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## Methods 1. Study design and subjects

The Norwegian COVID-19 Cohort Study is a population-based, open cohort study of participants (aged 18-96 years) from all over Norway. The main aim of the Norwegian COVID-19 Cohort study was to identify risk factors and to examine the routes of infection of the SARS-CoV-2 virus. The study was registered in Clinicaltrials.gov with identifier NCT04320732 on March 23, 2020. Throughout the pandemic, the study gathered approximately 190,000 participants (aged 18-96 years) who answered questions about their lifestyle, risk factors for becoming infected and current symptoms. All participants (≥18 years of age) with a Norwegian identification number and electronic access to the secure national digital governmental identification service could participate. From March 27, 2020, participants were recruited through social media and nationwide media coverage. Most participants (>70%) were included within the first month of the study. Participants completed a baseline questionnaire electronically at inclusion and all were invited to five follow-ups. During autumn 2020, the first questions about the symptoms of memory and concentration problems were included in the third follow-up questionnaire due to participants reporting these symptoms after COVID-19 in free text fields of the previous follow-up questionnaires. Based on observed memory problems up to 8 months after a positive SARS-CoV-2 test, [1] we then included the Everyday Memory Questionnaire (EMQ) in the fourth (completed by participants between December 2021 to August 2022) and fifth (completed by participants between September 2022 and April 2023) follow-up questionnaires to be able to further examine these issues. The study was approved by the Norwegian Regional Committee for Research Ethics (REK 124170), and all participants submitted electronic informed consent forms.

In the current study, participants of the Norwegian COVID-19 Cohort study who completed at least one EMQ questionnaire were eligible for inclusion (Figure S1). Nevertheless,

questionnaires completed after a second (or more) positive SARS-CoV-2 tests were excluded, to only compare being infected once by the SARS-CoV-2 virus to not being infected by the virus, and not a possibly higher or lower EMQ-score that could occur when being infected several times. Questionnaires completed between one month and one day before the SARS-CoV-2 test were excluded, to make sure we did not include participants that were already sick and experiencing symptoms, and therefore possibly yielding a higher symptom-load before the test. Untested participants were excluded as we wanted to compare participants infected with the SARS-CoV-2 virus to those experiencing another infection. We defined the SARS-CoV-2 negative test result as an indication of an infection. We have previously reported that >85% of negative test results were accompanied by symptoms. [2] If we were uncertain about the SARS-CoV-2 positive status or uncertain about whether an individual had several positive SARS-CoV-2 tests, we excluded the questionnaire completed after the uncertain status.

## Methods 2. Questionnaires

For the current study, the characteristics of the study participants (baseline questionnaire) were examined. Furthermore, the EMQ-questionnaire and self-reported SARS-CoV-2 status (follow-up questionnaires four and five) and the question about memory problems (follow-up questionnaires three, four and five) were examined.

### The Everyday Memory Questionnaire (EMQ)

We have reported the EMQ-scores averaged over all items among the participants with a SARS-CoV-2-positive or negative test, and not the mean of total sum EMQ-scores and the total range. We have used the following questionnaire, EMQ-r (13 items), in the analyses. [3] In the literature, most studies provide the mean of total sum EMQ-scores,[4-6] whereas there are

studies, including the current study, that have reported the EMQ-scores averaged over all items.[3,7,8] The maximum range for EMQ in the current study is 0-52, but presented as the total, or the total/13 (average across all items, 0-4) it will be the same – they are just on different scales. See Table S5 for the individual raw mean scores of the 13 questions of the EMQ of the current study.

## Selected questions from the questionnaires.

**I was tested for COVID-19 with a throat or nose swab** (Complete this question even if you have previously told us that you have had a positive test):

□ Yes, at least one test was positive, and I have/have had COVID-19

□ Yes, but the test was negative

□ Yes, and I have not received the test result yet

□ No, I have not been tested

**Approximately date when you had your first COVID-19 test?**

(Date field, DD.MM.YYYY, question for those ticking Yes, and at least one test was positive or Yes, I am waiting for the result)

**Check off every symptom you have experienced in the last three weeks.**

**You can tick several symptoms.**

□ Fever

□ High fever (measure to be higher than 39 °C)

□ Heavy breathing (dyspnea)

□ Cough

□ Fatigue

□ Muscle aches

□ Sore throat

□ Impaired sense of smell/taste

□ Stuffy or runny nose

□ Headache

□ Stomach pain/nausea/diarrhoea

□ Memory problems

□ Problems with concentration or thinking

□ Other symptoms

□ No symptoms

**Explain which other symptoms you have experienced the last three weeks:**

(Open text field, question for those ticking other symptoms)

**Sex**

□ Male

□ Female

□ Other

**Enter your age:**

(Open number field)

**What is your height in centimeters?**

(Open number field)

**What is your weight in kilos?**

(Open number field)

**Do you smoke?**

□ Yes

□ No, I have never smoked

□ I have smoked previously

□ I vape

□ Don’t know

**What is the household's annual income (NOK), calculated before taxes?**

□ <299 999 NOK

□ 300 000-599 999 NOK

□ 600 000-1 000 000 NOK

□ >1 000 000 NOK

**Check off any illnesses or conditions you have.**

**You can tick only one option per condition.**

*Chronic heart disease including congenital heart disease (not high blood pressure)*

□ Yes

□ No

□ Don’t know

*High blood pressure*

□ Yes

□ No

□ Don’t know

*Chronic lung disease (other than asthma)*

□ Yes

□ No

□ Don’t know

*Asthma*

□ Yes

□ No

□ Don’t know

*Diabetes*

□ Yes

□ No

□ Don’t know

On immunosuppressive treatment

□ Yes

□ No

□ Don’t know

*Cancer (being treated)*

□ Yes

□ No

□ Don’t know

**Were you bedridden due to COVID-19?**

□ No

□ Yes, 1-6 days

□ Yes, 7-13 days

□ Yes, 14 days or more

## Methods 3. SARS-CoV-2 testing.

SARS-CoV-2 testing was done according to official Norwegian guidelines. At the start of the pandemic detection of SARS-CoV-2 was done by a reverse transcription-polymerase chain reaction (RT-PCR) protocol, where a nasopharyngeal and/or oropharyngeal specimen was collected by health professionals and transported to the lab for PCR. Reporting of SARS-CoV-2 status to the Norwegian Surveillance System for Communicable Diseases (MSIS) was mandatory. Later, self-testing was recommended and all individuals with positive self-test were recommended to have a confirmatory PCR-test at a test station (reported to MSIS up until January 13, 2022). Self-reported tests from questionnaires were included from December 22, 2021.

## Methods 4. Statistical analyses.

In the current study, data consists of up to two measurements for all participants (first and second EMQ questionnaire). The EMQ-score was “measured” at each completed questionnaire

and the SARS-CoV-2 test status was either positive or negative. The time since SARS-CoV-2 test was allowed to change over questionnaires and participants with two EMQ measurements could be represented in up to two time strata. Participants could have first a negative test and then a positive test, but in analyses including the timepoint >1 month prior to the SARS-CoV-2 test, these participants ended up in the timepoint >1 month prior to a positive SARS-Cov-2 test. In analyses examining EMQ-score only after the SARS-CoV-2 test, 0-36 months after the positive and/or negative test, data before the test was not included. Here, those with a negative test preceding a positive test were included in the negative test group and contributed with data on EMQ-score after a negative test. This is visualized and demonstrated in sensitivity analyses in Figure S7 and Table S7, and the data are used in Figure S3, S4 and S5.

