Poverty in numbers

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>Sub-Saharan Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy (years)</td>
<td>79</td>
<td>56</td>
</tr>
<tr>
<td>Under-5 mortality (/1000 live births)</td>
<td>7</td>
<td>98</td>
</tr>
</tbody>
</table>
Approach: random assignment to treatment vs. control groups allows identification and unbiased estimation of treatment effects of social programs

Michael Kremer  Esther Duflo
Randomized Controlled Trials

Additional school years gained per $100 spent:

- Information on returns to education, for parents (Madagascar)
- Deworming through primary schools (Kenya)
- Free primary school uniforms (Kenya)
- Merit scholarships for girls (Kenya)
- Conditional cash transfer for girls' attendance (Malawi)
- Unconditional cash transfer for girls (Malawi)
Randomized Controlled Trials

- Additional school years gained per $100 spent:
  - Information on returns to education, for parents (Madagascar): 20.7 yrs
  - Deworming through primary schools (Kenya): 13.9 yrs
  - Free primary school uniforms (Kenya): .71 yrs
  - Merit scholarships for girls (Kenya): .27 yrs
  - Conditional cash transfer for girls' attendance (Malawi): .09 yrs
  - Unconditional cash transfer for girls (Malawi): .02 yrs
Goals

• Interventions at the behavioral level can have significant welfare benefits
Interventions at the behavioral level can have significant welfare benefits

More systematic use of psychology could...
- inform design of poverty alleviation programs
Goals

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- More systematic use of psychology could...
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  - generate insights about cognitive and behavioral architecture of poverty
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  - extend the scope of psychology to non-WEIRD populations
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
  
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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

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  - 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

Poverty

Decision-making

Psychological Neurobiological outcomes
First step: Does poverty *correlate* with psychological well-being?
Easterlin Paradox: poverty correlates with happiness within, but not across countries. Problem: only 14 countries.
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
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”
Across countries

Within countries

(Haushofer, 2013)
Locus of Control

Across countries

Log GPD (USD PPP)

Standardized response

Across countries

Within countries

Locus of Control

N = 43

r = 0.50, p = 0.0007

(Locus of Control)

N = 114378

r = 0.15, p = 0.0000

(Haushofer, 2013)
Meaninglessness

Across countries

Meaningless

Within countries

Meaningless

(Handshofer, 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

- Poverty
- Decision-making
- Psychological
- Neurobiological outcomes

Diagram:
- Poverty ➔ Decision-making ➔ Psychological outcomes ➔ Neurobiological ➔ Poverty
Working hypothesis

Poverty

Stress

Decision-making
Stress

Environmental demands that exceed an organism's 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
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- Objective measure, not subject to experimental demand effects
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- Better indicator of chronic stress than e.g. $\alpha$-amylase (norepinephrine)
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- 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. $\alpha$-amylase (norepinephrine)
- Long-term health consequences of chronically elevated 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)
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)
Representative sample, N=1200 (based on power calculation)
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

(Chemin, de Laat, Haushofer, 2013)
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 (Chemin, de Laat, Haushofer, 2013)
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

<table>
<thead>
<tr>
<th></th>
<th>Non-farmers</th>
<th>Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain &lt; median</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Rain &gt; median</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>

(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

<table>
<thead>
<tr>
<th>Stress score</th>
<th>Non-farmers</th>
<th>Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain &lt; median</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Rain &gt; median</td>
<td>23</td>
<td>25</td>
</tr>
</tbody>
</table>

Interaction: $p<0.05$

(Chemin, de Laat, Haushofer, 2013)
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.
Does poverty *alleviation reduce* stress?
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.
Cash to the poor

Pennies from heaven

The Economist

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?
“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)
Treatment and Control Villages
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

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- 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
- 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
Takeup “only” 96.5%: “intent-to-treat” (conservative)
Methods: Analysis

- Takeup “only” 96.5%: “intent-to-treat” (conservative)
- Dealing with attrition (<10%): Lee bounds
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- Standard errors clustered at household level
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- 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
Welfare Effects of Unconditional 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, assets, 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 Colins, Faizan Diwan, Channing Jang, Bena Mwongeli, Joseph Njoroge, Kenneth Okumu, James Vance, and Matthew White for excellent research assistance, the team of GiveDirectly (Piai Mukhopadhyay, Paul Niehaus, Raphael Gican) for collaboration, and Petra Persson for designing the intrahousehold 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.

†Ablul Latif Jameel Poverty Action Lab, MIT, E53-379, 30 Wadsworth St., Cambridge, MA 02142. 

