ORCHESTRA\_WP3.4 Variables for RQ 2, 3 & 4

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# Objectives of the Research Questions (RQ)

**RQ2**: To evaluate the associations between sleep disturbances and multiple Covid-19 infections as well as to mental health symptoms.

**Specific hypothesis under RQ2**: Sleep disturbances are associated with multiple Covid-19 infections and the association is mediated by mental health symptoms.

**RQ3.1**: To explore mental health symptoms (depression, anxiety, stress, loneliness) and evaluate the association with resilience capacity as well as with long-COVID symptoms.

**Specific hypothesis under RQ3.1**: Mental health symptoms are associated long-COVID symptoms and the association is mediated by resilience capacity.

**RQ3.2**: Does socio-economic status influence the relationship of mental health symptoms and long-COVID symptoms?

**Specific hypothesis under RQ3.2**: Mental health symptoms are associated with long-COVID and the association is mediated by socio-economic status.

**RQ4:** To evaluate the association of mistrust and hesitancy in Covid-19 vaccination with vaccination status and long-COVID symptoms.

**Specific hypothesis under RQ4:** Vaccine hesitancy and mistrust in research are associated with long-COVID and the association is mediated by vaccine status.

# Data

Prospective data used from ORCHESTRA-EUROPE. Longitudinal data is needed for the descriptive tables (if available).

## Variables needed for the Main Analysis

Listing of variables and names of these variables in dataset and RCode.

### Outcomes

* Total number of Covid-19 infections: *“nbCovInfections”*
* Total number of Long Covid symptoms: *“LongCovidSeverity”*

### Mediators

* Depression (Center for Epidemiologic Studies Depression Scale (CES-D Scale)): *“CES\_D\_SCALE\_CES\_D”*
* Depression (major depressive disorder (MDD)): *“MDD”*
* Anxiety (Generalized Anxiety Disorder 7-item (GAD-7) scale): *“GAD\_7\_SCALE\_GAD\_7”*
* Perceived Stress (Perceived Stress Scale - 4 Item version): *“PERCEIVED\_STRESS\_SCALE\_PSS”*
* Loneliness (UCLA Loneliness Scale-short version): *“UCLA\_LONELINESS\_SCALE\_UCLA”*
* Resilience (Brief Resilience Scale (BRS)): *“BRIEF\_RESILIENCE\_SCORE\_BRS”*
* Vaccination status: *“VACCINATION\_STATUS”*

### Independent Variables

* Categories of sleep duration: *“SLEEP\_ACTUALHOURS.cat”*
* Categories of sleep efficiency: *“SLEEP\_EFFICIENCY.cat”*
* Categories of sleep disturbance: *“SLEEP\_DISTURBANCE.cat”*
* Categories of daytime dysfunction: *“DAYTIME\_DYSFUNCTION.cat”*
* Categories of sleep latency: *“SLEEP\_LATENCY.cat”*
* Short Pittsburgh Sleep Quality Index (PSQI) score: *“PSQI\_score”*
* Categories of short PSQI: *“PSQI\_score.cat”*
* Vaccine hesitancy: *“VACCINATION\_HESITANCY”*
* Vaccine mistrust: *“VACCINATION\_MISTRUST”*

### Characteristics

* Sex (Female/ Male/ Prefer not to say): *“DEMOGRAPHICS\_45”*
* Age (numeric): *“DEMOGRAPHICS\_46”*
* Hours of Physical activity per week (numeric): *“physical.activity”*
* Smoking (No/ Yes): *“smoking.status”*
* Migration status (second generation immigrant/ first generation immigrant/ native born) : *“migration.status”*
* Work status (Employed/ Retired/ Unemployed): *“work.status”*
* Education (Less than basic/ Basic/ Intermediate/ Advanced/ Other type of degree): *“education”*

## Variables needed for Descriptive tables

If possible, data of questionnaires performed since December 2021 until beginning of 2023; One column for each visit/ questionnaire.

* *“VISIT”*: a variable is needed that represents for which visit/ questionnaire the data of the participants is from

### Baseline characteristics

* *“DEMOGRAPHICS\_45”*: Sex
* *“DEMOGRAPHICS\_46”*: Age
* *“DEMOGRAPHICS\_47”*: Marital Status
* *“education”*: Education
* *“DEMOGRAPHICS\_61”*: Employment Status
* *“work.status”*: Work Status
* *“migration.status”*: Migration Status
* *“physical.activity”*: Hours of Physical Activity per week
* *“smoking.status”*: Smoking Status
* *“nbCovInfections”*: Number of Covid-19 infections
* *“nbCovInfections.cat”*: Number of Covid-19 infections (numbers as factors)

### Sleep

* *“SLEEP\_TIMETOSLEEP”*: Time to sleep in minutes
* *“SLEEP\_EFFICIENCY”*: Sleep efficiency
* *“SLEEP\_EFFICIENCY.cat”*: Sleep efficiency (categorized)
* *“SLEEP\_ACTUALHOURS”*: Actual hours of sleep per night
* *“SLEEP\_ACTUALHOURS.cat”*: Actual hours of sleep per night (categorized)