## The linear mixed effects model

The regression model used to estimate mean EMQ-scores and 95% CI is a linear mixed effect model with random intercept:

$$\mathrm{Y} = \beta_0 + X_{ij}\beta \ + Z_{ij}\eta + b_i$$

$X_{ij}$ is the time since test and is defined as time between date of answering questionnaire j and date of first positive or negative test (for tested participants, with a positive test superseding a negative test) for individual $_i$. $Z_{ij}$ is the vector of adjustment variables with corresponding regression coefficients $\eta$. β is the regression coefficient associated with time and $b_i$ the subject specific random intercept. In particular, the model is given by:

$$\mathrm{Y} = \beta_0 + X_{ij}\beta \ + sex_{ij}\eta_{sex} +$$

$$BMI_{ij}\eta_{BMI} + income_{ij}\eta_{income} + smoking_{ij}\eta_{smoking} \ + underlying\_medical\_condition_{ij}\eta_{underlying\_medical\_condition} +$$

$$age_{ij}\eta_{age} + questionnaire\ number_{ij}\eta_{\ questionnaire\ number} + b_i$$

All included independent variables are categorical, thus $\beta$ and $\eta_{.}$ are vectors of regression coefficients. The adjustment variables are coded as follows: age (10-year categories, ref <30 years), gender (men, women, ref men), body mass index (BMI,<25 kg/m$^2$, 25-29.9, >25, ref <25), annual household income level (<299 999, 300 000-599 999, 600 000-100 0000, >1 000 000 NOK, ref <299 999), vaccination status (no, yes, ref no), smoking status (never, former, current, vaper, ref never), underlying medical condition (no, yes, ref no).

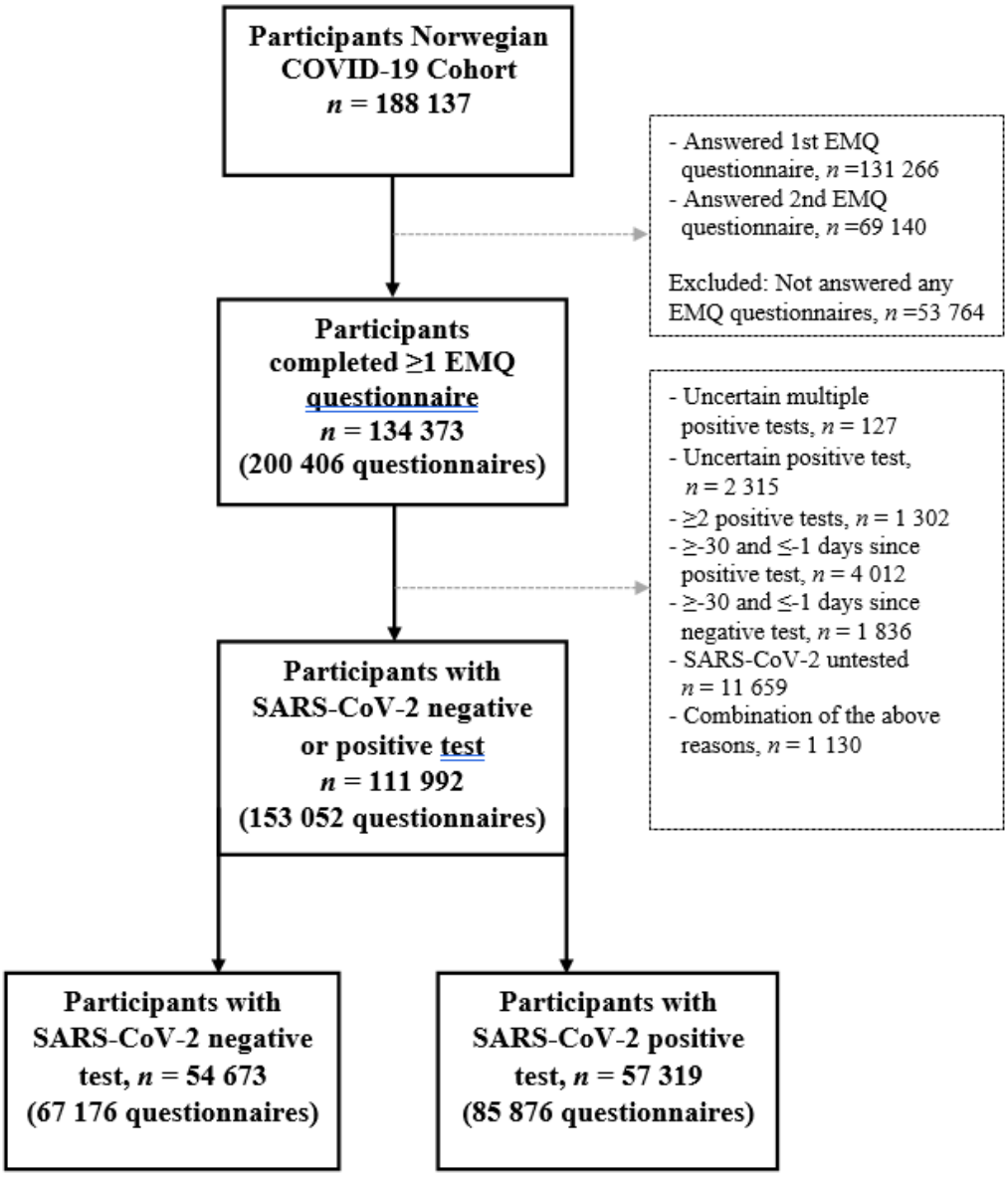
The correlation between measurements from the same participant was accommodated with the inclusion of a random intercept in the linear regression model. The random intercept model assumes heterogeneity in the participants' underlying risk of having a given EMQ-score which persists over all answered questionnaires (i.e., the model assumes and accommodates dependence in the EMQ-score within individuals), however, given the random intercept the EMQ-score is assumed independent. The mean EMQ-score was calculated as estimated marginal means (STATA command margins SARS-CoV-2 test status (positive/negative) x months since test (>1 month prior to test, 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-15, 15-16, 16-17, 17-18, >18) based on the linear mixed effects model. This results in the mean EMQ-score per SARS-CoV-2 test status by months since test, adjusted for age, body mass index, sex, vaccination status, smoking, income, questionnaire sequence, and underlying medical conditions, accommodating the dependence in the EMQ-score within individuals. Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.

## Methods 5. Limitations.

Limitations of the current study include the lower response rate of the second EMQ-questionnaire compared to the first EMQ-questionnaire which could have led to response bias

between those who responded and those who did not respond. For example, if participants who have memory problems are more likely to respond to both EMQ-questionnaires, the estimated prevalence will be higher than the true prevalence. Another limitation is the self-report in the EMQ-questionnaires, which could have led to information/recall bias. However, we do think that this possible misclassification is non-differential between participants with a SARS-COV-2-positive test and negative test.

## Figure S1. Flow chart of the study participants.



## Table S1. Frequency distribution and mean values of covariates by SARS-CoV-2 status.

| **Characteristics**[a] | **SARS-CoV-2-positive (n=57 319)** | **SARS-CoV-2-negative (n=54 673)** |
|---|---|---|
| **Time from EMQ to SARS-CoV-2-test (days)**[b] Median (IQR)[c] | 49 (247) | 175 (314) |
| Time prior to a SARS-CoV-2-test Median (IQR) | -80 (125) | -40 (12) |
| Time after a SARS-CoV-2-test | 145 (174) | 204 (303) |
| **Age (years)** Mean (SD) | 48 (13.0) | 50 (13.8) |
| | **n (%)** | |
| **Sex** | | |
| men | 16 196 (28) | 17 314 (32) |
| women | 41 025 (72) | 37 337 (68) |
| **Body mass index (kg/m$^2$)** | | |
| <25 | 25 955 (45) | 23 263 (43) |
| 25-29.9 | 18 861 (33) | 18 532 (34) |
| >30 | 9 278 (16) | 9 355 (17) |
| **Vaccination status** | | |
| No | 11 725 (20) | 9 492 (17) |
| Yes | 45 592 (80) | 45 181 (83) |
| **Income (NOK per household and year)** | | |
| < 299 999 | 1 626 (3) | 2 160 (4) |
| 300 000-599 999 | 8 899 (15) | 10 773 (20) |
| 600 000-1000 000 | 16 371 (29) | 16 001 (29) |
| >1000 000 | 26 286 (46) | 21 270 (39) |
| **Smoking status** | | |
| Never | 30 099 (53) | 26 648 (49) |
| Former | 20 966 (37) | 20 119 (37) |

| | | |
|---|---|---|
| Current | 3 084 (5) | 4 383 (8) |
| Vaper | 533 (1) | 616 (1) |
| **Underlying medical conditions[d]** | | |
| No | 39 991 (70) | 35 896 (66) |
| Yes | 14 610 (25) | 15 738 (29) |

