Correspondence Analysis of Survey Data

2024-09-02

- **M1 MIDS/MFA**
- **Université Paris Cité**
- Année 2024-2025
- Course Homepage

- Moodle

Objectives

Context

This notebook is based on

Reference: Social inequalities in hostility toward vaccination against Covid-19

by Alexis Spire, Nathalie Bajos, Léna Silberzan , for the EPICOV study group

> In recent decades, France has appeared as a country particularly hostile to vaccination in general. When asked in November 2020 about the intention to take the Covid-19 vaccine, the French public showed, once again, reluctance. Therefore, France appeared as an ideal case study to analyze whether the hostility toward the Covid-19 vaccine has its own reasons or whether it is related to the reluctance to the principle of vaccination itself. Our objective was to determine the specificity of the social determinants of the intention to get the Covid-19 vaccine. Thanks to the use of a large random sample of the general population in France (86,000 individuals), the reluctant to Covid-19 vaccine could be clearly distinguished from the hesitant and the convinced, and thereby thoroughly analyzed. Our analysis highlighted a gendered reluctance toward vaccination in general but even more so regarding vaccination against Covid-19. It might refer to women being more concerned about the possible effects of an injection in their body, especially at the age of maternity and a differentiated socialization making them more sensitive than men to long-term risks and more apprehensive toward rapid technological change. We also found that people at the bottom of the social hierarchy, in terms of level of education, financial resources, and immigration status, were more likely to refuse the Covid-19 vaccine. Nevertheless, this reluctance was less prominent than for vaccination in general, reflecting the actual spread of the epidemic in various social milieux. Finally,

our analysis showed that trust in the government's actions was significantly associated with reluctance toward the Covid-19 vaccine, even more than toward vaccination in general.

Recension dans Le Monde (Juin 2021)

Surexposition

Hésitants et réfractaires

The authors distinguish two skeptical attitudes towards vaccination.

Vaccine reluctance:

Vaccine hesitancy:

The EPICOV investigation

The EpiCoV (Epidémiologie et Conditions de Vie) *cohort* was set-up in April 2020, with the general aim of understanding the main epidemiological, social and behavioural issues related to the Covid-19 epidemic in France. The survey was approved by the CNIL (French independent administrative authority responsible for data protection) on April 25th 2020 (ref: MLD/MFI/AR205138) and by the "Comité de protection des personnes" (French equivalent of the Research Ethics Committee) on April 24th. The survey also obtained an agreement from the *Comité du Label de la statistique publique*, proving its adequacy to statistical quality standards.

See https://doi.org/10.1101/2021.02.24.21252316 for more the EpiCov *cohort*

This study was based on a large-scale random survey of 107,808 people conducted between October 26 and December 9, 2020, a pivotal time, as Pfizer announced on November 9, 2020, that it would be able to produce a 90% effective vaccine on a large scale.

Demographic variables

To describe the sample, six *sociodemographic variables* were considered: *age*, *gender*, *ethno-racial status* (based on *migration history*), social class (based on *current or last occupation*), standard of living (based on *decile of household income* per consumption unit), and *formal education level*. Ethno-racial status was defined by combining the criteria of place of birth, nationality, and status of the individual and both parents.

The analysis was conducted from an *intersectional* perspective [10] that simultaneously took into account gender, class, age, and ethno-racial social characteristics, as well as respondents' level of trust in the government.

Attitudinal variables: general versus specific vaccination hesitancy

To study attitudes toward vaccination in the EpiCoV survey in November 2020, two questions were available.

- About vaccination in general: Are you *strongly*; *somewhat*; *somewhat not*; or *not at all* in favor of vaccinations in general?
- About the Covid-19 vaccine: If a *free* vaccine against coronavirus were offered by the Sécurité Sociale, would you be willing to get vaccinated: *Yes probably*; *Yes maybe*; *Probably not*; *Certainly not*; or *you do not know*.

☐ Attitudes towards vaccination are reported on a *Likert*/rating scale. Is there any difference between the rating scales for the two questions?

☐ If you find any difference, can you guess the motivation?