**During the past month, how often have you had trouble sleeping because you** Possible answers: Not during the past month/ Less than once a week/ Once or twice a week/ Three of more times a week

* *“SLEEP\_PROBLEMS\_TIME”*: Cannot sleep within 30 minutes
* *“SLEEP\_PROBLEMS\_WAKINGUP”*: Wake-up in the middle of the night or early morning
* *“SLEEP\_PROBLEMS\_BREATHING”*: Cannot breathe comfortably
* *“SLEEP\_PROBLEMS\_COUGH\_SNORE”*: Cough or snore loudly
* *“SLEEP\_PROBLEMS\_FEELING\_HOT”*: Feel too hot
* *“SLEEP\_PROBLEMS\_BAD\_DREAMS”*: Have bad dreams
* *“SLEEP\_PROBLEMS\_PAIN”*: Have pains

**During the past month, how often have you had trouble staying awake**

* *“SLEEP\_TROUBLE\_STAYINGAWAKE”*: Staying awake while driving, eating meals, or engaging in social activity

**How much of a problem has it been for you to**

* *“SLEEP\_LACKING\_ENTHUSIASM”*: Keep up enthusiasm to get things done
* *“SLEEP\_DISTURBANCE.cat”*: Sleep disturbance (categorized)
* *“DAYTIME\_DYSFUNCTION.cat”*: Daytime dysfunction (categorized)
* *“SLEEP\_LATENCY.cat”*: Sleep latency (categorized)
* *“PSQI\_score”*: PSQI score
* *“PSQI\_score.cat”*: PSQI score (categorized)

### Psychological Scales

#### Depression

**How often have you felt this way during the past week?**  
Possible answers: Rarely or None of the time (less than 1 day)/ Some or a Little of the time (1 - 2 days)/ Occasionally or a moderate amount of time (3 - 4 days)/ Most or All of the time (5 - 7 days)

* *“CES.D\_204”*: Bothered by things that usually do not bother me
* *“CES.D\_205”*: I felt fearful
* *“CES.D\_206”*: I did not feel like eating; my appetite was poor
* *“CES.D\_207”*: Could not shake off blues even with help from family and friends
* *“CES.D\_208”*: Felt that I was just as good as other people
* *“CES.D\_209”*: Trouble keeping my mind on what I was doing
* *“CES.D\_210”*: Felt depressed
* *“CES.D\_211”*: Felt that everything I did was an effort
* *“CES.D\_212”*: Felt hopeful about the future
* *“CES.D\_213”*: Thought my life had been a failure
* *“CES.D\_214”*: My sleep was restless
* *“CES.D\_215”*: Could not get ‘going’
* *“CES.D\_216”*: Was happy
* *“CES.D\_217”*: Talked less than usual
* *“CES.D\_218”*: Felt lonely
* *“CES.D\_219”*: People were unfriendly
* *“CES.D\_220”*: Enjoyed life
* *“CES.D\_221”*: Had crying spells
* *“CES.D\_222”*: Felt sad
* *“CES.D\_223”*: Felt like people dislike me
* *“CES\_D\_SCALE\_CES\_D”*: CES-D score

#### Anxiety

**Over the last 2 weeks, how often have you been bothered by the following problems?**  
Possible answers: Not at all/ Several days/ More than half the days/ Nearly every day

* *“GAD.7\_SCALE\_224”*: Feeling nervous, anxious, or on edge
* *“GAD.7\_SCALE\_225”*: Not being able to stop or control worrying
* *“GAD.7\_SCALE\_226”*: Worrying to much about different things
* *“GAD.7\_SCALE\_227”*: Trouble relaxing
* *“GAD.7\_SCALE\_228”*: Being so restless that it is hard to sit still
* *“GAD.7\_SCALE\_229”*: Becoming easily annoyed or irritable
* *“GAD.7\_SCALE\_230”*: Feeling afraid as if something awful might happen
* *“GAD\_7\_SCALE\_GAD\_7”*: GAD - 7 score

#### Perceived Stress

**The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate with a check how often you felt or thought a certain way.**  
Possible answers: Never, almost never, sometimes, fairly often, very often

* *“LN\_66822\_8”*: Unable to control the important things in your life?
* *“LN\_66824\_4”*: Confident about your ability to handle your personal problems?
* *“LN\_66825\_1”*: Things were going your way?
* *“LN\_66830\_1”*: Difficulties were piling up so high that you could not overcome them?
* *“PERCEIVED\_STRESS\_SCALE\_PSS”*: PSS scale

#### Loneliness

**The next questions are about how you feel about different aspects of your life. For each one, tell how often you feel that way.**  
Possible answers: Hardly ever or never/ Some of the time/ Often

* *“UCLA\_LONELINESS\_SCALE.SHORT\_VERSION\_231”*: Lack companionship
* *“UCLA\_LONELINESS\_SCALE.SHORT\_VERSION\_232”*: Left out
* *“UCLA\_LONELINESS\_SCALE.SHORT\_VERSION\_233”*: Isolated from others
* *“UCLA\_LONELINESS\_SCALE\_UCLA”*: UCLA score