[a]The percentage of missing data in the covariates by SARS-CoV-2-status (positive/negative); age (0.17/0.04), sex (0.17/0.04), body mass index (6/6), income (7/8), smoking status (4/5), underlying medical conditions (5/5).
[b]Time since test is defined as the time from a SARS-CoV-2 test to completing the EMQ-questionnaire. 4 012 SARS-CoV-2-positives and 1 836 negatives with an EMQ-measurement from 1 month before the test up to test date were excluded.
[c]Median and interquartile range for all assessments of time since test for each participant, here demonstrated by the median time before (seen as >1 month prior to test in Figure 1) and the median time after the test (seen as 0->18 months after the test in Figure 1).
[d]Chronic heart disease, high blood pressure, chronic lung disease (not asthma), asthma, diabetes, receiving immunodeficiency treatment, cancer (under treatment).

Table S2. Frequency distribution and mean values of covariates in the parent cohort (n=188 137), participants who completed the Everyday Memory Questionnaire (EMQ, n=134 373) and the current study cohort (n=111 992).

| **Characteristics**[a] | **Parent cohort (n=188 137)** | **Completed EMQ (n=134 373)** | **The current analysis (n=111 992)** |
|---|---|---|---|
| **Age (years)** Mean (SD) | 48 (14.0) | 50 (13.6) | 49 (13.4) |
| | | **n (%)** | |
| **Sex** | | | |
| men | 60 127 (32) | 41 187 (31) | 33 510 (30) |
| women | 122 862 (68) | 93 038 (69) | 78 362 (70) |
| **Body mass index (kg/m$^2$)** | | | |
| <25 | 85 133 (45) | 58 627 (44) | 49 218 (44) |
| 25-29.9 | 63 048 (34) | 45 031 (33) | 37 393 (33) |
| >30 | 30 901 (16) | 22 480 (17) | 18 633 (17) |
| **Vaccination status** | | | |
| No | 52 514 (28) | 25 041 (19) | 21 217 (19) |
| Yes | 135 623 (72) | 109 332 (81) | 90 773 (81) |
| **Income (NOK per household and year)** | | | |
| < 299 999 | 7 416 (4) | 4 750 (4) | 3 786 (3) |
| 300 000-599 999 | 32 083 (17) | 24 331 (18) | 19 672 (18) |
| 600 000-1000 000 | 49 652 (27) | 39 040 (29) | 32 372 (29) |
| >1000 000 | 70 165 (37) | 55 768 (41) | 47 556 (42) |
| **Smoking status** | | | |
| Never | 96 708 (52) | 67 296 (50) | 56 747 (51) |
| Former | 68 433 (36) | 49 647 (37) | 41 085 (37) |
| Current | 13 485 (7) | 9 249 (7) | 7 467 (7) |
| Vaper | 2 101 (1) | 1 441(1) | 1 149 (1) |

| | | | |
|---|---|---|---|
| **Underlying medical conditions[b]** | | | |
| No | 130 381 (69) | 90 063 (67) | 75 887 (68) |
| Yes | 50 198 (27) | 37 275 (28) | 30 348 (27) |

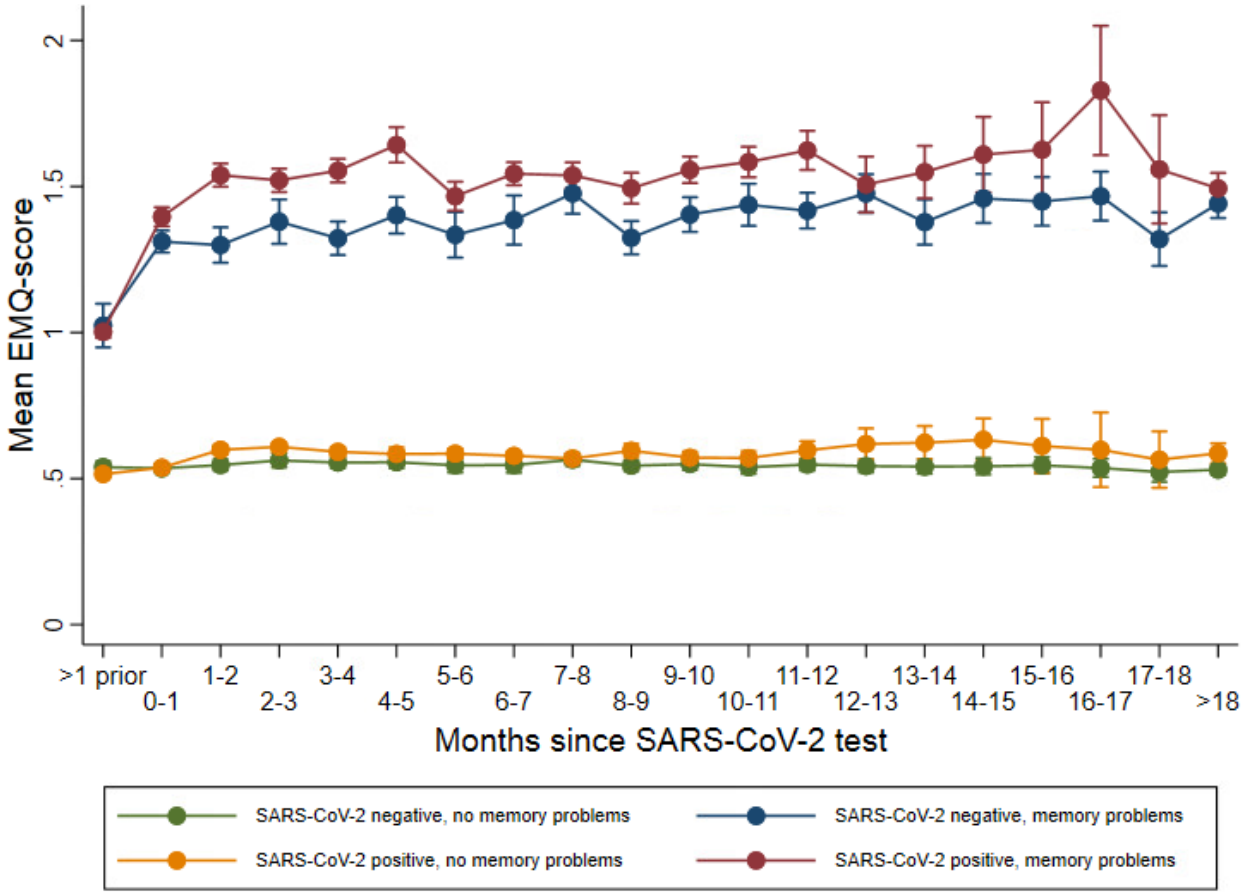
[a] The percentage of missing data in the covariates by SARS-CoV-2-status (parent cohort/completed EMQ/current analysis); age (0.08/0.11/0.11),.sex (0.08/0.11/0.11), body mass index (5/6/6), vaccination status (0/0/0), income (15/8/8), smoking status (4/5/5), underlying medical conditions (4/5/5).
[b]Chronic heart disease, high blood pressure, chronic lung disease (not asthma), asthma, diabetes, receiving immunodeficiency treatment, cancer (under treatment).

