COVIDSchoolClosures*

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Abstract

COVID-19 was an outbreak of virus that forced many instituations to shut down for 2-3 years. Schools were no different and this paper aims to look at the effects of the said closures in school and how it affected the population. This paper finds that with more inperson schooling provided the less the enrollment rates drop(more in depth analysis in later sections).

Introduction

The outcomes of this paper are that there is an over all increase in the percent of enrollment as more in person schools are opened in the educational districts of United States. The concept fo educational districts will be described later in the data section for the user's aid but in this context it is not the most important.

*Code and some data from this paper are available at: https://github.com/NotSakura/COVIDSchoolClosures.git

Data

Data Source and Collection

We use R Core Team (2022) to make this paper as well as the graphs and topic were taken inspiration from Jack and Oster (2023). Various helpful packages were used in order to clean, sort and graph this paper in a way such that the reader will not have difficulty undertsnading neither the topic nor the data sets of this paper. The packages are, Wickham (2016), Wickham et al. (2019), Wickham et al. (2023), Wickham, Hester, and Bryan (2023), Xie (2014), Firke (2023), Zhu (2021), Wickham, Vaughan, and Girlich (2024), Wickham and Miller (2021), Hyndman and O'Hara-Wild (2021).

Data Cleaning / Methodology

What data set did we clean and why. Explain the variable here too ig The data provided originally was called nces Some data sets cleaned were

The paper's third set of graphs represnt percent change in enrollment by share of in-person offering by distric

Results

The graphs we made and describe the trends. Only talk abotu results not what they mean

First Graph

```
  CountryName CountryCode RegionName RegionCode Jurisdiction     Date
1       Aruba         ABW         NA         NA    NAT_TOTAL 20200101
2       Aruba         ABW         NA         NA    NAT_TOTAL 20200102
3       Aruba         ABW         NA         NA    NAT_TOTAL 20200103
4       Aruba         ABW         NA         NA    NAT_TOTAL 20200104
5       Aruba         ABW         NA         NA    NAT_TOTAL 20200105
6       Aruba         ABW         NA         NA    NAT_TOTAL 20200106
  C1M_School.closing C1M_Flag C2M_Workplace.closing C2M_Flag
1                  0       NA                     0       NA
2                  0       NA                     0       NA
3                  0       NA                     0       NA
4                  0       NA                     0       NA
5                  0       NA                     0       NA
6                  0       NA                     0       NA
  C3M_Cancel.public.events C3M_Flag C4M_Restrictions.on.gatherings C4M_Flag
1                        0       NA                              0       NA
2                        0       NA                              0       NA
3                        0       NA                              0       NA
4                        0       NA                              0       NA
5                        0       NA                              0       NA
6                        0       NA                              0       NA
  C5M_Close.public.transport C5M_Flag C6M_Stay.at.home.requirements C6M_Flag
1                          0       NA                              0       NA
2                          0       NA                              0       NA
3                          0       NA                              0       NA
4                          0       NA                              0       NA
5                          0       NA                              0       NA
6                          0       NA                              0       NA
  C7M_Restrictions.on.internal.movement C7M_Flag
1                                     0       NA
2                                     0       NA
```

```
3                                    0       NA
4                                    0       NA
5                                    0       NA
6                                    0       NA
  C8EV_International.travel.controls E1_Income.support E1_Flag
1                                  0                 0      NA
2                                  0                 0      NA
3                                  0                 0      NA
4                                  0                 0      NA
5                                  0                 0      NA
6                                  0                 0      NA
  E2_Debt.contract.relief E3_Fiscal.measures E4_International.support
1                       0                  0                        0
2                       0                  0                        0
3                       0                  0                        0
4                       0                  0                        0
5                       0                  0                        0
6                       0                  0                        0
  H1_Public.information.campaigns H1_Flag H2_Testing.policy H3_Contact.tracing
1                                0      NA                 0                  0
2                                0      NA                 0                  0
3                                0      NA                 0                  0
4                                0      NA                 0                  0
5                                0      NA                 0                  0
6                                0      NA                 0                  0
  H4_Emergency.investment.in.healthcare H5_Investment.in.vaccines
1                                     0                        0
2                                     0                        0
3                                     0                        0
4                                     0                        0
5                                     0                        0
6                                     0                        0
  H6M_Facial.Coverings H6M_Flag H7_Vaccination.policy H7_Flag
1                    0       NA                     0      NA
```

```
2                    0       NA                    0      NA
3                    0       NA                    0      NA
4                    0       NA                    0      NA
5                    0       NA                    0      NA
6                    0       NA                    0      NA
  H8M_Protection.of.elderly.people H8M_Flag V1_Vaccine.Prioritisation..summary.
1                                0       NA                                   0
2                                0       NA                                   0
3                                0       NA                                   0
4                                0       NA                                   0
5                                0       NA                                   0
6                                0       NA                                   0
  V2A_Vaccine.Availability..summary.
1                                  0
2                                  0
3                                  0
4                                  0
5                                  0
6                                  0
  V2B_Vaccine.age.eligibility.availability.age.floor..general.population.summary.
1
2
3
4
5
6
  V2C_Vaccine.age.eligibility.availability.age.floor..at.risk.summary.
1
2
3
4
5
6
  V2D_Medically..clinically.vulnerable..Non.elderly. V2E_Education
```