#### Resilience

**Please indicate the extent to which you agree with each of the following statements by using the following scale:**  
Possible answers: Strongly disagree/ Disagree/ Neutral/ Agree/ Strongly agree

* *“BRS\_238”*: Tend to bounce back quickly after times
* *“BRS\_239”*: Have hard time making it through stressful events
* *“BRS\_240”*: Does not take long to recover from a stressful event
* *“BRS\_241”*: Hard to snap back when something bad happens
* *“BRS\_242”*: Usually come through difficult times with little trouble
* *“BRS\_243”*: Tend to take a long time to get over set-backs in life
* *“BRIEF\_RESILIENCE\_SCORE\_BRS”*: BRS score

## Data Manipulation/ Derivation

### Outcome: Number of Covid-19 Infections *“nbCovInfections”*

* The total number of Covid-19 infections for each participant at a timepoint close to end 2022 and beginning of 2023.

Participants had to answer the following question in the ORCHESTRA questionnaire:  
*3.1 Until today, have you ever tested positive for the Coronavirus (Sars-Cov-2)?*  
If this question was answered with *Yes*, then the participants were able to include the dates of the positive tests:  
*If ‘1 – Yes’ to 3.1, Please indicate the date of the positive test (if had multiple positive tests please add the date of each positive test)*.

As the mediation analysis will be cross-sectional, we will use the questionnaire timepoint that is closest to December 2022/ January 2023. Though for the derivation of number of Covid-19 infections, information of previous questionnaire timepoints should be taken into account (if available). All dates of positive test should be considered as a Covid-19 infection if the duration between the dates are equal or more than 90 days apart.  
If information of previous studies are available, e.g. self-reported dates, PCR tests or antibody tests, this information, and in best case the dates of these tests, should be taken into account as well.

### Outcome: Number of Long-Covid Symptoms *“LongCovidSeverity”*

The number of Long-Covid symptoms was counted for *“LongCovidSeverity”*.

Within the last seven days have you had any of these symptoms (that you did not experience before onset of your SARS-CoV-2 infection)? (yes/no)

* *“SCT\_267036007\_LUX”*: Difficulty breathing or shortness of breath
* *“SCT\_84229001\_367391008\_LUX”*: Tiredness or fatigue
* *“LN\_75325\_1\_worsening”*: Symptoms that get worse after physical or mental activities
* *“SCT\_40917007\_LUX”*: Altered consciousness and/or confusion
* *“SCT\_49727002\_LUX”*: Cough
* *“SCT\_21522001\_LUX”*: Abdominal pain
* *“SCT\_25064002\_LUX”*: Headache
* *“SCT\_248657009”*: Fast-beating or pounding heart (also known as heart palpitations)
* *“SCT\_68962001\_LUX”*: Joint pain
* *“SCT\_57676002\_LUX”*: Muscle pain
* *“SCT\_62507009”*: Tingling feeling/ *pins and needles*
* *“SCT\_62315008\_LUX”*: Diarrhoea
* *“SCT\_106168000”*: Problems sleeping
* *“SCT\_404640003”*: Dizziness/light headedness
* *“SCT\_271807003\_LUX”*: Skin rash
* *“SCT\_44169009\_LUX”*: Change in smell
* *“SCT\_36955009\_271801002\_LUX”*: Change in taste

**Based on these questions asked, the following variables were derived:**

* *“symptoms\_breath”* = *“SCT\_267036007\_LUX”*
* *“symptoms\_tired”* = *“SCT\_84229001\_367391008\_LUX”*
* *“symptoms\_activity”* = *“LN\_75325\_1\_worsening”*
* *“symptoms\_headache\_consciousness”*: *“SCT\_40917007\_LUX”* AND/OR *“SCT\_25064002\_LUX”*
* *“symptoms\_cough”* = *“SCT\_49727002\_LUX”*
* *“symptoms\_abdominalpain\_diarrhoea”* = *“SCT\_21522001\_LUX”* AND/OR *“SCT\_62315008\_LUX”*
* *“symptoms\_palpitations”* = *“SCT\_248657009”*
* *“symptoms\_joint\_muscle\_pain”* = *“SCT\_68962001\_LUX”* AND/OR *“SCT\_57676002\_LUX”*
* *“symptoms\_tingling”* = *“SCT\_62507009”*
* *“symptoms\_sleep”* = *“SCT\_106168000”*
* *“symptoms\_dizziness”* = *“SCT\_404640003”*
* *“symptoms\_rash”* = *“SCT\_271807003\_LUX”*
* *“symptoms\_smell\_taste”* = *“SCT\_44169009\_LUX”* AND/OR *“SCT\_36955009\_271801002\_LUX”*

For the variable *“LongCovidSeverity”* each *yes* was counted as one symptom so that *“LongCovidSeverity”* ranges between a count of 0 and 13.