## Table S3. Mean scores[a] and 95 % confidence intervals[b] of pre- and post-morbid assessments of Everyday Memory Questionnaire (EMQ)[c] in SARS-CoV-2 positive and negative participants[d].

| SARS-CoV-2 status | Everyday Memory Questionnaire Score (Mean, 95% CI)[c] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Months since test[d] | | | | | | | |
| | >1 prior | 0-1 | >1-3 | >3-6 | >6-9 | >9-12 | >12-18 | >18-36 |
| Positive (n=57 319) | 30 278[e] | 9 451 | 11 264 | 11 455 | 13 023 | 6 601 | 1 871 | 1 933 |
| Mean, 95 % CI | 0.61 (0.60-0.62) | 0.66 (0.65-0.67) | 0.74 (0.73-0.75) | 0.72 (0.71-0.73) | 0.71 (0.70-0.73) | 0.75 (0.73-0.76) | 0.82 (0.79-0.85) | 0.82 (0.79-0.85) |
| Negative (n=54 673) | 3 954 | 12 120 | 7 169 | 10 844 | 9 068 | 8 832 | 10 300 | 4 889 |
| Mean, 95 % CI | 0.60 (0.58-0.62) | 0.60 (0.58-0.61) | 0.62 (0.60-0.63) | 0.62 (0.60-0.63) | 0.62 (0.61-0.64) | 0.63 (0.61-0.64) | 0.62 (0.61-0.63) | 0.62 (0.60-0.64) |

[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60) body mass index (<25m/kg2, 25-29.9, >=30), sex (men, women), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]4 012 SARS-CoV-2-positives and 1 836 negatives with an EMQ-measurement from 1 month before the test up to test date were excluded. There were 57 319 SARS-CoV-2-positives and 54 673 negatives with a total of 153 052 questionnaires.
[e]Number of questionnaires.

## Figure S2. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] in SARS-CoV-2 positive and negative participants by memory problems[d] and months since SARS-CoV-2 test[e].



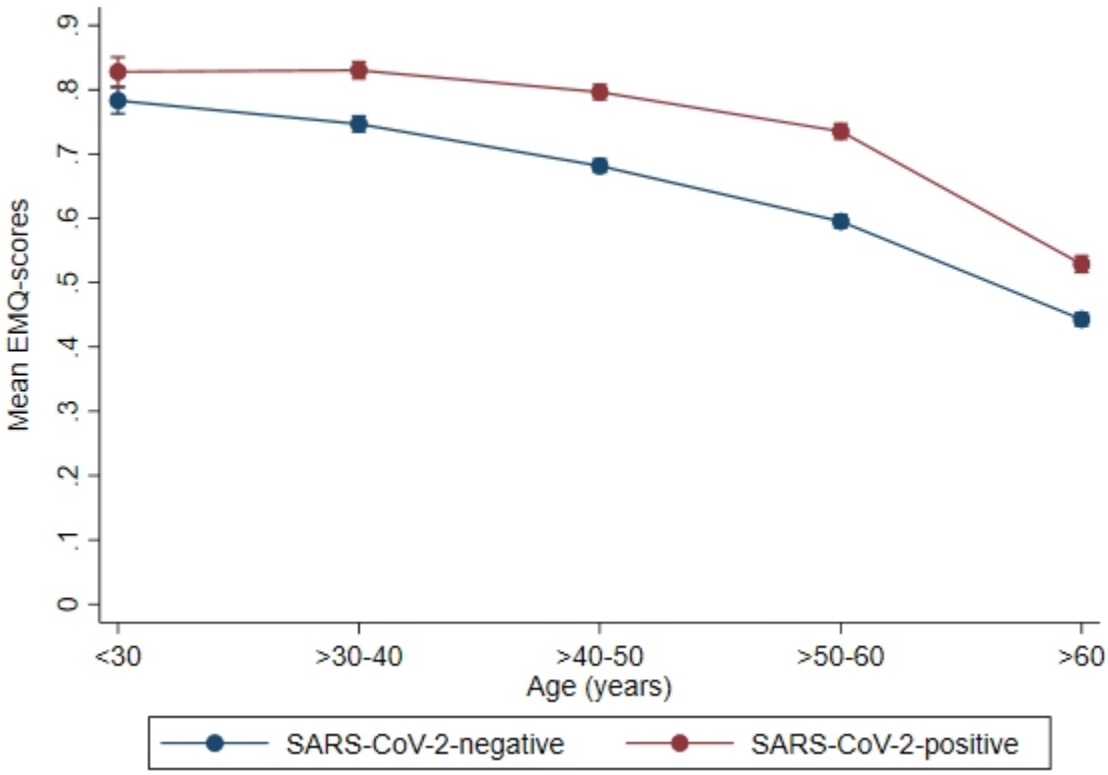

[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60) body mass index (<25m/kg$^2$, 25-29.9, >=30), sex (men, women), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]Self-reported memory problems (0=no, 1=yes) after the SARS-CoV-2 test. 1229 participants reporting memory problems before the SARS-CoV-2 test were excluded. There were 110 763 participants with a total of 151 014 questionnaires.
[e]4 012 SARS-CoV-2-positives and 1 836 negatives with an EMQ-measurement from 1 month before the test up to test date were excluded.

## Table S4. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] in SARS-CoV-2-positives by bedridden time.

| | Bedridden time by days[d] | | | |
|---|---|---|---|---|
| | 0 | 1-6 | >6-13 | >13 |
| SARS-CoV-2-positives, mean EMQ-scores and 95 % confidence intervals[c] | 0.60 (0.59-0.61) | 0.79 (0.79-0.80) | 1.11 (1.08-1.15) | 1.29 (1.23-1.34) |

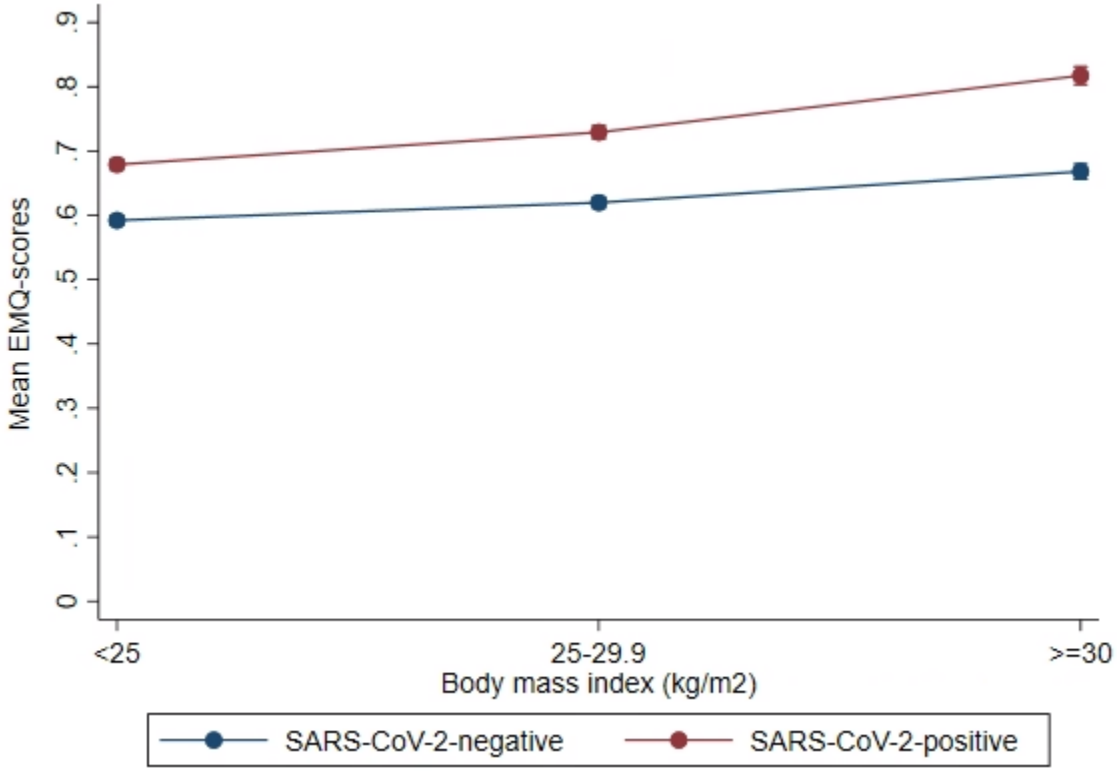
[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60) body mass index (<25m/kg$^2$, 25-29.9, >=30), sex (men, women), days since test (continuous), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]Bedridden days were divided into 0=no bedridden days due to COVID-19, 1=1-6 days due to COVID-19, 2= >7-13 days due to COVID-19, 3= 14 days and more. Of the SARS-CoV-2-positives 23 885 had no bedridden days, 26 897 had 1-6 days, 2 489 had >6-13 days and 880 had >13 days.