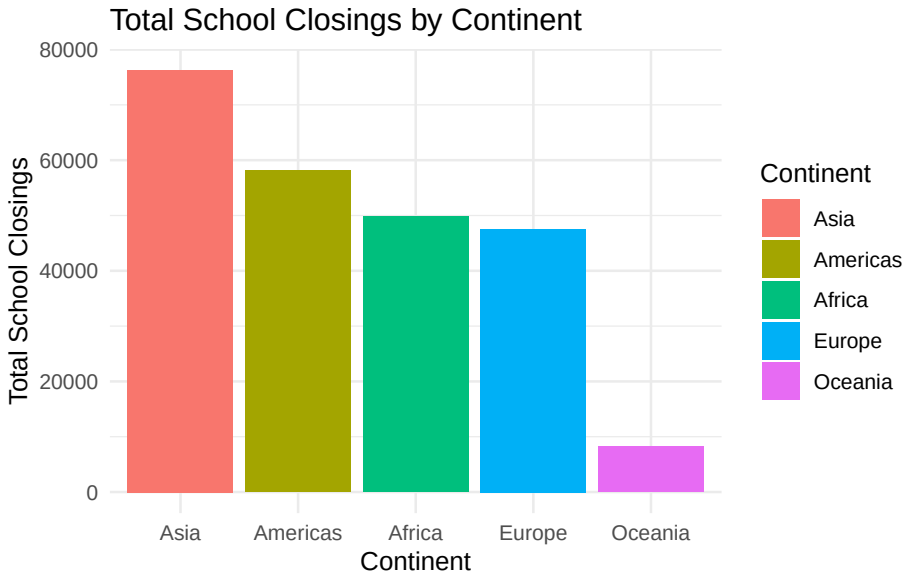
```
1                                                NA            NA
2                                                NA            NA
3                                                NA            NA
4                                                NA            NA
5                                                NA            NA
6                                                NA            NA
  V2F_Frontline.workers...non.healthcare. V2G_Frontline.workers...healthcare.
1                                      NA                                    NA
2                                      NA                                    NA
3                                      NA                                    NA
4                                      NA                                    NA
5                                      NA                                    NA
6                                      NA                                    NA
  V3_Vaccine.Financial.Support..summary. V4_Mandatory.Vaccination..summary.
1                                      0                                   NA
2                                      0                                   NA
3                                      0                                   NA
4                                      0                                   NA
5                                      0                                   NA
6                                      0                                   NA
  ConfirmedCases ConfirmedDeaths MajorityVaccinated PopulationVaccinated
1              0               0                 NV                    0
2              0               0                 NV                    0
3              0               0                 NV                    0
4              0               0                 NV                    0
5              0               0                 NV                    0
6              0               0                 NV                    0
  StringencyIndex_Average GovernmentResponseIndex_Average
1                       0                               0
2                       0                               0
3                       0                               0
4                       0                               0
5                       0                               0
6                       0                               0
```

