PANNEURO_analysis

Christopher Huebel

Sys.Date()

Contents

Frequencies of neurological symptoms in participants of the COPING/RAMP studies

Filtered by participants that self-reported a swap or antibody test

and that answered the neurological questionnaire

Script written by C Huebel Email: christopher.1.huebel@kcl.ac.uk

Set up

Clear global environment

Retrieve the current date to use it for file endings to not overwrite files when one exports files

Packages

Install packages (if they are not available in your version of R)

Load packages

```
Warning: package 'knitr' was built under R version 3.6.2
```

```
Registered S3 method overwritten by 'pryr':
  method      from
  print.bytes Rcpp
```

For best results, restart R session and update pander using devtools:: or remotes::install_github('rapp

```
Attaching package: 'polycor'
```

The following object is masked from 'package:psych':

```
    polyserial
```

corrplot 0.84 loaded

Warning: package 'patchwork' was built under R version 3.6.2

Warning: package 'broom' was built under R version 3.6.2

-- Attaching packages --- t

```
v ggplot2 3.3.2     v purrr   0.3.4
v tibble  3.0.3     v dplyr   1.0.0
v tidyr   1.1.0     v stringr 1.4.0
v readr   1.3.1     v forcats 0.5.0
```

Warning: package 'ggplot2' was built under R version 3.6.2

Warning: package 'tibble' was built under R version 3.6.2

Warning: package 'tidyr' was built under R version 3.6.2

Warning: package 'purrr' was built under R version 3.6.2

Warning: package 'dplyr' was built under R version 3.6.2

-- Conflicts -- tidyvers

```
x ggplot2::%+%()   masks psych::%+%()
x ggplot2::alpha() masks psych::alpha()
x dplyr::filter()  masks stats::filter()
x dplyr::lag()     masks stats::lag()
x tibble::view()   masks summarytools::view()
```

Warning: package 'ggpubr' was built under R version 3.6.2

Colour palettes

Define colours for plotting this are the standard coping colours

Choose in this chunk which palette to use 04.07.2020 - Default to 2 colour COPING palette