## Figure S3. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] in participants 0-36 months after SARS-CoV-2 positive and negative test[d] by age.



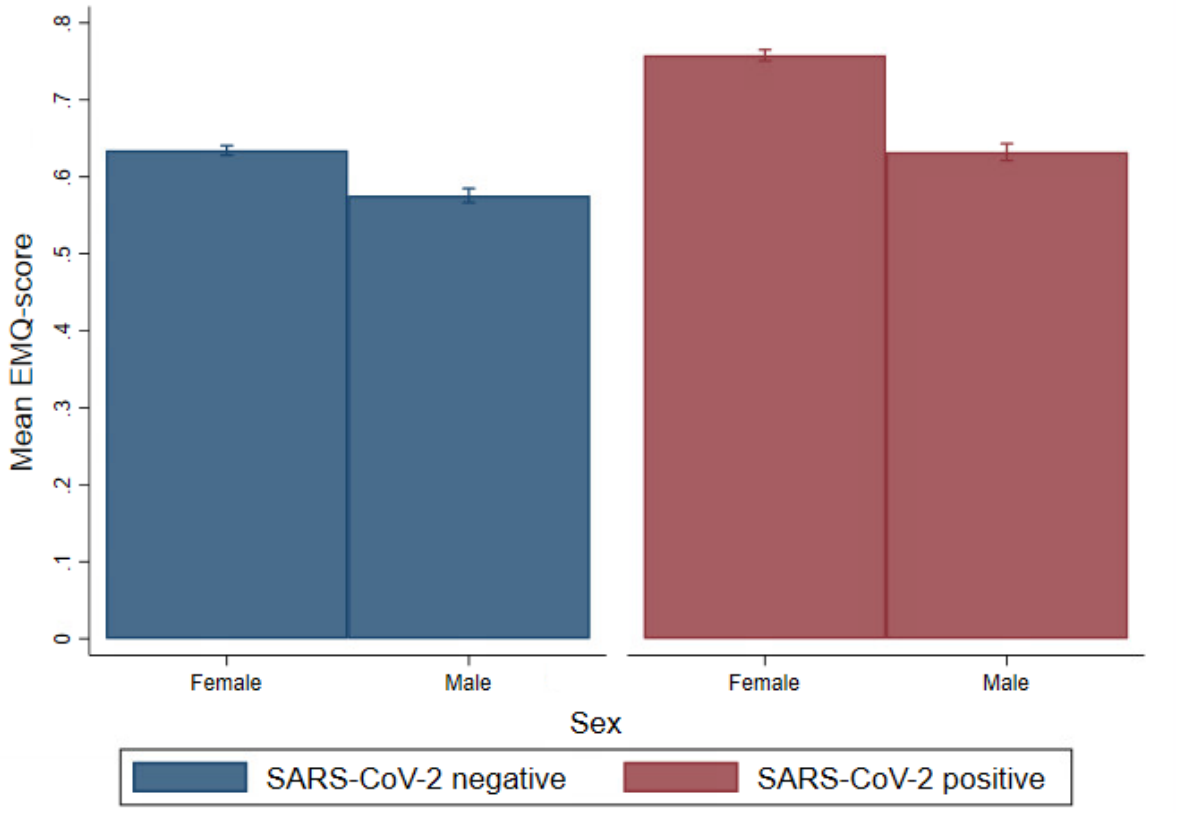

[a]Adjusted for body mass index (<25m/kg$^2$, 25-29.9, >=30), sex (men, women), days since test (continuous), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]Participants (n=106 672) with EMQ-score 0-36 months after a SARS-CoV-2 positive (55 598 questionnaires) and/or negative (84 274 questionnaires) test. Based on data organized as in Figure S7 and Table S6.

## Figure S4. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] in participants 0-36 months after SARS-CoV-2 positive and negative test[d] by body mass index.




[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60), sex (men, women), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]Participants (n=106 672) with EMQ-score 0-36 months after a SARS-CoV-2 positive (55 598 questionnaires) and/or negative (84 274 questionnaires) test. Based on data organized as in Figure S7 and Table S6.

## Figure S5. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] in participants 0-36 months after SARS-CoV-2 positive and negative test[d] by sex.




[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60), body mass index (<25m/kg$^2$, 25-29.9, >=30), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]Participants (n=106 672) with EMQ-score 0-36 months after a SARS-CoV-2 positive (55 598 questionnaires) and/or negative (84 274 questionnaires) test. Based on data organized as in Figure S7 and Table S6.

## Table S5. Mean scores[a] and 95 % confidence intervals[b] of pre- and post-morbid assessments of the different questions of the Everyday Memory Questionnaire (EMQ)[c] in SARS-CoV-2 positive (n=57 319) and negative participants (n=54 673)[d].

