Project Proposal

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2023-10-30

The Data

```
# Importing the original data set with its 81 variables for 1946 observations
 CollegesAdmissions_Data <-
read.csv("https://raw.githubusercontent.com/Heleinef/Data-Science-
Master_Heleine/main/CollegeAdmission_Data.csv")

## Listed U.S. colleges
name_colleges <- CollegesAdmissions_Data|>
  select(name)|>
 filter(name == unique(name))
name_colleges
```

```
##                                                 name
## 1                            American University
## 2                            Brandeis University
## 3                             Clemson University
## 4                                Duke University
## 5                              Hamilton College
## 6          Massachusetts Institute Of Technology
## 7                                 Pomona College
## 8                            Stanford University
## 9            University Of California, Berkeley
## 10                          University Of Florida
## 11                 University Of Nevada , Reno
## 12                      University Of Richmond
## 13 Virginia Polytechnic Institute & State University
## 14                            Yeshiva University
```

The working data set

```
## Selecting the working data set
college_admissions <- CollegesAdmissions_Data|>
  select(name, par_income_lab, rel_apply, attend, attend_sat, rel_attend,
rel_attend_sat, rel_att_cond_app, rel_att_cond_app_sat,rel_attend_unwgt)

## Variable names
names(college_admissions)
```

```
##  [1] "name"                "par_income_lab"      "rel_apply"
##  [4] "attend"              "attend_sat"          "rel_attend"
##  [7] "rel_attend_sat"      "rel_att_cond_app"    "rel_att_cond_app_sat"
## [10] "rel_attend_unwgt"
```

```
glimpse(college_admissions)
```

```
## Rows: 1,946
## Columns: 10
## $ name                 <chr> "American University", "American University",
"Am…
## $ par_income_lab       <chr> "0-20", "20-40", "40-60", "60-70", "70-80",
"80-9…
## $ rel_apply            <dbl> 0.6664472, 0.6807980, 0.7023500, 0.7154243,
0.722…
## $ attend               <dbl> 0.001122447, 0.001004590, 0.001408010,
0.00148840…
## $ attend_sat           <dbl> 0.001361366, 0.002062297, 0.001430209,
0.00140533…
## $ rel_attend           <dbl> 0.6977466, 0.6244828, 0.8752607, 0.9252373,
0.933…
## $ rel_attend_sat       <dbl> 0.8858411, 1.3419375, 0.9306375, 0.9144513,
0.818…
## $ rel_att_cond_app     <dbl> 1.0469646, 0.9172806, 1.2461888, 1.2932707,
1.292…
## $ rel_att_cond_app_sat <dbl> 1.2109903, 1.7600517, 1.3464237, 1.3958640,
1.336…
## $ rel_attend_unwgt     <dbl> 0.3917775, 0.3871515, 0.6014504, 0.7960280,
0.932…
```

```
## Skimming the data set
skim(college_admissions)
```

Data summary

Name	college_admissions
Number of rows	1946
Number of columns	10
_____	
Column type frequency:	
character	2
numeric	8
_____	
Group variables	None

Variable type: character

skim_variable	n_missing	complete_rate	min	max	empty	n_unique	whitespace
name	0	1	12	49	0	139	0
par_income_lab	0	1	4	7	0	14	0

