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Long COVID in children and adolescents: results from three cross-sectional school-based cohorts with adjudication

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Summary

STUDY AIMS: The prevalence of Long COVID in children and adolescents is heterogeneous, ranging from 1% to 51%, depending on the population studied. The lack of a standardised approach for establishing a Long COVID diagnosis in children and adolescents complicates the accurate assessment of prevalence, risk factors and outcomes. The present study aimed to examine the value of standardised interviews and an adjudication process to better understand self- or proxy-reported symptoms lasting longer than 12 weeks compatible with Long COVID in children and adolescents during the COVID-19 pandemic.

METHODS:We conducted a school-based, prospective cohort study (Ciao Corona) from March 2020 to July 2022 in the Canton of Zurich, Switzerland. Of 156 invited schools, 55 agreed to participate. Primary schools were randomly selected across all 12 districts of the Canton of Zurich, with nearby secondary schools subsequently invited. Within participating schools, classes were randomly selected, stratified by school level, and all students aged 6–17 years in selected classes were eligible. At three different time points (March/April 2021, November/December 2021 and June/July 2022), school-aged children and adolescents underwent serology testing and completed online questionnaires, including questions on symptoms lasting ≥12 weeks compatible with Long COVID. We invited those with persisting symptoms and who were seropositive for SARS-CoV-2 – whether "infected" i.e. infection and no vaccination or having "hybrid immunity" i.e. infection and vaccination – to participate in interviews to allow us to better understand the pattern, severity and timing of the reported symptoms. An adjudication process with experts then followed to assess the probability of Long COVID.

RESULTS: 39/1120 (3.5%) seropositive children and adolescents (i.e. infected or with hybrid immunity) reported persisting symptoms (≥12 weeks). The most frequently reported symptoms were headache, tiredness and stomach ache. In 20/39 (51%) with persisting symptoms who agreed to be interviewed, the adjudication committee concluded that Long COVID was unlikely in 13 (65%), possible in 7 (35%) and likely in 0 participants.

CONCLUSIONS: Relying exclusively on self- or proxy-reported questionnaire data, without more detailed information may overestimate Long COVID in children and adolescents. Implementing standardised interviews and an adjudication process helps to contextualise self- or proxy-reported symptoms compatible with Long COVID.

Trial registration: https://clinicaltrials.gov NCT04448717.

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Introduction

Children and adolescents generally have a mild course of SARS-CoV-2 infection and rarely suffer from severe acute or long-term COVID-19 [1–4]. We recently reported a 2% prevalence of symptoms compatible with Long COVID in a population-based school cohort during the period when the wildtype virus variant was predominantly circulating [5]. The prevalence of Long COVID in children and adolescents ranges from 1% to 51%, depending on the population studied [4, 6–14]. This heterogeneity in prevalence estimates can be attributed to several factors: highly selected study populations (e.g. inpatients), and variable sample sizes, study designs and settings. Many of these studies rely on self- or proxy-reported data, lacking rigorous clinical assessments, introducing potential response and/or recall bias leading to an over- or underestimation of Long COVID prevalence [4, 11, 15–17]. The lack of a standardised approach to establishing a Long COVID diagnosis in children and adolescents complicates the accurate assessment of prevalence, risk factors and outcomes [4, 11, 15, 16]. Moreover, population-based studies often lack detailed context about the participants reporting Long COVID-compatible symptoms. To address these challenges and improve the accuracy of Long COVID symptom assessment, structured interviews may be used as a more reliable method of distinguishing children and ado-

lescents affected by Long COVID from those who are not. Implementing such an approach would contribute substantially to our understanding of Long COVID in children and adolescents.

In this study, we followed up SARS-CoV-2 seropositive children and adolescents (hereinafter referred to as "infected" or having "hybrid immunity") reporting symptoms compatible with Long COVID at three different time points during the pandemic. We interviewed such participants to gain a better understanding of the pattern, severity and timing of their symptoms. Based on these interviews, serology and vaccination history, an adjudication process involving three expert paediatricians not involved in the initial study was conducted to assess the probability of Long COVID.

Materials and methods

Study setting

The Ciao Corona study is part of Switzerland's nationally coordinated Research Network "Corona Immunitas" [18]. The study protocol for Ciao Corona was registered before the start of the study (ClinicalTrials.gov identifier: NCT04448717) [19] and the study was approved by the Ethics Committee of the Canton of Zurich, Switzerland (2020-01336). We conducted the study in the Canton of Zurich, Switzerland, which comprises 1.5 million people. The region is characterised by linguistic and ethnic diversity, which includes both urban and rural areas, and accounts for 18% of the Swiss population. Informed consent was provided orally by children and in writing by parents or caregivers prior to study enrolment.

