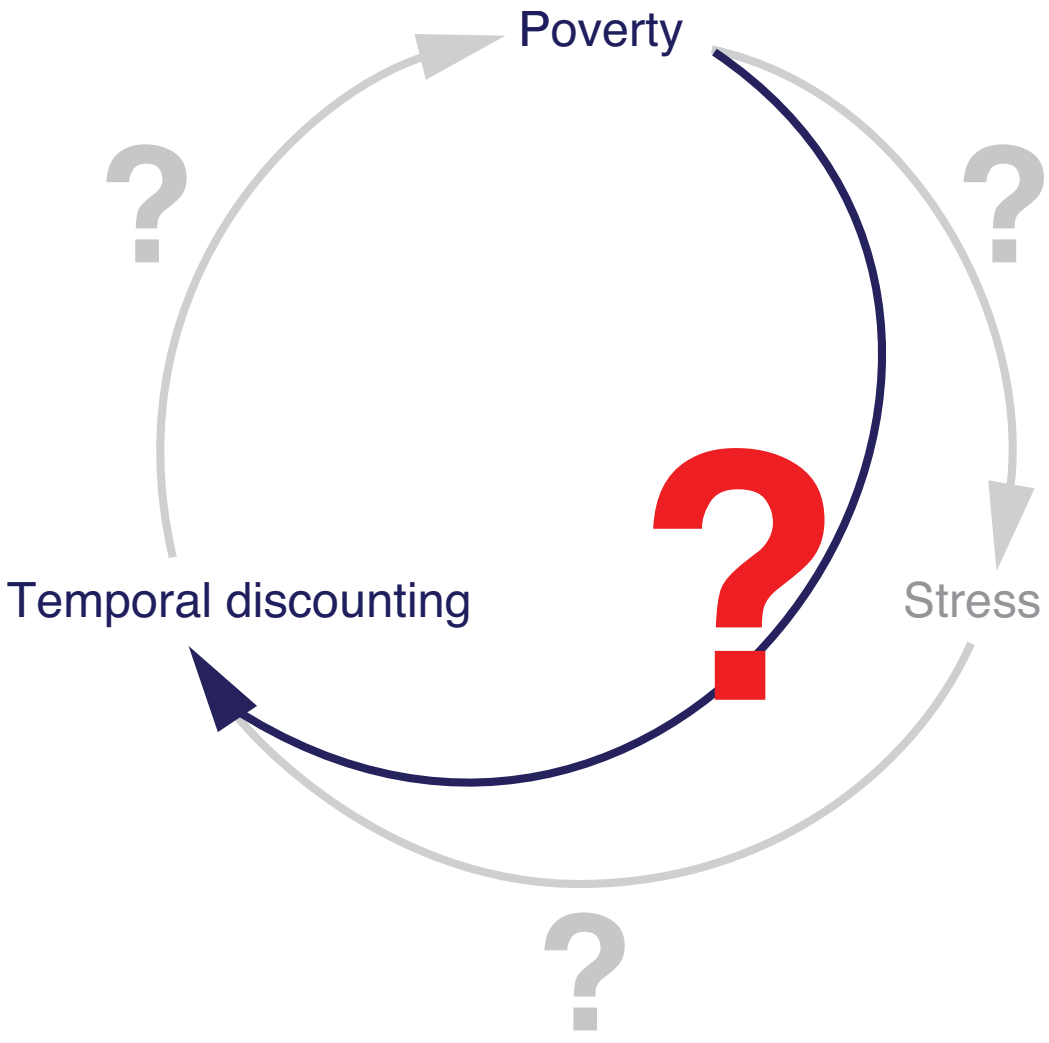
Hydrocortisone administration increases discounting



Increased cortisol levels increase temporal discounting.

Direct effect of poverty on temporal discounting?

Working hypothesis



Poverty and Decision-Making

- Does poverty causally affect temporal discounting?

Poverty and Decision-Making

- Does poverty causally affect temporal discounting?
- Study one particular characteristic of poverty: income shocks

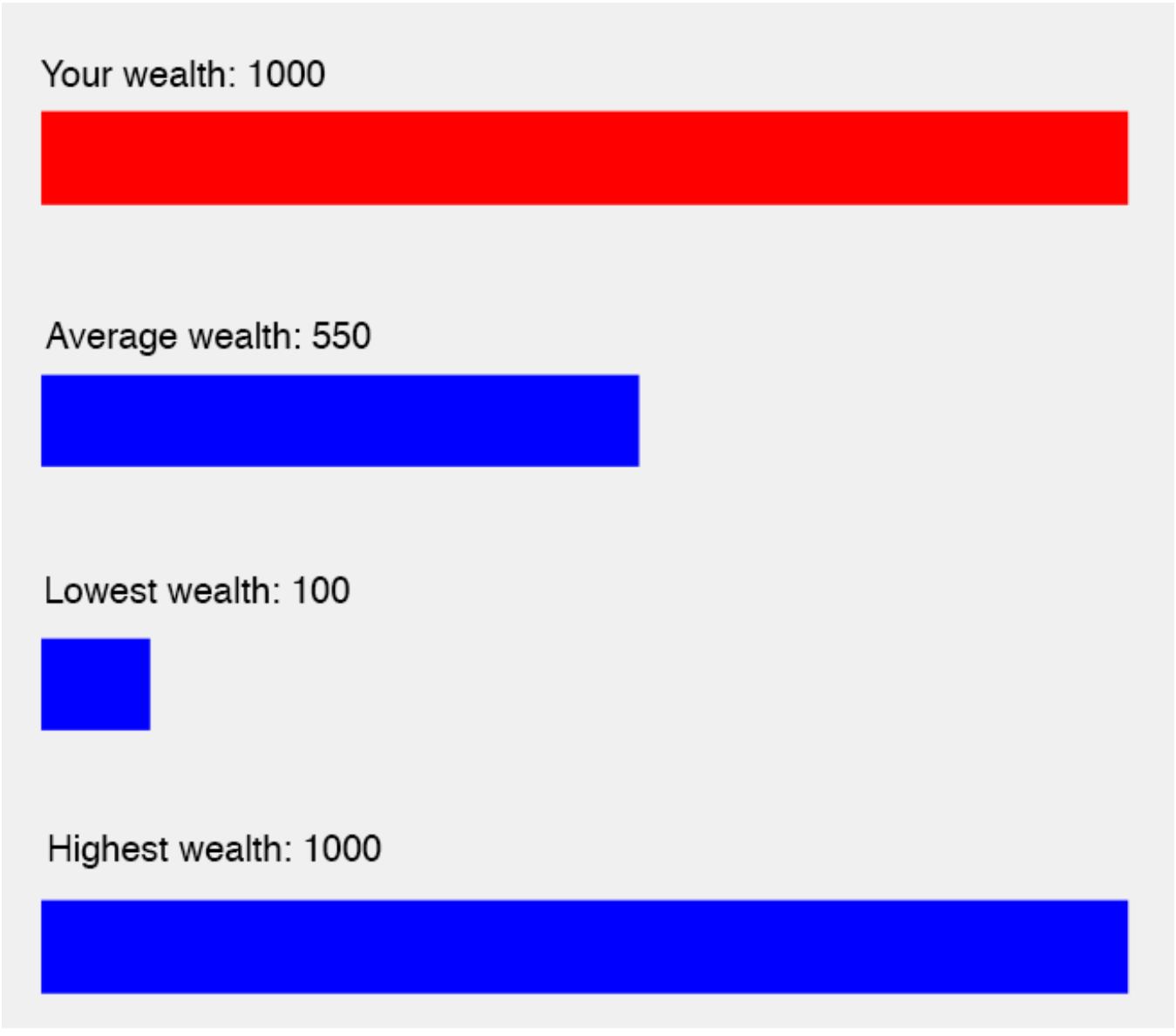
Poverty and Decision-Making

- Does poverty causally affect temporal discounting?
- Study one particular characteristic of poverty: income shocks
- Usually hard to disentangle effect of shock from differences in absolute wealth

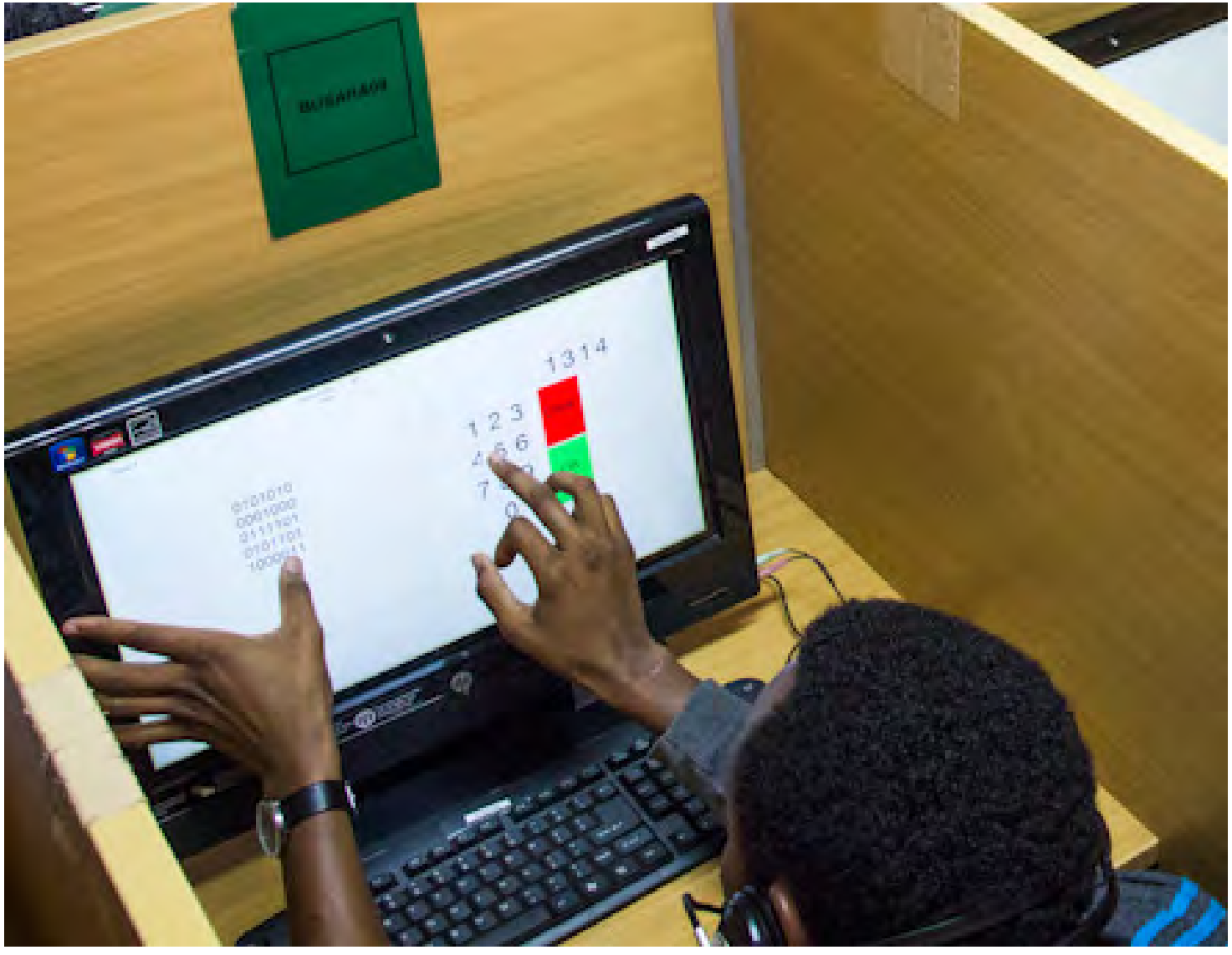
Poverty and Decision-Making

- Does poverty causally affect temporal discounting?
- Study one particular characteristic of poverty: income shocks
- Usually hard to disentangle effect of shock from differences in absolute wealth
- Lab paradigm: can hold absolute wealth constant