Variable type: numeric

skim_variable	n_missing	complete_rate	mean	sd	p0	p25	p50	p75	p100	hist
rel_apply	0	1.00	1.17	0.56	0.07	0.83	1.05	1.34	5.87	▇▂▁▁▁
attend	2	1.00	0.00	0.01	0.00	0.00	0.00	0.01	0.05	▇▁▁▁▁
attend_sat	294	0.85	0.00	0.00	0.00	0.00	0.00	0.01	0.04	▇▁▁▁▁
rel_attend	2	1.00	1.27	0.93	0.01	0.76	1.03	1.45	10.26	▇▁▁▁▁
rel_attend_sat	294	0.85	1.19	0.75	0.02	0.71	0.99	1.48	8.03	▇▂▁▁▁
rel_att_cond_app	2	1.00	1.03	0.27	0.05	0.88	1.00	1.15	3.06	▁▇▂▁▁
rel_att_cond_app_sat	294	0.85	1.01	0.35	0.04	0.82	0.98	1.17	3.85	▂▇▁▁▁
rel_attend_unwgt	1	1.00	2.48	3.10	0.00	0.62	1.41	2.94	30.80	▇▁▁▁▁

```
str(college_admissions)

## 'data.frame':    1946 obs. of  10 variables:
##  $ name                : chr  "American University" "American University"
"American University" "American University" ...
##  $ par_income_lab      : chr  "0-20" "20-40" "40-60" "60-70" ...
##  $ rel_apply           : num  0.666 0.681 0.702 0.715 0.722 ...
##  $ attend              : num  0.00112 0.001 0.00141 0.00149 0.0015 ...
##  $ attend_sat          : num  0.00136 0.00206 0.00143 0.00141 0.00126 ...
##  $ rel_attend          : num  0.698 0.624 0.875 0.925 0.933 ...
##  $ rel_attend_sat      : num  0.886 1.342 0.931 0.914 0.819 ...
##  $ rel_att_cond_app    : num  1.047 0.917 1.246 1.293 1.292 ...
##  $ rel_att_cond_app_sat: num  1.21 1.76 1.35 1.4 1.34 ...
##  $ rel_attend_unwgt    : num  0.392 0.387 0.601 0.796 0.932 ...
```

Data preparation

```
## Listing Ivy Plus options
Ivy_Plus <- c("Brown University", "Columbia University", "Cornell
University", "Darmouth College", "Harvard University", "University of
Pennsylvania", "Princeton University", "Yale University", "Cornell
University", "Duke University", "Massachussetts Institute of Technology")
Ivy_Plus

##  [1] "Brown University"
##  [2] "Columbia University"
##  [3] "Cornell University"
##  [4] "Darmouth College"
```

```
##  [5] "Harvard University"
##  [6] "University of Pennsylvania"
##  [7] "Princeton University"
##  [8] "Yale University"
##  [9] "Cornell University"
## [10] "Duke University"
## [11] "Massachussetts Institute of Technology"
```

```
## Listing public flagship colleges
Public_Flagships <- c("university of Alabama",
"University of Alaska","Arizona State University","University of Arkansas",
"University of California Berkeley","University of California Davis",
"University of California Irvine", "University of California Los Angeles",
"University of California Riverside", "University of California San Diego",
"University of California Santa Barbara", "University of California Santa
Cruz", "University of Colorado Boulder", "University of Connecticut",
"University of Delaware", "University of Florida", "University of Georgia",
"University of Hawaii at Manoa", "University of Idaho", "University of
Illinois at Urbana-Champaign","Indiana University Bloomington", "University
of Iowa","University of Kansas", "University of Kentucky", "Louisiana State
University", "University of Maine", "University of Maryland College Park",
"University of Massachusetts Amherst", "University of Michigan", "University
of Minnesota", "University of Mississippi", "University of Missouri",
"University of Montana", "University of Nebraska-Lincoln", "University of
Nevada Reno", "University of New Hampshire", "Rutgers University-New
Brunswick","University of New Mexico", "University of North Carolina at
Chapel Hill", "University of North Dakota", "Ohio State University",
"University of Oklahoma", "University of Oregon", "Pennsylvania State
University", "University of Rhode Island","University of South Carolina",
"University of South Dakota", "University of Tennessee", "University of Texas
at Austin", "University of Utah", "University of Vermont", "University of
Virginia", "University of Washington", "West Virginia University",
"University of Wisconsin-Madison","University of Wyoming")
Public_Flagships
```

```
##  [1] "university of Alabama"
##  [2] "University of Alaska"
##  [3] "Arizona State University"
##  [4] "University of Arkansas"
##  [5] "University of California Berkeley"
##  [6] "University of California Davis"
##  [7] "University of California Irvine"
##  [8] "University of California Los Angeles"
##  [9] "University of California Riverside"
## [10] "University of California San Diego"
## [11] "University of California Santa Barbara"
## [12] "University of California Santa Cruz"
## [13] "University of Colorado Boulder"
## [14] "University of Connecticut"
## [15] "University of Delaware"
```

```
## [16] "University of Florida"
## [17] "University of Georgia"
## [18] "University of Hawaii at Manoa"
## [19] "University of Idaho"
## [20] "University of Illinois at Urbana-Champaign"
## [21] "Indiana University Bloomington"
## [22] "University of Iowa"
## [23] "University of Kansas"
## [24] "University of Kentucky"
## [25] "Louisiana State University"
## [26] "University of Maine"
## [27] "University of Maryland College Park"
## [28] "University of Massachusetts Amherst"
## [29] "University of Michigan"
## [30] "University of Minnesota"
## [31] "University of Mississippi"
## [32] "University of Missouri"
## [33] "University of Montana"
## [34] "University of Nebraska-Lincoln"
## [35] "University of Nevada Reno"
## [36] "University of New Hampshire"
## [37] "Rutgers University-New Brunswick"
## [38] "University of New Mexico"
## [39] "University of North Carolina at Chapel Hill"
## [40] "University of North Dakota"
## [41] "Ohio State University"
## [42] "University of Oklahoma"
## [43] "University of Oregon"
## [44] "Pennsylvania State University"
## [45] "University of Rhode Island"
## [46] "University of South Carolina"
## [47] "University of South Dakota"
## [48] "University of Tennessee"
## [49] "University of Texas at Austin"
## [50] "University of Utah"
## [51] "University of Vermont"
## [52] "University of Virginia"
## [53] "University of Washington"
## [54] "West Virginia University"
## [55] "University of Wisconsin-Madison"
## [56] "University of Wyoming"
```

