Timing the Engagement with the Mindsets of Cash Transfer Recipients: Analysis Plan #1 (Cognitive Outcomes)

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1 Rationale

Scarcity in financial resources appears to tax the cognitive performance of the poor, and there are indications that cash inflows can cause cognitive boosts (Mani et al. 2013). This suggests that cash transfers can have an enabling effect on tasks that demand cognitive resources. For example, as cognitive load impedes schema adoption(Sweller 2013), cash transfer interventions may enhance the effectiveness of psychological interventions aimed at altering schematic cognitions. This suggests (perhaps counterintuitively) that when the two interventions are bundled, cash transfers should lead rather than trail psychological interventions. More generally, if bundling of the two interventions leads to synergies, the short-term cognitive impacts of cash transfers may be one explanation.

2 Experimental Context

The trial 'Promoting Future Orientation Among Cash Transfer Recipients' (see identifier #996 on the social science registry of the American Economic Association) combines a cash transfer intervention with a 'mindset' intervention aimed at altering the constellation of people's schematic cognitions about their own capacity and future. This provides an opportunity for a sub-trial that randomizes the timing of mindset engagement relative to cash transfers and evaluates if the bundled intervention is in fact more effective when it leads rather than trails. This is based on the assumption that that cash transfers indeed alter short-term cognitive performance, and the analysis plan presented here pertains to this initial hypothesis.

3 Data

3.1 Sample

Participants whose villages had been, for the purposes of the main trial, assigned into that arm which involves both cash transfers and the psychologically active ('mindset') intervention were further randomized at the individual level to either be candidates for receiving the mindset intervention in the weeks before or in the weeks after the transfer in question. (Note: GiveDirectly makes three transfers labeled Token, Lump Sum A, and Lump Sum B in approximately two-month intervals. The transfer in question is currently defined as Lump Sum A). The individual level randomization was stratified on the respondent's per capita housing space relative to the village median; widow status; and secondary educational attainment. The final sample analyzed for the sub-study will be limited to participants who, in addition to having been randomized into one of the sub-arms, have the following attributes:

1. Successfully baselined; and
2. Received the transfer in question in that month in which GiveDirectly first made the transfer in question in the same village; and
3. Received the mindset intervention within 72 hours of the first participant who received the mindset intervention in the same village and sub-arm.

3.2 Outcomes and Their Operationalization

Among the measures collected immediately before the administration of the mindset intervention will be three cognitive ones that, for the purposes of the analysis discussed here, will serve as outcomes:

1. Digit Span (Working Memory). Where no response is correct, scored as zero. Otherwise, scored as the length of the longest sequence that respondents can correctly recall, minus two points.

2. Raven's Matrices (Fluid Intelligence). Scored as the number of correct responses provided within the time limit.

3. Numerical Stroop (Cognitive Control). Scored as the number of correct responses provided within the time limit.

3.3 Data Source

All outcomes discussed here are collected in the form of a survey that is conducted immediately preceding the mindset intervention. Data sources for independent variables include the census, the baseline, and the randomization output. Data collection tools and visual aids will be made publicly available.

4 Empirical Strategy

4.1 Estimated Equation

The central specification will be the following linear model:

$$y_i = \alpha + \beta A_i + X_i \mu + \varepsilon_i \tag{1}$$

where y_i is the outcome of interest for individual i; α is a constant; A_i is the randomly assigned sub-arm, coded to 0 (to 1) among participants who are intended to receive the cognitive test and the psychological intervention before (after) Lump Sum A;β estimates the impact of intended assignment to the 'after' condition; X_i is a vector of controls that includes the respondent's age and per capita housing space, as well as dummy variables indicating the respondent's educational attainment and village; μ is a vector of associated coefficients; and ε_i is an error term.

4.2 Hypothesis

The null hypothesis is that $\beta = 0$. Based on the aforementioned rationale, I expect that $\beta > 0$.

4.3 Adjustments

In the main results, no adjustments will be made for attrition, non-response, and outliers, with one exception: observations will be dropped where cognitive measures fall outside of the range of values allowed by the test protocol.

4.4 Robustness checks

In addition to the above, I will estimate a specification that excludes controls X_i. Further, I will test the sharp null hypothesis using randomization inference (random number seed 98765; 10,000 simulations).

4.5 Aggregation

In order to jointly analyze the three individual cognitive effects, improve statistical power, and account for multiple hypotheses testing, I estimate effects on a cognitive index using the methodology presented in (Kling, Liebman, and Katz 2007), which aggregates across multiple treatment effect estimates.

References

Kling, Jeffrey R, Jeffrey B Liebman, and Lawrence F Katz. 2007. "Experimental Analysis of Neighborhood Effects." *Econometrica* 75 (1): 83–119 (jan).

Mani, Anandi, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao. 2013. "Poverty impedes cognitive function." *Science* 341 (6149): 976–80.

Sweller, John. 2013. "Working memory, long-term memory, and instructional design." *mimeo*.