Data import

Source data file paths

Read in data

[1] 63266   579

```
   [1] "Sample"
   [2] "ID"
   [3] "startDate.prepandemic"
```

```
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 [5] "Gender_unc"
 [6] "Sex"
 [7] "EduYrs"
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 [9] "demographics.a_levelsas_levels_or_equivalent"
[10] "demographics.o_levelsgcses_or_equivalent"
[11] "demographics.cses_or_equivalent"
[12] "demographics.nvq_or_hnd_or_hnc_or_equivalent"
[13] "Ethnicity_unc"
[14] "Gender_numeric"
[15] "Sex_numeric"
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[17] "demographics.a_levelsas_levels_or_equivalent_numeric"
[18] "demographics.o_levelsgcses_or_equivalent_numeric"
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[20] "demographics.nvq_or_hnd_or_hnc_or_equivalent_numeric"
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[24] "Age"
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[26] "age_category"
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[28] "highest_education_prepan"
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[30] "employment.masters_degree_or_equivalent"
[31] "employment.postgraduate_degree_or_equivalent"
[32] "employment.bachelors_degree_or_equivalent"
[33] "employment.a_levelsas_levels_or_equivalent"
[34] "employment.o_levelsgcses_or_equivalent"
[35] "employment.cses_or_equivalent"
[36] "employment.nvq_or_hnd_or_hnc_or_equivalent"
[37] "employment.government_work_key_workers"
[38] "employment.unemployed"
[39] "employment.zerohours_contract"
[40] "employment.stayathome_parent_or_carer"
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[43] "employment.student_university"
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[46] "employment.furloughed_or_paid_leave_company_funded"
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[57] "employment.unemployed_numeric"
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[137]  "pcl.cut_people_feeling_distant_prepan"
[138]  "pcl.feeling_irritable_or_having_angry_outbursts_prepan"
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[217] "gad.trouble_relaxing_retro"
[218] "gad.sit_restless_hard_retro"
[219] "gad.becoming_easily_annoyed_or_irritable_retro"
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[333] "ocir.repeat_feel_numbers_retro"
[334] "ocir.clean_simply_wash_feel_retro"
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[362] "ocir.arranged_properly_objects_upset_base"
[363] "ocir.feel_compelled_count_things_base"
[364] "ocir.strangers_touch_touched_difficult_base"
[365] "ocir.control_difficult_find_thoughts_base"
[366] "ocir.i_collect_things_i_dont_need_base"
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[371] "ocir.clean_simply_wash_feel_retro_numeric"
[372] "ocir.mind_upset_unpleasant_thoughts_retro_numeric"
[373] "ocir.afraid_avoid_throwing_things_retro_numeric"
[374] "ocir.light_switches_water_taps_retro_numeric"
[375] "ocir.arranged_things_retro_numeric"
[376] "ocir.good_feel_bad_numbers_retro_numeric"
[377] "ocir.hands_longer_wash_retro_numeric"
[378] "ocir.saved_things_retro_numeric"
[379] "ocir.frequently_difficulty_rid_nasty_retro_numeric"
[380] "ocir.i_check_things_more_often_than_necessary_retro_numeric"
[381] "ocir.arranged_properly_objects_upset_retro_numeric"
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[384] "ocir.control_difficult_find_thoughts_retro_numeric"
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[389] "ocir.clean_simply_wash_feel_base_numeric"
[390] "ocir.mind_upset_unpleasant_thoughts_base_numeric"
[391] "ocir.afraid_avoid_throwing_things_base_numeric"
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[393] "ocir.arranged_things_base_numeric"
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[395] "ocir.hands_longer_wash_base_numeric"
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[398] "ocir.i_check_things_more_often_than_necessary_base_numeric"
[399] "ocir.arranged_properly_objects_upset_base_numeric"
[400] "ocir.feel_compelled_count_things_base_numeric"
[401] "ocir.strangers_touch_touched_difficult_base_numeric"
[402] "ocir.control_difficult_find_thoughts_base_numeric"
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[413] "alsfrs.not_all_words_are_legible"
[414] "alsfrs.able_to_grip_pen"
[415] "alsfrs.unable_to_grip_pen"
[416] "alsfrs.have_you_noticed_any_difficulty_walking"
[417] "alsfrs.do_you_have_any_difficulty_climbing_stairs"
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[423] "alsfrs.unable_to_grip_pen_numeric"
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[425] "alsfrs.do_you_have_any_difficulty_climbing_stairs_numeric"
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[430] "ess.break_passenger_car_hour"
[431] "ess.afternoon_rest_circumstances_lying"
[432] "ess.sitting_and_talking_to_someone"
[433] "ess.sitting_quietly_after_a_lunch_without_alcohol"
[434] "ess.car_minutes_stopped_traffic"
[435] "ess.insomnia"
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[439] "ess.sleep_apnea"
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[446] "ess.watching_tv_numeric"
[447] "ess.sitting_inactive_in_a_public_place_numeric"
[448] "ess.break_passenger_car_hour_numeric"
[449] "ess.afternoon_rest_circumstances_lying_numeric"
[450] "ess.sitting_and_talking_to_someone_numeric"
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[456] "ess.restless_legs_syndrome_numeric"
[457] "ess.sleep_apnea_numeric"
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[459] "ess.sleepwalking_numeric"
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[465] "midas.days_past_month_miss_housework"
[466] "midas.days_past_month_housework_half_productivity"
[467] "midas.days_past_month_miss_social_activities"
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[471] "midas.days_past_month_miss_housework_numeric"
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[480] "nmsw.sex_difficult_finding"
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[482] "nmsw.acting_moving_sleep_talking"
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[485] "nmsw.regularly_night_pass_urine_numeric"
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[488] "nmsw.acting_moving_sleep_talking_numeric"
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[495] "tinnitus.noises_worry_worst_upset_numeric"
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[533] "respiratory.throat_swab_test_nose"
[534] "respiratory.coronavirus_antibody_test"
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[537] "respiratory.worst_ill_feel_numeric"
[538] "respiratory.persistent_cough_numeric"
[539] "respiratory.skipping_meals_because_you_felt_unwell_numeric"
[540] "respiratory.was_your_sense_of_smell_impaired_numeric"
[541] "respiratory.was_your_sense_of_taste_impaired_numeric"
[542] "respiratory.feeling_tiredfatigued_numeric"
[543] "respiratory.throat_swab_coronavirus_nose_numeric"
```

```
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[568] "Birthdate"
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[572] "Ethnicity.unc_numeric"
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[577] "employment.what_is_your_highest_level_of_education_numeric"
[578] "respiratory.coronavirus_week_antibody_test"
[579] "respiratory.coronavirus_week_antibody_test_numeric"
```