Research question:

Is family wealth and not academic credentials what truly predicts admission into highly selective U.S. colleges?

Controlling for scores, this analysis will examine the probability of getting into an Ivy_Plus college given a parental income range between 70 - 80.

Cases

The cases are U.S. selective Colleges and Universities. Each case represents a College or University and its rate of admission based on a specific parental income range. There are a total of 1946 observations or cases in the data set.

Data collection

The data were built by Raj Chetty, David J. Deming, and John N. Friedman. They linked five sources of data: (1) federal income tax records on parents and children incomes from 1996-2021; (2) 1098-T tax forms on college attendance from 1999-2015; (3) Pell grant records from the Department of Educations National Student Loan Data System from 1999-2013; (4) standardized test score data from the College Board from 2001-2005 and every other year from 2007-15 and ACT from 2001-15; and (5) applications and admissions records for undergraduate first-year student admissions spanning subsets of years from 1998- 2015 from several Ivy-Plus colleges and highly selective public flagship universities, as well as data for all colleges in the University of California (UC) and California State University (CSU) systems and all four-year public colleges in Texas from the Texas Higher Education Coordinating Board (THECB). We include data from UC-Berkeley, UCLA, and UT-Austin among others in our sample of highly selective public flagship universities with internal data. These five sets of data were linked to each other at the individual level by social security number and/or identifying information such as name, date of birth, and gender. All were then conducted using the linked individual-level data set after it was stripped of personally identifiable information.

Type of study:

This is an experiment.

Data Source

citations and links.

Links:

Data used in this analysis is available online here: CollegeAdmissions_Data.csv

The Data set code book is also available online here:

Codebook

Here are the links to journal article: Diversifying Society's Leaders? The Determinants and Causal Effects of Admission to Highly Selective Private Colleges

DIVERSIFYING SOCIETY'S LEADERS? THE DETERMINANTS AND CAUSAL EFFECTS OF ADMISSION TO HIGHLY SELECTIVE PRIVATE COLLEGES

Citation:

(Chetty, Deming, and Friedman 2023)

Response

The response variable is Parent Income Percentile and is categorical.

Explanatory

The explanatory variable : Relative Admission Rate and it is numeric.

Relevant summary statistics:

```
## Summary applications
applications_summary <- college_admissions|>
  group_by(par_income_lab)|>
  summarise(across(.cols = contains("app"), list(mean = mean, sd = sd)))
applications_summary
```

```
## # A tibble: 14 × 7
##    par_income_lab rel_apply_mean rel_apply_sd rel_att_cond_app_mean
##    <chr>                   <dbl>        <dbl>                 <dbl>
##  1 0-20                    0.876        0.306                 0.909
##  2 20-40                   0.911        0.297                 0.895
##  3 40-60                   0.846        0.180                 0.962
##  4 60-70                   0.812        0.129                 0.994
##  5 70-80                   0.823        0.141                 0.999
##  6 80-90                   0.912        0.149                 0.963
##  7 90-95                   1.07         0.173                 0.962
##  8 95-96                   1.20         0.226                 0.987
##  9 96-97                   1.28         0.255                 1.00
## 10 97-98                   1.36         0.327                 1.06
## 11 98-99                   1.46         0.461                 1.11
## 12 99-99.9                 1.61         0.742                 1.16
## 13 Top 0.1                 1.64         1.10                 NA
## 14 Top 1                   1.61         0.773                 1.17
## # ℹ 3 more variables: rel_att_cond_app_sd <dbl>,
## #   rel_att_cond_app_sat_mean <dbl>, rel_att_cond_app_sat_sd <dbl>
```

