Light-Touch Social Psychology Interventions and Cognitive Control: Pre-Analysis Plan

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Abstract

This document outlines the analysis plan for the study of the effects of three psychological interventions on cognitive control and real effort as measured by Raven's progressive matrices, a Stroop task, and a clicker task. This evaluation took place as a pilot trial across 54 villages in Migori County, Kenya. Random assignment of these psychological interventions allows us to estimate the causal impacts on cognitive control and real effort. Results of this analysis will be used to inform the selection of a psychological intervention for the main randomized controlled trial.

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1 Methods

1.1 Sample

This study sampled from rural households across 142 villages in Migori County, Kenya. We conducted a census of 12,707 households between August 2015 and September 2015 to determine eligibility for the project. In order to be eligible, households must have met the GiveDirectly eligibility criteria for Kenya. After sampling, households were stratified by poverty level. Eligible households were cluster randomized by village and poverty level into the control group or one of three treatment arms: "Aspirations", "Affirmations", and "Placebo". Data collection for baseline ocurred between October 2015 and December 2015. Project staff returned to surveyed households one week later for delivery of the intervention The second wave of data collection ocurred between November 2015 and January 2016. Respondents completed the endline survey approximately 5 weeks after receiving the intervention.

1.2 Tasks

1. **Raven's progressive matrices**: Participants were shown a set of six patterns in a large image on the tablets. For each of the six images, participants will have to choose from a set of objects which object completes the pattern in the large image. This is a paid task where participants can earn KES 20 for each correct answer. There was no time limit for this task and participants could choose to skip questions.

2. **Stroop task**: In this task, respondents were presented with a list of 25 integers. Respondents had to count the number of times the integer appears on the list. This is a paid task and the payoff will depend on how fast the participant completes the task across all three rounds. KES 10 was deducted from the respondent's total earnings for each uncorrected mistake. Corrected mistakes were not penalized. Participants played three rounds of this task.

3. **Clicker task**: In this task, participants will have three minutes to click as many times as they can on a clicker device provided to each participant. This was a paid effort task that paid KES 10 per 100 clicks rounded up to the nearest KES 10. Participants

must hold the clicker in one hand during the entire task and cannot switch hands to make clicks. Participants conducted a practice round before the paid round.

2 Analysis Plan

2.1 Model

In the following section we outline the outcome variables of interest and the econometric specifications we will use to analyze the data. To test the causal impact of our psychological interventions on cognitive control, we analyze the following linear model:

$$y_i = \alpha + \mathbf{T}_i'\beta + g_i\mathbf{T}_i'\gamma + \mathbf{X}_i'\sigma + \omega y_{iB} + \varepsilon_i$$

In the model, y_i is the outcome variable of interest for individual i, $\mathbf{T}_i$ is a vector of treatment indicators for "Aspirations", "Affirmations", and "Placebo", g_i is a dummy variable that takes the value of 1 for individuals who received a group intervention, $\mathbf{X}_i$ is a vector of covariates, and ε_i is the residual. Where possible, we condition on the baseline value of the outcome, y_{iB}, to improve power (McKenzie 2012). Standard errors will be clustered at the village level.

β identifies the treatment effect of individual interventions and $\beta + \gamma$ identifies the effect of group interventions. We will compare relative effects across interventions by conducting linear hypothesis tests on the coefficient estimates. We will estimate the system of seemingly unrelated regressions (SUR) to be able to conduct hypothesis tests on the treatment coefficients across regressions (Zellner 1962). This is a preliminary analysis used to inform selection of intervention in the main trial. Follow-up analysis will estimate models that control for strata.

2.2 Outcomes

Table 1 lists and describes the outcomes of interest.

Table 1: List of outcome variables to be analyzed

Name	Description
Raven's correct	Percentage of correct answers in Raven's progressive matrices
Stroop correct	Percentage of corect answers in Stroop task
Stroop time	Completion time for Stroop task
Clicks	Number of clicks in clicker task
Index	Weighted index of Raven's, Stroop, and clicker outcomes

References

McKenzie, David. 2012. "Beyond baseline and follow-up: The case for more T in experiments." *Journal of Development Economics* 99 (2): 210–221.

Zellner, Arnold. 1962. "An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias." *Journal of the American Statistical Association* 57 (298): 348–368 (June).