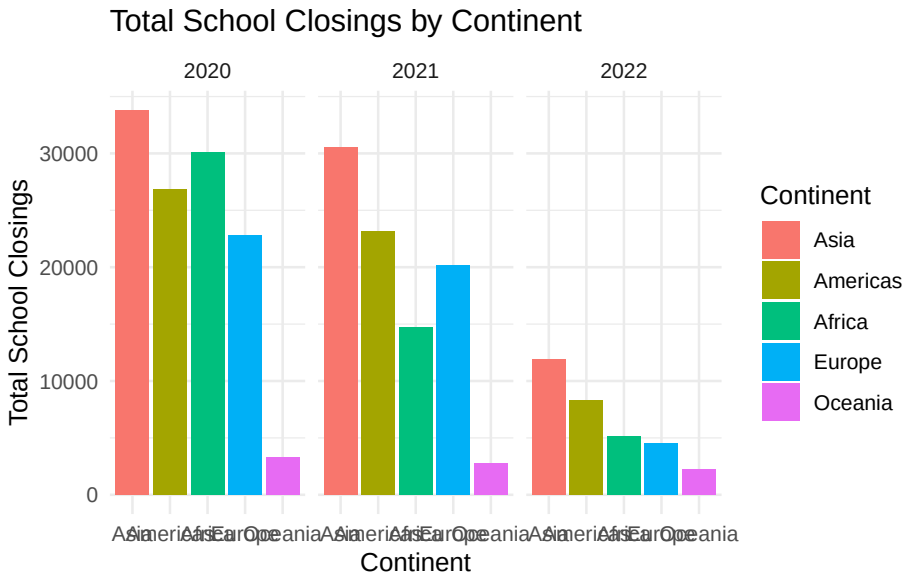
	ContainmentHealthIndex_Average	EconomicSupportIndex
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0

```
Warning: Some values were not matched unambiguously: Kosovo
```

As the original paper has divided the countries by Region, this paper has divided the countries by continent, to compare and contrast the findings based on the separation of the countries.

The original paper states that in their findings, the United States had longer terms of school closures, while given by the graph I have produced, it seems





##Second Graph

```
#| echo: false

score_data = read_csv("../../inputs/data/scores_lm_demographics.csv")
```

```
New names:
Rows: 9823 Columns: 63
-- Column specification
-------------------------------------------------------- Delimiter: "," chr
(9): state, DistrictName, subject, lea_name, fips, zip_location, urban... dbl
(51): ...1, county_code, covid_level, year, NCESDistrictID, lunch, miss... lgl
(2): spec_ed_students, english_language_learners date (1): ReportingDate
i Use `spec()` to retrieve the full column specification for this data. i
Specify the column types or set `show_col_types = FALSE` to quiet this message.
* `` -> `...1`
```

```r
clean_score_data_inperson <- score_data |>
  select(subject, change_2017_2018, change_2018_2019, change_2019_2021, change_202
  rename_with(~ sub("^change_(\\d{4})_(\\d{4})$", "Spring_\\2", .), starts_with("c
  mutate(share_inperson_grouped = cut(share_inperson * 100, breaks = seq(0, 100, b

# Pivot the data to a long format
score_data_long_inperson <- clean_score_data_inperson |>
  pivot_longer(cols = starts_with("Spring"), names_to = "time_period", values_to =

# Group by 'subject', 'share_inperson_grouped', and 'time_period', then summarize
score_data_summary_inperson <- score_data_long_inperson |>
  group_by(subject, share_inperson_grouped, time_period) |>
  summarise(
    mean_change = mean(change_score, na.rm = TRUE),
    .groups = 'drop'
  )

# Now prepare data for the 'urban_centric_locale' grouping
score_data_long_locale <- clean_score_data_inperson |>
  pivot_longer(cols = starts_with("Spring"), names_to = "time_period", values_to =

# Group by 'subject', 'urban_centric_locale', and 'time_period', then summarize
score_data_summary_locale <- score_data_long_locale |>
  group_by(subject, urban_centric_locale, time_period) |>
  summarise(
    mean_change = mean(change_score, na.rm = TRUE),
    .groups = 'drop'
  )

ggplot(score_data_summary_inperson, aes(y = share_inperson_grouped, x = round(mean
  geom_point(position = position_dodge(width = 0.2)) +
  scale_x_continuous(limits = c(-15, 5), breaks = seq(-15, 5, by = 5)) +
```

```
  labs(
    title = "Average Grade Change by In Person Attendence",
    y = "In-Person Share Group (%)",
    x = "Average Change Score (%)",
    color = "Time Period"
  ) +
  scale_color_brewer(palette = "Set1", labels = c("Spring 2018", "Spring 2019", "S
  theme_minimal() +
  theme(
    legend.position = "bottom",
    legend.background = element_rect(fill = "white", size = 0.3, linetype = "solic
    legend.text = element_text(size = 8),
    legend.title = element_text(size = 10, face = "bold"),
    legend.key.size = unit(0.2, "cm")
  ) +
  facet_wrap(~subject)
```

```
Warning: The `size` argument of `element_rect()` is deprecated as of ggplot2 3.4.0.
i Please use the `linewidth` argument instead.
```

```
Warning: Removed 1 rows containing missing values (`geom_point()`).
```

