

Increasing students' aspirations: the impact of a role model on students' educational attainment

Pre-Analysis Plan

Emma Riley ^{*}; Rachel Preofke[†]

February 22, 2017

1 Introduction

This analysis plan pertains to an initial set of outcomes associated with the trial “Increasing students' aspirations: the impact of a role model on students' educational attainment.”¹ In this trial we test whether students seeing an aspirational movie, *The Queen of Katwe*, increases their performance on national exams.

2 Interventions

This trial involves randomised screenings of an aspirations-building film to secondary school students before their national exams. The treatment film is called *Queen of Katwe* and is a biographical film, based on the true story of Phiona Mutesi, about the rise of a poverty stricken Ugandan girl to become a world chess champion. She does this through education, hard work and perseverance. The film therefore offers a potential role model of someone working hard and overcoming obstacles that could raise Ugandan student's aspirations and self-belief at a crucial decision point in their lives.

^{*}University of Oxford. emma.riley@economics.ox.ac.uk

[†]raproefke@gmail.com

¹See <http://www.socialsciceregistry.org/trials/1832> for the trial registration.

A growing body of behavioural economics research suggests that peoples aspirations and sense of control over their lives may be beaten down over time by the very difficult nature of living in poverty ([The World Bank, 2015](#)). In particular, low aspirations have been linked to low economic investments to try and bring about a more prosperous future and hence can lead to a poverty trap ([Dalton et al., 2014](#)). A role-model can help to address low aspirations, inspiring and motivating by their behavioural and enabling others to achieve things which have a long-run positive effect on their lives ([Bernard et al., 2014](#); [Beauman et al., 2012](#)).

Social psychologists have long noted that aspirations and self-efficacy are based on observing others in the immediate environment [Bandura \(1977\)](#). There is evidence from psychology that exposure to role models can improve aspirations, particularly among young adults, and educational attainment. [Stout et al. \(2011\)](#) find improvements in self-efficacy, career aspirations and effort in science subjects among female calculus students after they are exposed to photographs and videos of female role models in science. [Dasgupta and Asgari \(2004\)](#) show the power of role models in overcoming stereotypes.

In order to separate out any boost to student’s aspirations simply from the unusual experience of being taken to the cinema (many of the students reported never having been before), we used a placebo movie. The placebo movie was *Miss Peregrine’s Home for Peculiar Children*, a fantasy movie about children with paranormal abilities. It was chosen for featuring similarly aged characters to the students, while containing no aspirational or self-belief messages or potential role models the students could strongly relate to.

3 Sampling and Treatment Assignment

Schools were approached during September 2016 in the urban Kampala area and asked if their students sitting national exams would like to participate in the study and see a free movie screening. Only students in candidate classes sitting their national exams in November 2016 were asked to participate. Schools were signed-up until we reached the desired sample size of 2000 students. Schools were given a list of possible movies including the treatment and placebo movie so they could assess their suitability for their students to see, but not told which of them their students would be seeing.

Consenting schools were allocated to one of five consecutive screening days in the first week

of October and either a morning or afternoon session. This was based on their geographical proximity to each other, the number of students at the school and the capacity of the cinema screens. Schools with less than 100 students were combined into a screening session with another school nearby. The cinema had 3 screens we could use for screening the movies, two screens of 100 person capacity and one screen of 300 person capacity. If we had less than 200 student attending the screening we would use the two small screens, between 200 and 300 students we would use one screen of 100 and one of 300 and for more than 300 students we could use both screens of 100 and the 300 person screen.

The students were collected by mini vans we hired, which arrived at the cinema 1 hour before the screening to allow time for the randomisation. Students were individually randomised into the treatment or placebo movie upon arrival at the cinema for a screening. This was done by picking a ticket out of a bag without looking. The bag was opaque and the tickets identical except for the name of the movie printed in small print at the bottom of the ticket. After getting a ticket, students were steered to the designated registration desk for that movie, where their ticket was checked and they registered their name, school, age and gender before proceeding into the theatre. These registration lists were later combined with lists from the schools of students UCE index numbers, which uniquely identify students exam results. All students also received a soft drink, chapati and bag of popcorn at the cinema.

Due to the discontinuities in the sizes of the cinema screens, students within individual schools did not have an equal probability of seeing the treatment and placebo movie. For example, if a school had 250 students then 150 would have to see one movie and 100 the other. This was randomised and balanced over different sessions so that overall we issued 1000 treatment movie tickets and 900 placebo movie tickets.

4 Outcomes of Interest

The primary outcomes of analysis will be standardised exam scores on national exams. These exams had already been registered for before the intervention occurred.