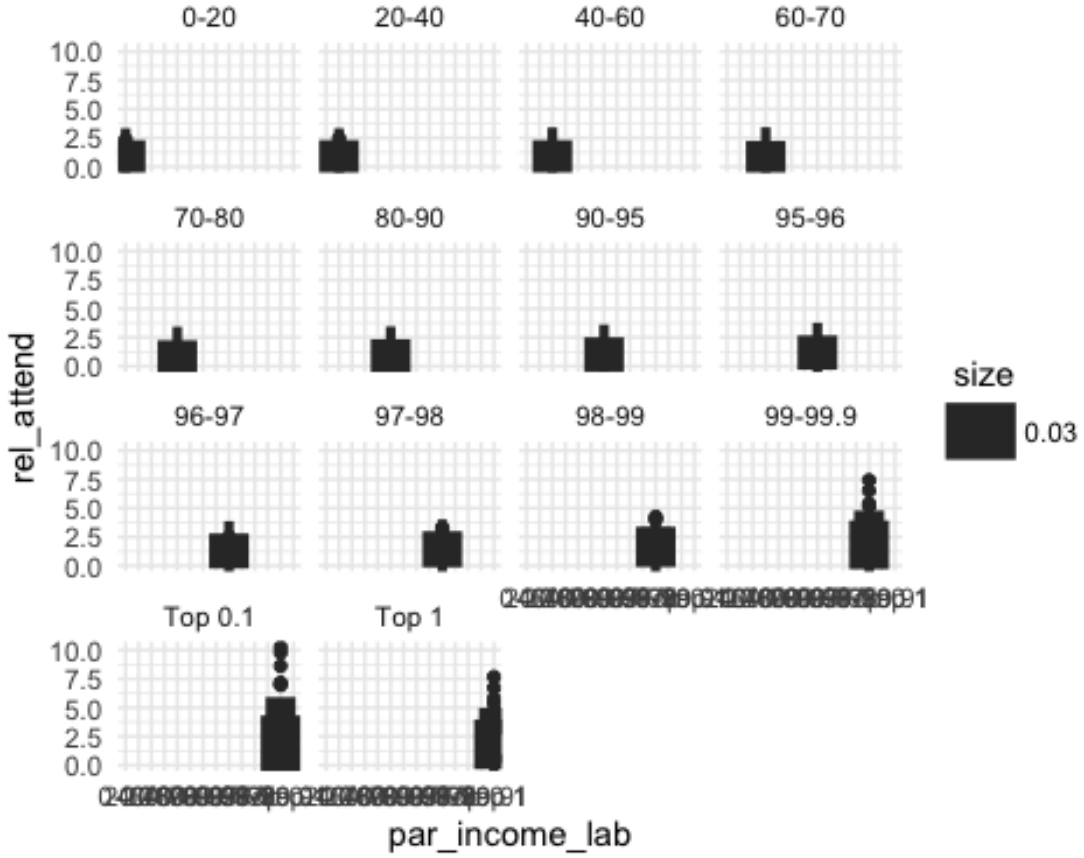
```
## Summary admissions
admissions_summary <- college_admissions|>
  group_by(par_income_lab)|>
  summarise(across(.cols = contains("att"), list(mean = mean, sd = sd)))
admissions_summary
```

```
## # A tibble: 14 × 15
##    par_income_lab attend_mean attend_sd attend_sat_mean attend_sat_sd
##    <chr>                <dbl>     <dbl>           <dbl>         <dbl>
##  1 0-20               0.00367   0.00464        NA            NA
##  2 20-40              0.00366   0.00441        NA            NA
##  3 40-60              0.00350   0.00366        NA            NA
##  4 60-70              0.00334   0.00321         0.00255       0.00276
##  5 70-80              0.00341   0.00318         0.00261       0.00259
##  6 80-90              0.00367   0.00335         0.00287       0.00274
##  7 90-95              0.00418   0.00367         0.00353       0.00316
```