Data availability

Data availability GAD

```
Frequencies
dat.raw$data_group_gad
Type: Factor
```

	Freq	% Valid	% Total
Only prepandemic data	14	0.04	0.02
Baseline and retrospective data	11852	34.01	18.73
Prepandemic and baseline data	3590	10.30	5.67
Baseline data only	10354	29.71	16.37
All prepandemic, baseline and retrospective data	9024	25.90	14.26
Retrospective data only	11	0.03	0.02
<NA>	28421		44.92

```
                                    Total   63266    100.00    100.00
```

Data availability PHQ

```
Frequencies
dat.raw$data_group_phq
Type: Factor


                                                    Freq   % Valid   % Total
------------------------------------------------- ------- --------- ---------
                            Only prepandemic data     18      0.05      0.03
                 Baseline and retrospective data   12724     36.25     20.11
                  Prepandemic and baseline data     3241      9.23      5.12
                               Baseline data only    9739     27.74     15.39
    All prepandemic, baseline and retrospective data 9357    26.66     14.79
                           Retrospective data only     25      0.07      0.04
                                             <NA>   28162               44.51
                                            Total   63266    100.00    100.00
```

Data availability PCL

```
Frequencies
dat.raw$data_group_pcl
Type: Factor


                                                    Freq   % Valid   % Total
------------------------------------------------- ------- --------- ---------
                            Only prepandemic data    107      0.31      0.17
                 Baseline and retrospective data    4420     12.78      6.99
                  Prepandemic and baseline data     8032     23.23     12.70
                               Baseline data only   17093     49.44     27.02
    All prepandemic, baseline and retrospective data 4885    14.13      7.72
                           Retrospective data only     35      0.10      0.06
                                             <NA>   28694               45.35
                                            Total   63266    100.00    100.00
```

Data availability OCI-R

```
Frequencies
dat.raw$data_group_ocir
Type: Factor


                                                    Freq   % Valid   % Total
------------------------------------------------- ------- --------- ---------
                            Only prepandemic data   1219     19.49      1.93
                  Prepandemic and baseline data        2      0.03      0.00
                          Retrospective data only    487      7.79      0.77
    All prepandemic, baseline and retrospective data 483     7.72      0.76
                  Baseline and retrospective data    3031     48.46      4.79
                               Baseline data only    1033     16.51      1.63
                                             <NA>   57011               90.11
                                            Total   63266    100.00    100.00
```

```
Frequencies
dat.raw$Sample
Type: Character
```

```
                  Freq    % Valid   % Valid Cum.    % Total   % Total Cum.
         ----------- ------- --------- -------------- --------- --------------
                EDGI    1950      3.08           3.08      3.08           3.08
                GLAD   38622     61.05          64.13     61.05          64.13
                 NBR   13989     22.11          86.24     22.11          86.24
                RAMP    8705     13.76         100.00     13.76         100.00
                <NA>       0                              0.00         100.00
               Total   63266    100.00         100.00    100.00         100.00
```

COVID

Recode variable

```
Frequencies
dat.raw$covid_test_positive_double
Type: Factor

                        Freq    % Valid   % Valid Cum.    % Total   % Total Cum.
---------------------- ------- --------- -------------- --------- --------------
             Negative     540     81.33          81.33      0.85           0.85
             Positive     116     17.47          98.80      0.18           1.04
      Double positive       8      1.20         100.00      0.01           1.05
                 <NA>   62602                             98.95         100.00
                Total   63266    100.00         100.00    100.00         100.00
```

```
Frequencies
dat.raw$covid_test_positive
Type: Factor

                  Freq    % Valid   % Valid Cum.    % Total   % Total Cum.
--------------- ------- --------- -------------- --------- --------------
      Negative     540     81.33          81.33      0.85           0.85
      Positive     124     18.67         100.00      0.20           1.05
          <NA>   62602                             98.95         100.00
         Total   63266    100.00         100.00    100.00         100.00
```