### Mediators

#### Depresssion

*“CES\_D\_SCALE\_CES\_D”*: Center for Epidemiologic Studies Depression Scale (CES-D Scale) for Depression with a score ranging from 0 to 60 (higher scores indicating the presence of more symptomatology for depression) using the sum following variables for the score:

* *“CES.D\_204”*: Bothered by things that usually do not bother me
* *“CES.D\_205”*: I felt fearful
* *“CES.D\_206”*: I did not feel like eating; my appetite was poor
* *“CES.D\_207”*: Could not shake off blues even with help from family and friends
* *“CES.D\_208”*: Felt that I was just as good as other people
* *“CES.D\_209”*: Trouble keeping my mind on what I was doing
* *“CES.D\_210”*: Felt depressed
* *“CES.D\_211”*: Felt that everything I did was an effort
* *“CES.D\_212”*: Felt hopeful about the future
* *“CES.D\_213”*: Thought my life had been a failure
* *“CES.D\_214”*: My sleep was restless
* *“CES.D\_215”*: Could not get ‘going’
* *“CES.D\_216”*: Was happy
* *“CES.D\_217”*: Talked less than usual
* *“CES.D\_218”*: Felt lonely
* *“CES.D\_219”*: People were unfriendly
* *“CES.D\_220”*: Enjoyed life
* *“CES.D\_221”*: Had crying spells
* *“CES.D\_222”*: Felt sad
* *“CES.D\_223”*: Felt like people dislike me

**With the answers scored as:**  
- Rarely or None of the time (less than 1 day) –> 0  
- Some or a Little of the time (1 - 2 days) –> 1  
- Occasionally or a moderate amount of time (3 - 4 days) –> 2  
- Most or All of the time (5 - 7 days) –> 3

**Reverse order of score applied to *“CES.D\_208”*, *“CES.D\_212”*, *“CES.D\_216”*, *“CES.D\_220”*.**

#### Depression (major depressive disorder (MDD)): “MDD”

Harmonization of Mini (DSM-V) and CES-D:

The proposed scoring of the answers is:  
- Rarely or none of the time (less than one day) = 0  
- Some or a little of the time (1-2 days) = 0  
- Occasionally or a moderate amount of time (3-4 days) = 1  
- Most or all of the time (5-7 days) = 1

*“CES.D\_208”*, *“CES.D\_212”*, *“CES.D\_216”*, *“CES.D\_220”* are reverse scored as follows: - Most or all of the time (5-7 days) = 0  
- Occasionally or a moderate amount of time (3-4 days) = 0  
- Some or a little of the time (1-2 days) = 1  
- Rarely or none of the time (less than 1 day) = 1

**Needed variables**:

* *“DepressedMood”*: IF (rowMeans(*“CES.D\_207”*, *“CES.D\_210”*, *“CES.D\_212”*, *“CES.D\_213”*, *“CES.D\_216”*, *“CES.D\_222”*)) >= 0.5 –> 1 ELSE 0
* *“DecreasedInterestPleasure”*: IF (rowMeans(*“CES.D\_204”*, *“CES.D\_220”*)) >= 0.5 –> 1 ELSE 0
* *“FatigueLossEnergy”*: IF (rowMeans(*“CES.D\_211”*, *“CES.D\_215”*)) >= 0.5 –> 1 ELSE 0
* *“ChangesWeightAppetite”*: *“CES.D\_206”*
* *“DiminishedConcentration”*: *“CES.D\_209”*
* *“ChangesSleep”*: *“CES.D\_214”*
* *“Worthlessness”*: IF (rowMeans(*“CES.D\_208”*, *“CES.D\_218”*, *“CES.D\_219”*, *“CES.D\_223”*)) >= 0.5 –> 1 ELSE 0
* *“AgitationRetardation”*: IF (rowMeans(*“CES.D\_205”*, *“CES.D\_217”*, *“CES.D\_221”*)) >= 0.5 –> 1 ELSE 0

##### For Lifelines data

* *“DepressedMood”*: 1. In the last 7/14 days have you felt low or depressed for much of the day, every day?
* *“DecreasedInterestPleasure”*: 2. In the last 7/14 days have you had the feeling that you’ve lost interest in or the will to do things you are normally interested in?
* *“FatigueLossEnergy”*: 9. Did you feel tired or without energy almost every day? (In the last 14 days)
* *“ChangesWeightAppetite”*: 3. Did your appetite change noticeably, or did your weight increase or decrease without this being intended? (In the last 7/14 days)
* *“DiminishedConcentration”*: 7. Was it difficult to concentrate or make decisions almost every day? (In the last 7/14 days)
* *“ChangesSleep”*: 4. Have you had problems sleeping almost every night (difficulty falling asleep, waking up in the night or too early in the morning, or actually sleeping too much)? (In the last 7/14 days)
* *“Worthlessness”*: 6. Did you feel worthless or guilty almost every day? (In the last 7/14 days)
* *“AgitationRetardation”*: 5. Did you speak or move more slowly than normal? Or did you feel restless, jittery and could barely sit still? Nearly every day? (In the last 7/14 days)

**ORCHESTRA/LIFELINES ADAPTED**: For a diagnosis of MDD, at least 4 items out of 8 must be present and at least one of the symptoms must be (1) depressed mood or (2) diminished interest or pleasure.