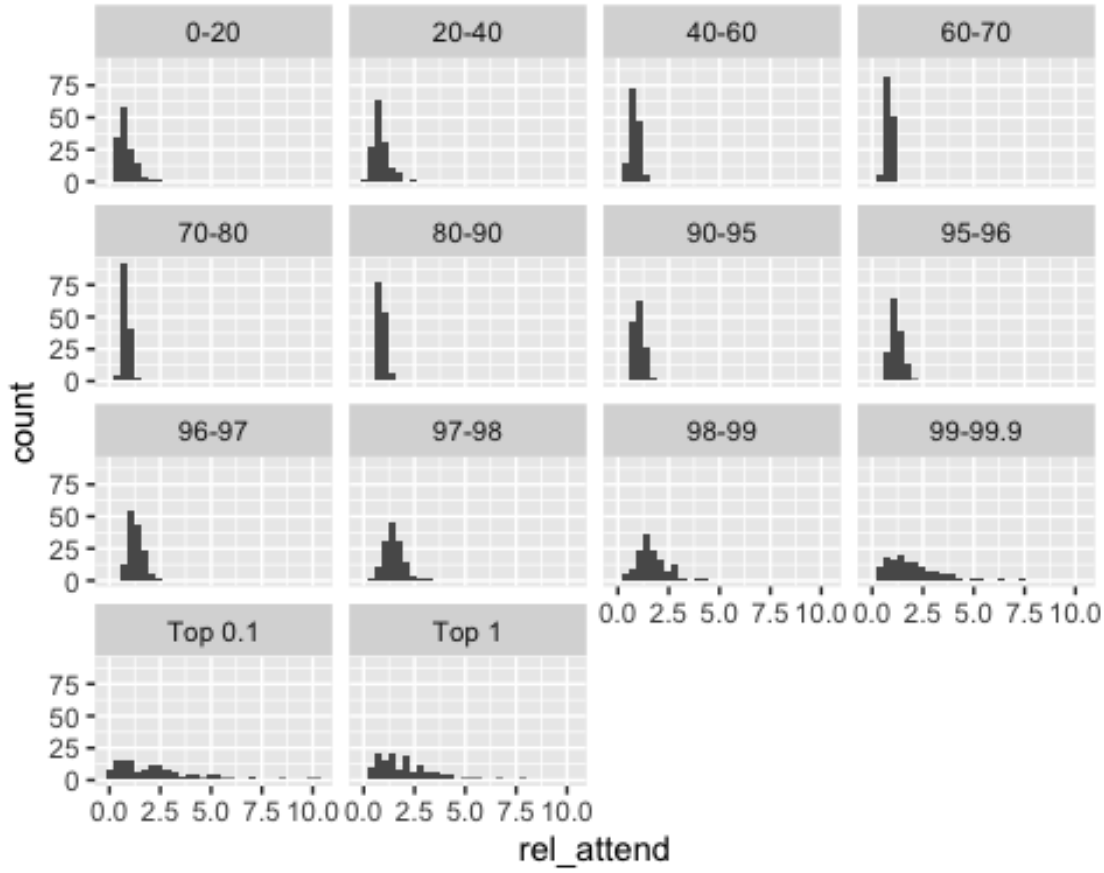
```
##  8 95-96               0.00467   0.00407        NA            NA
##  9 96-97               0.00495   0.00424         0.00452       0.00415
## 10 97-98               0.00543   0.00466        NA            NA
## 11 98-99               0.00590   0.00493         0.00592       0.00555
## 12 99-99.9             0.00668   0.00629        NA            NA
## 13 Top 0.1            NA        NA              NA            NA
## 14 Top 1               0.00679   0.00664         0.00720       0.00773
## # ℹ 10 more variables: rel_attend_mean <dbl>, rel_attend_sd <dbl>,
## #   rel_attend_sat_mean <dbl>, rel_attend_sat_sd <dbl>,
## #   rel_att_cond_app_mean <dbl>, rel_att_cond_app_sd <dbl>,
## #   rel_att_cond_app_sat_mean <dbl>, rel_att_cond_app_sat_sd <dbl>,
## #   rel_attend_unwgt_mean <dbl>, rel_attend_unwgt_sd <dbl>
```

```
## Boxplot - admissions
ggplot(college_admissions, aes(x = par_income_lab, y = rel_attend, size =
0.03)) + geom_boxplot() + facet_wrap(~par_income_lab)+
  theme_minimal()
```

