Pre-Analysis Plan

Role models among us: Evidence on the motivational effect of statues on Indian students

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1 Introduction

The analysis plan describes the research design to investigate the presence of a role-modelling effect of statues on a set of key outcomes: aspiration, hope, effort and academic achievement. A randomised controlled trial aims to assess the impact of exposure to a motivational video clip including four popular statues in primary school students in Jaipur, India.

Interacting with statues is an essential ingredient of civilised urban life. As erecting statues could be a pedagogic device used by the dominant political ideologies to win over the inhabitants, they are often viewed as symbols of power (Cohen, 1989; Kelly, 2015). However, it is simply not the complete story of statues. Statues offer a highly visible and lasting mean of memory, transmitting role models to posterity (Bell, 2008). This mean is defined as a mnemonic device for aiding the memory in psychology (Bower, 1970; Manuel, 2000). Therefore, statues served to establish a particular vision of behaviour could have a role-modelling effect in society. For example, portrait

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statues visibly manifesting the different roles that men and women were expected to play in ancient Roman society (Davies, 2008). Surprisingly, there is no experimental study on the relationship between statues and people's aspirations and behaviour.

Firstly, we contribute to a small but growing literature that studies a role-modelling effect by focusing on the impact of movies and video clips on education attainment (Riley, 2017; Bhan, 2020), entrepreneurial aspirations (Bjorvatn et al., 2020; Dalton et al., 2020) and youths' behaviour (Kearney and Levine, 2015). Yet, unlike that literature, we focus on the effect of real-life role models that have been existing for years.

Secondly, this study links to studies focusing on real-life role models as well. For instance, Kipchumba et al., (2021) show that visits from college students in randomly selected treatment schools impact students' aspirations. Porter and Serra (2020) investigate the effect of exposing students enrolled in introductory classes to successful and charismatic women who majored in economics at the same university. The present study also looks into real-life role models, while it relies on recalling the content of students' memory rather than the direct interaction with role models. We see statues as using mechanisms of familiarity to have an eventual role-modelling effect.

Thirdly, this study also contributes to the literature that examines the role-modelling effect of political leaders on civilians' norms and behaviour. Beaman et al. (2009) and Beaman et al. (2012) find that exposure to female political leaders increases women's aspiration and changes their gender norms. Our intervention video including Indira Gandhi who is the only female prime minister in the Indian history enables us to test the effect of female statues on students' (perception of) gender norms.

Lastly, we view our work as closely related to marketing studies of how billboard marketing influence audiences' attitudes and behaviour today. Several such studies

demonstrate the powerful effect of billboard on attracting audiences' attention and increasing their buying behaviour (Fiala et al., 2018; Kumar, 2012; Oberholster, 2008). Statues could function as the repository of memory, commemorating role models and their inspiring stories, and then motivating students to emulate good deeds.

2 Research Strategy

2.1 Research Questions

- Does exposure to monumental statues have a motivational effect?
- Do monumental statues have a role modelling effect?
- Does exposure to motivational videos increase student motivation and effort?

2.2 Sample

The sample consists of approximately 2000 primary school students of class 4 and 5 in private schools of urban areas of Jaipur in India. These students are randomised at an individua level to three homogeneous groups (two treatment and one pure control). The schools were approached in April-May 2021 to gather consent.

2.3 Statistical Power

The average effect size of 1 standard deviations (sd) improvement in the psychological outcomes; and 0.5 sd increase in effort variables is used for calculating power. We assume the unexplained variation to range between 2-5 sd, depending on the outcome variable[1]. An estimate of the desired sample size for three treatment arms with a two-sided test at 5 percent level of significance is approximately 1400 students. But, to avoid potential threats of attrition, we identify a sample of nearly 2000 students.

[1] As mentioned in section 3.

2.4 Assignment to treatment

Randomisation will be performed on Microsoft Excel, such that each participating student will be assigned to one of the three groups. The first treatment group witnesses a virtual tour to four monumental statues of Jaipur with a short narrative in the background about the individual in that statue; the second group watches a video about the same role model that is scripted using images of that role model (but not their statue) with the same narrative as in the first treatment arm, while the third group acts as a pure control. These are explained in the table below:

Treatment 1 (T1)	**Treatment 2 (T2)**	**Control (C)**
Statues - virtual tour	Motivational video	No treatment
Narrative	Narrative	

2.5 Intervention

Exposure to role models via multimedia channles can influence human behaviour (Chong and La Ferrara, 2009; La Ferrara et al., 2012, and Riley, 2017). We expose kids to such role-modelling content via online tours or short video clips on individual screens.

As a part of the online RCT, we have saught assistance from school teachers to ensure that participants pay attention to the videos. We hired a production company ('Braille Cam') to produce the intervention videos. Treatment 1 and 2 comprise of a set of four role models, namely, Mahatma Gandhi, Indira Gandhi, Arjuna and Dr. B.R. Ambedkar. However, in the former, students watch a virtual tour of their statues in the city of Jaipur with a short narrative on their lives. Students in Treatment 2 watch a video with the same narrative and duration, but devoid of any statues and instead images of these role models stitched into a short video. The third group serves as a pure control. Each video is approximately a minute and half long and will be delivered within one

session in the local language (Hindi).

Comparison between the treatment groups and the pure control detect any treatment effects from role modelling. Additionally, a comparison between T1 and T2, underlines the effect of statues over and above the role modelling effect of these personalities by invoking additional feelings of familiarity.