The present manuscript was prepared according to the STROBE guideline [20].

The primary aims of the study were to assess the probability of Long COVID through questionnaire-based self-reporting of persisting symptoms and to examine whether Long COVID may be misclassified by other non-infection-related reasons, using a combination of self- or proxy-reported standardised interviews and an adjudication process.

Population

Primary schools across the Canton of Zurich were randomly selected to assess the spread and evolution of SARS-CoV-2 infections repeatedly from June 2020 to 2022. Subsequently, we extended invitations to the geographically closest secondary school for each primary school selected. The number of schools invited in each district was proportional to the population size of the 12 districts within the Canton of Zurich. Among the 156 schools invited, including both public and private (around 10%) institutions, 55 agreed to participate. Classes were randomly selected, stratified by school level: grades 1–2 (6- to 8-year-old children) of lower school level, grades 4–5 (9- to 11-year-old children) of middle school level and grades 7–9 (12- to 14-year-old adolescents) of higher school level. All children and adolescents of the randomly selected classes were eligible to participate in any testing round, regardless of their involvement at baseline.

Study design

At three different time points during the Ciao Corona study (March/April 2021, November/December 2021 and June/July 2022; see table 1), children and adolescents were included if they had undergone serology testing and completed several questionnaires over time. We only included children and adolescents who were either infected (i.e. seropositive for anti-spike IgG) or had hybrid immunity (i.e. seropositive for anti-nucleocapsid IgG and vaccinated), as shown in the study participant flowchart in figure 1. Cohort 1 tested seropositive in March/April 2021 and was followed up until November/December 2021; Cohort 2 tested seropositive in November/December 2021 and was followed up until June/July 2022; and Cohort 3 tested seropositive in June/July 2022 and was followed up until November/December 2022 (table 1). Within 6 to 9 months post-serology testing, each cohort completed online questionnaires to assess symptoms persisting for more than 12 weeks. The list of symptoms provided in the questionnaire was prepared in accordance with the International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC) questionnaire [21]. Of note, we intentionally avoided using the term "Long COVID" in any questionnaire. We contacted participants with persisting symptoms for a structured interview in the presence of a parent to assess more detailed information of the reported symptoms compatible with Long COVID. The structured interview comprised four categories, each containing a combination of open and closed questions: physical symptoms, psychological symptoms, impact of symptoms on everyday life, and overall health status (further details are given in appendix table S1). The interviews were conducted within 3 months following the questionnaire assessment.

The summarized interviews of each participant are presented in a supplementary Excel file (appendix table S2, downloadable as a separate file at https://doi.org/10.57187/s.4337). This table presents the summarized interviews of children and adolescents along with their proxies. Each row represents an individual interview with a participant. The initial columns contain data from questionnaires and serology testing, followed by the questions asked during the interview (for more details, see Table S1). All interviews were pseudonymized and summarized to ensure individuals cannot be identified.

After all interviews were completed, we conducted an adjudication process involving three external expert paediatricians (one infectious disease specialist, two paediatric pulmonologists) with clinical experience in the evaluation of children and adolescents potentially affected by Long COVID. Following detailed instructions by the research team, each member of the adjudication committee evaluated children and adolescents independently based on the table summarising transcribed interviews, baseline questionnaire data and serology status. The goal was to use evaluation criteria, based on a modified version of the Delphi process by Stephenson et al. [22] and the WHO Long COVID definition [23], to categorise children and adolescents into "unlikely", "possible" or "likely" probability of Long COVID (appendix table S2). We set up an online consensus meeting to discuss and clarify any discrepancies between the members of the adjudication committee regarding individual patient cases. Consensus was

reached when all members agreed on the probability of Long COVID (unlikely, possible, likely); however, the adjudication committee members did not have to agree on each of the individual criteria.

Statistical analysis and sample size estimations

We performed descriptive analyses for participants' characteristics. The analyses were performed with the R programming language (v4.2.1), using the *tidyverse* (v1.3.2), *openxlsx* (v4.2.5), *tableone* (v0.13.2), *stringr* (v1.5.1), *viridisLite* (v0.4.1), *lubridate* (v1.9.3), *knitr* (v1.47), *kableExtra* (v1.3.4), *gtsummary* (v1.6.2) and *flextable* (v0.8.2) packages. Results were visualised using the *ggplot2* (v3.3.6) and *RColorBrewer* (v1.1-2) packages [24].

During the conduct of the study, Long COVID emerged as a new clinical condition. We decided to amend the study protocol to capture persisting symptoms in children and adolescents but did not perform an a priori sample size calculation due to the lack of available data on which to base sample size calculations.