‡‡McKinsey & Co., San Francisco, CA. jereynshapiros@gmail.com
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)
Happiness

Happiness (WVS)

Pure control
Spillover
Small Large

(Haushofer & Shapiro, 2013)
Depression

(Haushofer & Shapiro, 2013)
Stress

- Pure control
- Spillover
- Small
- Large

(Haushofer & Shapiro, 2013)
Cortisol levels

(Haushofer & Shapiro, 2013)
Cortisol levels

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

(Haushofer & Shapiro, 2013)
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(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?

(Please refer to the chart for visual representation.)

(Haushofer & Shapiro, 2013)
Negative psychological externalities of transfers?

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

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of non-land assets (USD)</td>
<td>477.66</td>
<td>333.56</td>
<td>387.85</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>(389.23)</td>
<td>(39.90)</td>
<td>(42.69)</td>
<td></td>
</tr>
<tr>
<td>Non-durable expenditure (USD)</td>
<td>157.40</td>
<td>19.79</td>
<td>26.46</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>(82.18)</td>
<td>(9.42)</td>
<td>(11.80)</td>
<td></td>
</tr>
<tr>
<td>Total revenue, monthly (USD)</td>
<td>48.98</td>
<td>8.33</td>
<td>9.56</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>(90.52)</td>
<td>(9.55)</td>
<td>(8.74)</td>
<td></td>
</tr>
<tr>
<td>Food security index</td>
<td>0.00</td>
<td>0.27</td>
<td>0.23</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>(1.00)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td></td>
</tr>
<tr>
<td>Health index</td>
<td>0.00</td>
<td>-0.01</td>
<td>-0.13</td>
<td>0.28</td>
</tr>
<tr>
<td></td>
<td>(1.00)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td></td>
</tr>
<tr>
<td>Education index</td>
<td>0.00</td>
<td>0.16</td>
<td>0.05</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>(1.00)</td>
<td>(0.08)</td>
<td>(0.10)</td>
<td></td>
</tr>
</tbody>
</table>
# Economic effects: Female vs. male

<table>
<thead>
<tr>
<th></th>
<th>Control mean (SD)</th>
<th>Female recipient</th>
<th>Male recipient</th>
<th>Difference (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of non-land assets (USD)</td>
<td>477.66 (389.23)</td>
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<td>0.28</td>
</tr>
<tr>
<td>Education index</td>
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<td>0.16* (0.08)</td>
<td>0.05 (0.10)</td>
<td>0.58</td>
</tr>
</tbody>
</table>
## Domestic violence: Female vs. male

<table>
<thead>
<tr>
<th></th>
<th>Control mean (SD)</th>
<th>Female recipient</th>
<th>Male recipient</th>
<th>Difference (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical violence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slapped you</td>
<td>0.24 (0.43)</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kicked, dragged, beat you</td>
<td>0.11 (0.31)</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sexual violence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced sexual intercourse</td>
<td>0.09 (0.29)</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced sexual acts</td>
<td>0.06 (0.23)</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Female empowerment index</strong></td>
<td>0.00 (1.00)</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>Control mean (SD)</td>
<td>Female recipient</td>
<td>Male recipient</td>
<td>Difference (p-value)</td>
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<td></td>
</tr>
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<td>0.24 (0.43)</td>
<td>-0.13*** (0.04)</td>
<td>-0.10*** (0.04)</td>
<td>0.52</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kicked, dragged, beat you</td>
<td>0.11 (0.31)</td>
<td>-0.08*** (0.03)</td>
<td>-0.09*** (0.03)</td>
<td>0.54</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sexual violence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced sexual intercourse</td>
<td>0.09 (0.29)</td>
<td>-0.07** (0.03)</td>
<td>-0.03 (0.03)</td>
<td>0.37</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced sexual acts</td>
<td>0.06 (0.23)</td>
<td>-0.06*** (0.02)</td>
<td>-0.03 (0.03)</td>
<td>0.29</td>
</tr>
<tr>
<td>(dummy, last 6 months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Female empowerment index</strong></td>
<td>0.00 (1.00)</td>
<td>0.29*** (0.10)</td>
<td>0.10 (0.11)</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
### Psychological well-being & cortisol: Female vs. male