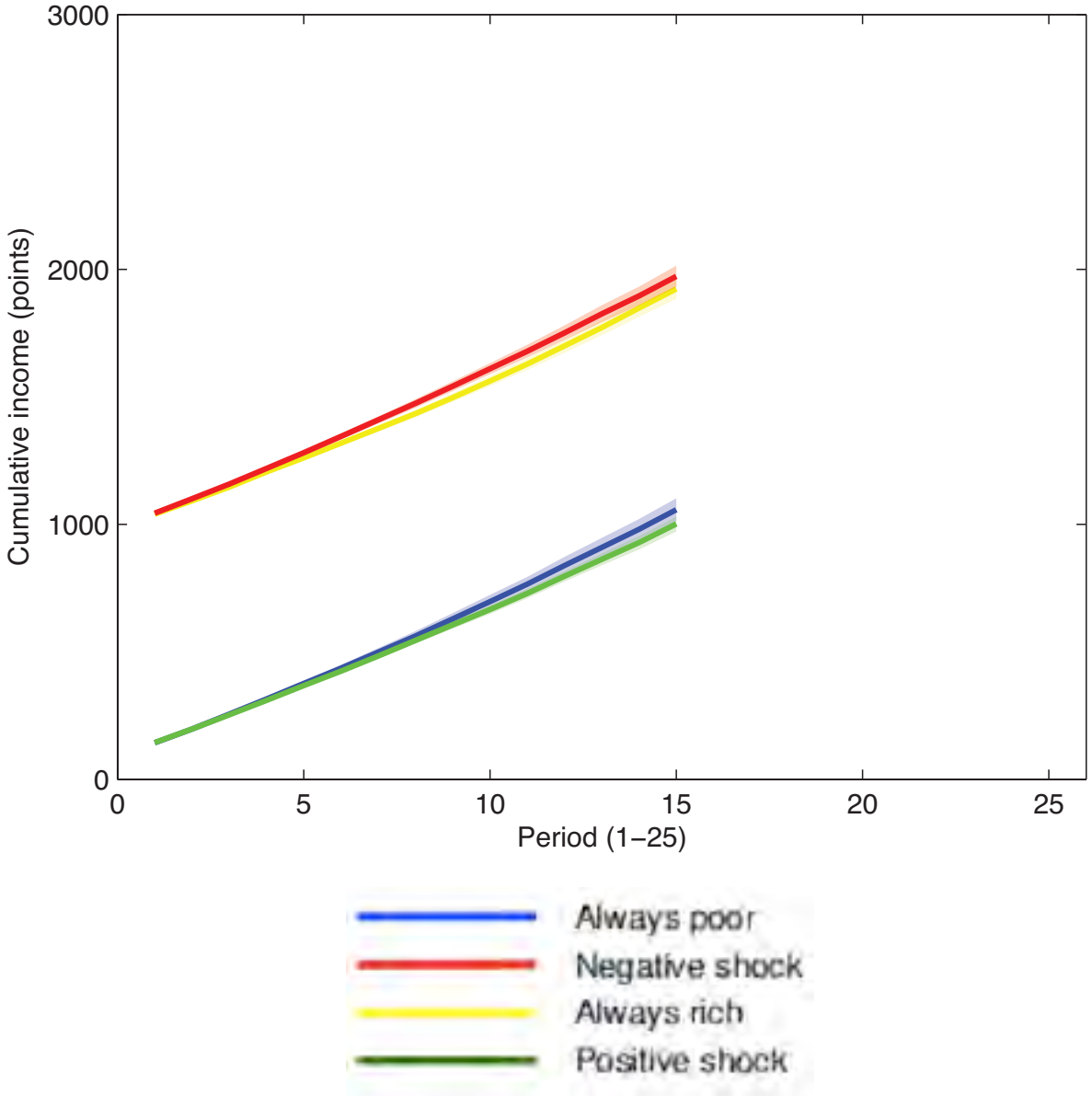
Income Display



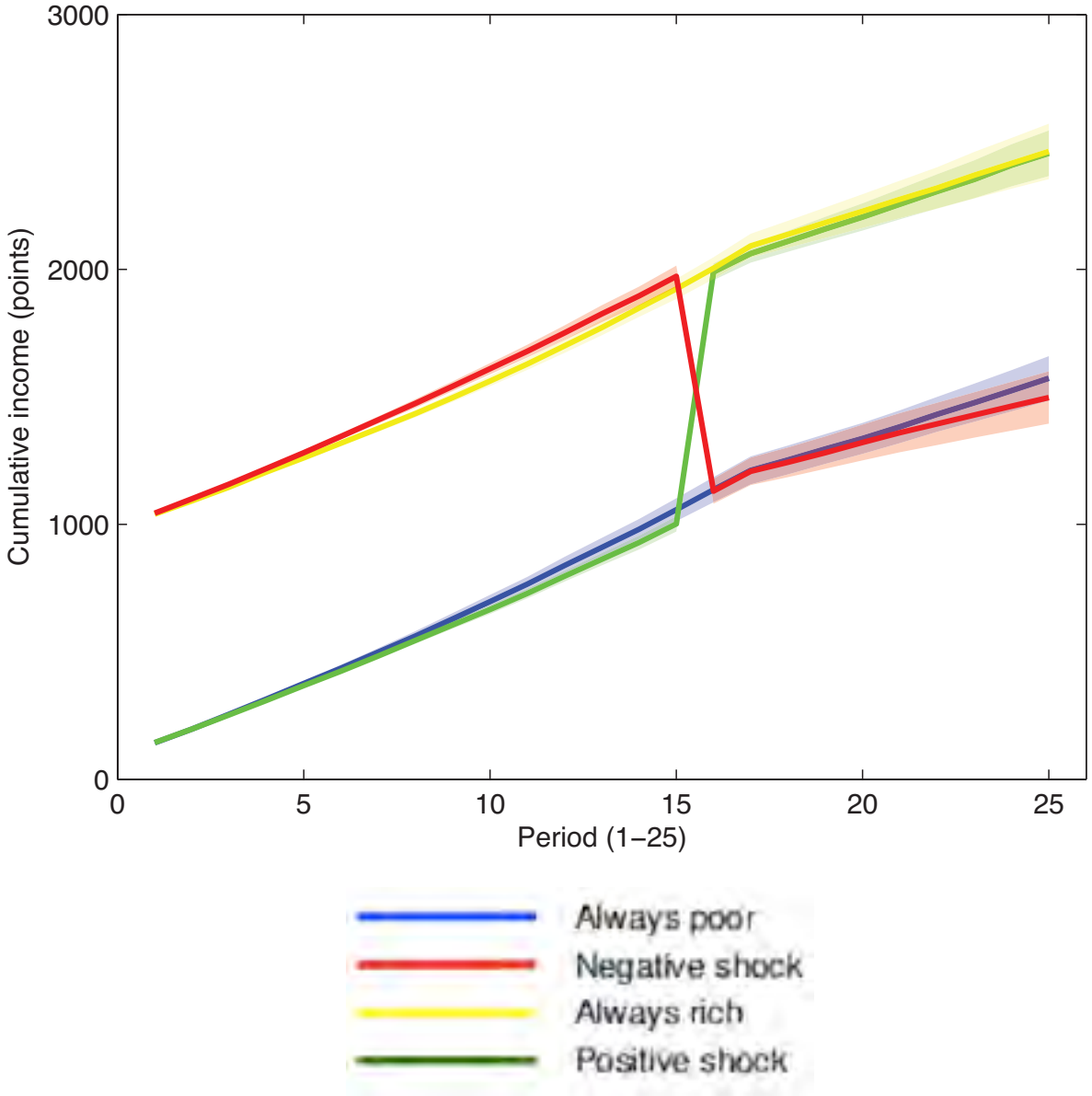
Effort Task



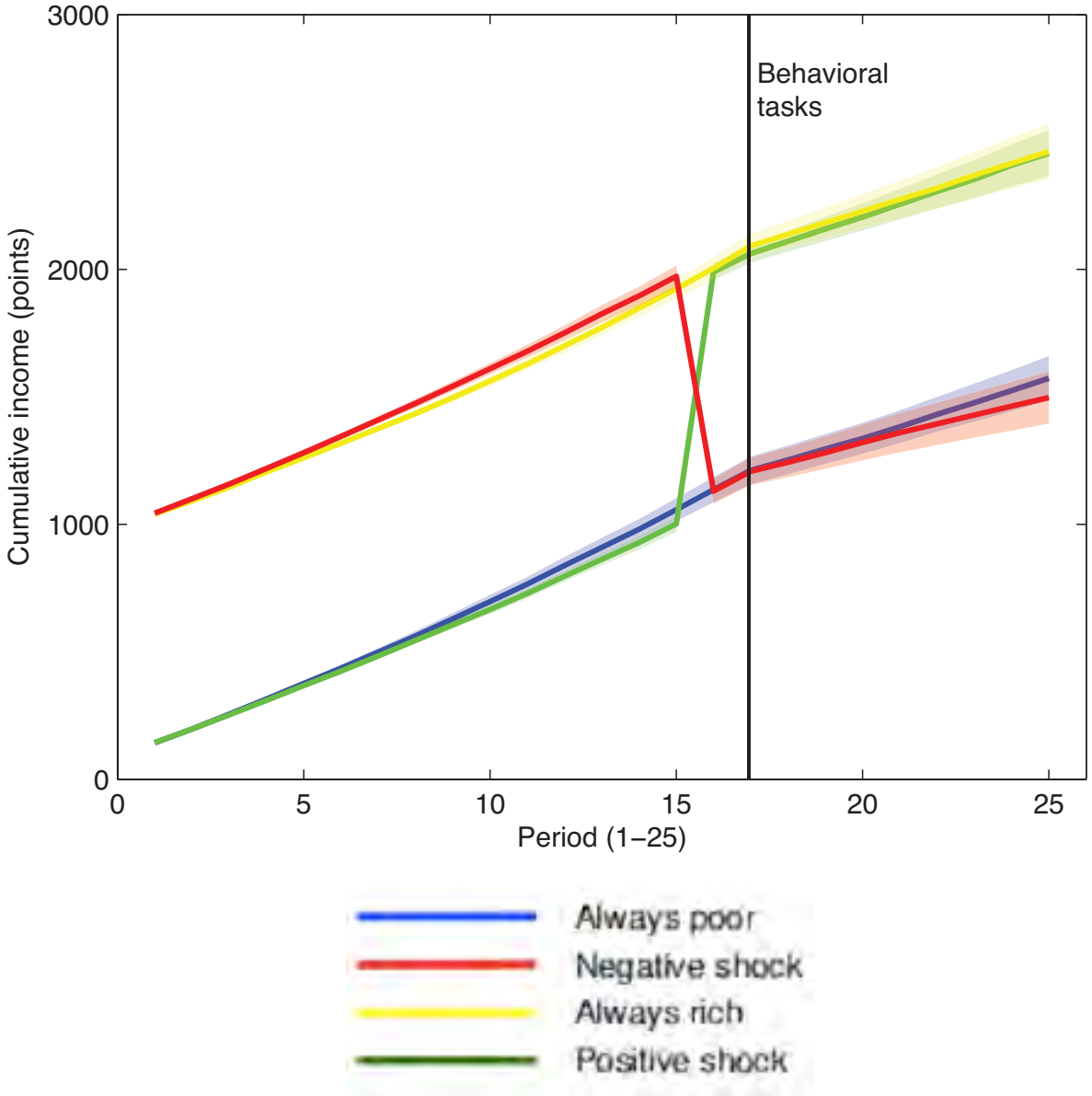
Income progression



Income progression



Income progression

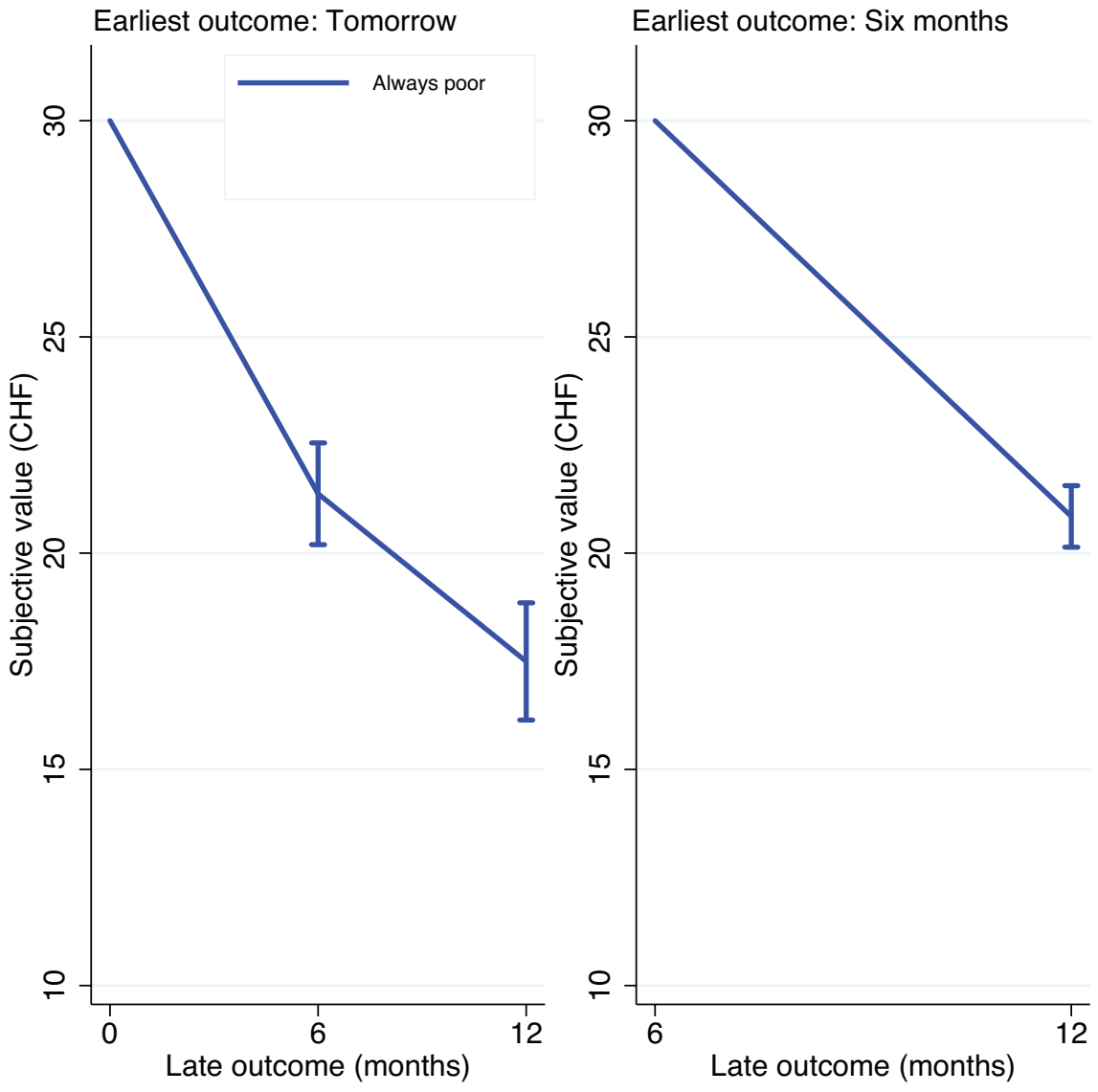


Income Shocks

