Mental Health in the Developing World: Using Positive Psychology to Improve Psychological Well-being
Pre-Analysis Plan

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Abstract

We conduct a randomized experiment to evaluate a light-touch psychological intervention in a developing-country setting. Numerous psychological studies suggest that simple, light-touch interventions are effective in improving psychological well-being, particularly in sub-clinical populations. However, little is known about the effectiveness of such interventions in developing-country populations. These populations are of particular interest because poor mental health is thought to be a barrier to development. Residents of an informal settlement in Kenya were randomly assigned to either a control condition, or an experimental condition in which they participated in a combination of psychological exercises aimed at improving psychological well-being over the course of two weeks. The psychological interventions consisted of a "Count Your Blessings" exercise encouraging participants to recall three good things about their life every day, a "self-affirmation" exercise in which participants wrote about their talents, and an "aspirations" exercise in which they were encouraged to think about their life goals. This document outlines the outcome variables and econometric methods we will use to assess the effect of the intervention on psychological well-being, aspirations, cognitive control, and decision-making.

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1 Introduction

A number of previous studies suggest that simple, light-touch psychological interventions may be effective in improving psychological well-being, particularly in sub-clinical populations (Cohen and Sherman 2014, Seligman et al. 2005). The evidence on the effectiveness of these light-touch interventions primarily focuses on populations in developed countries, while little is known about the effectiveness in low-income and developing-country populations. This question is of particular interest because poor mental health in developing countries is a significant barrier to development, possibly partly due to its effects on decision-making (Haushofer and Fehr 2014). Thus, such interventions could improve both mental health and economic outcomes in developing countries. However, causal evidence on this question is scarce.

In this study, we adapt several protocols from psychology to develop a combined intervention that incorporates the most effective elements from a number of different approaches used in this literature. The goal of our intervention was not to evaluate any one particular protocol, but rather to find a light-touch intervention that has a measurable impact on psychological well-being and decision-making in a general population. Based on a review of the literature, we combined three of the most successful light-touch interventions into a single intervention adapted to the Kenyan context: Count Your Blessings, self-affirmation, and aspirations priming.

Count Your Blessings (CYB) interventions have been shown to increase life satisfaction, positive affect, and subjective happiness and decrease depression, negative affect, and negative health symptoms (Emmons and McCullough 2003, Froh et al. 2008, Chancellor et al. 2013, Seligman et al. 2005), although some studies have produced contradictory results or have been difficult to replicate (Bolier et al. 2013). The majority of studies with positive and significant results asked participants to count their blessings daily for at least 13 days. This is the approach we adopt here.

Self-affirmation (SA) interventions have been shown to increase the grade-point average (GPA) of minority students, the acceptance of unwelcome risk feedback or information, and cognitive control and fluid intelligence (Cohen et al. 2009, Howell and Shepperd 2012, Harris and Epton 2009, Hall et al. 2013, Sherman et al. 2013). Successful interventions either asked participants to write about traits they value about themselves, or a personal event important to them. We note that issues of non-random sample selection and attrition raise concerns about the external validity of some of the existing findings on self-affirmation.

The third element of our intervention was an aspirations priming (AP) exercise. Aspirations do not directly relate to psychological well-being, but instead to the concept of self-efficacy (Bandura 1989, Locke and Latham 2002). Recent studies suggest that aspirations can be "raised" using simple methods such as showing "aspirational" videos or cartoons, particularly in developing-country settings (Bernard et al. 2014, Macours and Vakis 2009). We included the aspirations priming because we hypothesize that raised aspirations may positively affect both psychological well-being and decision-making.

This project explores the impact of these interventions on psychological well-being and decision-making in a field setting using a randomized controlled trial. If we find that psychological well-

being improves in response to the intervention, our results lend support to the effectiveness of these psychological interventions in a novel setting. Further, the success of this intervention would allow us to use the intervention as an instrument for psychological well-being, which in turn makes it possible to ask whether psychological well-being causally affects decision-making.

2   Intervention

Using the subject pool of the Busara Center for Behavioral Economics, we recruited 220 participants from Kibera, an informal settlement in Nairobi, Kenya to participate in the study. We selected exclusively high school graduates to ensure that participants were literate. Participants were told that they were invited to participate in a study evaluating the effects of psychological exercises on well-being. The psychological intervention consisted of the three exercises described above, which were combined into a single intervention to create the treatment condition.[1] The three elements of the treatment are described below:

1. **Count Your Blessings:** This protocol was administered daily for 14 days (two weeks). All participants were given a packet to be filled out each day. Both control and treatment participants completed an identical series of ten questions, comprising basic physical health including sleep quality and exercise, ratings of mood, appraisals of the day, expectations for tomorrow, perception of social support received, and a well-being rating derived from 30 affect terms of commonly occurring affective states (Emmons and McCullough 2003). Treatment participants were additionally asked to complete an eleventh question each day, instructing them to write down the five things in their life that they were most grateful or thankful for over the past day.