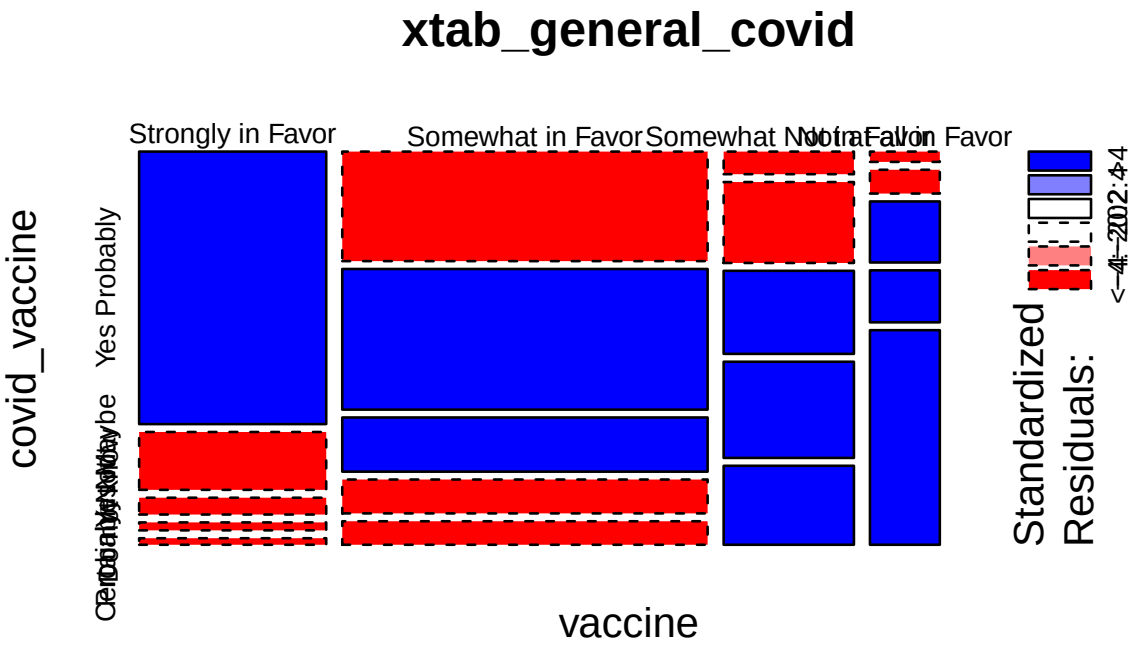
Rating scales

Likert scale/Rating scale

```
xtab_general_covid |>
  knitr::kable()
```

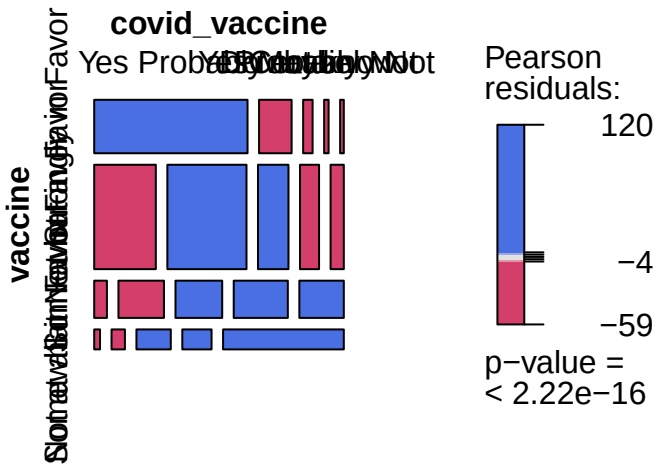
	Yes Probably	Yes Maybe	Do not know	Probably Not	Certainly Not
Strongly in Favor	16062	3411	993	468	386
Somewhat in Favor	12607	16190	6234	3901	2705
Somewhat Not in Favor	928	3321	3408	3947	3242
Not at all in Favor	227	524	1344	1144	4723

Mosaiplot vaccination against covid vaccination



☐ Use tools from package `vcd` to display mosaicplots with different stylings

```
vcd::mosaic(~ vaccine + covid_vaccine, xtab_general_covid, shade=T)
```




```
chisq.test(xtab_general_covid) |>
  broom::tidy()
```