* IF((*“DepressedMood”* = 1 OR *“DecreasedInterestPleasure”* = 1) & SUM(*“DepressedMood”*, *“DecreasedInterestPleasure”*, *“FatigueLossEnergy”*, *“ChangesWeightAppetite”*, *“DiminishedConcentration”*, *“ChangesSleep”*, *“Worthlessness”*, *“AgitationRetardation”*) >= 4) –> *“MDD”* = Yes
* ELSE –> *“MDD”* = No

#### Anxiety

*“GAD\_7\_SCALE\_GAD\_7”*: Generalized Anxiety Disorder 7-item (GAD-7) scale for Anxiety with a score ranging from 0 to 14 (higher scores indicating a more severe anxiety) using the sum following variables for the score:

* *“GAD.7\_SCALE\_224”*: Feeling nervous, anxious, or on edge
* *“GAD.7\_SCALE\_225”*: Not being able to stop or control worrying
* *“GAD.7\_SCALE\_226”*: Worrying to much about different things
* *“GAD.7\_SCALE\_227”*: Trouble relaxing
* *“GAD.7\_SCALE\_228”*: Being so restless that it is hard to sit still
* *“GAD.7\_SCALE\_229”*: Becoming easily annoyed or irritable
* *“GAD.7\_SCALE\_230”*: Feeling afraid as if something awful might happen
* *“GAD\_7\_SCALE\_GAD\_7”*: GAD - 7 score

**With the answers scored as:**  
- Not at all –> 0  
- Several days –> 1  
- More than half the days –> 2  
- Nearly every day –> 3

#### Perceived Stress

*“PERCEIVED\_STRESS\_SCALE\_PSS”*: Perceived Stress Scale (PSS) scale for Perceived Stress with a score ranging from 0 to 16 (higher scores indicating a higher stress level) using the sum following variables for the score:

* *“LN\_66822\_8”*: Unable to control the important things in your life?
* *“LN\_66824\_4”*: Confident about your ability to handle your personal problems?
* *“LN\_66825\_1”*: Things were going your way?
* *“LN\_66830\_1”*: Difficulties were piling up so high that you could not overcome them?

**With the answers scored as:**  
- Never –> 0  
- Almost never –> 1  
- Sometimes –> 2  
- Fairly often –> 3  
- Very often –> 4

**Reverse order of score applied to *“LN\_66824\_4”*, *“LN\_66825\_1”*.**

#### Loneliness

*“UCLA\_LONELINESS\_SCALE\_UCLA”*: UCLA Loneliness Scale for Loneliness with a score ranging from 0 to 9 (higher scores indicating higher level of loneliness) using the sum following variables for the score:

* *“UCLA\_LONELINESS\_SCALE.SHORT\_VERSION\_231”*: Lack companionship
* *“UCLA\_LONELINESS\_SCALE.SHORT\_VERSION\_232”*: Left out
* *“UCLA\_LONELINESS\_SCALE.SHORT\_VERSION\_233”*: Isolated from others

**With the answers scored as:**  
- Hardly ever or never –> 1  
- Some of the time –> 2  
- Often –> 3

#### Resilience

*“BRIEF\_RESILIENCE\_SCORE\_BRS”*: Brief Resilience Scale (BRS) for Resilience with a score ranging from 6 to 30 (higher scores indicating a higher resilience) using the sum following variables for the score:

* *“BRS\_238”*: Tend to bounce back quickly after times
* *“BRS\_239”*: Have hard time making it through stressful events
* *“BRS\_240”*: Does not take long to recover from a stressful event
* *“BRS\_241”*: Hard to snap back when something bad happens
* *“BRS\_242”*: Usually come through difficult times with little trouble
* *“BRS\_243”*: Tend to take a long time to get over set-backs in life

**With the answers scored as:**  
- Strongly disagree –> 1  
- Disagree –> 2  
- Neutral –> 3  
- Agree –> 4  
- Strongly agree –> 5

**Reverse order of score applied to *“BRS\_239”*, *“BRS\_241”*, *“BRS\_243”*.**

#### Vaccination Status

* *“VACCINATION\_STATUS\_369”*: Have you already been vaccinated against COVID-19?