3 Outcomes of Interest

There will be two main strands of outcomes of interest, namely psychological and effort. The psychological outcome variables will include: hope, positivity, aspirations, happiness, gender norms and life satisfaction. Effort is measured on a cognitive memory test and an arduous spot the differences task. Additionally, we measure performance and effort in a math test. Several instruments are employed to measure this information, which are enumerated below[2].

1. **Psychological outcomes**

    - **Hope** - Using Snyder's (2002) Children's Hope Scale (CHS), which is a 6-item likert scale.
    - **Aspirations** - Using a 3-item generalised aspiration scale (Garcia et al., 2019) and an additional binary variable about future aspirations[3] of these students.
    - **Positivity** - Using a sentimental analysis approach with word associations.
    - **Happiness and life satisfaction** - statement responses on a scale of 1-5.
    - **Gender norms** - responses for a set of likert scale-style items.

[2]We will also collect information on covariates as a part of the baseline survey. This information won't change due to the experiment but will be useful for heterogeneity analysis and for adding controls.

[3]Including career aspirations to become a civil servant.

2. **Effort**

   - **Memory test** - a simple memory task on number identification like
   - **Spot the difference** - students are asked to spot the number of correct differences between two seemingly identical images without a knowledge of the total number of dissimilarities.
   - **Math test** - performance scores out of 25 on a math test of simple algebra.
   - **Word formation**[4] - performance in a word formation task that is used formerly to capture positively using sentimantal analysis.

4 Data Collection

We start by administering a baseline survey to track the initial scores on the outcome variables, along with other confounding factors (age, gender, ethnicity, among many others). The respondents to this questionnaire will form the participant group.

In the same week, we will roll out the endline survey, of which, the treatment is the first part. We have the videos in-built as part of the online surveys. So any individual who wishes to fill the endline survey, will have to watch the treatment video in the beginning. Three types of endline surveys will be administered to the participant pool, on the basis of their treatment group assignments. As soon as the participant finishes watching the treatment videos[5], they progress to the information elicitation tools for the variables of interest.

The online survey will capture information on the outcome variables only. We will also track student performance in school examinations before and after the treatment. Each

[4]Can also cater to be an outcome for academic performance, along with the preceding math test.

[5]Only for those in T1 and T2. The students in the pure control group, there is not video and they proceed straight to the instruments for eliciting information about the outcome variables.

of these surveys would be expected to last for approximately 1 hour. The surveys will be administered via Qualtrics and shall remain live for 36 hours. Real time data will be stored immediately with the research team. Data analysis will be performed in Stata.

5 Empirical Analysis

5.1 Estimation and Testing

In order to estimate the impact of being assigned to the treatment arm 1 (T1), or to treatment arm 2 (T2), on the outcomes of interest, we measure the intent to treat (iTT) effect by a difference-in-differences (DiD) approach as follows:

$$Y_{it} = \alpha + \beta_1 D_i + \beta_2 T_t + \beta_3 (D_i T_t) + \varphi X_{it}^{'} + \varepsilon_{it} \tag{1}$$

Where Y_{it} represents the main outcomes of interest: psychological outcomes[6], and effort[7] for individual i at time t[8]. D_i is a dummy variable taking value 0 if that individual is in pure control group, and 1 if that individual is in the treatment group(s). T_t is a dummy variable that equals 0 and 1 for baseline and endline surveys. $X_{it}^{'}$ is the vector of covariates of individual i at time t. ε_{it} is the error term.

To answer our research questions, we have the following hypothesis to test:
H_o : The virtual tours of statues (T1) have no effect on the outcome variable, $\beta_3 = 0$
H_o : The motivational videos (T2) have no effect on the outcome variable, $\beta_3 = 0$

The size and significance of β_3 will enable us to identify the treatment effects.

[6] hope, aspiration, happiness and positivity
[7] memory task, math test and spot-the-differences
[8] Subject to the availability and access to school administrative data, we may be able to also assess the impact on academic performance of students. This is based on the discretion of schools and the nature of the examinations that are scheduled to be held in September 2021 after the data collection period.

In addition to DiD, we follow McKenzie (2012) and estimate treatment effects via Ancova using the following specification:

$$Y_{it} = \alpha + \beta_1 Y_{i0} + \beta_2 D_i + \mu_{it} \tag{2}$$

Where Y_{it} controls the variations in the outcome at baseline. β_2 captures the treatment effect in the outcome. μ is the error term.

5.2 Heterogeneous Effects

Heterogeneous treatment effects (HTEs) can be expected across numerous confounding factors. These range from gender, age, ethnicity to baseline measures of outcome variables[9]. Differential treatment effects will be estimated by interacting a variable containing that information with the interaction of treatment and time dummy. We may be able to explore additional HTEs based on the wealth of information available after the completion of the data collection phase, including but not limiting to geographical locations, the knowledge of role models or past academic performance.

5.3 Robustness Checks

- A one-off treatment at an individual level pre-empts clustering by design.
- Baseline associations will be calculated and later controlled for in the estimation of treatment effects[10].
- Equation 1 and 2 will be estimated without controls X_{it}.

[9] Well-defined variables and instruments capture this information in the baseline survey.
[10] Using both DiD and Ancova.

5.4 Organisation and Deliverables

The online RCT is conducted by the authors under the supervision of Prof. Sayantan Ghosal and funded by The College of Social Sciences (CoSS) in The University of Glasgow. The project aims to unearth any inspirational effects of monumental statues on children. The findings will contribute to growing literature on hope, aspirations, and role modelling.

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