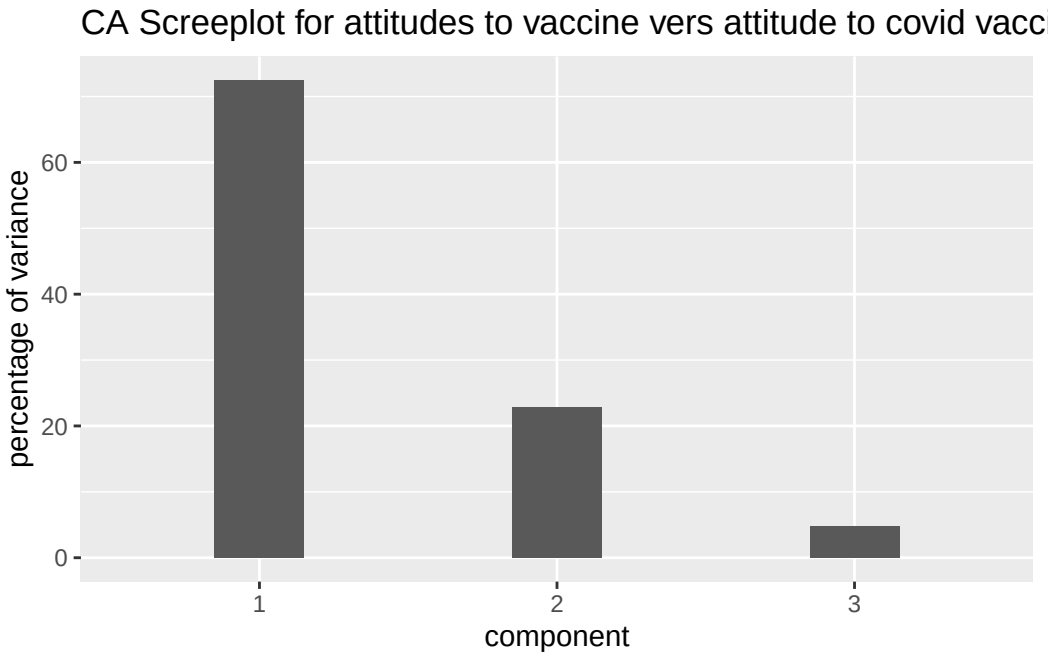
```
# A tibble: 1 x 4
  statistic p.value parameter method
      <dbl>   <dbl>     <int> <chr>
1    45356.       0        12 Pearson's Chi-squared test
```

CA using low-levels funtions

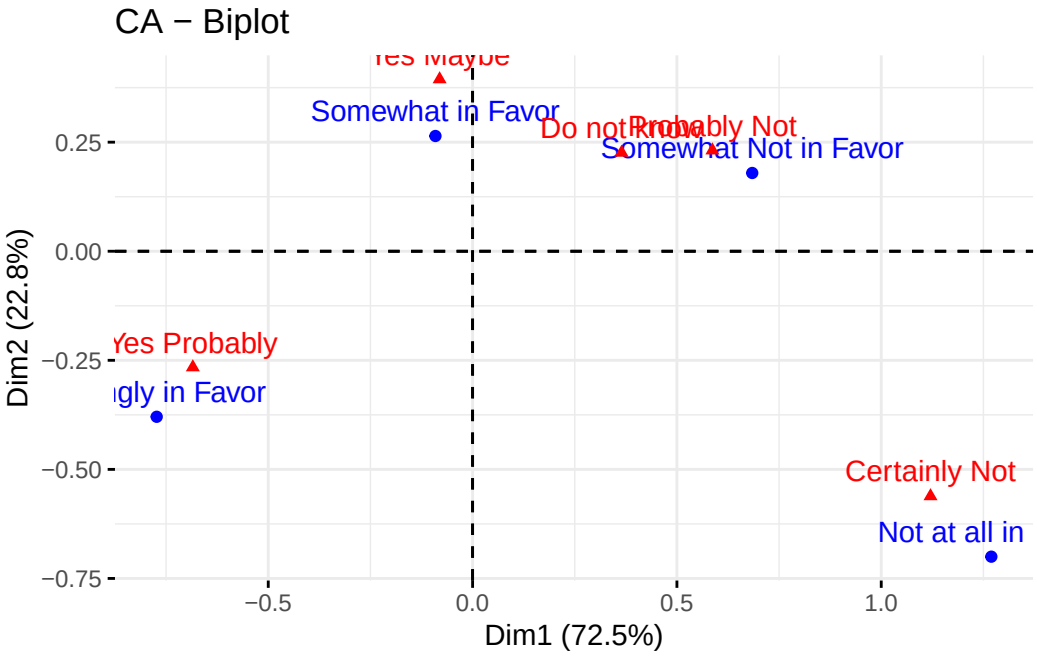
```
X <-  as.matrix(xtab_general_covid)
# P <-
# Dc <-
# Dr <-
# R <-
# ...
# svd()
```