Results

The study populationcomprised three cross-sectional cohorts among seropositive children and adolescents (i.e. infected or hybrid immunity) from three different time periods throughout the pandemic (figure 2). In total, we included 1120 children and adolescents (table 1) of whom 39 (3.5%) reported having persisting symptoms compatible with Long COVID (figure 1). Overall, the most frequently reported symptoms lasting more than 12 weeks were headache, tiredness and stomach ache (table 1). Other reported symptoms (i.e. mentioned more than once) were difficulties concentrating, nasal congestion and/or runny nose. Across the three cohorts, 24 interviews were conducted with 20 (51%) children and adolescents (table 1) reporting symptoms that persisted for more than 12 weeks. All interviews are summarised in the supplementary Excel file (downloadable as a separate file at https://doi.org/10.57187/s.4337). The overall and individual ratings of the external adjudication committee are displayed in table 2 *(*see table S3). Individual expert ratings with respect to the probability of Long COVID were heterogeneous (see

Table 1:
Characteristics of the three distinct cohorts. This table shows the baseline characteristics of participants per cohort. We stratified the participants by serology into infected or hybrid immunity. The "overall" cohort includes all those who underwent serology testing and completed a questionnaire, while the "interviewed" cohort includes only those participants who were interviewed.

	C ohort 1: Mar/Apr 2021		C ohort 2: Nov/Dec 2021		C ohort 3: Jun/Jul 2022	
	Infected	Hybrid immunity	Infected	Hybrid immunity	Infected	Hybrid immunity
Overall children and adolescents cohort (n = 1120)						
N° of participants	232	–	264	15	416	193
…Age, median (IQR)	11 (9–12)	–	10 (9–12)	13 (12–15)	10 (9–12)	13 (10–14)
…Female sex, n (%)	117 (50.4)	–	129 (48.9)	7 (46.7)	213 (51.2)	113 (58.5)
…Chronic condition, n (%) *	59 (25.4)	–	51 (19.3)	5 (33.3)	83 (20.0)	51 (26.4)
≥1 symptom ≥12 weeks, n (%)	8 (3.4)	–	14 (5.3)	1 (6.7)	8 (1.9)	8 (4.1)
…Tiredness, n (%)	5 (2.2)	–	7 (2.7)	1 (6.7)	4 (1.0)	3 (1.6)
…Headache, n (%)	3 (1.3)	–	4 (1.5)	1 (6.7)	2 (0.5)	1 (0.5)
…Stomach ache, n (%)	3 (1.3)	–	2 (1.0)	0 (0)	1 (0.5)	1 (0.5)
…Difficulty concentrating, n (%)	0 (0)	–	3 (1.1)	0 (0)	0 (0)	2 (0.5)
Interviewed children and adolescents (n = 20)						
≥1 symptom ≥12 weeks, n / Total n **	5/8	–	11/14	–	4/8	4/8
…Age, median (IQR)	11 (8–15)	–	10 (7–15)	–	12 (10–15)	12 (9–15)
…Female sex, n	2	–	5	–	2	2
…Chronic condition, n	2	–	4	–	1	3

IQR: interquartile range.

* Chronic conditions reported by parents in the questionnaire: asthma, hay fever, coeliac disease, lactose intolerance, allergies (other than hay fever), neurodermitis, diabetes mellitus, inflammatory bowel disease, hypertension, arthritis, other chronic diseases potentially affecting the immune response (neutropenia; periodic fever with aphthous stomatitis, pharyngitis and adenitis [PFAPA] syndrome; renal failure; cystic fibrosis; bronchitis).

** Children and adolescents with persisting symptoms (≥12 weeks) who participated in the interviews. The denominator is the number of children and adolescents from the entire cohort (n = 1120) who reported persisting symptoms (≥12 weeks).

Figure 1: Flowchart of participants for the three cross-sectional cohorts from June 2020 to July 2022. Cohort 1: March/April; Cohort 2: November/December; Cohort 3: June/July 2022.