| SARS-CoV-2 status | Everyday Memory Questionnaire Score (Mean, 95% CI)[c] | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Months since test[d] | | | | | | | |
| | >1 prior | 0-1 | >1-3 | >3-6 | >6-9 | >9-12 | >12-18 | >18-36 |
| Q1-Q13 Total score | | | | | | | | |
| Positive, Mean, 95 % CI | 0.59 (0.58-0.60) | 0.70 (0.69-0.72) | 0.76 (0.75-0.78) | 0.73 (0.71-0.74) | 0.72 (0.71-0.73) | 0.77 (0.75-0.79) | 0.87 (0.83-0.91) | 0.86 (0.82-0.89) |
| Negative, Mean, 95 % CI | 0.64 (0.62-0.66) | 0.60 (0.59-0.61) | 0.63 (0.62-0.65) | 0.65 (0.64-0.66) | 0.62 (0.61-0.64) | 0.62 (0.60-0.63) | 0.61 (0.59-0.62) | 0.59 (0.57-0.61) |
| Q1 Having to check whether you have done something | | | | | | | | |
| Positive, Mean, 95 % CI | 1.36 (1.34-1.37) | 1.43 (1.41-1.46) | 1.53 (1.50-1.55) | 1.48 (1.45-1.50) | 1.44 (1.42-1.46) | 1.53 (1.50-1.56) | 1.62 (1.56-1.69) | 1.59 (1.53-1.66) |
| Negative, Mean, 95 % CI | 1.46 (1.42-1.50) | 1.34 (1.31-1.36) | 1.40 (1.37-1.43) | 1.42 (1.40-1.45) | 1.37 (1.35-1.40) | 1.35 (1.32-1.38) | 1.32 (1.29-1.34) | 1.28 (1.24-1.32) |
| Q2 Forgetting when it was that something happened | | | | | | | | |
| Positive, Mean, 95 % CI | 0.84 (0.83-0.86) | 0.97 (0.95-1.00) | 1.06 (1.04-1.09) | 1.01 (0.98-1.03) | 1.00 (0.98-1.02) | 1.05 (1.02-1.08) | 1.16 (1.10-1.22) | 1.13 (1.07-1.19) |
| Negative, Mean, 95 % CI | 0.90 (0.86-0.94) | 0.87 (0.85-0.89) | 0.92 (0.89-0.95) | 0.95 (0.93-0.98) | 0.89 (0.87-0.92) | 0.90 (0.87-0.92) | 0.87 (0.85-0.90) | 0.84 (0.81-0.87) |
| Q3 Forgetting that you were told something yesterday | | | | | | | | |
| Positive, Mean, 95 % CI | 0.68 (0.67-0.69) | 0.81 (0.79-0.83) | 0.89 (0.87-0.91) | 0.85 (0.83-0.87) | 0.84 (0.82-0.86) | 0.91 (0.88-0.94) | 1.01 (0.96-1.07) | 1.01 (0.96-1.07) |
| Negative, Mean, 95 % CI | 0.76 (0.72-0.79) | 0.70 (0.68-0.72) | 0.72 (0.70-0.75) | 0.77 (0.75-0.79) | 0.74 (0.71-0.76) | 0.73 (0.71-0.75) | 0.71 (0.69-0.73) | 0.67 (0.64-0.70) |
| Q4 Starting to read something you have read before | | | | | | | | |
| Positive, Mean, 95 % CI | 0.19 (0.18-0.20) | 0.30 (0.29-0.32) | 0.34 (0.33-0.36) | 0.31 (0.30-0.33) | 0.31 (0.30-0.33) | 0.35 (0.33-0.37) | 0.44 (0.39-0.48) | 0.44 (0.40-0.49) |
| Negative, Mean, 95 % CI | 0.23 (0.21-0.25) | 0.21 (0.20-0.22) | 0.21 (0.19-0.22) | 0.22 (0.21-0.24) | 0.23 (0.21-0.24) | 0.23 (0.21-0.24) | 0.22 (0.21-0.24) | 0.21 (0.20-0.23) |
| Q5 Finding that a word is 'on the tip of your tongue' | | | | | | | | |
| Positive, Mean, 95 % CI | 1.36 (1.35-1.37) | 1.38 (1.35-1.41) | 1.60 (1.58-1.63) | 1.56 (1.53-1.58) | 1.55 (1.53-1.57) | 1.61 (1.58-1.64) | 1.69 (1.62-1.75) | 1.72 (1.65-1.78) |
| Negative, Mean, 95 % CI | 1.33 (1.29-1.37) | 1.33 (1.31-1.35) | 1.37 (1.34-1.40) | 1.38 (1.36-1.41) | 1.40 (1.38-1.43) | 1.43 (1.40-1.45) | 1.42 (1.39-1.44) | 1.47 (1.43-1.50) |
| Q6 Completely forgetting to do things you said you would | | | | | | | | |