*“VACCINATION\_STATUS”*:

* If *“VACCINATION\_STATUS\_369”* = Yes –> *“VACCINATION\_STATUS”* = Yes
* If *“VACCINATION\_STATUS\_369”* = No –> *“VACCINATION\_STATUS”* = No

### Independet variables

#### Sleep duration “SLEEP\_ACTUALHOURS.cat”

Sleep duration (*“SLEEP\_ACTUALHOURS”*) is defined as the total time of sleep (in hours) and is categorized into the four following categories:

* *“SLEEP\_ACTUALHOURS”* 7 hours –> *“SLEEP\_ACTUALHOURS.cat”* = 0
* *“SLEEP\_ACTUALHOURS”* 6 & *“SLEEP\_ACTUALHOURS”* 7 –> *“SLEEP\_ACTUALHOURS.cat”* = 1
* *“SLEEP\_ACTUALHOURS”* 5 & *“SLEEP\_ACTUALHOURS”* 6 –> *“SLEEP\_ACTUALHOURS.cat”* = 2
* *“SLEEP\_ACTUALHOURS”* 5 hours –> *“SLEEP\_ACTUALHOURS.cat”* = 3

#### Sleep efficiency “SLEEP\_EFFICIENCY.cat”

Sleep efficiency is defined as sleep duration (in hours) divided by hours in bed times 100%.  
SleepEfficiency = (SleepDuration / HoursInBed) \* 100%  
*“SLEEP\_EFFICIENCY”* = (*“SLEEP\_ACTUALHOURS”* / *“HOURS\_IN\_BED”*) \* 100

*“HOURS\_IN\_BED”* = (*“SLEEP\_GETUPTIME”* - *“SLEEP\_INDEX”*)/(60\*60)  
Please perform quality checks on times!

***“SLEEP\_EFFICIENCY.cat”*: The percentage can be categorized as following:**

* *“SLEEP\_EFFICIENCY”* 85% –> *“SLEEP\_EFFICIENCY.cat”* = 0
* *“SLEEP\_EFFICIENCY”* 75% & *“SLEEP\_EFFICIENCY”* < 85% –> *“SLEEP\_EFFICIENCY.cat”* = 1
* *“SLEEP\_EFFICIENCY”* 65% & *“SLEEP\_EFFICIENCY”* < 75% –> *“SLEEP\_EFFICIENCY.cat”* = 2
* *“SLEEP\_EFFICIENCY”* < 65% –> *“SLEEP\_EFFICIENCY.cat”* = 3

#### Sleep disturbance “SLEEP\_DISTURBANCE.cat”

The sleep disturbance variable *“SLEEP\_DISTURBANCE”* is a score based on the following questions:

* *“SLEEP\_PROBLEMS\_WAKINGUP”*: During the past month, how often have you had trouble sleeping because you wake up in the middle of the night or early morning.
* *“SLEEP\_PROBLEMS\_BREATHING”*: During the past month, how often have you had trouble sleeping because you have cannot breathe comfortably.
* *“SLEEP\_PROBLEMS\_COUGH\_SNORE”*: During the past month, how often have you had trouble sleeping because you cough or snore loudly.
* *“SLEEP\_PROBLEMS\_FEELING\_HOT”*: During the past month, how often have you had trouble sleeping because you feel too hot.
* *“SLEEP\_PROBLEMS\_BAD\_DREAMS”*: During the past month, how often have you had trouble sleeping because you have bad dreams.
* *“SLEEP\_PROBLEMS\_PAIN”*: During the past month, how often have you had trouble sleeping because you have pain.

**The answers of the questions should be scored as following:**

* Not during past month –> 0
* Less than once a week –> 1
* Once or twice a week –> 2
* Three or more times a week –> 3

**The sum of scores of these questions can then be categorized as following:**

* *“SLEEP\_DISTURBANCE”* = 0 –> *“SLEEP\_DISTURBANCE.cat”* = 0
* *“SLEEP\_DISTURBANCE”* 1 & *“SLEEP\_DISTURBANCE”* 6 –> *“SLEEP\_DISTURBANCE.cat”* = 1
* *“SLEEP\_DISTURBANCE”* > 6 & *“SLEEP\_DISTURBANCE”* 12 –> *“SLEEP\_DISTURBANCE.cat”* = 2
* *“SLEEP\_DISTURBANCE”* > 12 –> *“SLEEP\_DISTURBANCE.cat”* = 3

#### Daytime dysfunction “DAYTIME\_DYSFUNCTION.cat”

The daytime dysfunction variable (*“DAYTIME\_DYSFUNCTION”*) is based on the following questions:

* *“SLEEP\_TROUBLE\_STAYINGAWAKE”*: During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?
* *“SLEEP\_LACKING\_ENTHUSIASM”*: During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

**The answers of the questions should be scored as following:**

* No problem at all –> 0
* Only a very slight problem –> 1
* Somewhat of a problem –> 2
* A very big problem –> 3

**The sum of score of these questions can be categorized as following:**

* *“DAYTIME\_DYSFUNCTION”* = 0 –> 0
* *“DAYTIME\_DYSFUNCTION”* 1 & *“DAYTIME\_DYSFUNCTION”* 2 –> *“DAYTIME\_DYSFUNCTION.cat”* = 1
* *“DAYTIME\_DYSFUNCTION”* > 2 & *“DAYTIME\_DYSFUNCTION”* 4 –> *“DAYTIME\_DYSFUNCTION.cat”* = 2
* *“DAYTIME\_DYSFUNCTION”* > 4 & *“DAYTIME\_DYSFUNCTION”* 6 –> *“DAYTIME\_DYSFUNCTION.cat”* = 3