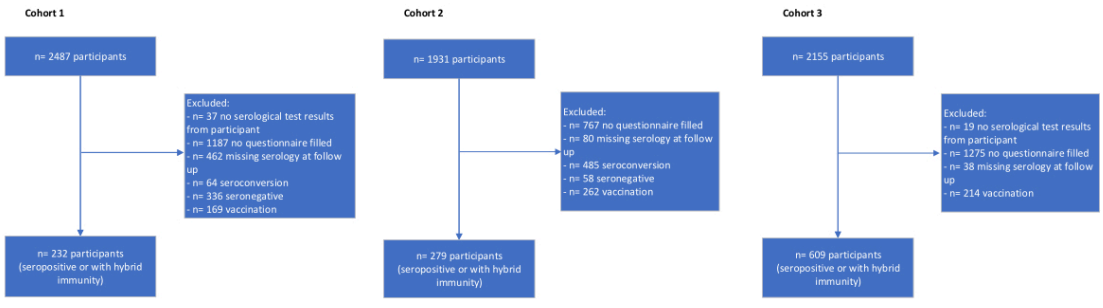

table 2 and table S3). Alternative diagnoses and/or other non-SARS-CoV-2-related reasons for persisting symptoms were, among others, lack of temporal relationship (e.g. symptoms were present before the pandemic), psychosocial stress from school and family environments (e.g. bullying at school, burnout of a parent, learning difficulties at school) and individual psychological conditions (e.g. attention deficit hyperactivity disorder [ADHD], anxiety, depression) (see supplementary file). Finally, the adjudication committee agreed that among the 20 interviewed children and adolescents, none of them was likely to have Long COVID, seven (35%) had possible Long COVID and 13 (65%) were unlikely to have Long COVID.

Discussion

In this large school-based study, we demonstrate that conducting interviews with children and adolescents and/or their proxies can provide important contextual information to self- or proxy-reported data in the assessment of Long COVID. Overall, we found that none of the children and adolescents were likely to have Long COVID, seven (35%) possibly had Long COVID and 13 (65%) were unlikely to have Long COVID over a timeframe of two years. Thus, the probability of the questionnaire-based assessment of Long COVID was reduced following evaluation of self- or proxy-reported symptoms and additional information from interviews by an adjudication committee.

Figure 2: Overview of the Ciao Corona timeline (2020–2023) and the three study cohorts comprising the interviewed children and adolescents. This figure illustrates the timeline of the Ciao Corona study for the three cohorts, highlighting the time points for serology, questionnaire assessments and interviews. Each cohort is represented by a colour: blue for Cohort 1, green for Cohort 2 and violet for Cohort 3. T1: first study round in June/July 2020; T2: second study round in October/November 2020; T3: third study round in March/April 2021 (Cohort 1); T4: fourth study round in November/December 2021 (Cohort 2); T5: fifth study round in June/July 2022 (Cohort 3). The icon meanings are: *Test tube with virus:* serology testing; *Written document:* questionnaire data assessment; *Microphone:* interviews. The light green area depicts the evolution of the incidence of diagnosed SARS-CoV-2 infections in Switzerland, shown as the 14-day incidence per 100,000 inhabitants. Grey: the predominant variant of concern in Switzerland (>50% of variants circulating).

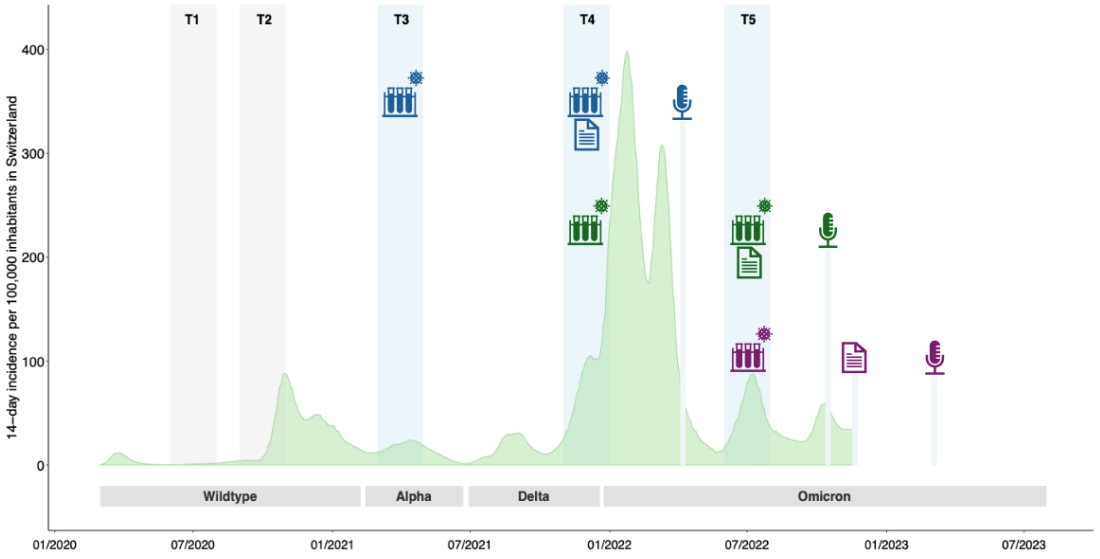

Table 2:
The individual ratings of the 20 interviewed children and adolescents by the external adjudication committee. This table presents the five criteria used by the adjudication committee to rate each interviewed participant according to a modified version of the Delphi process by Stephenson et al. [22] and the WHO Long COVID definition [23].