COVID swab test positive

```
   respiratory.throat_swab_test_nose Sample      n Prop
1                          Positive    EDGI      1 0.00
2                          Positive    GLAD     59 0.00
3                          Positive     NBR     46 0.00
4                          Positive    RAMP     10 0.00
5                          Negative    EDGI      7 0.00
6                          Negative    GLAD    363 0.01
7                          Negative     NBR    122 0.00
8                          Negative    RAMP     27 0.00
9                    Result awaited    EDGI      2 0.00
10                   Result awaited    GLAD     80 0.00
11                   Result awaited     NBR     49 0.00
12                   Result awaited    RAMP      7 0.00
13                             <NA>    EDGI   1940 0.03
14                             <NA>    GLAD  38120 0.60
15                             <NA>     NBR  13772 0.22
```

antibody test

	respiratory.results_antibody_test	Sample	n	Prop
1	Positive	EDGI	1	0.00
2	Positive	GLAD	12	0.00
3	Positive	NBR	7	0.00
4	Positive	RAMP	2	0.00
5	Negative	EDGI	3	0.00
6	Negative	GLAD	25	0.00
7	Negative	NBR	12	0.00
8	Negative	RAMP	2	0.00
9	Result awaited	GLAD	18	0.00
10	Result awaited	NBR	5	0.00
11	Result awaited	RAMP	2	0.00
12	<NA>	EDGI	1946	0.03
13	<NA>	GLAD	38567	0.61
14	<NA>	NBR	13965	0.22
15	<NA>	RAMP	8699	0.14

COVID probable diagnosis

	covid_probable_case_incl_screening	Sample	n	Prop
1	No COVID	EDGI	443	0.01
2	No COVID	GLAD	10650	0.17
3	No COVID	NBR	12015	0.19
4	No COVID	RAMP	8177	0.13
5	Probable COVID	EDGI	44	0.00
6	Probable COVID	GLAD	1153	0.02
7	Probable COVID	NBR	609	0.01
8	Probable COVID	RAMP	183	0.00
9	<NA>	EDGI	1463	0.02
10	<NA>	GLAD	26819	0.42
11	<NA>	NBR	1365	0.02
12	<NA>	RAMP	345	0.01

Cross table probable covid and covid test positive

	covid_probable_case_incl_screening	Negative	Positive	<NA>
1	No COVID	322	33	30930
2	Probable COVID	139	85	1765
3	<NA>	79	6	29907

Neurological frequencies

Adding missing grouping variables: `covid_test_positive`

[1] "covid_test_positive"
[2] "alsfrs.limb_weakness_noticed_past"
[3] "alsfrs.normal"
[4] "alsfrs.slow_or_sloppy_all_words_are_legible"
[5] "alsfrs.not_all_words_are_legible"
[6] "alsfrs.able_to_grip_pen"

```
[7] "alsfrs.unable_to_grip_pen"
[8] "alsfrs.have_you_noticed_any_difficulty_walking"
[9] "alsfrs.do_you_have_any_difficulty_climbing_stairs"
```