2. **Self-affirmation:** This protocol was conducted once only, at endline. All participants completed two writing exercises. Participants in the treatment condition were first instructed to spend 3 to 5 minutes writing in depth about a personal experience during which they felt very successful or proud (the "event" condition). Following this, the same participants were then instructed to spend 3 to 5 minutes writing in depth about a selected value that was important to them, describing why it was so important (the "values" condition). Options included athletic ability, music, religious values, and sense of humor. Participants in the control condition were first instructed to write about their daily routine on a typical day, and then instructed to write about what they had eaten or drunk in the last 48 hours.[2]

3. **Aspirations:** This protocol was conducted once only, at endline. All participants read short stories based on real individuals from Kibera and similar informal settlements. In the treatment condition, the stories were about successful individuals, while in the control

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[1]In this study, we did not focus on which element of the intervention had what impact, but instead were interested in asking whether we could detect *any* impact with the strongest possible psychological intervention. If we find positive results we will conduct further studies to explore their source.

[2]The protocol was derived from McQueen and Klein (2006) and Cohen et al. (2009).

condition, the story was about someone's daily routine. After the readings, participants in both conditions were asked to think about the future: the treatment group was asked to think about the year ahead, while the control group was asked to think about tomorrow. The participants then had 5 minutes to write down anything that came to mind about the future. The protocol was adapted from that used in Bernard et al. (2014).

3 Evaluation Questions

Our main question is whether light-touch psychological interventions improve psychological well-being and aspirations in a developing country setting. A secondary question is whether these interventions also affect decision-making (temporal discounting and willingness to take an HIV test) or cognitive control (Stroop task). The intervention only contains a treatment arm and a control arm, and thus will not test specifically at which elements of the intervention are most effective and if there are complementarities between treatment elements.

4 Evaluation Design

4.1 Sampling and Identification Strategy

To establish a causal relationship between treatment and outcomes, this study uses a randomized design. A total of 220 participants were recruited from the subject pool of the Busara Center for Behavioral Economics in Nairobi, Kenya, with 120 participants randomly assigned to the treatment condition and the other 100 participants to the control condition.[3]

4.2 Data Collection Methods and Instruments

Data were collected in the lab at baseline and at endline after the end of the intervention. In addition, some data related to the CYB portion of the intervention were collected daily via surveys that respondents filled out at home. The lab team provided a short training session to respondents to explain how to fill out the daily forms, and a practice sheet was completed. We also conducted a field visit two days after baseline to ensure that these sheets were being completed correctly.

4.3 Power Calculation

The sample size of 120 participants in the treatment and 100 in the control group was chosen such that we would be able to detect an effect size of 0.38 SD with 80% power.

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[3]The different numbers between treatment and control groups arose from the fact that the project had to finish before the 2014 Christmas break in Kenya, at which point 100 control and 120 treatment participants had completed the study. The original target enrollment had been 120 per group.

4.4 Attrition

Of the 220 respondents that participated in the baseline survey, 186 participated in the endline survey, an attrition rate of 15.5%. To assess whether attrition confounds our results, we proceed as follows. First, we define $attrit_i = 1$ if individual i was surveyed at baseline but not at endline, and zero otherwise. We then assess the severity of attrition using three approaches. First, equation 1 estimates whether the magnitude of attrition is different for treatment and control participants:

$$attrit_i = \beta_0 + \beta_1 T_i + \varepsilon_i \tag{1}$$

Second, equation 2 assesses whether attrition participants are different in terms of a vector of baseline characteristics $\mathbf{y_{i,t=0}}$:

$$\mathbf{y_{i,t=0}} = \beta_0 + \beta_1 attrit_i + \varepsilon_{i,t=0} \tag{2}$$

And third, equation 3 measures whether the baseline characteristics of attrition individuals in the treatment group are significantly different from those in the control group. The sample for regression will be restricted to attrition households:

$$(y_{i,t=0} \mid attrit_i = 1) = \beta_0 + \beta_1 T_i + \varepsilon_{i,t=0} \tag{3}$$

If worrying levels of attrition are found, we will adjust for the potential effect of such attrition using Lee bounds.