Criteria	Expert	No	Yes	No categorisation possible
Start of symptoms: Symptoms present since acute SARS-CoV-2 infection or developed thereafter	Expert 1	5	13	2
	Expert 2	8	12	0
	Expert 3	7	13	0
Testing: At least one positive COVID-19 test	Expert 1	0	18	2
	Expert 2	0	20	0
	Expert 3	1	19	0
Burden of symptoms: The young person had symptoms that continued or developed after SARS-CoV-2 which impacted their physical, mental or social wellbeing	Expert 1	4	12	4
	Expert 2	0	19	1
	Expert 3	6	12	2
Burden of symptoms: The young person had symptoms that were interfering with some aspect of daily living (e.g. school, work, home, relationships)	Expert 1	7	10	3
	Expert 2	4	15	1
	Expert 3	7	12	1
Duration: Symptoms persisted for a minimum duration of 12 weeks after testing	Expert 1	0	17	3
	Expert 2	0	20	0
	Expert 3	4	16	0

Most studies on Long COVID in children and adolescents rely on self- or proxy-reported data, with prevalence estimates varying from 1% to 51% for the same clinical condition [4–14]. However, this self- or proxy-reported data presents challenges, potentially impacting its reliability and validity, as shown by different studies and reports [4, 11, 15, 16]. Relying solely on self- or proxy-reported data can pose difficulties due to potential recall bias [25, 26], subjective interpretation of symptoms [27–29] and the risk of response bias [30]. Although the number of participants reporting persisting symptoms in our study was low, evaluating the probability of Long COVID solely based on self- or proxy-reported symptoms without contextual information is likely to be similar in larger studies. Therefore, we decided to integrate standardised interviews, aiming to gain more additional contextual information regarding the symptoms possibly related to Long COVID. These individual interviews offered insights into the pattern, severity and timing of symptoms, as well as their effects on the participant's environment, social interactions and school performance. Furthermore, the interviews helped establish a timeline with respect to the occurrence of SARS-CoV-2 infection and the first presentation of symptoms possibly related to Long COVID. All this information seems crucial for the evaluation of the plausibility of Long COVID in the absence of clear clinical diagnostic criteria.

By implementing the adjudication process, i.e. a structured evaluation by an independent adjudication committee, we were able to carefully assess each participant's data against evaluation criteria for Long COVID. Taking this process into consideration, the number of children and adolescents with symptoms possibly related to Long COVID decreased substantially compared to only self- or proxy-reported data. The adjudication process is particularly valuable in the context of diseases like Long COVID, where symptoms are heterogeneous and diagnostic criteria are continuously evolving. As reported elsewhere [31], the adjudication process can significantly enhance the validity of self- or proxy-reported data and improve its accuracy.

The strengths of our study include its large, randomly selected and longitudinal school cohort, enabling us to capture the different waves of the SARS-CoV-2 pandemic from 2020 to 2022. Further, the standardised interviews and subsequent adjudication process allowed us to weigh the probability of Long COVID in children and adolescents with symptoms attributable to Long COVID.

Some limitations need to be considered when interpreting the findings of this study. First, we were only able to follow up children and adolescents who filled out the questionnaires by themselves or by their proxy, potentially introducing a selection and response bias. Second, the exact timing of SARS-CoV-2 infections in children and adolescents is not known as we did not perform PCR or antigen tests – although we did enquire during interviews whether the participants had experienced an infection and when. Third, we did not conduct clinical assessments, which may have been useful for excluding underlying diseases or conditions related to self- or proxy-reported symptoms. Fourth, the study population overrepresented individuals from higher socioeconomic backgrounds, indicating a clear dominance of responses from educated proxies [32]. Finally, it is possible that some participants may have been missed due to their failure to complete the questionnaires, lack of understanding of the study purpose, or language barriers preventing them from participating in the interviews or the study in general.

Conclusion

Our study highlights the usefulness of implementing standardised interviews and an adjudication process in addition to self- or proxy-reported data to better understand the likelihood that self- or proxy-reported persisting symptoms are related to a SARS-CoV-2 infection. Thus, relying solely on self- or proxy-reported data, without more detailed contextual information, likely overestimates symptoms compatible with Long COVID in children and adolescents.

Data sharing statement

For confidentiality reasons (e.g. potential identifiable information from individual interviews), we would like to abstain from sharing individual participant data. The code used to support the findings of this study is available from the corresponding author upon reasonable request.