Compare your own CA with `FactoMineR::CA()`

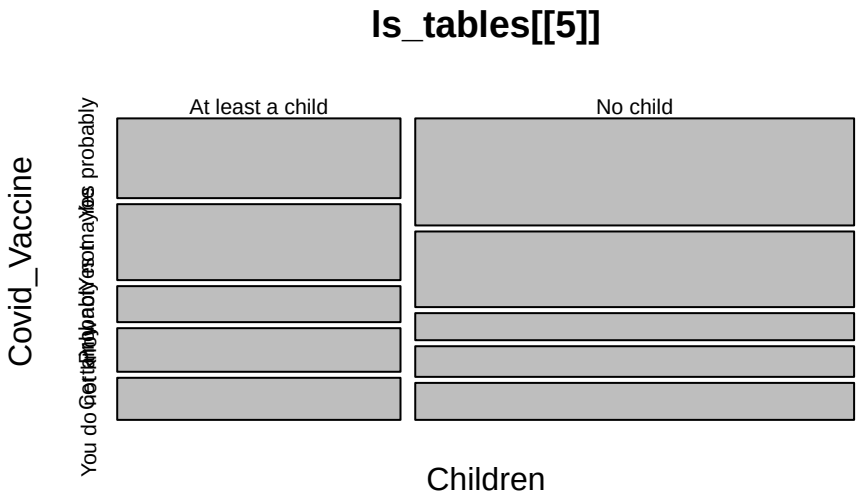
Correspondence analysis : Screeplot



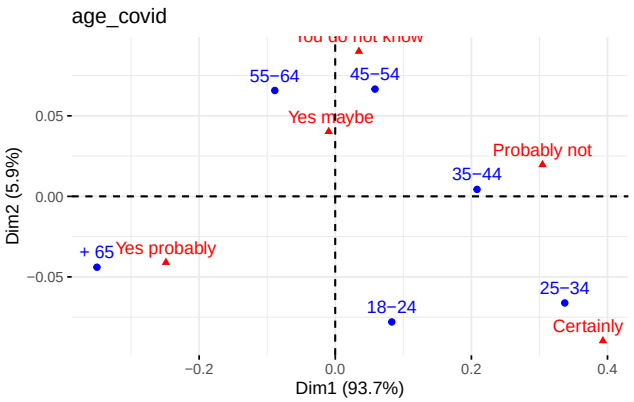
Biplot



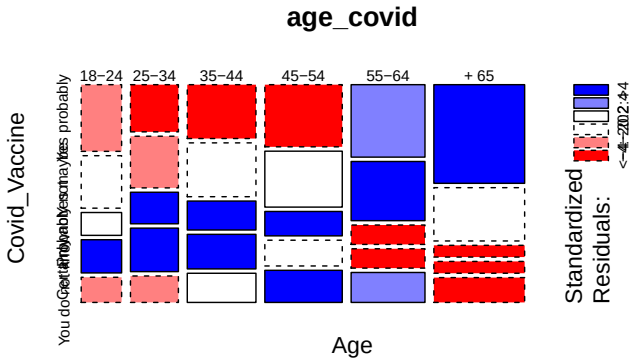

```
mosaicplot(ls_tables[[5]])
```



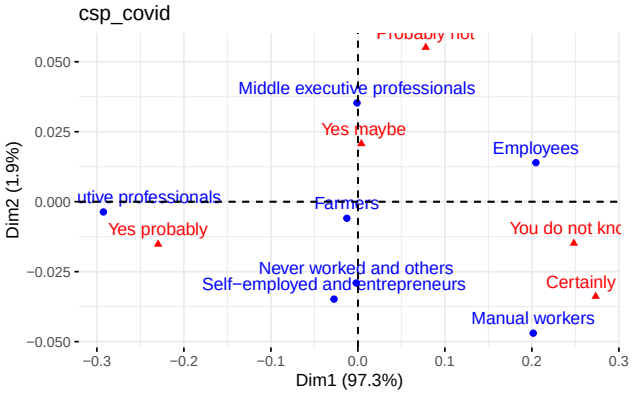
Age



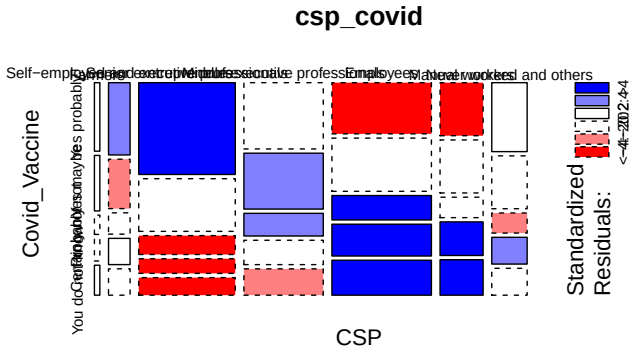
Age mosaicplots



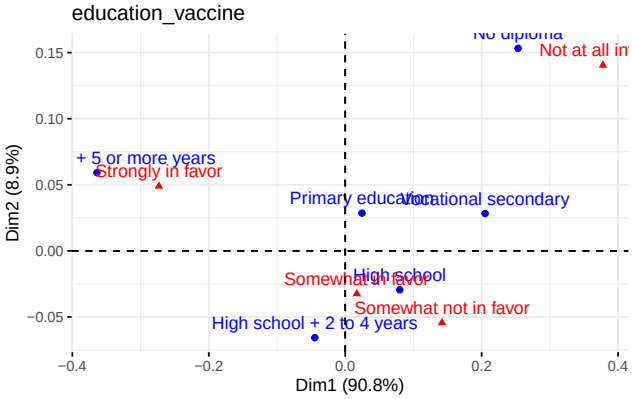
CSP

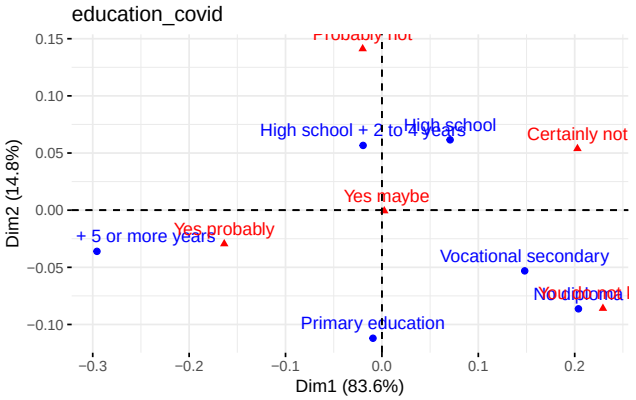


CSP mosaicplots