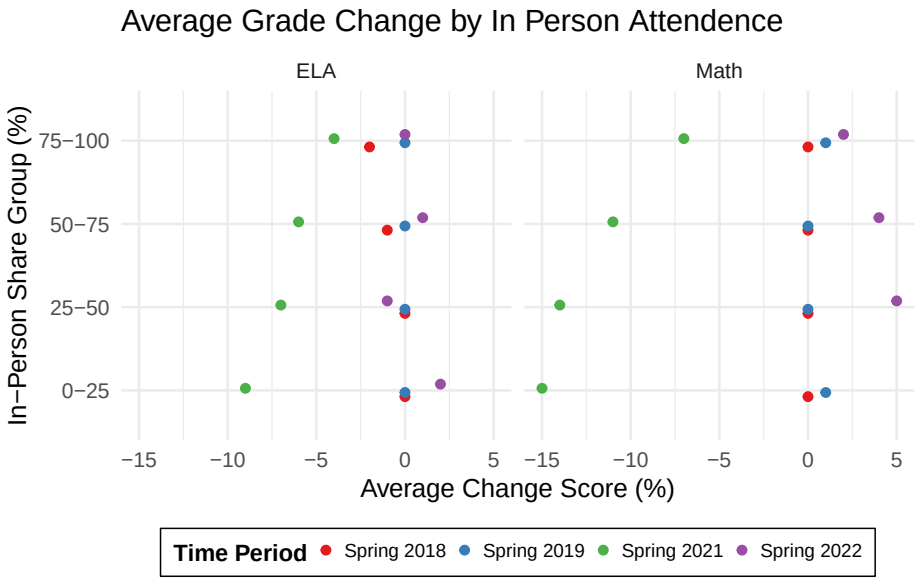


Figure 1: Average Grade Change by In Person Attendence

```
Warning: Removed 1 rows containing missing values (`geom_point()`).
```

Third Graph

It is no secret that COVID-19 affected the school enrollment rates, when the students were forced to learn in a virtual environment. In this section the paper will uncover any trends in enrollment rates with relation to the number of in-person learning offered in each district.

First, we take a look at the overall enrollment through out the districts. We can see that most values are in the negatives with one value in the positives in the [0.545, 0.6360] bin. We however see an upward trend signifying that we have a a positive change in the percent of rate of change. This means