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

Driven by women: significant reduction in women, but not men, for transfers to women.
<table>
<thead>
<tr>
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<td>0.09*</td>
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</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Control mean (SD)</th>
<th>Monthly transfer</th>
<th>Lump-sum transfer</th>
<th>Difference (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beg because not enough food (last month)</td>
<td>0.31 (0.8)</td>
<td>-0.17** (0.07)</td>
<td>-0.11 (0.08)</td>
<td>0.50</td>
</tr>
<tr>
<td>Enough food for tomorrow? (dummy)</td>
<td>0.36 (0.48)</td>
<td>0.10* (0.05)</td>
<td>-0.01 (0.04)</td>
<td>0.04**</td>
</tr>
<tr>
<td>Respondent slept hungry (last week, dummy)</td>
<td>0.23 (0.42)</td>
<td>-0.06* (0.04)</td>
<td>0.00 (0.04)</td>
<td>0.09*</td>
</tr>
<tr>
<td>Food security index</td>
<td>0.00 (1.00)</td>
<td>0.40*** (0.12)</td>
<td>0.12 (0.10)</td>
<td>0.02**</td>
</tr>
<tr>
<td></td>
<td>Control mean (SD)</td>
<td>Overall effect</td>
<td>Monthly transfer</td>
<td>Lump-sum transfer</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Log cortisol (clean)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(log nmol/l)</td>
<td>0.00 (1.00)</td>
<td>-0.06 (0.06)</td>
<td>0.15* (0.07)</td>
<td>-0.16** (0.08)</td>
</tr>
<tr>
<td><strong>Linear cortisol (clean)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(nmol/l)</td>
<td>11.70 (4.23)</td>
<td>-0.70 (0.70)</td>
<td>1.76* (0.82)</td>
<td>-1.87** (0.94)</td>
</tr>
<tr>
<td><strong>Psychological well-being</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>index</td>
<td>0.00 (1.00)</td>
<td>0.39*** (0.09)</td>
<td>0.25* (0.13)</td>
<td>0.42** (0.17)</td>
</tr>
</tbody>
</table>
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.
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### Investment in assets

<table>
<thead>
<tr>
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<th>Control mean (SD)</th>
<th>Monthly transfer</th>
<th>Lump-sum transfer</th>
<th>Difference (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of non-land assets (USD)</td>
<td>477.66 (389.23)</td>
<td>170.32*** (34.55)</td>
<td>245.29*** (33.95)</td>
<td>0.08*</td>
</tr>
<tr>
<td>Has non-thatched roof (dummy)</td>
<td>0.16 (0.37)</td>
<td>0.11*** (0.04)</td>
<td>0.23*** (0.04)</td>
<td>0.01**</td>
</tr>
</tbody>
</table>
• 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

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.
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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?

Poverty → Stress → Decision-making → Poverty

?
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.
Temporal discounting is the decrease in subjective value of a reward as it is delayed. It lowers the attractiveness of long-term investments by decreasing the subjective value of their returns (e.g., health, education).
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%

⇒ Preference for commitment suggests that people have self-control problems (and they know it)
Significant welfare improvements by nudging people to discount (procrastinate) less
Why discounting breeds poverty

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⇒ 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

Pill 1: Placebo

Pill 2: Placebo

lunch

Info S1 S2 S3 S4 S5 S6 S7 S8

30 min 30 min 30 min 90 min 15 min 15 min

Exit Debriefing

180 min

Intertemporal choice
Timeline: “Rapid cort” group

Pill 1: Placebo

Pill 2: 20 mg h.cort

Intertemporal choice

Info -> S1 30 min -> S2 30 min -> S3 30 min -> S4 30 min -> S5 90 min -> S6 15 min -> S7 15 min -> Exit Debriefing
Timeline: “Slow cort” group

Pill 1: 20 mg h.cort

Pill 2: Placebo

180 min

lunch

Intertemporal choice

Info S1 S2 S3 S4 S5 S6 S7 S8 Exit

30 min 30 min 30 min 90 min 15 min 15 min

Debriefing
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?

Subjective value vs. Late outcome (months)
Hydrocortisone administration increases discounting.