Acknowledgments

Author contributions: SK and MAP conceived the study. TR, SK and MAP developed the preliminary design. TR, SK, MAP, AR, SR, SRH and AU established the study design and methodology. TR, SK, AU, AR, SRH and SR recruited participants. TR, SK, AU, AR, SRH, SR, PZ, NR, CB and MAP performed data acquisition, management and interpretation. AR, SR, SRH and AU conducted statistical analysis. AR wrote the first draft of the manuscript. All authors were involved in the interpretation of the findings, the review and authorisation of the manuscript for intellectual accuracy. TR is the corresponding author and guarantor, assuming complete accountability for the conducted research. Furthermore, TR had full access to the data and made the final decision to publish. The corresponding author (TR) attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. All contributing authors approved the submitted manuscript.

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Potential competing interests

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest related to the content of this manuscript was disclosed.

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Appendix

The appendix table S2 is available for download as a separate Excel file at https://doi.org/10.57187/s.4337.

Table S1: Outline of the interviews. This table outlines the interview, which is divided into four parts: physical symptoms/ complaints, psychological symptoms/complaints, effects on everyday life, and state of health.

Outline - personal interviews with the children:
Place/Date:
Time: 30 minutes
ID of the child:
Interviewer:
Italics: Notes for interviewer
Introduction to the interview:
Thank you for being here today. My name is _____, I am part of the Ciao Corona study team and I will be conducting the interview with you. The interview today will take about 30 minutes. Please let me know if you need a break, and we can continue the interview at a later time. If anything is unclear, you can interrupt me at any time. At the end of month XX, you completed the Ciao Corona questionnaire alone or together with a parent. In this questionnaire you indicated certain symptoms / complaints (>3 months), such as a cough, headache or stomachache. We would like to discuss these with you and understand them better. The interview is divided into different stages. We are interested in the symptoms/complaints (>3 months) that you indicated in the questionnaire from month XX. We would like to understand them better and generally know how you have been during this time. We will start with the physical symptoms/complaints, how you have been feeling and whether these symptoms/complaints have burdened you. Furthermore, we are interested in how these complaints have affected your daily life and finally, how you have generally felt at that time. So that I can concentrate on the conversation with you and not have to write down your answers at the same time, I would like to record the conversation. I will use a dictation machine that only records the sound. We will delete the recording as soon as we have analysed the conversation. The data will be analysed anonymously, which means that no direct conclusions can be drawn about your person. If you wish, we can send you an e-mail confirming the destruction of the audio recording. Do you consent to us recording the conversation?
☐ Yes, I agree that the interview is being recorded.
☐ No, I would prefer that the interview is not to be recorded.
Great, thank you very much for your participation, this will certainly help other children and young people. Do you have any questions about the interview right now? I will start the recording now.

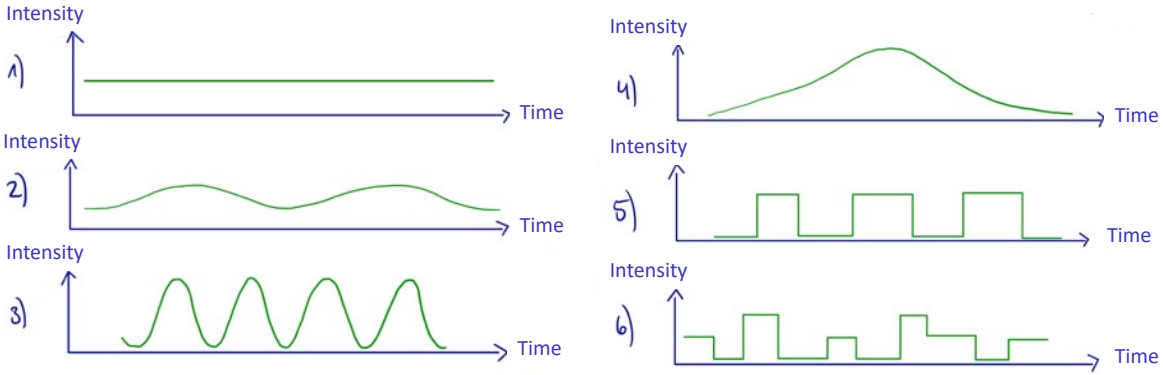
1. Physical symptoms / complaints

We will start with the physical symptoms / complaints that you described in the questionnaire. We will go through each of these symptoms (>3 months) together to find out more about them. You have indicated these symptoms:
Name the symptoms that were ticked in the questionnaire

1.1. Imagine that each pattern describes the course of your symptom.
(The individual illustrations must be explained here)

1.1.1. Which pattern best describes your first symptom?
(name the specific symptom here)

Possible answer: => to describe the pattern:
1) The symptom remained constant over time, 2) The symptom was always present, sometimes more sometimes less, 3) A regular appearance and disappearance of the symptom, 4) The symptom became stronger and stronger and then weaker again until it disappeared, 5) The symptom always appeared suddenly and then disappeared again, 6) The symptom was very irregular, with different time course and different strength (intensity) came and went.