5 Econometric Specifications

5.1 Basic Specification

Our basic treatment effects specification estimates the following equation:

$$y_{i,t=14} = \beta_0 + \beta_1 T_i + \varepsilon_{i,t=14} \tag{4}$$

where $y_{i,t=14}$ is the outcome of interest for individual i measured at the endline survey, 14 days (two weeks) after the intervention began, $t = 14$. T_i is a dummy variable equal to 1 if the participant was randomly assigned to the treatment condition and 0 if assigned to the control. $\varepsilon_{i,t=14}$ is the unobserved error component, which is assumed to be serially uncorrelated. Where possible, we will control for baseline levels of the outcome variables, $y_{i,t=0}$ to improve statistical power. The modified estimating equation is:

$$y_{i,t=14} = \beta_0 + \beta_1 T_i + \delta y_{i,t=0} + \varepsilon_{i,t=14}. \tag{5}$$

5.2 Instrumental Variables Interpretation

Conditional on "large enough" treatment effects on psychological well-being, we can obtain an estimate of the effect of a one standard deviation increase in psychological well-being on decision-making (temporal discounting and willingness to take an HIV test) and cognitive control (Stroop task). We can do so by re-scaling the reduced-form estimate, or alternatively by estimating the following equation (with the required adjustment of standard errors):

$$y_{i,t=14}^{\text{DM}} = \beta_0 + \beta_1 \hat{y}_{i,t=14}^{\Psi} + \varepsilon_{i,t=14}. \tag{6}$$

Here, $y_{i,t=14}^{\text{DM}}$ is the decision-making outcome and $\hat{y}_{i,t=14}^{\Psi}$ is an index that combines all psychological variables to measure overall psychological well-being, and is instrumented using the randomization T_i.

5.3 Heterogeneous Treatment Effects

We will further test whether the impact of the psychological intervention varies with pre-determined individual characteristics, measured at baseline and denoted by $\mathbf{X}_{i,t=0}$. The estimating equation for differential effect of treatment for a particular characteristic is given by:

$$y_{i,t=14} = \beta_0 + \beta_1 T_i + \beta_2 X_{i,t=0} + \beta_3 T_i \times X_{i,t=0} + \delta y_{i,t=0} + \varepsilon_{i,t=14}. \tag{7}$$

where β_3 captures the additional effect that treatment has for individuals with characteristic X. The dimensions of heterogeneous effects are:

1. Respondent gender

2. Respondent age (younger vs. older)

3. Respondent baseline employment status

4. Household type (joint vs. single)

5. Baseline cognitive function (measured by Raven's matrix, high vs. low)

6. Baseline psychological well-being (high vs. low)

7. Respondent baseline education level

5.4 Temporal Dynamics of the Treatment Effect

With daily data on psychological well-being, we will be able to explore the temporal dynamics of the treatment effect. That is, we can observe how quickly or slowly the intervention impacts psychological well-being over the two weeks. In addition, we collect daily data on sleep patterns and can therefore observe the response of this variable to treatment. In the daily data, we have outcome measures y_{it} for individual i for $t = 1, \ldots, 14$, where $t = 1$ is the measure after the first

day of the intervention, and $t = 14$ is the measure at endline. We will estimate the following specification:

$$y_{it} = \beta_0 + \sum_{k=2}^{14} \beta_1^k (T_i \times [t = k]) + \delta y_{i,t=0} + \varepsilon_{it} \tag{8}$$

where $[t = k]$ is a dummy indicator for the kth day of the intervention. The standard errors will be corrected for auto-correlation by clustering at the individual level. As before $y_{i,t=0}$ is the measure of the outcome variable at baseline, prior to the start of the intervention, and is included as a control to improve precision.

5.5 Accounting for Multiple Inference

To account for multiple inference, we will follow three approaches. First, we will define summary indices for psychological well-being and decision-making and ask whether these indices are affected by treatment. Second, for individual outcome variables within the psychological well-being and economic decision-making groups, we will adjust for multiple inference using a family-wise p-value adjustment following Anderson's (2008) variant of Efron & Tibshirani's (1993) non-parametric permutation test. Finally, we will run seemingly unrelated regression (SUR) for each group of outcomes to test for the joint significance of the outcomes in each category.

6 Outcome Variables

Below we list the outcome variables and indices which we will consider by group. Outcomes marked by an asterisk (*) were measured daily.

1. Psychological well-being

    (a) Happiness - WVS2

    (b) Life satisfaction - SWLS + WVS3

    (c) Depression - CESD

    (d) Rating of well-being from affective states - PANAS*

    (e) Gratitude - GQ6

    (f) Locus of control - LOTR + WVS1

    (g) Sleep quality index: PCA/weighted standardized average of:

        i. Hours of sleep*

        ii. Respondent had difficulty sleeping*

        iii. How refreshed respondent felt after sleep*

    (h) Appraisal of day*

    (i) Expectations for tomorrow*

(j) Respondent helped someone with a problem or offered emotional support*

(k) Appraisal of connection with others*

(l) Index: PCA/weighted standardized average of variables (a)-(e)

2. Exercise

   (a) Respondent exercised*

   (b) Respondent had difficulties with physical activity*

   (c) Index: PCA/weighted standardized average of variables (a)-(b)