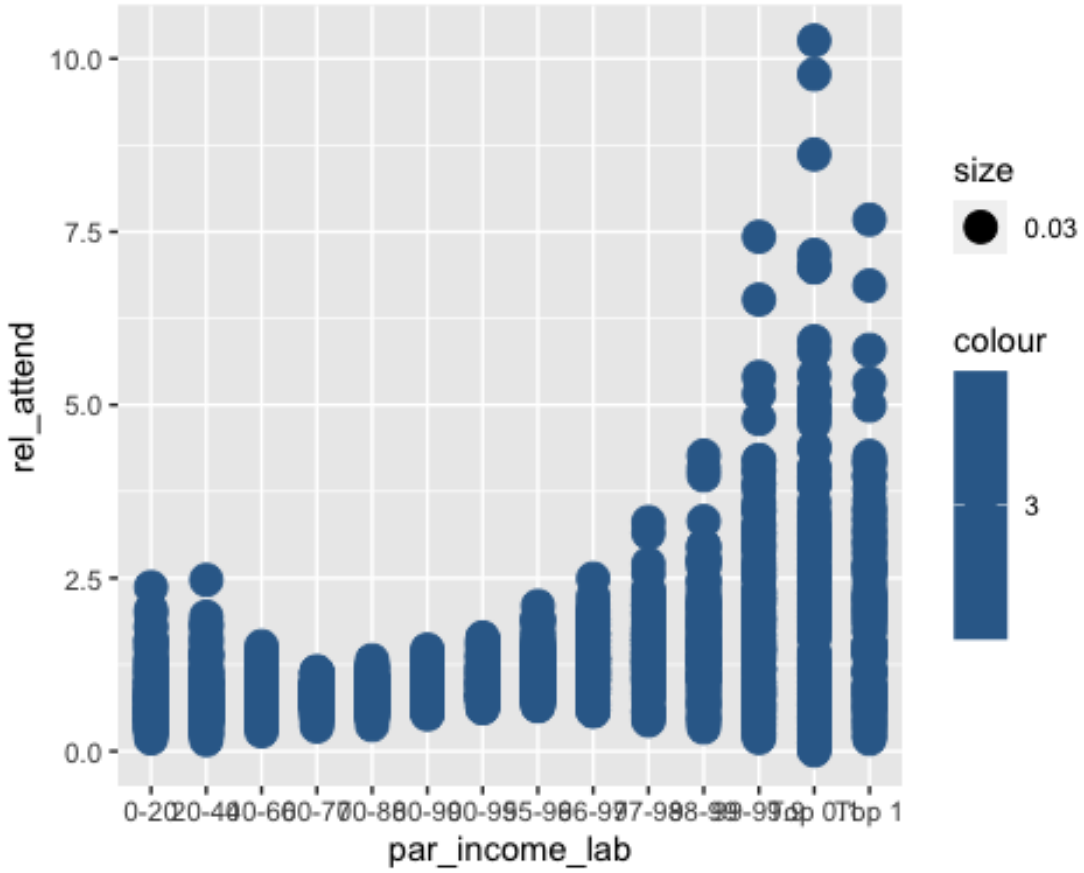
```
## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## ℹ Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.

## Warning: Removed 2 rows containing non-finite values (`stat_boxplot()`).
```




```
## Histogram-admissions
ggplot(college_admissions, aes(x = rel_attend))+ geom_histogram() +
facet_wrap(~par_income_lab)

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

## Warning: Removed 2 rows containing non-finite values (`stat_bin()`).
```




```
## Warning: Removed 2 rows containing missing values (`geom_point()`).
```




```
## List of 97
##  $ line                      :List of 6
##   ..$ colour       : chr "black"
##   ..$ linewidth    : num 0.5
##   ..$ linetype     : num 1
##   ..$ lineend      : chr "butt"
##   ..$ arrow        : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
##  $ rect                      :List of 5
##   ..$ fill         : chr "white"
##   ..$ colour       : chr "black"
##   ..$ linewidth    : num 0.5
##   ..$ linetype     : num 1
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
##  $ text                      :List of 11
##   ..$ family       : chr ""
##   ..$ face         : chr "plain"
##   ..$ colour       : chr "black"
##   ..$ size         : num 11
##   ..$ hjust        : num 0.5
##   ..$ vjust        : num 0.5
```

```
##   ..$ angle        : num 0
##   ..$ lineheight   : num 0.9
##   ..$ margin       : 'margin' num [1:4] 0points 0points 0points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ title                     : NULL
##  $ aspect.ratio              : NULL
##  $ axis.title                : NULL
##  $ axis.title.x              :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : num 1
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 2.75points 0points 0points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.title.x.top          :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : num 0
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 0points 2.75points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.title.x.bottom       : NULL
##  $ axis.title.y              :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : num 1
##   ..$ angle        : num 90
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 2.75points 0points 0points
##   .. ..- attr(*, "unit")= int 8
```

```
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.title.y.left         : NULL
##  $ axis.title.y.right        :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : num 0
##   ..$ angle        : num -90
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 0points 0points 2.75points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.text                 :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : chr "grey30"
##   ..$ size         : 'rel' num 0.8
##   ..$ hjust        : NULL
##   ..$ vjust        : NULL
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : NULL
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.text.x               :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : num 1
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 2.2points 0points 0points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.text.x.top           :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
```

```
##   ..$ hjust        : NULL
##   ..$ vjust        : num 0
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 0points 2.2points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.text.x.bottom        : NULL
##  $ axis.text.y               :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : num 1
##   ..$ vjust        : NULL
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 2.2points 0points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.text.y.left          : NULL
