Does Having a Criminal Record Affect the Chances of Receiving A Call Back for a Job Interview? Part III

Let's continue working with the data from the experiment in Milwaukee where researchers randomly assigned whether the job applicant had a criminal record. As a reminder, Table 1 shows the names and descriptions of the variables in this dataset, where the unit of observation is individual job applications.

variable	description
job_id	identifying number of job opening
criminal	whether the job applicant presented himself as having a criminal record (1=yes, 0=no)
race	race of applicant (black or white)
call	whether job application received a call back for a job interview (1=yes, 0=no)

Table 1: Variables in "applications.csv"

In this problem set, we practice (1) how to estimate an average treatment effect using data from a randomized experiment and (2) how to write a conclusion statement.

As always, we start by loading and looking at the data:

```
## load and look at the data
applications <- read.csv("applications.csv") # reads and stores data
head(applications) # shows first observations
##   job_id criminal  race call
## 1      1        0 white    1
## 2      1        1 white    1
## 3      2        1 white    0
## 4      2        0 white    0
## 5      3        1 white    0
## 6      3        0 white    0
```

To simplify our analysis, let's focus on one of the two pairs: the pair of white applicants. To do so, we can run the piece of code below, which creates a new dataframe containing only the job applications that correspond to the white applicants. (It uses the [] operator to extract a selection of observations from a dataframe, as explained on page 208 of DSS.)

```
## create new dataframe containing only the job applications for white applicants
applications_white <- applications[applications$race=="white",]
```

Now, we are ready to start our analysis:

1. Considering that the dataset we are analyzing comes from a randomized experiment, what can we compute to estimate the average causal effect of having a criminal record on the number of new (or repaired) drinking call facilities? Please provide the name of the estimator. (5 points)

2. In the dataset about the white applicants, what is the probability of receiving a call back for a job interview among the job applications with a criminal record? Please answer with a full sentence. (10 points)

3. In the dataset about the white applicants, what is the probability of receiving a call back for a job interview among the job applications without a criminal record? Please answer with a full sentence. (10 points)

4. What is the estimated average causal effect of having a criminal record on the probability of receiving a call back for a job interview? Please provide a full substantive answer (make sure to include the assumption, why the assumption is reasonable, the treatment, the outcome, as well as the direction, size, and unit of measurement of the average treatment effect) (25 points)