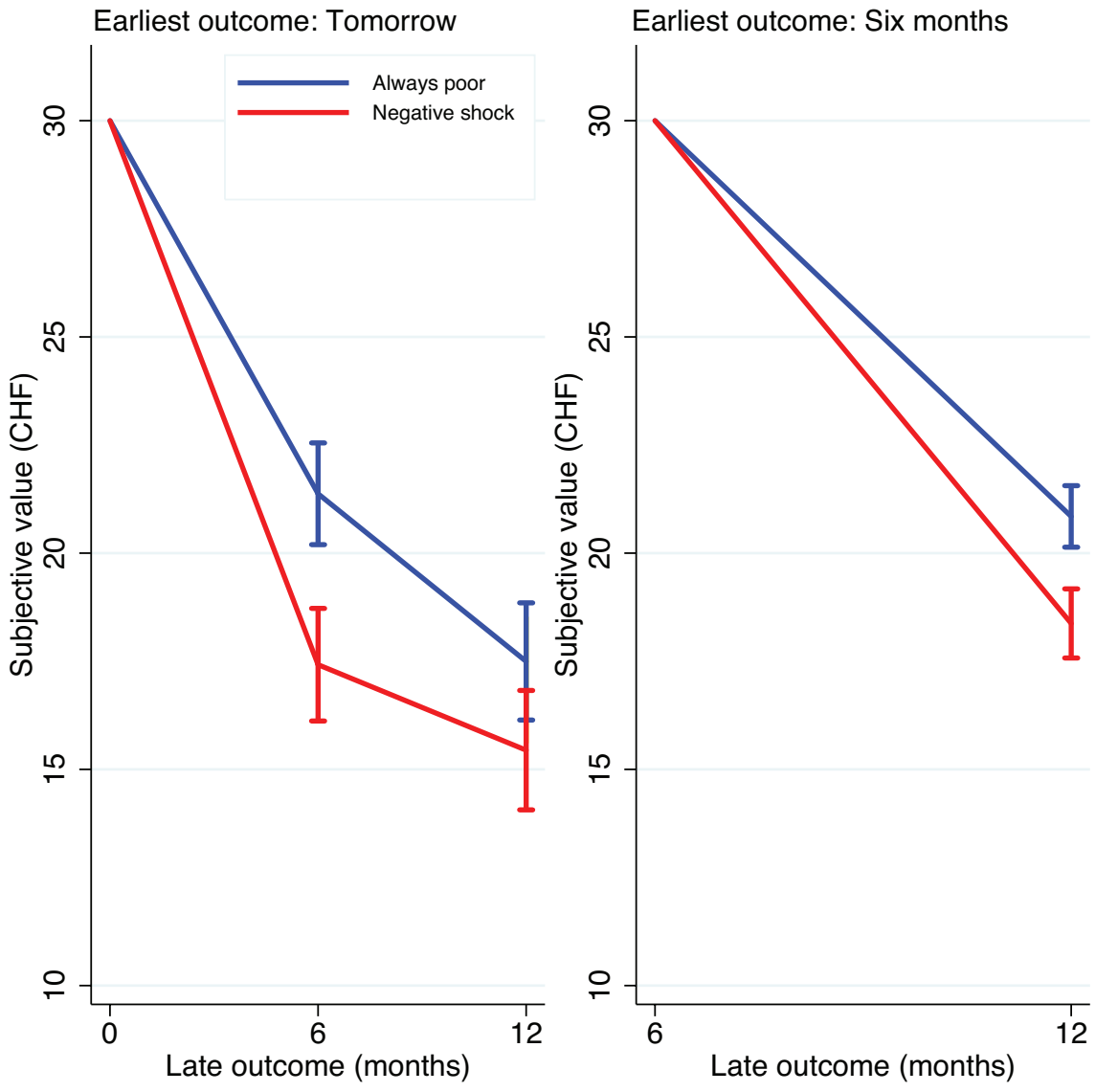
Before the experiment: subjects are told...

- that they may gain or lose points at some point during the experiment
- that they cannot influence this
- that it will happen at most once

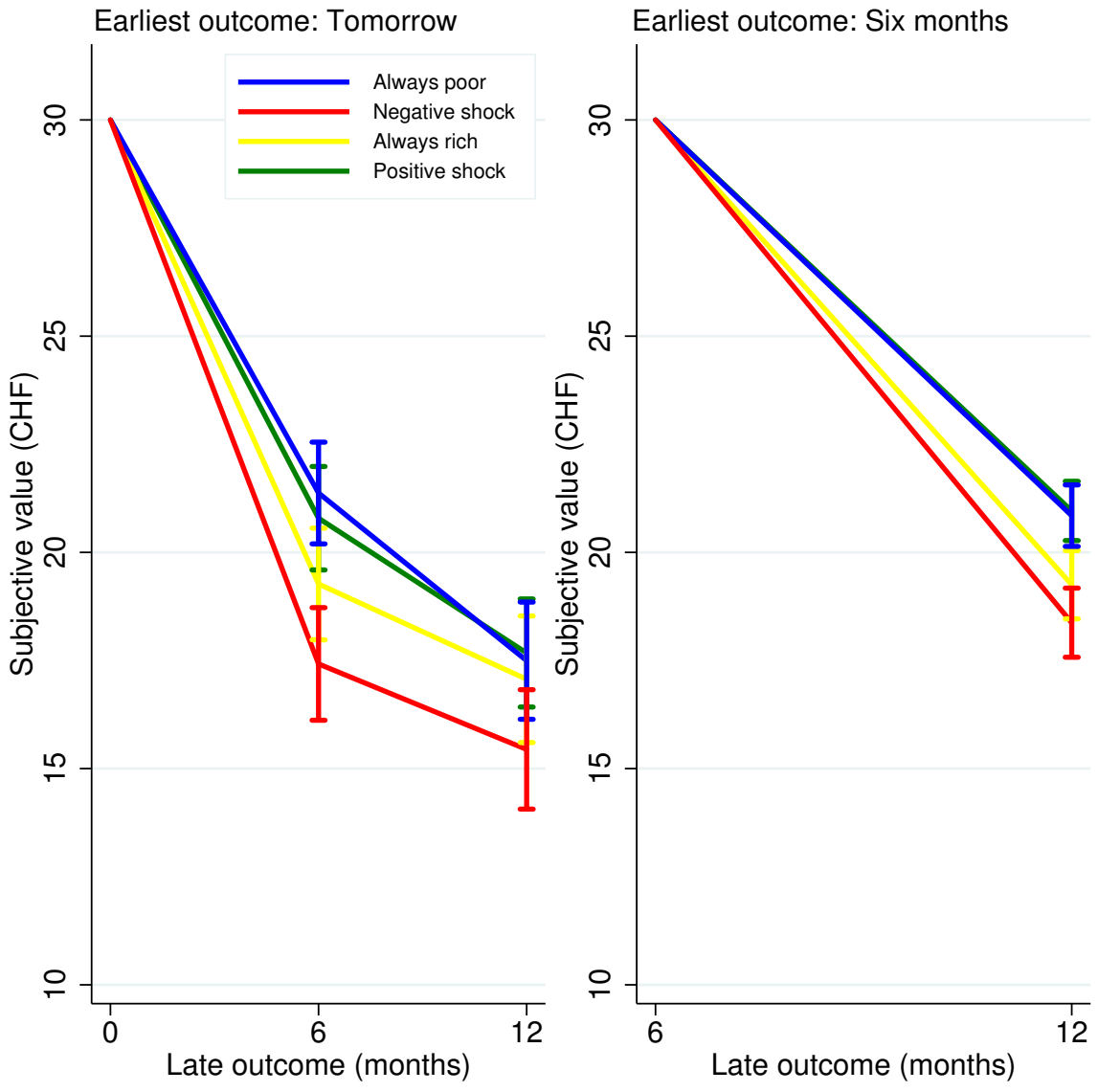
Temporal Discounting after Income Shocks