##  $ axis.text.y.right         :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : num 0
##   ..$ vjust        : NULL
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 0points 0points 2.2points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ axis.ticks                : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ axis.ticks.x              : NULL
##  $ axis.ticks.x.top          : NULL
##  $ axis.ticks.x.bottom       : NULL
##  $ axis.ticks.y              : NULL
##  $ axis.ticks.y.left         : NULL
##  $ axis.ticks.y.right        : NULL
##  $ axis.ticks.length         : 'simpleUnit' num 2.75points
##   ..- attr(*, "unit")= int 8
##  $ axis.ticks.length.x       : NULL
```

```
##  $ axis.ticks.length.x.top   : NULL
##  $ axis.ticks.length.x.bottom: NULL
##  $ axis.ticks.length.y       : NULL
##  $ axis.ticks.length.y.left  : NULL
##  $ axis.ticks.length.y.right : NULL
##  $ axis.line                 : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ axis.line.x               : NULL
##  $ axis.line.x.top           : NULL
##  $ axis.line.x.bottom        : NULL
##  $ axis.line.y               : NULL
##  $ axis.line.y.left          : NULL
##  $ axis.line.y.right         : NULL
##  $ legend.background         : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ legend.margin             : 'margin' num [1:4] 5.5points 5.5points
5.5points 5.5points
##   ..- attr(*, "unit")= int 8
##  $ legend.spacing            : 'simpleUnit' num 11points
##   ..- attr(*, "unit")= int 8
##  $ legend.spacing.x          : NULL
##  $ legend.spacing.y          : NULL
##  $ legend.key                : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ legend.key.size           : 'simpleUnit' num 1.2lines
##   ..- attr(*, "unit")= int 3
##  $ legend.key.height         : NULL
##  $ legend.key.width          : NULL
##  $ legend.text               :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : 'rel' num 0.8
##   ..$ hjust        : NULL
##   ..$ vjust        : NULL
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : NULL
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ legend.text.align         : NULL
##  $ legend.title              :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : num 0
##   ..$ vjust        : NULL
##   ..$ angle        : NULL
```

```
##   ..$ lineheight   : NULL
##   ..$ margin       : NULL
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ legend.title.align        : NULL
##  $ legend.position           : chr "right"
##  $ legend.direction          : NULL
##  $ legend.justification      : chr "center"
##  $ legend.box                : NULL
##  $ legend.box.just           : NULL
##  $ legend.box.margin         : 'margin' num [1:4] 0cm 0cm 0cm 0cm
##   ..- attr(*, "unit")= int 1
##  $ legend.box.background     : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ legend.box.spacing        : 'simpleUnit' num 11points
##   ..- attr(*, "unit")= int 8
##  $ panel.background          : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ panel.border              : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ panel.spacing             : 'simpleUnit' num 5.5points
##   ..- attr(*, "unit")= int 8
##  $ panel.spacing.x           : NULL
##  $ panel.spacing.y           : NULL
##  $ panel.grid                :List of 6
##   ..$ colour       : chr "grey92"
##   ..$ linewidth    : NULL
##   ..$ linetype     : NULL
##   ..$ lineend      : NULL
##   ..$ arrow        : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
##  $ panel.grid.major          : NULL
##  $ panel.grid.minor          :List of 6
##   ..$ colour       : NULL
##   ..$ linewidth    : 'rel' num 0.5
##   ..$ linetype     : NULL
##   ..$ lineend      : NULL
##   ..$ arrow        : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
##  $ panel.grid.major.x        : NULL
##  $ panel.grid.major.y        : NULL
##  $ panel.grid.minor.x        : NULL
##  $ panel.grid.minor.y        : NULL
##  $ panel.ontop               : logi FALSE
##  $ plot.background           : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ plot.title                :List of 11
```