alsfrs.limb_weakness_noticed_past, alsfrs.normal, alsfrs.slow_or_sloppy_all_words_are_legible, alsfrs.not_all_words_are_legible, alsfrs.able_to_grip_pen, alsfrs.unable_to_grip_pen, alsfrs.have_you_noticed_any_difficulty
alsfrs.do_you_have_any_difficulty_climbing_stairs

```
  covid_test_positive alsfrs.limb_weakness_noticed_past    n Prop
1            Negative                               No 132 0.60
2            Negative                              Yes  30 0.14
3            Positive                               No  43 0.19
4            Positive                              Yes  16 0.07
# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive alsfrs.normal      n  Prop
  <fct>               <fct>          <int> <dbl>
1 Negative            Not Normal        10  0.33
2 Negative            Normal            20  0.67
3 Positive            Not Normal         3  0.19
4 Positive            Normal            13  0.81

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive alsfrs.slow_or_sloppy_all_words_are_legible     n  Prop
  <fct>               <fct>                                       <int> <dbl>
1 Negative            Not Slow or sloppy, all words are legible     26  0.87
2 Negative            Slow or sloppy, all words are legible          4  0.13
3 Positive            Not Slow or sloppy, all words are legible     13  0.81
4 Positive            Slow or sloppy, all words are legible          3  0.19

# A tibble: 3 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive alsfrs.not_all_words_are_legible     n  Prop
  <fct>               <fct>                            <int> <dbl>
1 Negative            Not Not all words are legible       26  0.87
2 Negative            Not all words are legible            4  0.13
3 Positive            Not Not all words are legible       16  1

# A tibble: 3 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive alsfrs.able_to_grip_pen     n  Prop
  <fct>               <fct>                   <int> <dbl>
1 Negative            Not Able to grip pen       27   0.9
2 Negative            Able to grip pen            3   0.1
3 Positive            Not Able to grip pen       16   1

# A tibble: 3 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive alsfrs.unable_to_grip_pen     n  Prop
  <fct>               <fct>                     <int> <dbl>
1 Negative            Not Unable to grip pen       29  0.97
2 Negative            Unable to grip pen            1  0.03
3 Positive            Not Unable to grip pen       16  1

# A tibble: 6 x 4
# Groups:   covid_test_positive [2]
```

```
    covid_test_positive alsfrs.have_you_noticed_any_difficulty_walking      n  Prop
    <fct>               <fct>                                            <int> <dbl>
1 Negative              Normal                                              17 0.570
2 Negative              Early walking difficultly                           11 0.37
3 Negative              Need a person, crutch or frame to help you wa~        2 0.07
4 Positive              Normal                                              10 0.62
5 Positive              Early walking difficultly                            5 0.31
6 Positive              Need a person, crutch or frame to help you wa~        1 0.06

# A tibble: 7 x 4
# Groups:   covid_test_positive [2]
    covid_test_positive alsfrs.do_you_have_any_difficulty_climbing_st~      n  Prop
    <fct>               <fct>                                            <int> <dbl>
1 Negative              Normal                                              17 0.570
2 Negative              Slow                                                  7 0.23
3 Negative              Mild unsteadiness or fatigue                         5 0.17
4 Negative              Need assistance of a person or a rail                1 0.03
5 Positive              Normal                                               9 0.56
6 Positive              Slow                                                  2 0.12
7 Positive              Mild unsteadiness or fatigue                         5 0.31

Adding missing grouping variables: `covid_test_positive`

 [1] "covid_test_positive"
 [2] "ess.felt_excessively_sleepy_past"
 [3] "ess.sitting_and_reading"
 [4] "ess.watching_tv"
 [5] "ess.sitting_inactive_in_a_public_place"
 [6] "ess.break_passenger_car_hour"
 [7] "ess.afternoon_rest_circumstances_lying"
 [8] "ess.sitting_and_talking_to_someone"
 [9] "ess.sitting_quietly_after_a_lunch_without_alcohol"
[10] "ess.car_minutes_stopped_traffic"
[11] "ess.insomnia"
[12] "ess.narcolepsy"
[13] "ess.rem_sleep_behaviour_disorder"
[14] "ess.restless_legs_syndrome"
[15] "ess.sleep_apnea"
[16] "ess.sleep_terrors"
[17] "ess.sleepwalking"
[18] "ess.other"
[19] "ess.none"

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
    covid_test_positive ess.felt_excessively_sleepy_past      n  Prop
    <fct>               <fct>                              <int> <dbl>
1 Negative              No                                    90 0.56
2 Negative              Yes                                   72 0.44
3 Positive              No                                    25 0.42
4 Positive              Yes                                   34 0.580

# A tibble: 8 x 4
# Groups:   covid_test_positive [2]
    covid_test_positive ess.sitting_and_reading      n  Prop
    <fct>               <fct>                     <int> <dbl>
```

```
1 Negative          Would never doze             14  0.2