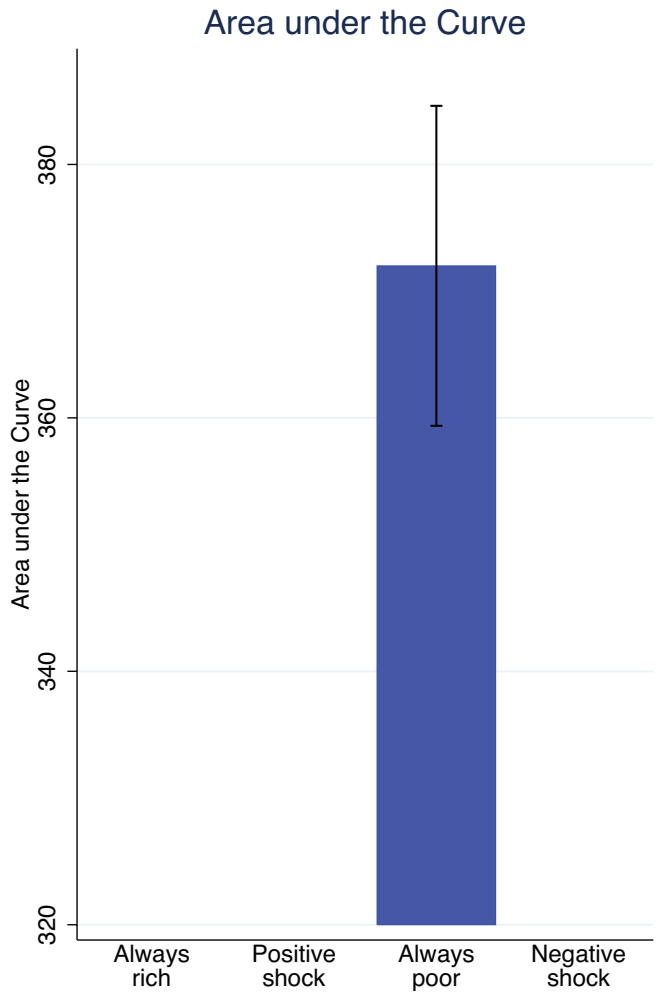
Temporal Discounting after Income Shocks



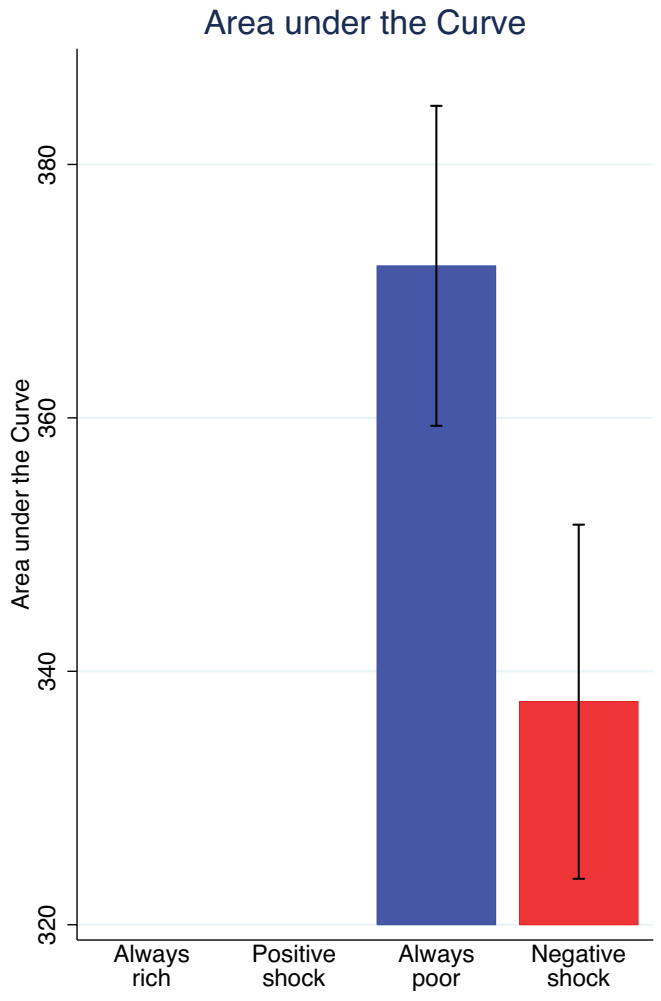
Temporal Discounting after Income Shocks



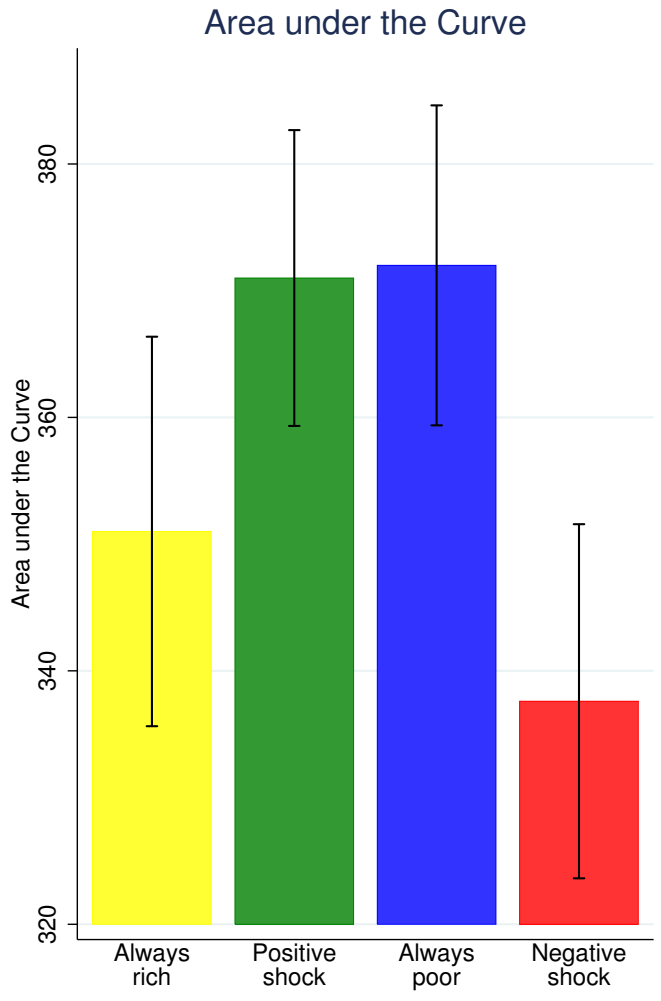
Temporal Discounting after Income Shocks



Temporal Discounting after Income Shocks



Temporal Discounting after Income Shocks



Interaction: $p < 0.05$

What are the psychological mechanisms through which negative income shocks increase temporal discounting?

1. After income shocks, subjects are below the reference point and in a loss frame

1. After income shocks, subjects are below the reference point and in a loss frame

Problem: Predicts an increase in risk-seeking and therefore a *decrease* in impatience

Possible explanations

2. **Breaking even (making up for lost income)?**

Possible explanations

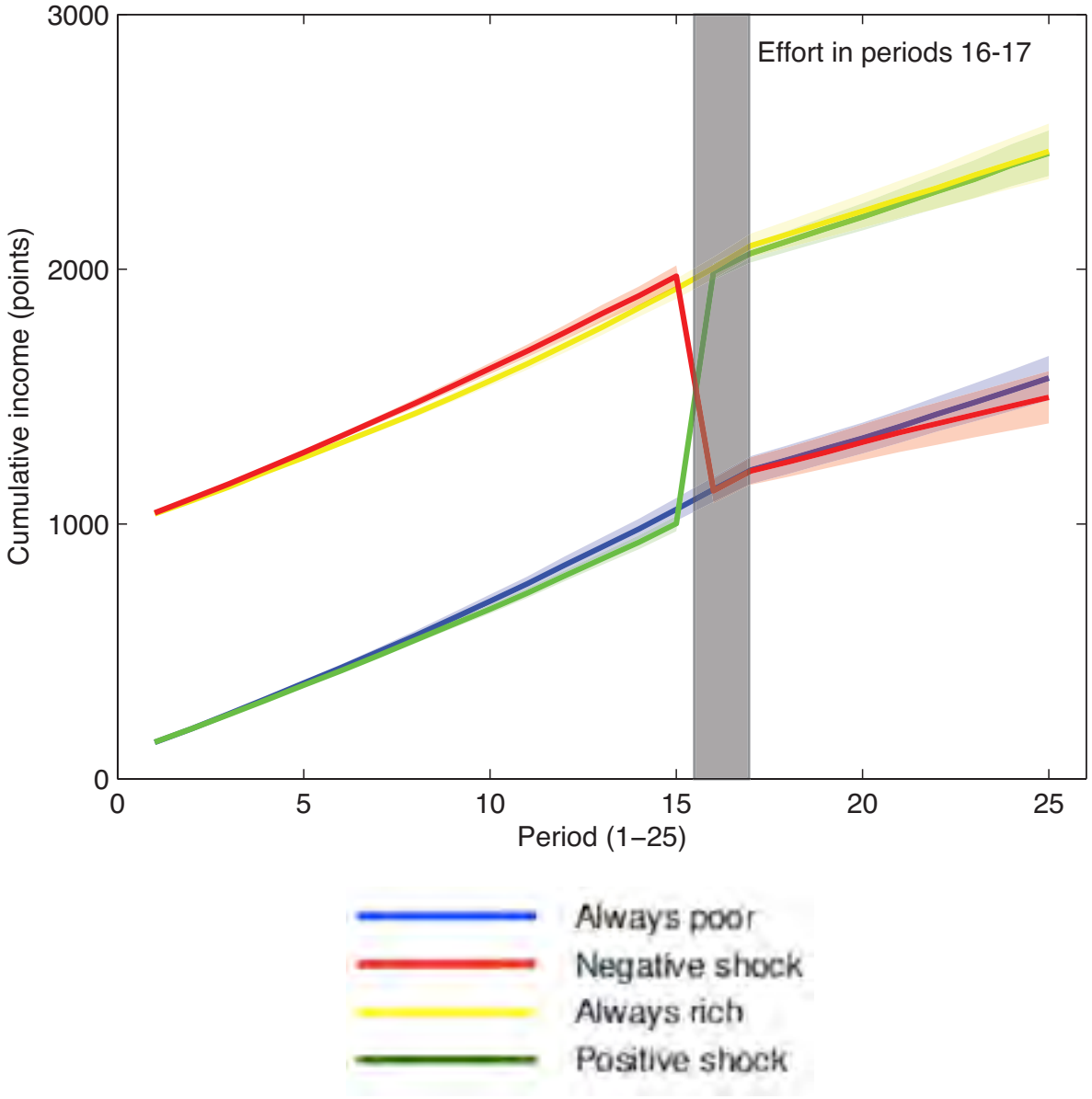
2. Breaking even (making up for lost income)?