```
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : 'rel' num 1.2
##   ..$ hjust        : num 0
##   ..$ vjust        : num 1
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 0points 5.5points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ plot.title.position       : chr "panel"
##  $ plot.subtitle             :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : num 0
##   ..$ vjust        : num 1
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 0points 0points 5.5points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ plot.caption              :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : 'rel' num 0.8
##   ..$ hjust        : num 1
##   ..$ vjust        : num 1
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 5.5points 0points 0points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ plot.caption.position     : chr "panel"
##  $ plot.tag                  :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : 'rel' num 1.2
##   ..$ hjust        : num 0.5
##   ..$ vjust        : num 0.5
```

```
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : NULL
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ plot.tag.position         : chr "topleft"
##  $ plot.margin               : 'margin' num [1:4] 5.5points 5.5points
5.5points 5.5points
##   ..- attr(*, "unit")= int 8
##  $ strip.background          : list()
##   ..- attr(*, "class")= chr [1:2] "element_blank" "element"
##  $ strip.background.x        : NULL
##  $ strip.background.y        : NULL
##  $ strip.clip                : chr "inherit"
##  $ strip.placement           : chr "inside"
##  $ strip.text                :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : chr "grey10"
##   ..$ size         : 'rel' num 0.8
##   ..$ hjust        : NULL
##   ..$ vjust        : NULL
##   ..$ angle        : NULL
##   ..$ lineheight   : NULL
##   ..$ margin       : 'margin' num [1:4] 4.4points 4.4points 4.4points
4.4points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ strip.text.x              : NULL
##  $ strip.text.x.bottom       : NULL
##  $ strip.text.x.top          : NULL
##  $ strip.text.y              :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : NULL
##   ..$ angle        : num -90
##   ..$ lineheight   : NULL
##   ..$ margin       : NULL
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ strip.text.y.left         :List of 11
##   ..$ family       : NULL
##   ..$ face         : NULL
```

```
##   ..$ colour       : NULL
##   ..$ size         : NULL
##   ..$ hjust        : NULL
##   ..$ vjust        : NULL
##   ..$ angle        : num 90
##   ..$ lineheight   : NULL
##   ..$ margin       : NULL
##   ..$ debug        : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
##  $ strip.text.y.right        : NULL
##  $ strip.switch.pad.grid     : 'simpleUnit' num 2.75points
##   ..- attr(*, "unit")= int 8
##  $ strip.switch.pad.wrap     : 'simpleUnit' num 2.75points
##   ..- attr(*, "unit")= int 8
##  - attr(*, "class")= chr [1:2] "theme" "gg"
##  - attr(*, "complete")= logi TRUE
##  - attr(*, "validate")= logi TRUE
```

Chetty, Raj, David Deming, and John Friedman. 2023. “Diversifying Society’s Leaders? The Determinants and Causal Effects of Admission to Highly Selective Private Colleges.” https://doi.org/10.3386/w31492.