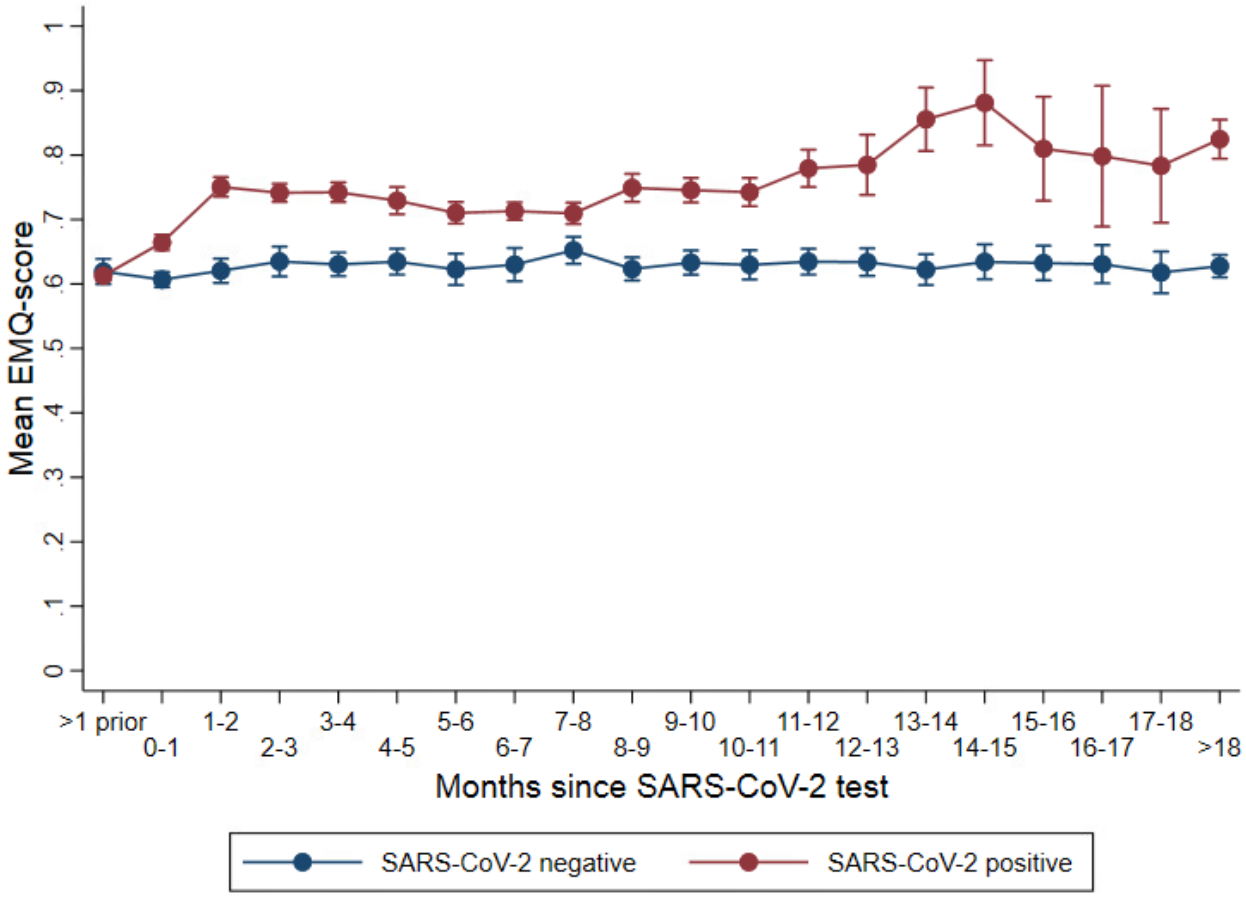
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Positive, Mean, 95 % CI | 0.55 (0.54-0.56) | 0.68 (0.66-0.70) | 0.71 (0.70-0.73) | 0.68 (0.66-0.70) | 0.68 (0.66-0.70) | 0.74 (0.71-0.76) | 0.87 (0.81-0.92) | 0.81 (0.76-0.86) |
| Negative, Mean, 95 % CI | 0.59 (0.56-0.62) | 0.55 (0.53-0.57) | 0.58 (0.56-0.61) | 0.61 (0.59-0.63) | 0.57 (0.55-0.59) | 0.56 (0.54-0.58) | 0.54 (0.52-0.56) | 0.51 (0.48-0.53) |
| Q7 Forgetting important details of what you did | | | | | | | | |
| Positive, Mean, 95 % CI | 0.31 (0.30-0.32) | 0.44 (0.42-0.46) | 0.49 (0.47-0.50) | 0.45 (0.43-0.47) | 0.44 (0.42-0.45) | 0.49 (0.47-0.51) | 0.58 (0.53-0.63) | 0.57 (0.52-0.62) |
| Negative, Mean, 95 % CI | 0.36 (0.33-0.39) | 0.33 (0.32-0.35) | 0.35 (0.33-0.37) | 0.38 (0.36-0.39) | 0.36 (0.35-0.38) | 0.36 (0.34-0.37) | 0.37 (0.35-0.38) | 0.36 (0.34-0.38) |
| Q8 When talking to someone, forgetting what you just said | | | | | | | | |
| Positive, Mean, 95 % CI | 0.44 (0.43-0.45) | 0.58 (0.56-0.60) | 0.63 (0.61-0.65) | 0.57 (0.56-0.59) | 0.58 (0.56-0.60) | 0.63 (0.60-0.65) | 0.74 (0.69-0.79) | 0.72 (0.67-0.77) |
| Negative, Mean, 95 % CI | 0.50 (0.47-0.53) | 0.44 (0.42-0.45) | 0.48 (0.46-0.50) | 0.49 (0.47-0.51) | 0.47 (0.45-0.49) | 0.45 (0.43-0.47) | 0.45 (0.43-0.47) | 0.41 (0.39-0.44) |
| Q9 When reading a paper, being unable to follow the story | | | | | | | | |
| Positive, Mean, 95 % CI | 0.34 (0.33-0.35) | 0.49 (0.47-0.51) | 0.50 (0.48-0.51) | 0.45 (0.43-0.47) | 0.46 (0.44-0.48) | 0.50 (0.48-0.53) | 0.61 (0.56-0.66) | 0.56 (0.52-0.61) |
| Negative, Mean, 95 % CI | 0.39 (0.37-0.42) | 0.35 (0.34-0.37) | 0.38 (0.36-0.40) | 0.40 (0.38-0.42) | 0.37 (0.35-0.39) | 0.36 (0.35-0.38) | 0.36 (0.35-0.38) | 0.33 (0.31-0.36) |
| Q10 Forgetting to tell somebody something important | | | | | | | | |
| Positive, Mean, 95 % CI | 0.47 (0.46-0.48) | 0.60 (0.58-0.62) | 0.64 (0.62-0.66) | 0.62 (0.60-0.63) | 0.61 (0.60-0.63) | 0.68 (0.66-0.70) | 0.75 (0.71-0.80) | 0.73 (0.68-0.77) |
| Negative, Mean, 95 % CI | 0.53 (0.51-0.56) | 0.47 (0.45-0.48) | 0.51 (0.49-0.53) | 0.53 (0.51-0.55) | 0.49 (0.47-0.50) | 0.47 (0.45-0.49) | 0.47 (0.45-0.48) | 0.43 (0.40-0.45) |
| Q11 Getting the details mixed up (of what someone told you) | | | | | | | | |
| Positive, Mean, 95 % CI | 0.34 (0.34-0.35) | 0.45 (0.43-0.47) | 0.49 (0.47-0.51) | 0.48 (0.47-0.50) | 0.49 (0.47-0.50) | 0.51 (0.48-0.53) | 0.60 (0.56-0.65) | 0.57 (0.53-0.61) |
| Negative, Mean, 95 % CI | 0.37 (0.35-0.40) | 0.35 (0.34-0.36) | 0.38 (0.36-0.40) | 0.40 (0.39-0.42) | 0.37 (0.36-0.39) | 0.37 (0.35-0.38) | 0.37 (0.36-0.39) | 0.35 (0.33-0.38) |
| Q12 Forgetting where things are normally kept | | | | | | | | |
| Positive, Mean, 95 % CI | 0.39 (0.38-0.40) | 0.47 (0.45-0.48) | 0.49 (0.48-0.51) | 0.47 (0.45-0.49) | 0.44 (0.43-0.46) | 0.49 (0.47-0.51) | 0.59 (0.54-0.64) | 0.59 (0.54-0.63) |
| Negative, Mean, 95 % CI | 0.47 (0.45-0.50) | 0.43 (0.41-0.44) | 0.45 (0.43-0.47) | 0.46 (0.44-0.48) | 0.43 (0.41-0.45) | 0.43 (0.41-0.44) | 0.43 (0.41-0.44) | 0.41 (0.39-0.44) |
| Q13 Repeating to someone what you have just told them | | | | | | | | |
| Positive, Mean, 95 % CI | 0.38 (0.37-0.39) | 0.46 (0.45-0.48) | 0.49 (0.47-0.50) | 0.46 (0.45-0.48) | 0.45 (0.44-0.47) | 0.49 (0.47-0.51) | 0.59 (0.54-0.63) | 0.55 (0.51-0.59) |
| Negative, Mean, 95 % CI | 0.41 (0.38-0.43) | 0.36 (0.35-0.37) | 0.40 (0.38-0.42) | 0.41 (0.39-0.42) | 0.39 (0.37-0.40) | 0.38 (0.37-0.40) | 0.37 (0.35-0.38) | 0.34 (0.32-0.36) |

[a]Unadjusted, raw mean scores

[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]4 012 SARS-CoV-2-positives and 1 836 negatives with an EMQ-measurement from 1 month before the test up to test date were excluded. There were 57 319 SARS-CoV-2-positives and 54 673 negatives with a total of 153 052 questionnaires.

## Sensitivity analyses

Figure S6. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] in SARS-CoV-2 positive and negative participants by months since SARS-CoV-2 test[d] where missing was included as a category in covariates.




[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60, missing) body mass index (<25m/kg$^2$, 25-29.9, >=30, missing), sex (men, women, missing), vaccination status (no, yes), smoking status (never, former, current, vaper, missing), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000, missing), questionnaire number (1,2) and underlying medical conditions (no, yes, missing).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]4 012 SARS-CoV-2-positives and 1 836 negatives with an EMQ-measurement from 1 month before the test up to test date were excluded. There were 57 319 SARS-CoV-2-positives and 54 673 negatives with a total of 153 052 questionnaires.

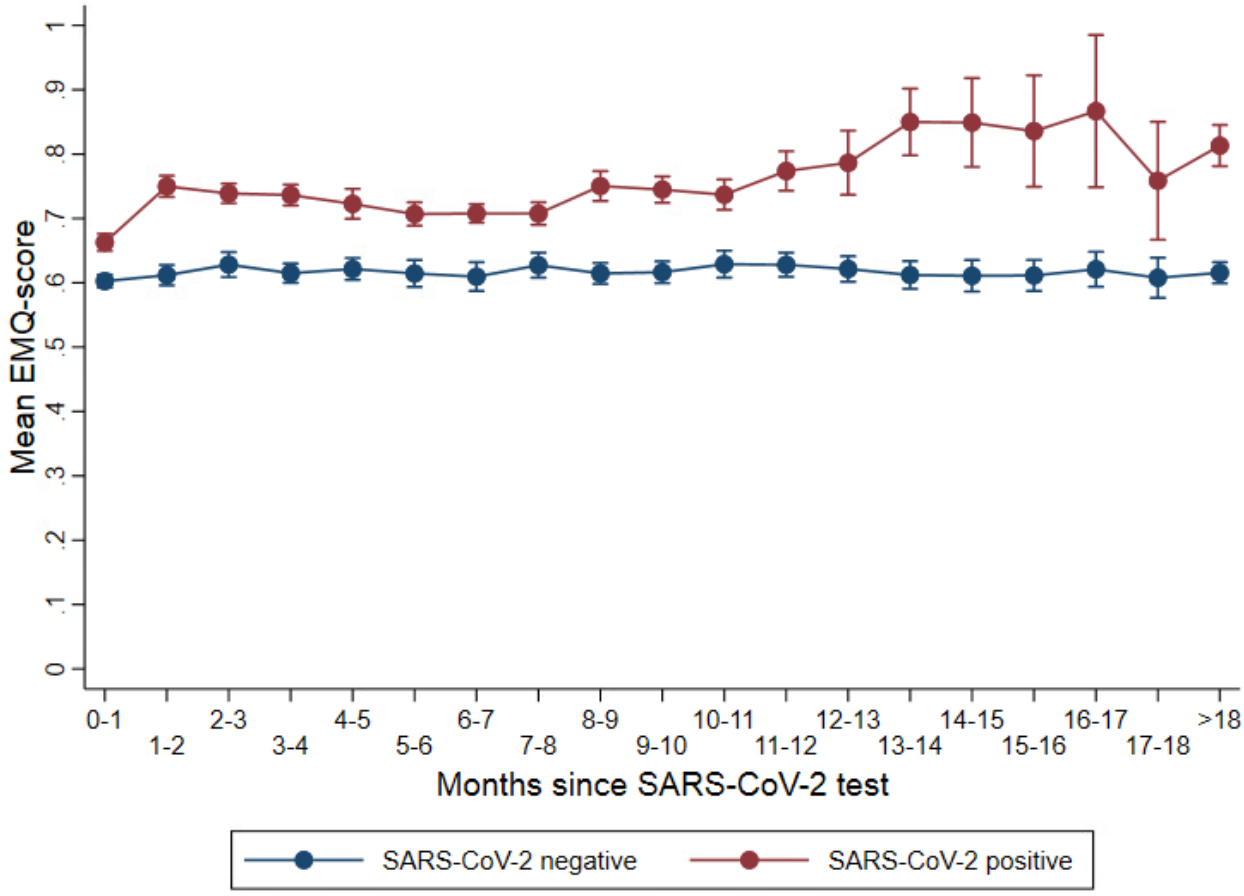
Table S6. Frequency distribution and mean values of covariates by SARS-CoV-2 status including missing indicators.