#### Sleep latency “SLEEP\_LATENCY.cat”

The sleep latency variable *“SLEEP\_LATENCY”* is based on the following questions:

* *“SLEEP\_TIMETOSLEEP”*: During the past month, how long (in minutes) has it usually taken you to fall asleep each night?
* *“SLEEP\_PROBLEMS\_TIME”*: During the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes

**Categorization of *“SLEEP\_TIMETOSLEEP”***:

* *“SLEEP\_TIMETOSLEEP”* < 15 minutes –> 0
* *“SLEEP\_TIMETOSLEEP”* 15 & *“SLEEP\_TIMETOSLEEP”* < 30 minutes –> 1
* *“SLEEP\_TIMETOSLEEP”* 30 & *“SLEEP\_TIMETOSLEEP”* < 60 minutes –> 2
* *“SLEEP\_TIMETOSLEEP”* 60 minutes –> 3

**Categorization of *“SLEEP\_PROBLEMS\_TIME”***:

* Not during past month –> 0
* Less than once a week –> 1
* Once or twice a week –> 2
* Three or more times a week –> 3

**The sum of score of these two questions can be categorized as following:**

* *“SLEEP\_LATENCY”* = 0 –> 0
* *“SLEEP\_LATENCY”* > 0 & *“SLEEP\_LATENCY”* 2 –> *“SLEEP\_LATENCY.cat”* = 1
* *“SLEEP\_LATENCY”* > 2 & *“SLEEP\_LATENCY”* 4 –> *“SLEEP\_LATENCY.cat”* = 2
* *“SLEEP\_LATENCY”* > 4 & *“SLEEP\_LATENCY”* 6 –> *“SLEEP\_LATENCY.cat”* = 3

#### PSQI Score “PSQI\_score”

Sum of score of *“SLEEP\_ACTUALHOURS.cat”*, *“SLEEP\_EFFICIENCY.cat”*, *“SLEEP\_DISTURBANCE.cat”*, *“DAYTIME\_DYSFUNCTION.cat”* and *“SLEEP\_LATENCY.cat”*.

#### Categorise of PSQI Score “PSQI\_score.cat”

Categorized version of *“PSQI\_score”*:

* *“PSQI\_score”* 4 –> *“PSQI\_score.cat”* = Poor sleep quality
* *“PSQI\_score”* 4 –> *“PSQI\_score.cat”* = Good sleep quality

#### Vaccine hesitancy “VACCINATION\_HESITANCY”

* *“VACCINATION\_STATUS\_369”*: Have you already been vaccinated against COVID-19?
* *“VACCINATION\_HESITANCY\_416”*: Will you agree to get vaccinated against COVID-19 when it is your turn?

*“VACCINATION\_HESITANCY”*:

* *“VACCINATION\_STATUS\_369”* = Yes –> *“VACCINATION\_HESITANCY”* = No
* *“VACCINATION\_HESITANCY\_416”* = I don’t know yet OR Rather unlikely OR Very unlikely –> *“VACCINATION\_HESITANCY”* = Yes

#### Vaccine mistrust “VACCINATION\_MISTRUST”

2.7 Why are you undecided about getting vaccinated against COVID-19?

* *“VACCINATION\_HESITANCY\_425”*: I do not believe in vaccinations in general
* *“VACCINATION\_HESITANCY\_426”*: I also do not get vaccinated against other diseases
* *“VACCINATION\_HESITANCY\_427”*: I have had bad experiences with other vaccinations
* *“VACCINATION\_HESITANCY\_428”*: I do not feel well enough informed about vaccinations in general
* *“VACCINATION\_HESITANCY\_429”*: I do not feel well enough informed about COVID-19 vaccinations
* *“VACCINATION\_HESITANCY\_433”*: I am sceptical that the COVID-19 vaccine really protects
* *“VACCINATION\_HESITANCY\_435”*: I think that the vaccine has not been tested sufficiently

2.9 why do you think it is unlikely for you to agree to get vaccinated against COVID-19?

* *“VACCINATION\_HESITANCY\_437”*: I do not believe in vaccinations in general
* *“VACCINATION\_HESITANCY\_438”*: I also do not get vaccinated against other diseases
* *“VACCINATION\_HESITANCY\_439”*: I have had bad experiences with other vaccinations
* *“VACCINATION\_HESITANCY\_440”*: I do not feel well enough informed about vaccinations in general
* *“VACCINATION\_HESITANCY\_441”*: I do not feel well enough informed about COVID-19 vaccinations
* *“VACCINATION\_HESITANCY\_445”*: I am sceptical that the COVID-19 vaccine really protects
* *“VACCINATION\_HESITANCY\_447”*: I think that the vaccine has not been tested sufficiently

*“VACCINATION\_MISTRUST”*:  
If any of the above questions was answered with “yes” –> *“VACCINATION\_MISTRUST”* = Yes ELSE No

### Characterictis

#### Sex “DEMOGRAPHICS\_45”

Sex was not specifically asked in the ORCHESTRA questionnaires, though if information of sex exists in previous questionnaires of these participants, please use this information.