Predictions:

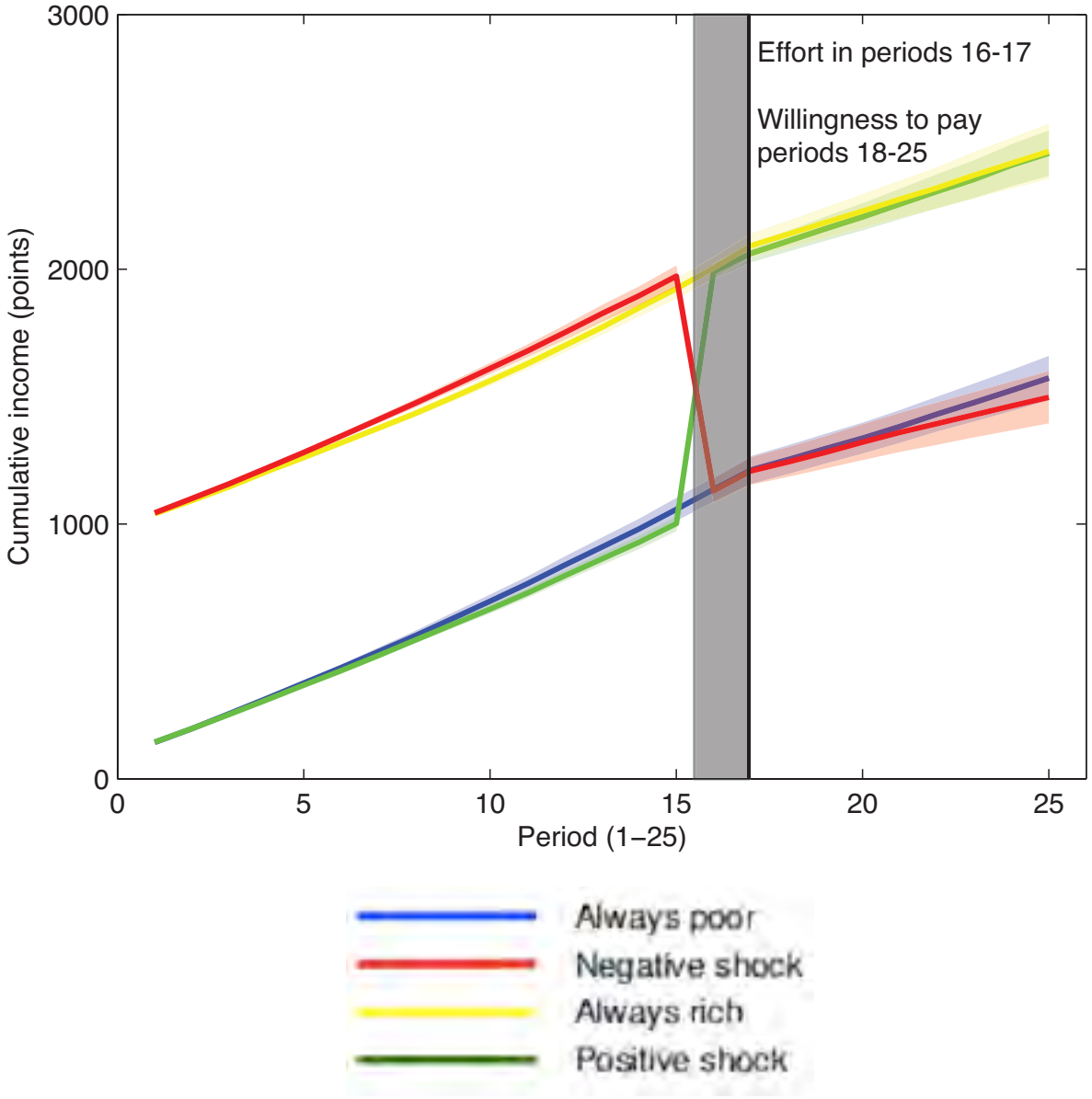
i. Increased effort after the income shock

ii. Lower reservation wage after the income shock

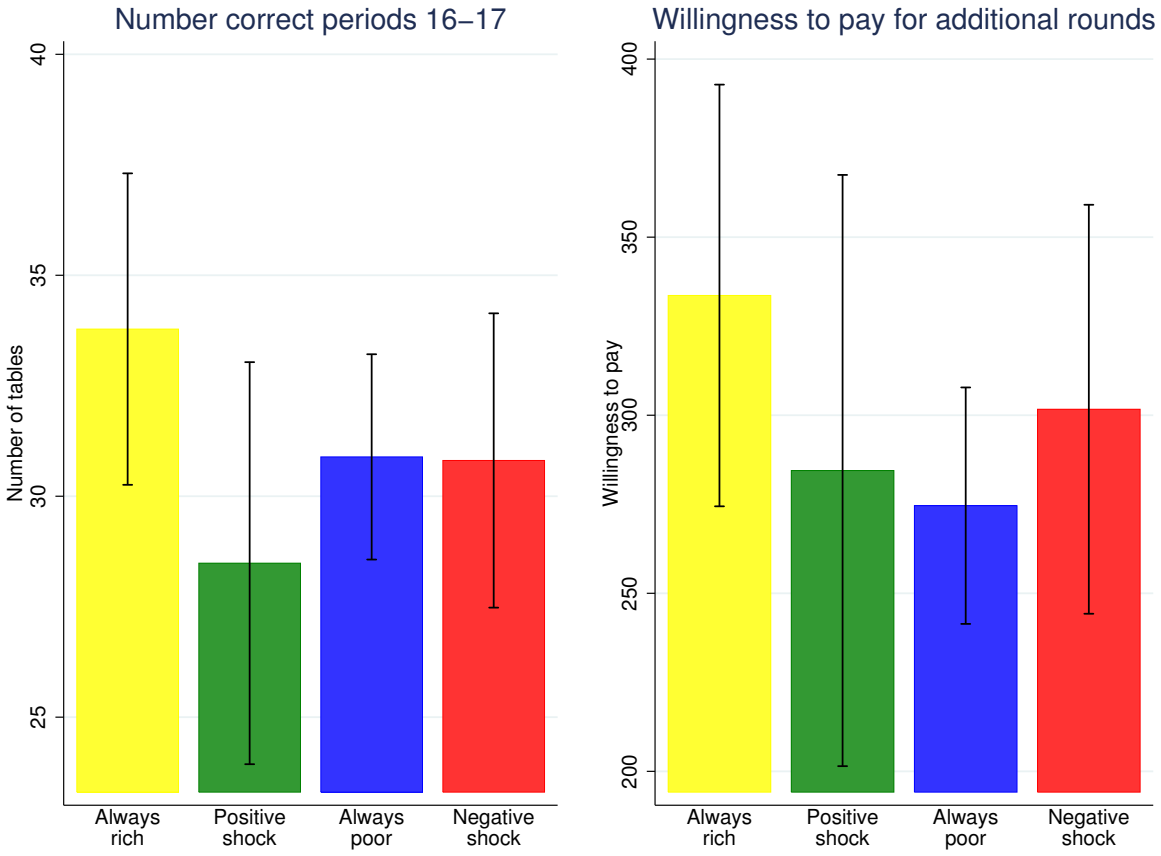
Increased effort/lower reservation wage?



Increased effort/lower reservation wage?



Increased effort/lower reservation wage?

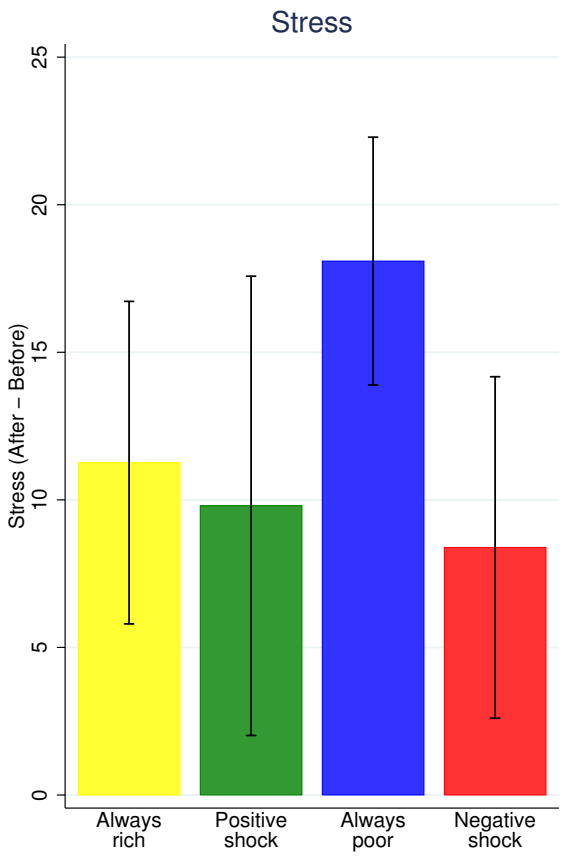


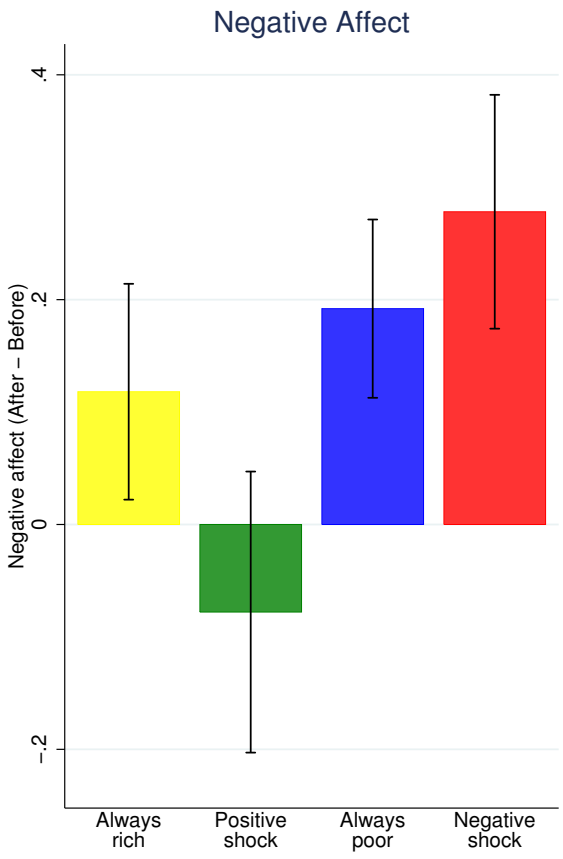
3. Affective response to income shocks (stress?)