Examination results will be collected from the schools for each student in the study. Secondary school students sat their national exam in November 2016 and the results are released in February 2017. Ordinary exams are taken after 4 years of secondary school, the Uganda Certificate of Education (UCE), and advanced level exams after a further 2 years, the Uganda

Advanced Certificate of Education (UACE).

The UCE comprises six mandatory subjects administered in English; these are Mathematics, English language, Biology, Chemistry, Physics, and a choice of either Geography, or History, or Religious education. Two other optional subjects are also chosen from subjects such as music and business. Candidates must register for a minimum of 8 and a maximum of 10 subjects. The exams are graded with a score from 1-9 with 1 being the best score and 9 the worst. For a candidate sitting 8 exams, the best score is therefore 8 and the worst 72. Passing grades are considered to be an 8 or lower.

For this analysis scores will be inverted so that a 9 becomes 0 and a 1 becomes 8. This is so that a higher score can be interpreted as a better performance and a higher aggregate score incorporates better performance per paper or more papers taken.

Standardized test scores will be created for each subject by subtracting the mean and dividing by the standard deviation of the control group. An overall aggregate of exam performance will be calculated by summing standardised test scores across all subjects and renormalising. A core index of exam performance will be calculated by summing test scores across the 6 core subjects and renormalising.

For students taking UCE exams the following outcomes will be examined:

1. **Exam score aggregate:** aggregate score composed of exam scores across all 8-10 subjects taken by a student
2. **Core exam score :** composed of exam score in the 6 mandatory subjects taken by all students
3. **Individual subject grade:** Standardised score achieved in maths and English subjects

The UACE is taken in 3-5 subjects, between 1 and 3 of which can be from a list of principle subjects, one in a subsidiary subject out of mathematics or computer and one in a general paper. The subsidiary subjects and general paper are graded on a 1-9 scale, with 1 being the best and 9 the worst grade. Grades 7 and above are fails. Any student achieving a 6 or below on a subsidiary paper or the general paper gets one point. The principal papers are marked on a A,B,C scale, with an A earning 6 points, a B 5 points etc. The maximum of 2 points earned on the subsidiary and general paper are added to the points earned on the principal papers. This means the highest total score a subject could earn is 3 As and passes on the subsidiary and general paper, giving 20 points.

Standardised test scores will be constructed for each subject by subtracting the mean and dividing by the standard deviation of the control group. An overall index of exam performance will be calculated by summing test scores across all subjects and renormalising.

For students taking UACE exams the following outcomes will be examined:

1. **Total exam score:** Aggregate exam score composed of exam scores across all principal and subsidiary subjects taken by a student, with subsidiary subjects scored in points.
2. **Principal score:** Aggregate score in the principal papers only.
3. **General paper and subsidiary paper score:** Standardised score on the general paper and subsidiary paper in maths or computer taken by all students. This will be an inverted scale of the 1-9 score on these papers.

5 Estimation and testing

We will estimate models of the form

$$y_i = \beta_0 + \beta_1 \text{QofK} + \mathbf{x}'_i \cdot \gamma + \theta_s + \epsilon_i, \quad (1)$$

where i indexes student, y_i denotes the exam outcome of interest, QofK is an indicator variable equal to one for if the student saw the movie The Queen of Katwe, \mathbf{x}'_i is a vector of individual characteristics, θ_s is a vector of school fixed effects and ϵ_i is a random error. The list of outcomes of interest is given in section 4

The parameter of interest is β_1 , the treatment effects of the aspirational movie.

We include the following control variables in \mathbf{x}'_i to improve precision, which were measured at the cinema during registration and confirmed with the schools.

1. whether the student is female
2. the age of the student
3. the number of subjects taken

For each outcome listed in section 4, we will test the following statistical hypotheses:

1. The aspirational movie has no effect on the outcome, $\beta_1 = 0$.

6 Robustness Checks

The following robustness checks will be performed:

1. We will test the sharp null hypothesis using randomisation inference.
2. We will estimate a version of equation 1 excluding the individual student controls \mathbf{x}'_i .

7 Subgroup Analysis

We will estimate heterogeneous treatment effects across variables collected at treatment assignment by augmenting equation 1 to include the variable and the interaction between treatment and the variable. These variables are

1. An indicator equal to one if the respondent is female
2. An indicator variable equal to one if respondent's age is above the sample median for that grade.
3. An indicator variable by school
4. An indicator variable equal to one if the respondent is taking more subjects than the median for that grade.
5. An indicator variable equal to one if the student is taking at least on principal science subject (maths, physics, biology and chemistry) at UACE

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