[Graphs showing subjective value over late outcome (months) for placebo with earliest outcomes of Tomorrow and 6 months, with confidence intervals.]
Hydrocortisone administration increases discounting

![Graph showing subjective value (Euros) vs. late outcome (months) for placebo and cort, rapid. Earliest outcome: Tomorrow and Earliest outcome: 6 months are indicated.](image-url)
Hydrocortisone administration increases discounting.
Increased cortisol levels increase temporal discounting.
Direct effect of poverty on temporal discounting?
Poverty and Decision-Making

Does poverty causally affect temporal discounting?
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
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

Your wealth: 1000

Average wealth: 550

Lowest wealth: 100

Highest wealth: 1000
Income progression

Period (1–25)
Cumulative income (points)

- Always poor
- Negative shock
- Always rich
- Positive shock
Income progression

Period (1–25) vs. Cumulative income (points)

- **Always poor**
- **Negative shock**
- **Always rich**
- **Positive shock**
Income progression

Period (1−25)
Cumulative income (points)
Behavioral tasks

Always poor
Negative shock
Always rich
Positive shock
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

Earliest outcome: Tomorrow

Earliest outcome: Six months
Temporal Discounting after Income Shocks

![Graph showing subjective value (CHF) versus late outcome (months) for two scenarios: Earliest outcome: Tomorrow and Earliest outcome: Six months. The graph includes two lines: Always poor (blue) and Negative shock (red). The x-axis represents late outcome in months, ranging from 0 to 12, and the y-axis represents subjective value in CHF, ranging from 0 to 30. The data points show a decrease in subjective value over time for both scenarios.](image-url)
Temporal Discounting after Income Shocks

Earliest outcome: Tomorrow

Earliest outcome: Six months
Interaction: $p < 0.05$
Temporal Discounting after Income Shocks

Area under the Curve

Always rich
Positive shock
Always poor
Negative shock

Interaction: $p < 0.05$
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.
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?

The graph shows the cumulative income (points) over periods 1 to 25 for different conditions:

- **Always poor** (blue line)
- **Negative shock** (red line)
- **Always rich** (yellow line)
- **Positive shock** (green line)

A dark gray shaded area indicates the effort in periods 16-17.
Increased effort/lower reservation wage?

```

Period (1−25)
Cumulative income (points)
Effort in periods 16-17
Willingness to pay periods 18-25

Cumulative income (points)
Period (1−25)
Always poor
Negative shock
Always rich
Positive shock

```

The graph illustrates thecumulative income points over periods 1 to 25, with a shaded area indicating effort in periods 16-17 and willingness to pay in periods 18-25. The lines represent different conditions: Always poor, Negative shock, Always rich, and Positive shock.
Increased effort/lower reservation wage?

Number correct periods 16–17

Willingness to pay for additional rounds

<table>
<thead>
<tr>
<th>Always rich</th>
<th>Positive shock</th>
<th>Always poor</th>
<th>Negative shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tables</td>
<td>35</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Number correct periods 16–17</td>
<td>25</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Willingness to pay</td>
<td>200</td>
<td>250</td>
<td>300</td>
</tr>
<tr>
<td>Willingness to pay for additional rounds</td>
<td>350</td>
<td>300</td>
<td>400</td>
</tr>
</tbody>
</table>
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

Stress

- Positive shock
- Always poor
- Negative shock

Negative Affect

- Positive shock
- Always poor
- Negative shock

Cortisol

- Positive shock
- Always poor
- Negative shock
4. “The world is risky – better consume today”
4. “The world is risky – better consume today”
Prediction: negative income shocks may affect decision-making by biasing subjective probability estimates downward
Pharmacological elevation of cortisol levels increases temporal discounting (Cornelisse, van Ast, Haushofer et al., 2013)
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)
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

Poverty

Decision-making

Stress
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?

90 participants, Western Kenya
Count blessings/hassles by phone, 10 consecutive days
5 days later: Depression questionnaire (CESD)
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?

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- **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)

Depression (CESD) After − Before
Hassles Blessings

Diagram showing a comparison between hassles and blessings in terms of depression scores (CESD) after and before the intervention.
Heat Stress and Test Scores in Kenya

Simone Schaner, Dartmouth
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

Poverty

Decision-making

Psychological outcomes

Neurobiological
Future directions 2: Breadth

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

- Unpacking decision-making:
  - Risk aversion, explore-vs.-exploit behavior, status quo bias, illusion of control

- Unpacking psychological consequences of poverty: aspirations
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:
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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

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?”
Goal: “Getting into the heads of the poor”
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Strong a priori hypothesis: poverty $\rightarrow$ stress $\rightarrow$ temporal discounting
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Ongoing work: The Landscape of Thought in Poverty

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

![Bar chart showing frequency of thoughts]

- **Food**: 150
- **Family**: 100
- **Work**: 50
- **Health**: 0
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
Observe the image below.
Then, put your finger on the missing element that completes it.
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’)

![Developmental testing room 1 (12.5’ x 18’)](image-url)
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 Mwangeli, 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
No negative externalities of transfers
No negative externalities of transfers
Results on consumption, asset holdings, income, health, education, domestic violence: cf. working paper