2 Negative          Slight chance of dozing      31  0.44
3 Negative          Moderate chance of dozing    14  0.2
4 Negative          High chance of dozing        12  0.17
5 Positive          Would never doze              6  0.18
6 Positive          Slight chance of dozing      18  0.55
7 Positive          Moderate chance of dozing     5  0.15
8 Positive          High chance of dozing         4  0.12

# A tibble: 8 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.watching_tv               n  Prop
  <fct>               <fct>                      <int> <dbl>
1 Negative            Would never doze             12  0.17
2 Negative            Slight chance of dozing      21  0.3
3 Negative            Moderate chance of dozing    24  0.34
4 Negative            High chance of dozing        14  0.2
5 Positive            Would never doze              6  0.18
6 Positive            Slight chance of dozing      13  0.39
7 Positive            Moderate chance of dozing    12  0.36
8 Positive            High chance of dozing         2  0.06

# A tibble: 8 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.sitting_inactive_in_a_public_place    n  Prop
  <fct>               <fct>                                  <int> <dbl>
1 Negative            Would never doze                         42  0.59
2 Negative            Slight chance of dozing                  18  0.25
3 Negative            Moderate chance of dozing                 8  0.11
4 Negative            High chance of dozing                     3  0.04
5 Positive            Would never doze                         21  0.64
6 Positive            Slight chance of dozing                   8  0.24
7 Positive            Moderate chance of dozing                 2  0.06
8 Positive            High chance of dozing                     2  0.06

# A tibble: 8 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.break_passenger_car_hour      n  Prop
  <fct>               <fct>                          <int> <dbl>
1 Negative            Would never doze                 21  0.3
2 Negative            Slight chance of dozing          24  0.34
3 Negative            Moderate chance of dozing        17  0.24
4 Negative            High chance of dozing             9  0.13
5 Positive            Would never doze                 13  0.39
6 Positive            Slight chance of dozing          11  0.33
7 Positive            Moderate chance of dozing         4  0.12
8 Positive            High chance of dozing             5  0.15

# A tibble: 8 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.afternoon_rest_circumstances_lying    n  Prop
  <fct>               <fct>                                  <int> <dbl>
1 Negative            Would never doze                          4  0.06
2 Negative            Slight chance of dozing                  18  0.25
3 Negative            Moderate chance of dozing                23  0.32
4 Negative            High chance of dozing                    26  0.37
```

```
5 Positive               Would never doze                        5  0.15
6 Positive               Slight chance of dozing                11  0.33
7 Positive               Moderate chance of dozing               9  0.27
8 Positive               High chance of dozing                   8  0.24

# A tibble: 6 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.sitting_and_talking_to_someone    n  Prop
  <fct>               <fct>                             <int> <dbl>
1 Negative            Would never doze                     63  0.89
2 Negative            Slight chance of dozing               6  0.08
3 Negative            Moderate chance of dozing             2  0.03
4 Positive            Would never doze                     30  0.91
5 Positive            Slight chance of dozing               2  0.06
6 Positive            Moderate chance of dozing             1  0.03

# A tibble: 8 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.sitting_quietly_after_a_lunch_without_alc~     n  Prop
  <fct>               <fct>                                          <int> <dbl>
1 Negative            Would never doze                                  30  0.42
2 Negative            Slight chance of dozing                          27  0.38
3 Negative            Moderate chance of dozing                         8  0.11
4 Negative            High chance of dozing                             6  0.08
5 Positive            Would never doze                                 18  0.55
6 Positive            Slight chance of dozing                          10  0.3
7 Positive            Moderate chance of dozing                         3  0.09
8 Positive            High chance of dozing                             2  0.06

# A tibble: 6 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.car_minutes_stopped_traffic    n  Prop
  <fct>               <fct>                          <int> <dbl>
1 Negative            Would never doze                  59  0.83
2 Negative            Slight chance of dozing            9  0.13
3 Negative            Moderate chance of dozing          1  0.01
4 Negative            High chance of dozing              2  0.03
5 Positive            Would never doze                  32  0.97
6 Positive            Slight chance of dozing            1  0.03

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.insomnia      n  Prop
  <fct>               <chr>         <int> <dbl>