| **Characteristics** | **SARS-CoV-2-positive (n=57 319)** | **SARS-CoV-2-negative (n=54 673)** |
|---|---|---|
| **Time from EMQ to a SARS-CoV-2-test (days)**[a] Median (IQR)[b] | 49 (247) | 175 (314) |
| Time prior to a SARS-CoV-2-test Median (IQR) | -80 (125) | -40 (12) |
| Time after a SARS-CoV-2-test | 145 (174) | 204 (303) |
| **Age (years)** Mean (SD) | 48 (13.0) | 50 (13.8) |
| | **n (%)** | |
| **Sex** | | |
| men | 16 196 (28) | 17 314 (32) |
| women | 41 025 (72) | 37 337 (68) |
| Missing | 98 (0.17) | 22 (0.04) |
| **Body mass index (kg/m$^2$)** | | |
| <25 | 25 955 (45) | 23 263 (43) |
| 25-29.9 | 18 861 (33) | 18 532 (34) |
| >30 | 9 278 (16) | 9 355 (17) |
| Missing | 3 225 (6) | 3 523 (6) |
| **Vaccination status** | | |
| No | 11 725 (20) | 9 492 (17) |
| Yes | 45 592 (80) | 45 181 (83) |
| Missing | 2 (0) | 0 |
| **Income (NOK per household and year)** | | |
| < 299 999 | 1 626 (3) | 2 160 (4) |
| 300 000-599 999 | 8 899 (15) | 10 773 (20) |
| 600 000-1000 000 | 16 371 (29) | 16 001 (29) |
| >1000 000 | 26 286 (46) | 21 270 (39) |

| | | |
|---|---|---|
| Missing | 4 137 (7) | 4 469 (8) |
| **Smoking status** | | |
| Never | 30 099 (53) | 26 648 (49) |
| Former | 20 966 (37) | 20 119 (37) |
| Current | 3 084 (5) | 4 383 (8) |
| Vaper | 533 (1) | 616 (1) |
| Missing | 2 637 (4) | 2 907 (5) |
| **Underlying medical conditions[c]** | | |
| No | 39 991 (70) | 35 896 (66) |
| Yes | 14 610 (25) | 15 738 (29) |
| Missing | 2 718 (5) | 3 039 (5) |

[a]Time since test is defined as the time from a SARS-CoV-2 test to completing the EMQ-questionnaire. 4 012 SARS-CoV-2-positives and 1 836 negatives with an EMQ-measurement from 1 month before the test up to test date were excluded.
[b]Median and interquartile range for all assessments of time since test for each participant, here demonstrated by the median time before (seen as >1 month prior to test in Figure 1) and the median time after the test (seen as 0->18 months after the test in Figure 1).
[c]Chronic heart disease, high blood pressure, chronic lung disease (not asthma), asthma, diabetes, receiving immunodeficiency treatment, cancer (under treatment).

Figure S7. Mean scores[a] and 95 % confidence intervals[b] of Everyday Memory Questionnaire (EMQ)[c] 0-36 months after SARS-CoV-2 positive and/or negative test[d] by months since SARS-CoV-2 test.




[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60) body mass index (<25m/kg$^2$, 25-29.9, >=30), sex (men, women), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]Participants (n=106 672) with EMQ-score 0-36 months after a SARS-CoV-2 positive (55 598 questionnaires) and/or negative (84 274 questionnaires) test. Participants could contribute with data both as negative AND positive, i.e. 21 052 questionnaires contributing with EMQ-score before positive test (>1 month prior) in Figure 1, S2, S6 and Table S1, S2, S3, S5 contribute here with EMQ score 0-36 months after a negative test.

## Table S7. Mean scores[a] and 95 % confidence intervals[b] of post-morbid assessments of Everyday Memory Questionnaire (EMQ)[c] in participants with a SARS-CoV-2 positive and/or negative test[d].

| SARS-CoV-2 status | Everyday Memory Questionnaire Score (Mean, 95% CI) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Months since test | | | | | | |
| | 0-1 | 1-3 | 3-6 | 6-9 | 9-12 | 12-18 | 18-36 |
| Positive[d] | 9 451[e] | 11 264 | 11 455 | 13 023 | 6 601 | 1 871 | 1 933 |
| Mean, 95 % CI | 0.66 (0.65-0.67) | 0.74 (0.73-0.76) | 0.72 (0.71-0.74) | 0.72 (0.71-0.73) | 0.75 (0.74-0.76) | 0.82 (0.79-0.85) | 0.82 (0.78-0.85) |
| Negative[d] | 17 832 | 10 219 | 15 492 | 11 551 | 11 072 | 12 808 | 5 300 |
| Mean, 95 % CI | 0.60 (0.59-0.61) | 0.62 (0.60-0.63) | 0.62 (0.61-0.63) | 0.62 (0.61-0.63) | 0.62 (0.61-0.63) | 0.61 (0.60-0.62) | 0.61 (0.60-0.63) |

[a]Adjusted for age (<30, 30-39, 40-49, 50-59, >=60) body mass index (<25m/kg$^2$, 25-29.9, >=30), sex (men, women), vaccination status (no, yes), smoking status (never, former, current, vaper), income (<299 999 NOK, 300 000-599 999, 600 000-1000 000, >1000 000), questionnaire number (1,2) and underlying medical conditions (no, yes).
[b]Confidence interval widths have not been adjusted for multiplicity and should not be used in place of hypothesis testing.
[c]Each item is scored on a 5-point rating scale (0 to 4), based on frequency of reported difficulty. Higher scores indicate more reported difficulties.
[d]The number used in analyses comparing participants (n=106 672) with EMQ-score 0-36 months after a SARS-CoV-2 positive (55 598 questionnaires) and/or negative (84 274 questionnaires) test. Participants could contribute with data both as negative AND positive, i.e. 21 052 questionnaires contributing with EMQ-score before positive test (>1 month prior) in Figure 1, S2, S6 and Table S1, S2, S3, S5 contribute here with EMQ score 0-36 months after a negative test.
[e]Number of questionnaires.

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