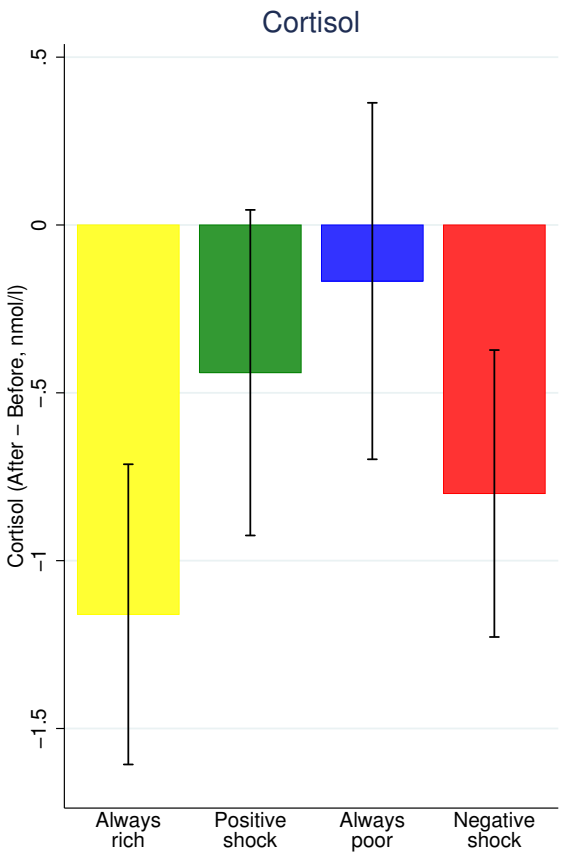
3. Affective response to income shocks (stress?)

Prediction: should be measurable in self-reported stress, negative affect, cortisol levels

Psychological Effects of Income Shocks







Possible explanations

4. “The world is risky – better consume today”

Possible explanations

4. "The world is risky – better consume today"

Prediction: negative income shocks may affect decision-making by biasing subjective probability estimates downward

Summary

- Pharmacological elevation of cortisol levels increases temporal discounting (Cornelisse, van Ast, Haushofer et al., 2013)

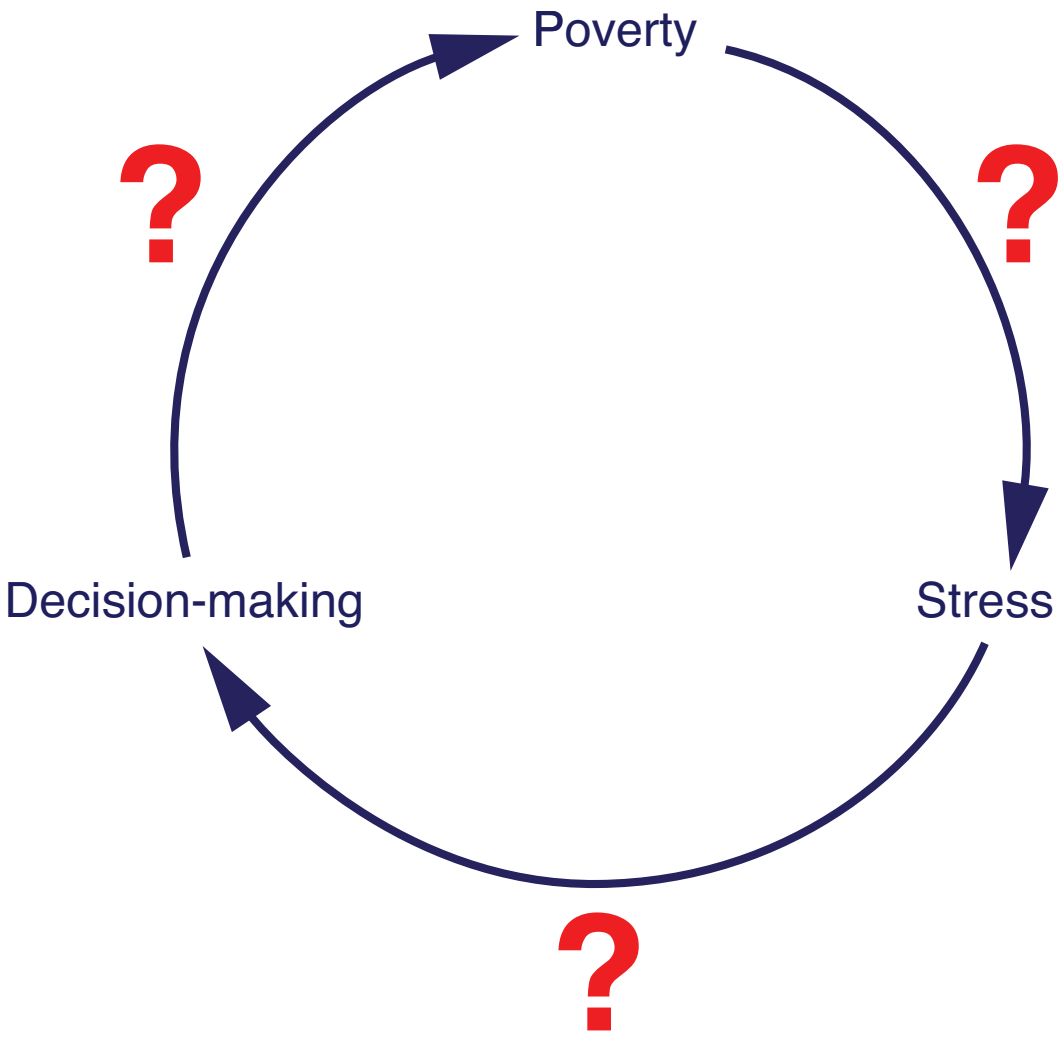
Summary

- Pharmacological elevation of cortisol levels increases temporal discounting (Cornelisse, van Ast, Haushofer et al., 2013)
- Negative income shocks increase temporal discounting (Haushofer et al., 2013)

Summary

- Pharmacological elevation of cortisol levels increases temporal discounting (Cornelisse, van Ast, Haushofer et al., 2013)
- Negative income shocks increase temporal discounting (Haushofer et al., 2013)
- Together with results on poverty and stress: poverty may perpetuate itself by increasing stress and temporal discounting

Future directions 1: Depth



Ongoing work: Increase psychological well-being?

Ongoing work: Increase psychological well-being?

- Count Your Blessings: Can you name three things that went well for you today? What was the cause for them?

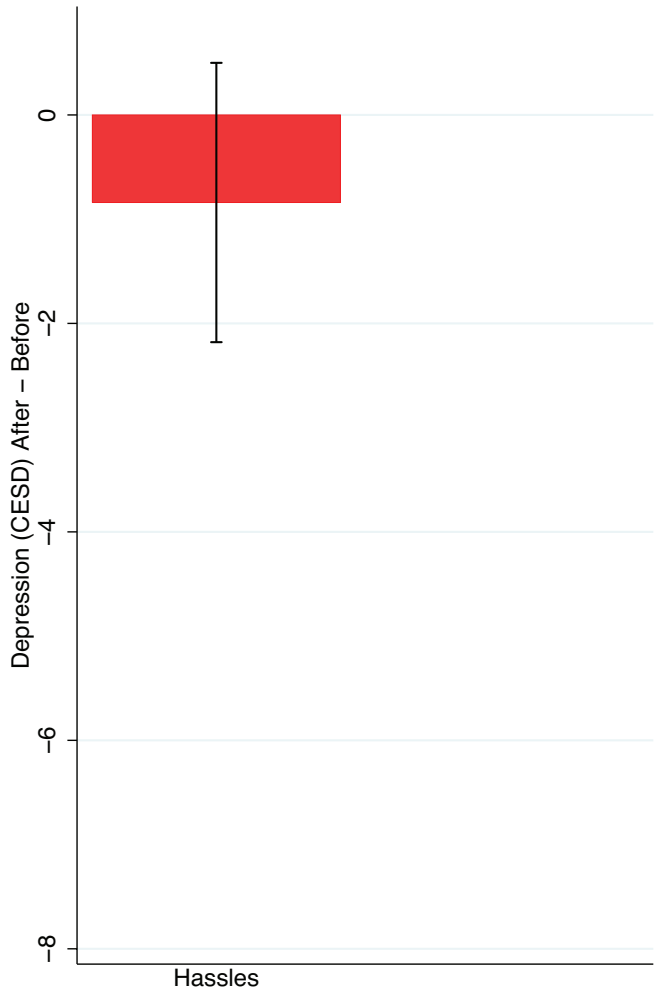
Ongoing work: Increase psychological well-being?

- Count Your Blessings: Can you name three things that went well for you today? What was the cause for them?
- Count Your Hassles: Can you name three things that did not go well for you today? What was the cause for it them?

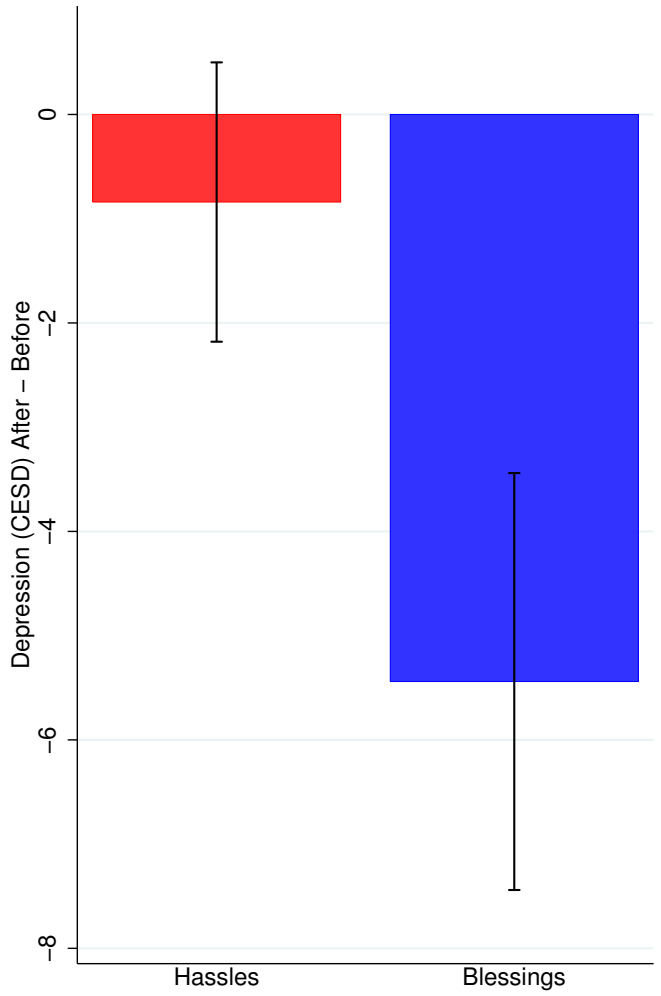
Ongoing work: Increase psychological well-being?