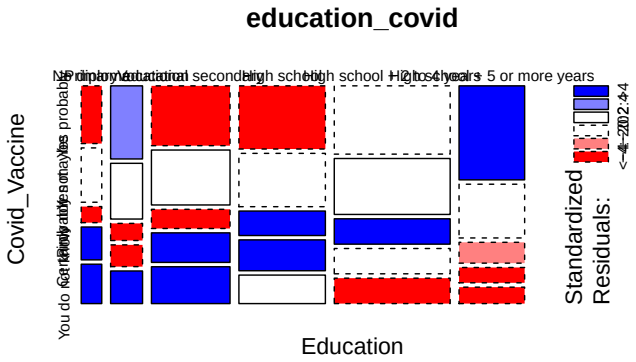


Education



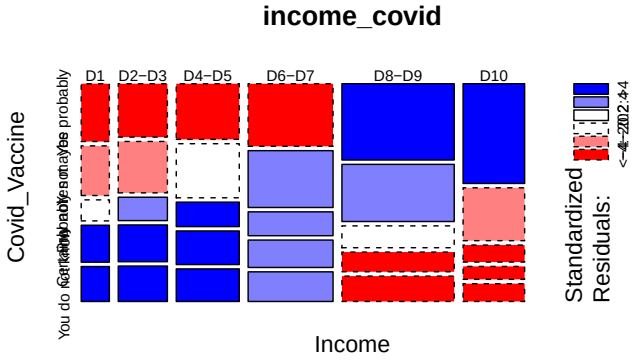


Education mosaicplots

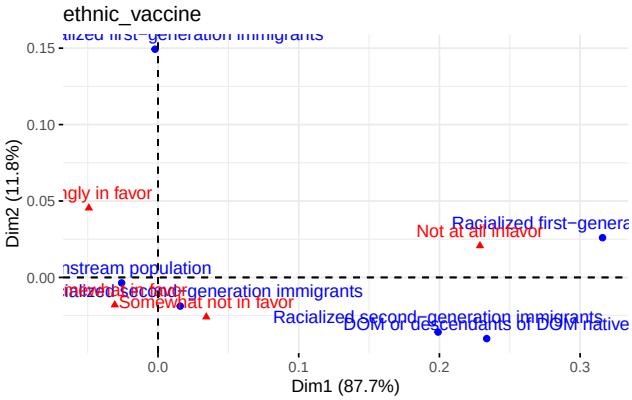


Income

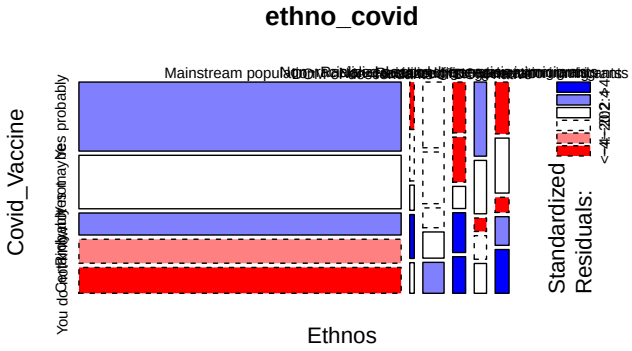
Income mosaicplots



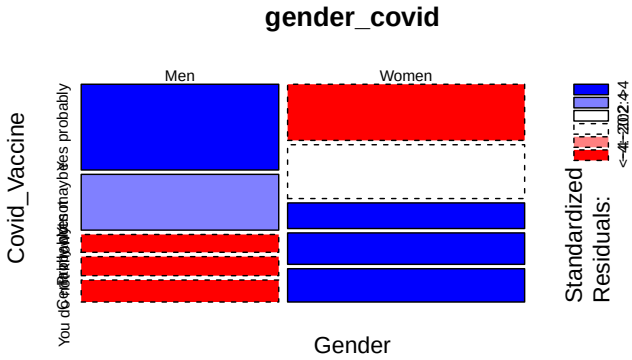
Ethnicity



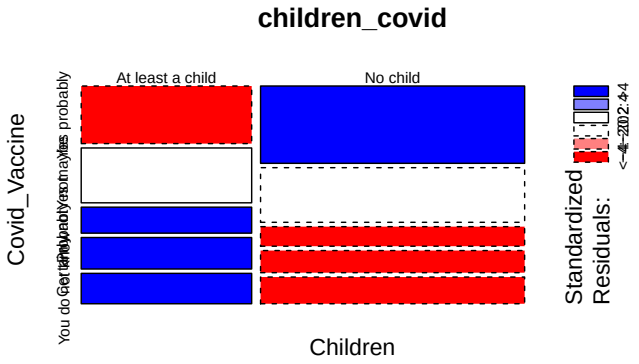
Ethnicity mosaicplots



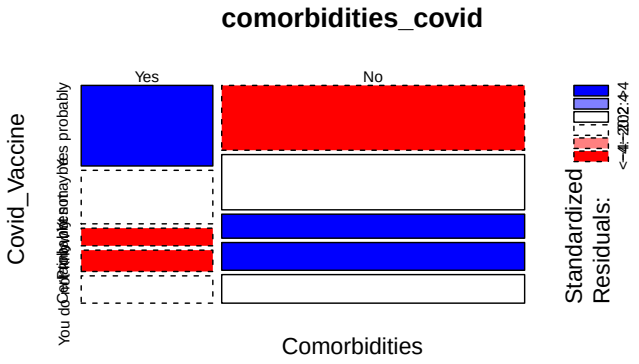
Gender



#Family



In government we trust (or not)




```
names(ca_analyses)
```

```
 [1] "afraid_covid"           "age_covid"              "age_vaccine"
 [4] "child_vaccine"          "children_covid"         "comorbidities_covid"
 [7] "csp_covid"              "csp_vaccine"            "education_covid"
[10] "education_vaccine"      "ethnic_vaccine"         "ethno_covid"
[13] "gender_covid"           "gender_vaccine"         "income_covid"
[16] "income_vaccine"         "trust_government_covid" "xtab_general_covid"
```