*“DEMOGRAPHICS\_45”*: sex is categorized into:

* Female
* Male
* Prefer not to say (*optional*)

#### Age “DEMOGRAPHICS\_46”

Age was not specifically asked in the ORCHESTRA questionnaires, though if information of age exists in previous questionnaires of these participants, please use this information.  
*“DEMOGRAPHICS\_46”*: Age in years.

#### Physical Activity “physical.activity”

Hours of physical activity per week (inside and outside). If participants answered, that they do not perform any exercise, 0 hours were set.

* *“EXERCISE\_STATUS\_126”*: Do you exercise during the Coronavirus pandemic?
* *“EXERCISE\_STATUS\_127”*: How many hours per week do you exercise during the Coronavirus pandemic? Inside
* *“EXERCISE\_STATUS\_128”*: How many hours per week do you exercise during the Coronavirus pandemic? Outside

**The variable *“physical.activity”* can be derived as:**

* *“physical.activity”* = *“EXERCISE\_STATUS\_127”* + *“EXERCISE\_STATUS\_128”*
* *“EXERCISE\_STATUS\_126”* = No –> *“physical.activity”* = 0

#### Smoking Status “smoking.status”

*“SCT\_365981007\_LUX”*: \*Do you currently smoke? If not, please elaborate.

Smoking *“SCT\_365981007\_LUX”* is categorized to *“smoking.status”* *Yes* and *No*.

* *“SCT\_365981007\_LUX”* = Yes –> *“smoking.status”* = Yes
* *“SCT\_365981007\_LUX”* = No, I stopped smoking during the pandemic (March 2020 – until now) OR  
  *“SCT\_365981007\_LUX”* = No, but I am a former smoker OR  
  *“SCT\_365981007\_LUX”* = No and I never smoked OR  
  *“SCT\_365981007\_LUX”* = No, but I live with someone who smokes  
  –> *“smoking.status”* = No

#### Migration “migration.status”

*“LN\_89089\_7”*: What is your migration status?

For migration status *“migration.status”*, the following categories of the variable *“LN\_89089\_7”* are summarized:

* *“LN\_89089\_7”* = First-generation immigrant born in another Member State OR  
  *“LN\_89089\_7”* = First-generation immigrant born outside the EU  
  –> *“migration.status”* = First generation immigrant
* *“LN\_89089\_7”* = Second-generation immigrant of EU origin (native-born with at least one foreign parent where at least one parent was born in an EU country, including the reporting one) OR  
  *“LN\_89089\_7”* = *Second-generation immigrant of non-EU origin (native-born with both parents born outside the EU)*  
  *–>* ”migration.status”\* = Second generation immigrant
* *“LN\_89089\_7”* = Native-born resident with native backgrounds (i.e. both parents are also native-born) –> *“migration.status”* = Native born

#### Work Status “work.status”

*“DEMOGRAPHICS\_61”*: What is your current employment status?

For work status, the following categories of the variable *“DEMOGRAPHICS\_61”* were summarized:

* *“DEMOGRAPHICS\_61”* = In retirement or early retirement –> *“work.status”* = Retired
* *“DEMOGRAPHICS\_61”* = Looking after home or family OR  
  *“DEMOGRAPHICS\_61”* = Permanently sick or disabled OR  
  *“DEMOGRAPHICS\_61”* = Short-time working OR  
  *“DEMOGRAPHICS\_61”* = Unemployed  
  –> *“work.status”* = Unemployed
* *“DEMOGRAPHICS\_61”* = Full-time employed OR  
  *“DEMOGRAPHICS\_61”* = In vocational training/retraining/education OR  
  *“DEMOGRAPHICS\_61”* = Parental leave OR  
  *“DEMOGRAPHICS\_61”* = Part-time employed OR  
  *“DEMOGRAPHICS\_61”* = Self-employed or working for own family business  
  –> *“work.status”* = Employed

#### Education “education”

To derive a international education variable, the International Standard Classification of Education (ISCED) is used (<https://ilostat.ilo.org/resources/concepts-and-definitions/classification-education/>). Specifically for Luxembourg, categories of the education *“DEMOGRAPHICS\_58”* were summarized as following:

*“DEMOGRAPHICS\_58”*: What is your educational degree? Please choose the highest degree achieved.

* *“DEMOGRAPHICS\_58”* = No formal degree OR  
  *“DEMOGRAPHICS\_58”* = fundamental education  
  –> *“education”* = Basic
* *“DEMOGRAPHICS\_58”* = Secondary education - classical system OR  
  *“DEMOGRAPHICS\_58”* = Secondary education - technical system  
  –> *“education”* = Intermediate
* *“DEMOGRAPHICS\_58”* = University degree: Bachelor OR  
  *“DEMOGRAPHICS\_58”* University degree: Master or above  
  –> *“education”* = Advanced
* *“DEMOGRAPHICS\_58”* = Other type of degree  
  –> *“education”* = Other type of degree

Education was not asked specifically in ORCHESTRA, though if previous data of participants exists where questions about education were asked, please use the ISCED to derive the education variable.