1 Negative            Insomnia          7  0.05
2 Negative            Not Insomnia    125  0.95
3 Positive            Insomnia          1  0.02
4 Positive            Not Insomnia     47  0.98

# A tibble: 2 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.narcolepsy      n  Prop
  <fct>               <chr>           <int> <dbl>
1 Negative            Not Narcolepsy    132     1
2 Positive            Not Narcolepsy     48     1

# A tibble: 2 x 4
```

```
# Groups:   covid_test_positive [2]
  covid_test_positive ess.rem_sleep_behaviour_disorder     n  Prop
  <fct>               <chr>                             <int> <dbl>
1 Negative            Not REM sleep behaviour disorder    132     1
2 Positive            Not REM sleep behaviour disorder     48     1

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.restless_legs_syndrome     n  Prop
  <fct>               <chr>                       <int> <dbl>
1 Negative            Not Restless legs syndrome    130  0.98
2 Negative            Restless legs syndrome          2  0.02
3 Positive            Not Restless legs syndrome     46  0.96
4 Positive            Restless legs syndrome          2  0.04

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.sleep_apnea      n  Prop
  <fct>               <chr>            <int> <dbl>
1 Negative            Not Sleep apnea    131  0.99
2 Negative            Sleep apnea          1  0.01
3 Positive            Not Sleep apnea     47  0.98
4 Positive            Sleep apnea          1  0.02

# A tibble: 3 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.sleep_terrors      n  Prop
  <fct>               <chr>              <int> <dbl>
1 Negative            Not Sleep terrors    130  0.98
2 Negative            Sleep terrors          2  0.02
3 Positive            Not Sleep terrors     48  1

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.sleepwalking      n  Prop
  <fct>               <chr>             <int> <dbl>
1 Negative            Not Sleepwalking    129  0.98
2 Negative            Sleepwalking          3  0.02
3 Positive            Not Sleepwalking     47  0.98
4 Positive            Sleepwalking          1  0.02

# A tibble: 3 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.other      n  Prop
  <fct>               <chr>      <int> <dbl>
1 Negative            Not Other:   131  0.99
2 Negative            Other:         1  0.01
3 Positive            Not Other:    48  1

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive ess.none     n  Prop
  <fct>               <chr>    <int> <dbl>
1 Negative            None       121  0.92
2 Negative            Not None    11  0.08
3 Positive            None        44  0.92
4 Positive            Not None     4  0.08
```

```
Adding missing grouping variables: `covid_test_positive`

[1] "covid_test_positive"
[2] "midas.headaches_suffered_past_month"
[3] "midas.days_past_month_miss_work_school"
[4] "midas.days_past_month_work_school_half_productivity"
[5] "midas.days_past_month_miss_housework"
[6] "midas.days_past_month_housework_half_productivity"
[7] "midas.days_past_month_miss_social_activities"
# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive midas.headaches_suffered_past_month     n  Prop
  <fct>               <fct>                               <int> <dbl>
1 Negative            No                                     75  0.47
2 Negative            Yes                                    86  0.53
3 Positive            No                                     23  0.39
4 Positive            Yes                                    36  0.61

# A tibble: 0 x 4
# Groups:   covid_test_positive [0]
# ... with 4 variables: covid_test_positive <fct>,
#   midas.days_past_month_miss_work_school <fct>, n <int>, Prop <dbl>

# A tibble: 0 x 4
# Groups:   covid_test_positive [0]
# ... with 4 variables: covid_test_positive <fct>,
#   midas.days_past_month_work_school_half_productivity <fct>, n <int>,
#   Prop <dbl>

# A tibble: 0 x 4
# Groups:   covid_test_positive [0]
# ... with 4 variables: covid_test_positive <fct>,
#   midas.days_past_month_miss_housework <fct>, n <int>, Prop <dbl>

# A tibble: 0 x 4
# Groups:   covid_test_positive [0]
# ... with 4 variables: covid_test_positive <fct>,
#   midas.days_past_month_housework_half_productivity <fct>, n <int>,
#   Prop <dbl>

# A tibble: 0 x 4
# Groups:   covid_test_positive [0]
# ... with 4 variables: covid_test_positive <fct>,
#   midas.days_past_month_miss_social_activities <fct>, n <int>, Prop <dbl>

Adding missing grouping variables: `covid_test_positive`

[1] "covid_test_positive"          "nmss.ability_taste_food_smell"
[3] "nmss.severe_taste_smell_loss"
# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmss.ability_taste_food_smell     n  Prop
  <fct>               <fct>                         <int> <dbl>
1 Negative            No                              136  0.84
2 Negative            Yes                              25  0.16
3 Positive            No                               27  0.46
4 Positive            Yes                              32  0.54
```

```
# A tibble: 10 x 4
# Groups:   covid_test_positive [2]
   covid_test_positive nmss.severe_taste_smell_loss      n  Prop
   <fct>               <fct>                         <int> <dbl>
 1 Negative            Minimal                           3  0.12
 2 Negative            Mild                             12  0.48