- Count Your Blessings: Can you name three things that went well for you today? What was the cause for them?
- Count Your Hassles: Can you name three things that did not go well for you today? What was the cause for it them?
- 90 participants, Western Kenya
- Count blessings/hassles by phone, 10 consecutive days
- 5 days later: Depression questionnaire (CESD)

“Counting Blessings” reduces depression scores (maybe)



“Counting Blessings” reduces depression scores (maybe)



Heat Stress and Test Scores in Kenya

Simone Schaner, Dartmouth

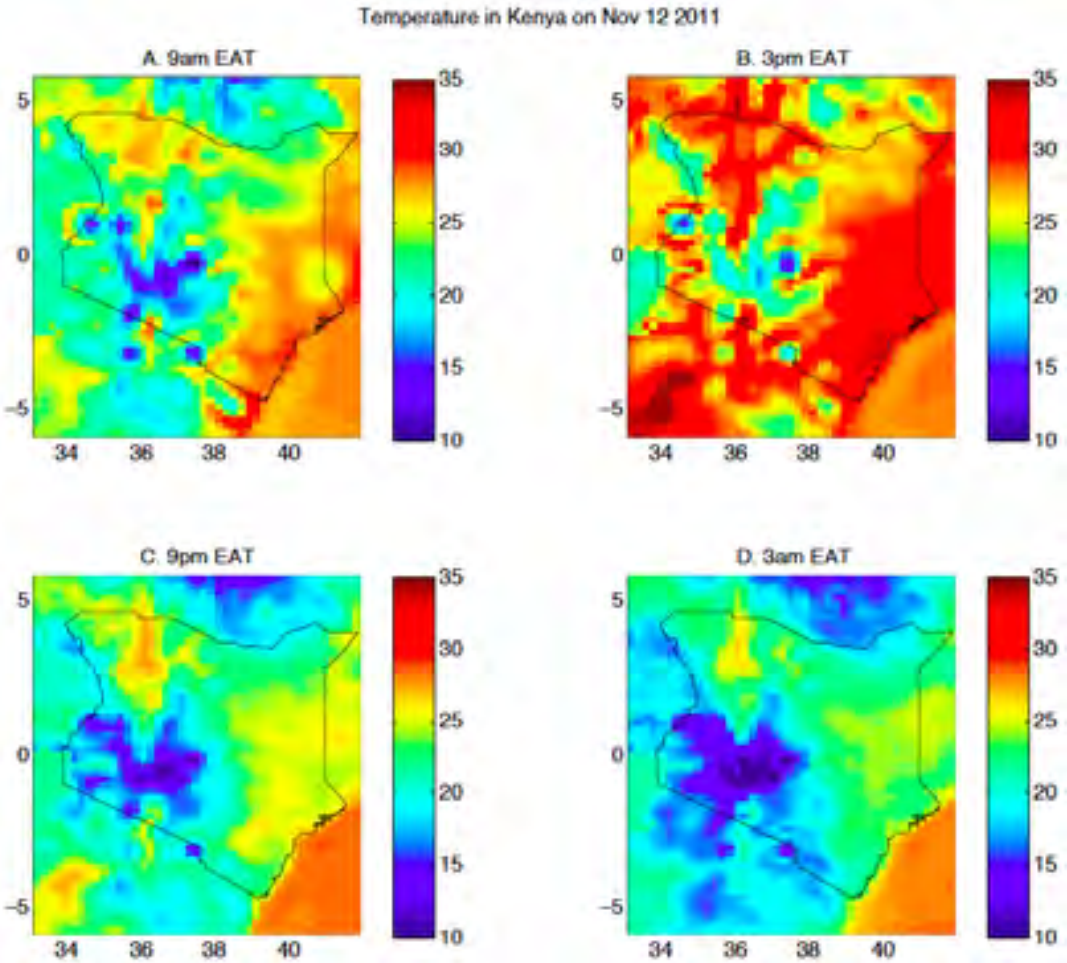
Heat Stress and Test Scores in Kenya

Mukhtar Abdi Ogle, Kenya National Examinations Council

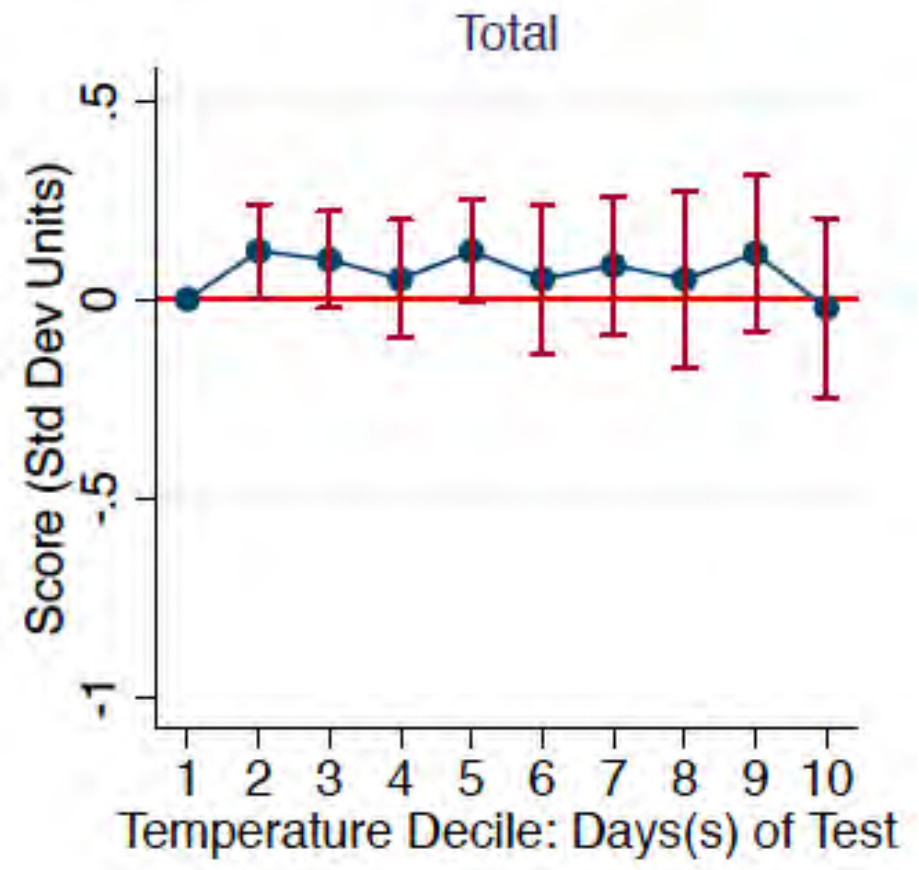
Data: Standardized Test Scores from Kenya

- Standardized test scores from all Kenyan primary and secondary school students
- 5 consecutive years
- 5 tests per student per year
- Total: 5,103,450 students, 25,517,250 test scores

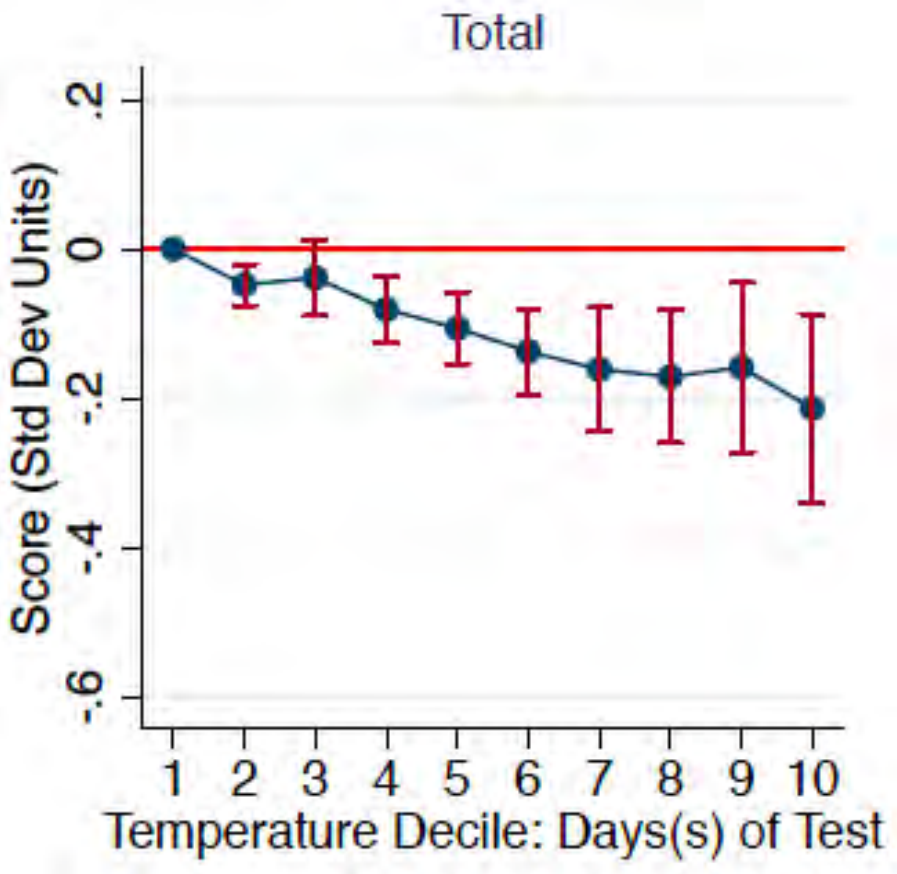
Data: High-resolution satellite climate data



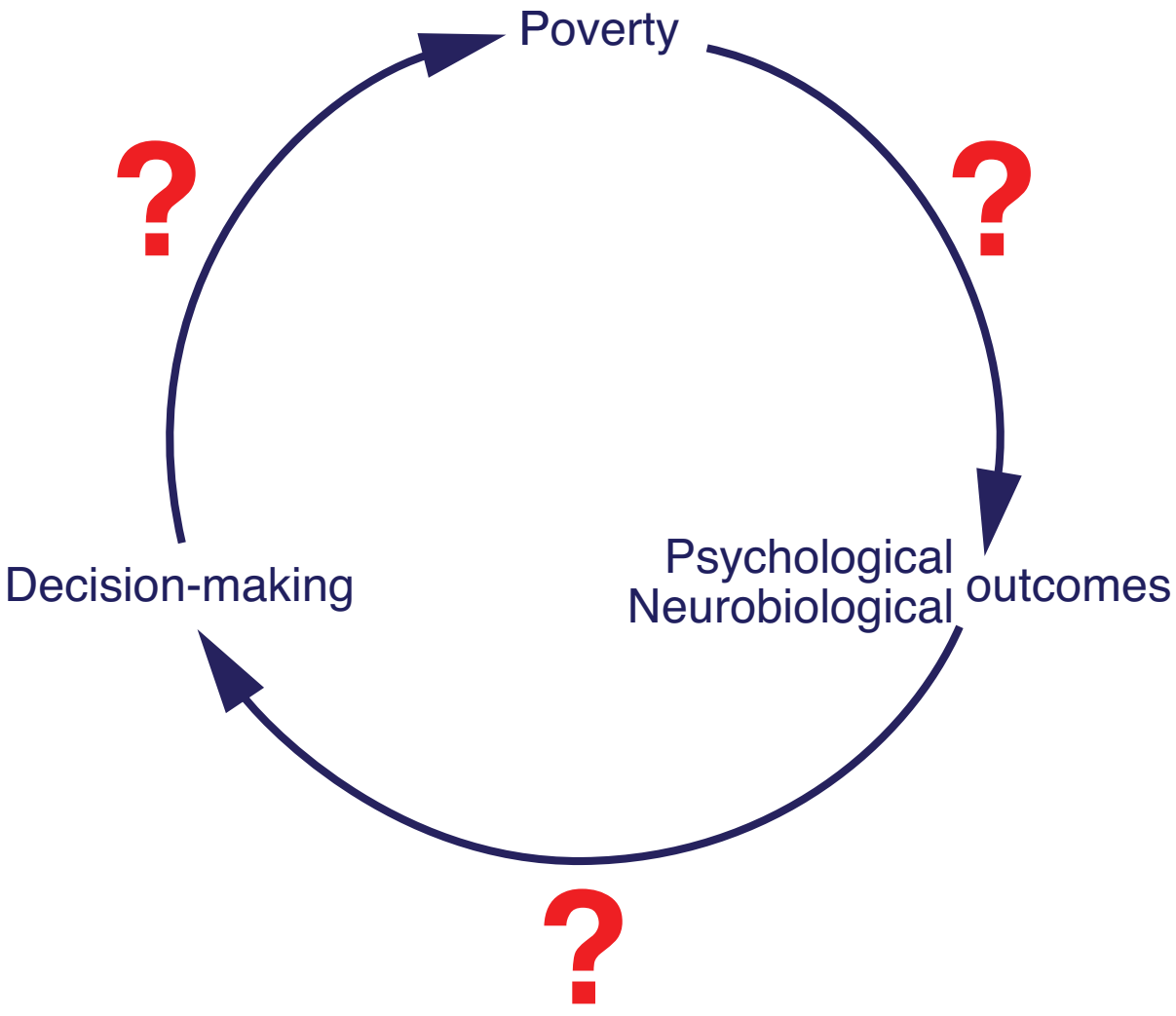
Heat Stress and Test Scores: Cross-sectional Relationship