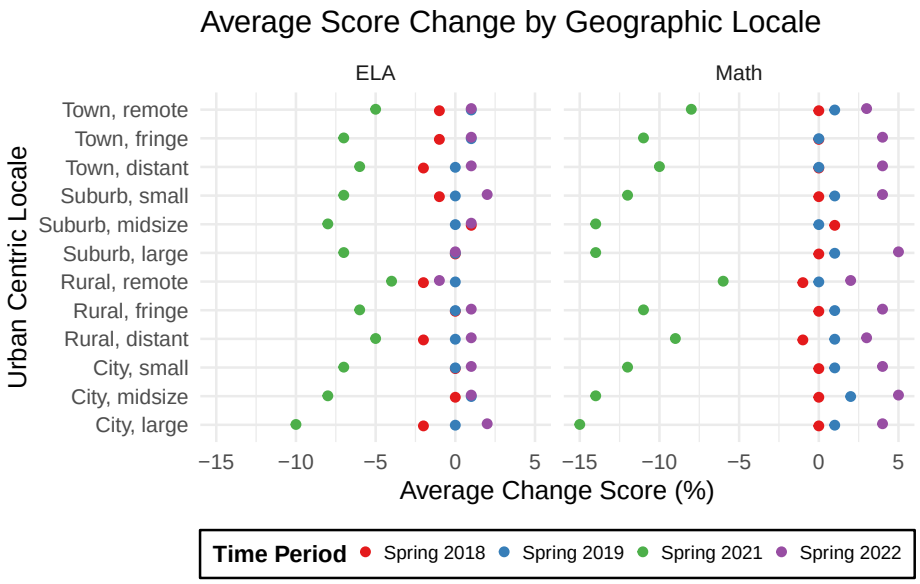


Figure 2: Average Score Change by Geographic Locale

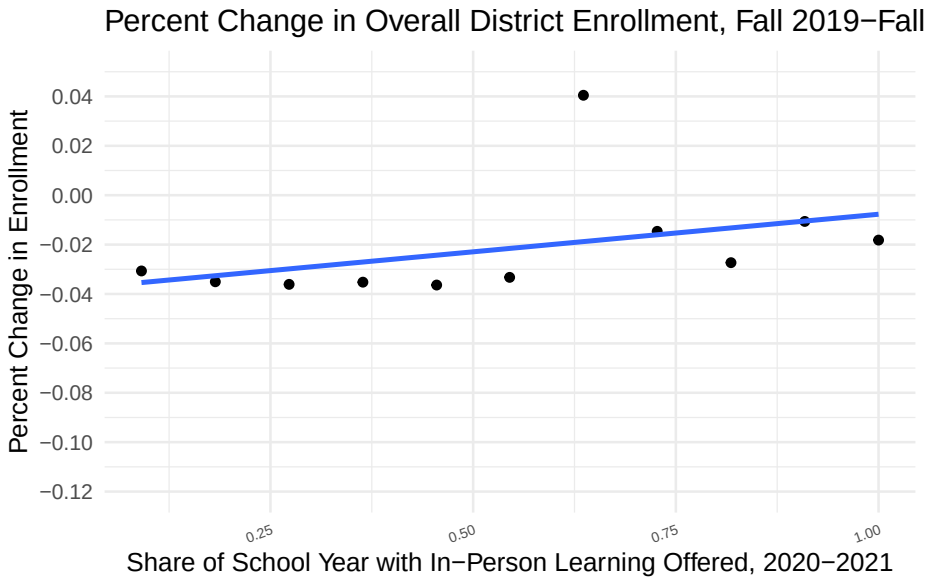


Figure 3: The weighted mean of the percent of overall district enrollment was calulated and graphed. The weights were decided on the bins which were cut in eleven sections based on share of in person school overall.

that the enrollment rate increases with more shares of the district going inperson.

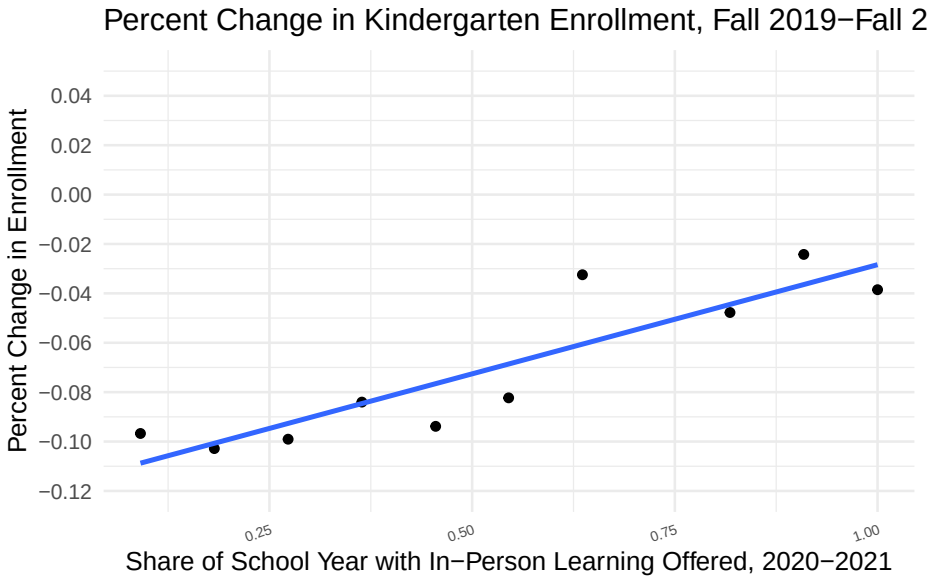


Figure 4: The weighted mean of the percent of kindergarden enrollment in all districts was calulated and graphed. The weights were decided on the bins which were cut in eleven sections based on share of in person school overall.

Discussion

Interesting point 1

Intresting point 2

Change in enrollment rate in kindergarden vs all

The third set of graphs that were shown in the results section was graphs that showed the change in enrollment with the shares of in-person school that started (Figure 3, Figure 4). As discussed in the section it seemed like the overall trend of the graph was that enrollment rates were higher the more in-person school there was. This was seen in both cases but more predominantly in the kindergarten graph (Figure 4). This result was interesing as this shows with younger ages the enrollment rates being higher means the children enjoy going to school in person. This is important as kindergarten is when most children start developing the fundamental socila skills required to interact with other people.

Ethics and Bias could talk about mental health maybe but it might apply to other "interesting point"

weakness and limitations

how to solve the limitations

Furthur questions?

Appendix

Share of inperson	average enrollment rate
0.0909	-0.0306700
0.1820	-0.0350468
0.2730	-0.0360982
0.3640	-0.0352125
0.4550	-0.0363727
0.5450	-0.0332659
0.6360	0.0404678
0.7270	-0.0146317
0.8180	-0.0273175
0.9090	-0.0106241
1.0000	-0.0181826

Reference

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