1.1.2. How long did an episode last? How long was the duration of a phase of a symptom? (width of the wave/bar depending on the pattern)?

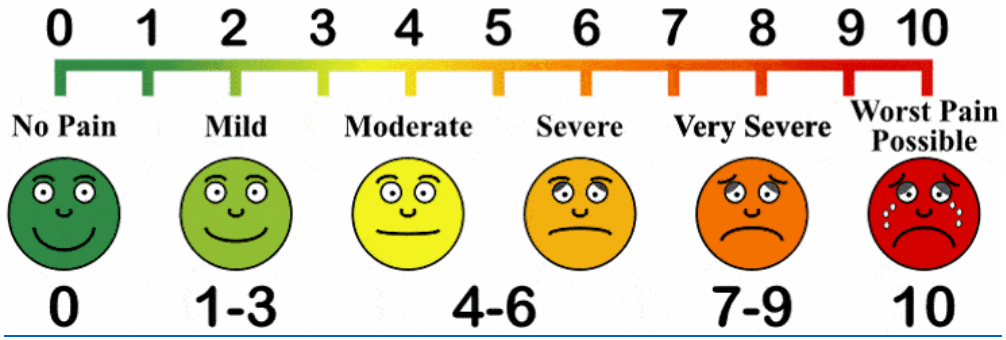
Possible answers: 1 few hours, 1 day, several days, 1 week, individual answer

1.2. Now that I understand the pattern and therefore the progression of the symptom, I would like to know how strong these symptoms were.

1.2.1. Imagine a scale from 0 - 10, how strong / intense was the symptom *(name the symptom)* on very good days and on very bad days.

Describe the scale: 0 means you felt top fit (no symptoms at all) & 10 means it was worse than ever (worst possible symptoms). =>to describe the scale: 0) no symptoms at all, 1-3) mild symptoms, 4-6) moderate symptoms, 7-9) severe symptoms, 10) worst possible symptoms

Quelle: https://www.disabled-world.com/health/pain/scale.php



1.2.2. When did the symptom start and end?

1.3. Did you already have this symptom before the corona pandemic?

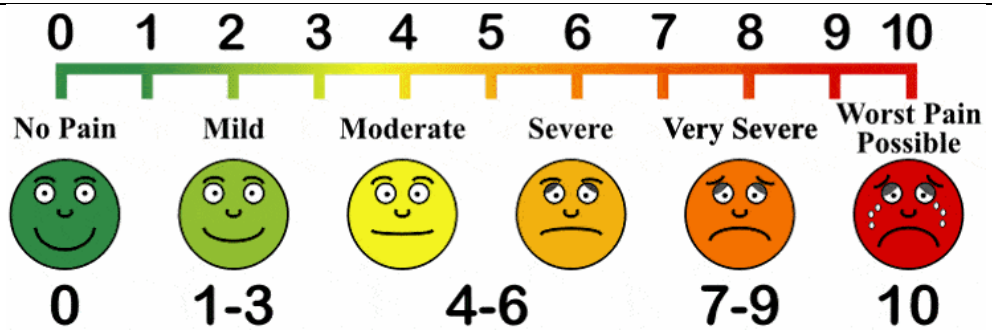
If NO, skip questions 1.3.1 & 1.3.2

1.3.1. **If YES**, how often?

Possible answers: Never, rarely (< 1 per month), frequently (> 1 per month)

1.3.2. Imagine the scale from 0-10 again, when you think about the time before the coronavirus pandemic, how strong/intense were these symptoms? 0 means you felt top fit (no symptoms at all) & 10 means it was worse than ever (worst possible symptoms)

Possible answer:



1.4. Is there anything else YOU would like to tell us?
Open answer option

2. Psychological symptoms / complaints

2.1. Now we would like to find out more about how you were feeling at that time (when you had symptoms). If you like, you are welcome to tell us how you felt at that time. Did you feel different? If so, how different did you feel (cheerful, nervous, anxious, happy, ...)?

Open answer option

3. Effects on everyday life

Half time already, you've done very well!
We have now gone through the symptoms. We would now like to know how they have affected your life and your everyday life. We'll go through a list together and if you want to, you can tell us more about these individual points: *(share the answers from the questionnaire again)*
(Ask the first question and then wait and see what the child answers. If the child is not able to categorise the question, ask the additional questions below or ask additional questions if the child has only answered one of the questions listed).