Heat Stress and Test Scores: Causal Effect



Future directions 2: Breadth



Future directions 2: Breadth

- Unpacking poverty:
  - Monetary vs. other types of deprivation: cash transfers vs. health insurance (completed experiment in Kenya)

Future directions 2: Breadth

- Unpacking poverty:
  - Monetary vs. other types of deprivation: cash transfers vs. health insurance (completed experiment in Kenya)
  - Relative vs. absolute: randomize treatment intensity at village level (ongoing cash transfer experiment in Kenya)

Future directions 2: Breadth

- Unpacking poverty:
  - Monetary vs. other types of deprivation: cash transfers vs. health insurance (completed experiment in Kenya)
  - Relative vs. absolute: randomize treatment intensity at village level (ongoing cash transfer experiment in Kenya)
- Unpacking decision-making: risk aversion, explore-vs.-exploit behavior, status quo bias, illusion of control

Future directions 2: Breadth

- Unpacking poverty:
  - Monetary vs. other types of deprivation: cash transfers vs. health insurance (completed experiment in Kenya)
  - Relative vs. absolute: randomize treatment intensity at village level (ongoing cash transfer experiment in Kenya)
- Unpacking decision-making: risk aversion, explore-vs.-exploit behavior, status quo bias, illusion of control
- Unpacking psychological consequences of poverty: aspirations

Ongoing work: The Landscape of Thought in Poverty

Ongoing work: The Landscape of Thought in Poverty

Goal: "Getting into the heads of the poor"

Ongoing work: The Landscape of Thought in Poverty

Goal: “Getting into the heads of the poor”
Strong a priori hypothesis: poverty –> stress –> temporal discounting

Ongoing work: The Landscape of Thought in Poverty

Goal: "Getting into the heads of the poor"
Strong a priori hypothesis: poverty –> stress –> temporal discounting
More agnostic approach: "What do the poor think about?"

Ongoing work: The Landscape of Thought in Poverty

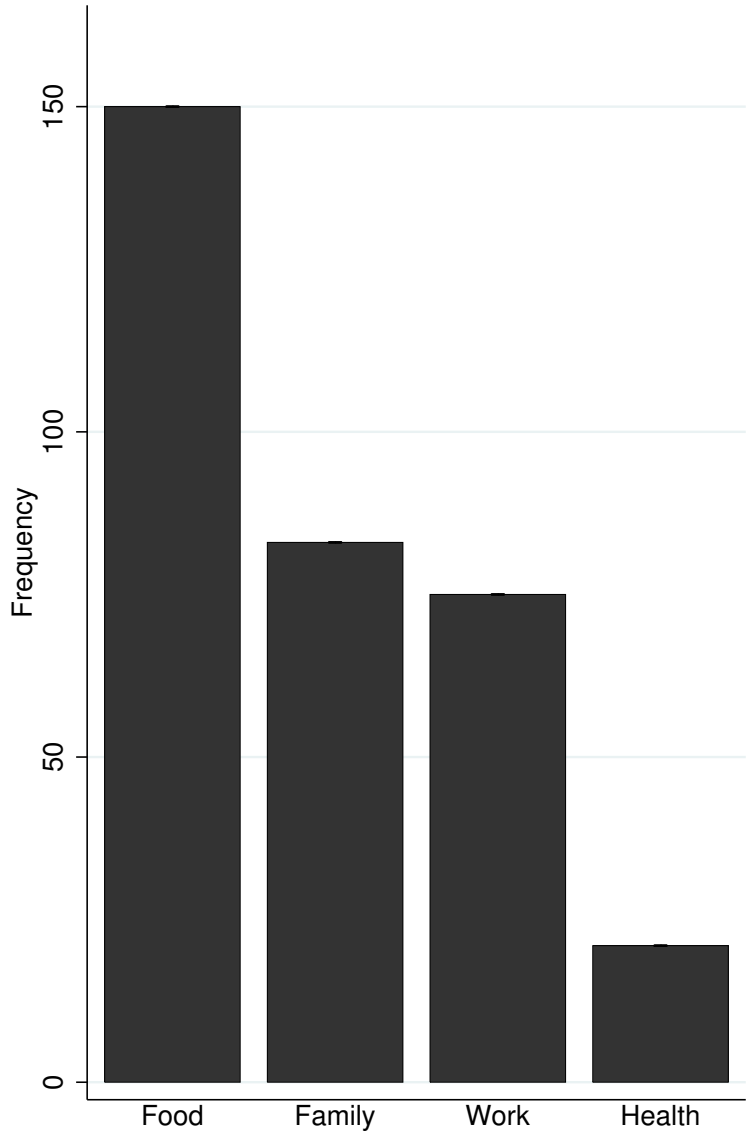
Goal: "Getting into the heads of the poor"
Strong a priori hypothesis: poverty –> stress –> temporal discounting
More agnostic approach: "What do the poor think about?"
150 subjects in rural Kenya: "What was on your mind just before you received this call?"

Ongoing work: The Landscape of Thought in Poverty

What was on your mind just before you received this call?

Ongoing work: The Landscape of Thought in Poverty

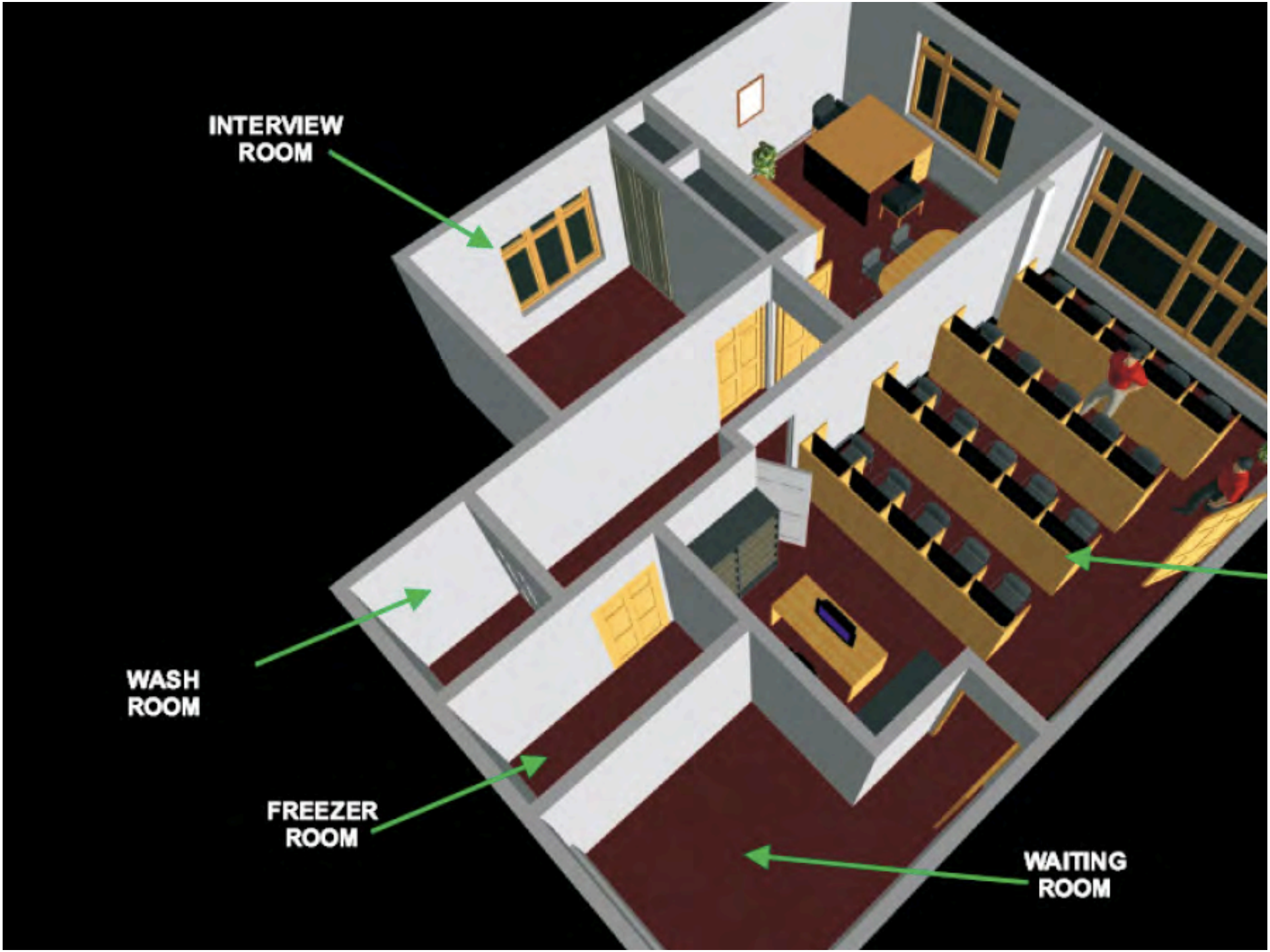
What was on your mind just before you received this call?



Busara Center for Behavioral Economics, Nairobi, Kenya

- Goals:
  - Behavioral economics/psychology: insights into behavior and preferences of participants who are not from WEIRD backgrounds
  - Development economics: inform design before RCTs; identify channels after RCTs

Nairobi Lab


INTERVIEW ROOM
WASH ROOM
FREEZER ROOM
WAITING ROOM


RE EXIT


Observe the image below.

Mobile Lab


BUSARA
CENTER FOR
BEHAVIORAL ECONOMICS

Trenton Lab

Computer lab (24 machines)

Office (5 desks)

Waiting room (24 people; restrooms in the back)

Developmental testing room 1 (12.5’ x 18’)

Busara Team

Collaborators

- **Psychology**: Tobias Kalenscher, Maayke Seinstra (Düsseldorf)
- **Neurobiology**: Sandra Cornelisse, Marian Joëls**,** Vanessa van Ast (Utrecht)
- **Economics**: Ernst Fehr, (Zürich); Daniel Schunk (Mainz); Matthieu Chemin (McGill); Joost de Laat (World Bank), Jeremy Shapiro (MIT)
- **RAs: Faizan Diwan,** James Vancel, Marie Collins, Giovanna de Giusti, Amos Odero, Joseph Njoroge, Bena Mwongeli, Kenneth Okumu
- **Fieldwork:** Busara team, Kenya; Innovations for Poverty Action, Kenya; GiveDirectly, Kenya
- **Funding:** NIH R01 AG039297, USAID, World Bank, Cogito, Harvard, MIT/J-PAL

EXTRA SLIDES

No negative externalities of transfers

EXTRA SLIDES

No negative externalities of transfers

Results on consumption, asset holdings, income, health, education, domestic violence: cf. working paper