3. Intentions

   (a) Intent to eat sweets and sodas over next month

   (b) Intent to spend money wisely over next month

   (c) Intent to have good relationship with spouse over next month

   (d) Index: PCA/weighted standardized average of variables (a)-(c)

4. Beliefs

   (a) Belief of competency of people in own ethnic group

   (b) Belief of competency of people in other ethnic groups

   (c) Belief of trustworthiness of people in own ethnic group

   (d) Belief of trustworthiness of people in other ethnic groups

   (e) Index: PCA/weighted standardized average of variables (a)-(d)

5. Aspirations index (following Bernard and Taffesse (2012))

   (a) Annual income

   (b) Assets

   (c) Status

   (d) Education

   (e) Priorities

   (f) Index: Individual-assigned weighted standardized average of variables (a)-(e)

6. Cognitive control (Stroop - heart/flower)

7. Decision-making

   (a) Discount rate (MPL)

   (b) Willingness to take HIV test

   (c) Index: PCA/weighted standardized average of variables (a)-(b)

References

Anderson, Michael L., "Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects," 2008.

Bandura, Albert, "Human agency in social cognitive theory.," *American psychologist*, 1989, *44* (9), 1175.

Bernard, Tanguy and Alemayehu Seyoum Taffesse, "Measuring aspirations: discussion and example from Ethiopia," *International Food Policy Research Institute Discussion Paper*, 2012, *1190*.

___ , **Stefan Dercon, and Alemayehu Seyoum Taffesse**, "The Future in Mind: Aspirations and Forward-Looking Behavior in Rural Ethiopia.," 2014.

Bolier, Linda, Merel Haverman, Gerben Westerhof, Heleen Riper, Filip Smit, and Ernst Bohlmeijer, "Positive psychology interventions: a meta-analysis of randomized controlled studies.," *BMC public health*, 2013, *13*, 119.

Chancellor, J, K Layous, and S Lyubomirsky, "Recalling positive events at work makes employees feel happier, move more, and talk less: A 6-week randomized controlled intervention at a Japanese workplace," *Manuscript under review*, 2013.

Cohen, Geoffrey L and David K Sherman, "The psychology of change: self-affirmation and social psychological intervention.," *Annual review of psychology*, 2014, *65*, 333–71.

___ , **Julio Garcia, Valerie Purdie-Vaughns, Nancy Apfel, and Patricia Brzustoski**, "Recursive processes in self-affirmation: Intervening to close the minority achievement gap," *science*, 2009, *324* (5925), 400–403.

Efron, B and R J Tibshirani, *An Introduction to the Bootstrap*, Vol. 57, CRC Press, 1994.

Emmons, Robert A and Michael E McCullough, "Counting blessings versus burdens: an experimental investigation of gratitude and subjective well-being in daily life.," *Journal of personality and social psychology*, 2003, *84* (2), 377.

Froh, Jeffrey J, William J Sefick, and Robert A Emmons, "Counting blessings in early adolescents: An experimental study of gratitude and subjective well-being," *Journal of School Psychology*, 2008, *46* (2), 213–233.

Hall, Crystal C, Jiaying Zhao, and Eldar Shafir, "Self-Affirmation Among the Poor Cognitive and Behavioral Implications," *Psychological science*, 2013.

Harris, Peter R and Tracy Epton, "The impact of self-affirmation on health cognition, health behaviour and other health-related responses: a narrative review," *Social and Personality Psychology Compass*, 2009, *3* (6), 962–978.

Haushofer, Johannes and Ernst Fehr, "The Psychology and Neurobiology of Poverty," *Science*, 2014, *344* (6186).

Howell, Jennifer L and James A Shepperd, "Reducing information avoidance through affirmation," *Psychological science*, 2012, *23* (2), 141–145.

Locke, Edwin A and Gary P Latham, "Building a practically useful theory of goal setting and task motivation: A 35-year odyssey.," *American psychologist*, 2002, *57* (9), 705.

Macours, Karen and Renos Vakis, "Changing Householdsï¿œ Investments and Aspirations through Social Interactions," *World Bank Research Working papers*, 2009, pp. 1–45.

McQueen, Amy and William M P Klein, "Experimental manipulations of self-affirmation: A systematic review," *Self and Identity*, 2006, *5* (4), 289–354.

Seligman, Martin E. P., Tracy A. Steen, Nansook Park, and Christopher Peterson, "Positive psychology progress.," *American psychologist*, 2005, *60*, 410–421.

Sherman, David K, Kimberly A Hartson, Kevin R Binning, Valerie Purdie-Vaughns, Julio Garcia, Suzanne Taborsky-Barba, Sarah Tomassetti, A David Nussbaum, and Geoffrey L Cohen, "Deflecting the trajectory and changing the narrative: How self-affirmation affects academic performance and motivation under identity threat.," *Journal of Personality and Social Psychology*, 2013, *104* (4), 591.