 3 Negative            Moderate                          3  0.12
 4 Negative            Severe                            4  0.16
 5 Negative            I cannot taste or smell at all    3  0.12
 6 Positive            Minimal                           4  0.12
 7 Positive            Mild                              4  0.12
 8 Positive            Moderate                          6  0.19
 9 Positive            Severe                            7  0.22
10 Positive            I cannot taste or smell at all   11  0.34

Adding missing grouping variables: `covid_test_positive`

[1] "covid_test_positive"
[2] "nmsw.drink_problems_choking_difficulty"
[3] "nmsw.regularly_night_pass_urine"
[4] "nmsw.sex_difficult_finding"
[5] "nmsw.weak_standing_feeling_light"
[6] "nmsw.acting_moving_sleep_talking"
[7] "nmsw.double_vision"

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmsw.drink_problems_choking_difficulty     n  Prop
  <fct>               <fct>                                  <int> <dbl>
1 Negative            No                                       140  0.88
2 Negative            Yes                                       20  0.12
3 Positive            No                                        56  0.97
4 Positive            Yes                                        2  0.03

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmsw.regularly_night_pass_urine      n  Prop
  <fct>               <fct>                            <int> <dbl>
1 Negative            No                                  89  0.56
2 Negative            Yes                                 71  0.44
3 Positive            No                                  42  0.72
4 Positive            Yes                                 16  0.28

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmsw.sex_difficult_finding      n  Prop
  <fct>               <fct>                       <int> <dbl>
1 Negative            No                            141  0.9
2 Negative            Yes                            15  0.1
3 Positive            No                             49  0.86
4 Positive            Yes                             8  0.14

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmsw.weak_standing_feeling_light      n  Prop
  <fct>               <fct>                             <int> <dbl>
1 Negative            No                                  102  0.64
```

```
2 Negative             Yes                            58  0.36
3 Positive             No                             35  0.6
4 Positive             Yes                            23  0.4
# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmsw.acting_moving_sleep_talking     n  Prop
  <fct>               <fct>                            <int> <dbl>
1 Negative            No                               134  0.85
2 Negative            Yes                               24  0.15
3 Positive            No                                51  0.88
4 Positive            Yes                                7  0.12

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive nmsw.double_vision      n  Prop
  <fct>               <fct>               <int> <dbl>
1 Negative            No                    142  0.89
2 Negative            Yes                    17  0.11
3 Positive            No                     54  0.93
4 Positive            Yes                     4  0.07

Adding missing grouping variables: `covid_test_positive`

[1] "covid_test_positive"
[2] "tinnitus.ears_noises_minutes_head"
[3] "tinnitus.ears_noises_minutes_head_frequency"
[4] "tinnitus.noises_worry_worst_upset"

# A tibble: 4 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive tinnitus.ears_noises_minutes_head     n  Prop
  <fct>               <fct>                            <int> <dbl>
1 Negative            No                               134  0.83
2 Negative            Yes                               27  0.17
3 Positive            No                                50  0.85
4 Positive            Yes                                9  0.15

# A tibble: 7 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive tinnitus.ears_noises_minutes_head_frequency     n  Prop
  <fct>               <fct>                                       <int> <dbl>
1 Negative            Not now                                         2  0.07
2 Negative            Some of the time                               16  0.59
3 Negative            Now most or all of the time                     9  0.33
4 Positive            Not now                                         1  0.11
5 Positive            Some of the time                                4  0.44
6 Positive            Now a lot of the time                           2  0.22
7 Positive            Now most or all of the time                     2  0.22

# A tibble: 7 x 4
# Groups:   covid_test_positive [2]
  covid_test_positive tinnitus.noises_worry_worst_upset     n  Prop
  <fct>               <fct>                             <int> <dbl>
1 Negative            Not at all                            7  0.26
2 Negative            Slightly                             17  0.63
3 Negative            Moderately                            3  0.11
```

```
4 Positive          Not at all                              1   0.11
5 Positive          Slightly                                5   0.56
6 Positive          Moderately                              2   0.22
7 Positive          Severely                                1   0.11
```