3.1. How have these complaints / symptoms affected your life at home and within your family?
3.1.1. Has anything changed in your relationship with your parents or siblings?
3.1.2. How have your parents and siblings reacted to your situation (Were they considerate, did they show understanding or not)?

3.2. How did these complaints / symptoms affect your friendships? 3.2.1. Have your friendships changed? 3.2.2. Have any of your friends withdrawn from you? 3.2.3. How did your friends react to your situation (Were they considerate, did they show understanding or not)?
3.3. How has the whole situation affected you at school? 3.3.1. Have you been less / more / equally motivated? 3.3.2. Have you missed a lot / a little / not at all in school? Has this changed compared to before the pandemic? 3.3.3. Have your school performance / grades changed 3.3.4. How have your teachers reacted to your situation (Were they considerate, did they show understanding or not)?
3.4. How has this affected your leisure activities (hobbies, scouts, music, etc.)? 3.4.1. Have you been less / more / equally motivated? 3.4.2. Has your leisure behaviour changed?
3.5. How has the whole thing affected your sports or physical activities? 3.5.1. Have you been less / more / equally motivated? 3.5.2. Has your sports / physical activity behavior changed? 3.5.3. Has your performance (endurance/strength) changed?
3.6. Would you like to tell us more? *Open answer option*
4. State of health and conclusion
We have now discussed a lot about the time when you had symptoms, both at school and at home. We are now interested in how you were generally feeling at that time when you had symptoms / complaints and how you were feeling before the pandemic.

4.1. If you had to summarise all of this (how you were feeling in general) and put it on a scale of 0 - 10, where would YOU be? 0 means I was doing extremely badly (it couldn't be worse) and 10 means the best life you can imagine.
=> to describe the scale: 0 = extremely bad (it couldn't be worse); 10 = the best life YOU can imagine.

0	1	2	3	4	5	6	7	8	9	10

4.2. Before the corona pandemic started, can you remember how you felt at that time (How did you feel before the pandemic?).

0	1	2	3	4	5	6	7	8	9	10

4.3. How are you doing now (about 3 months after you filled out the last questionnaire)?

4.3.1. Have you done anything about it? (consulted a doctor, undergone treatment/therapy)

4.4. For the evaluation and assessment of the quality of your answers, it is important to know how confident you were in answering the question. Our questions related to the time between month XX and month XX. Personally, I can remember certain things during this time very well and others less well. Now we would like to know how well you can remember this time.

How confident were you in answering our questions?
Possible answers: 1) Very sure, 2) Sure, 3) Somewhat sure, 4) Not sure/not sure at all

4.5. Is there anything else you would like to tell us that we didn't ask about?

4.5.1. Any other comments / feedback you would like to share?

So now we have come to the end of our interview.
We would now like to give you the opportunity to ask questions. Do you have any questions for us or is there anything we can help you with?
Now that all your questions have been answered, we would like to thank you very much for your time and answers.
As for the next steps, we will evaluate and analyse your data as soon as possible. To do this, we will compare your answers with those of the other children. Overall, we hope that the data from these interviews will help us to better understand and learn more about the effects of both the coronavirus and the coronavirus pandemic.
Once your interview has been analysed, we will destroy your recording immediately.
Thank you for your participation!

Table S2: Individual ratings of the 20 interviewed children and adolescents, as assessed by the external adjudication committee. This table presents the five criteria used by the adjudication committee to rate the probability of Long COVID for each interviewed participant.

	EXPERT 1						EXPERT 2						EXPERT 3					
ID PARTICIPANT	**Diagnosis Long Covid** 0: Unlikely; 1: Possible, 2: Likely	**Start of symptoms** [a] Symptoms present since acute SARS-CoV-2 infection or developed thereafter	**Testing** [a] At least one positive COVID-19 test	**Burden of symptoms** [a] The young person has symptoms that continue or develop after COVID-19 which impact their physical, mental or social well-being	**Burden of symptoms** [a] The young person has symptoms that are interfering with some aspect of daily living (eg, school, work, home, relationships)	**Duration** [a] Persist for a minimum duration of 12 weeks after initial testing	**Diagnosis Long Covid** 0: Unlikely; 1: Possible, 2: Likely	**Start of symptoms** [a] Symptoms present since acute SARS-CoV-2 infection or developed thereafter	**Testing** [a] At least one positive COVID-19 test	**Burden of symptoms** [a] The young person has symptoms that continue or develop after COVID-19 which impact their physical, mental or social well-being	**Burden of symptoms** [a] The young person has symptoms that are interfering with some aspect of daily living (eg, school, work, home, relationships)	**Duration** [a] Persist for a minimum duration of 12 weeks after initial testing	**Diagnosis Long Covid** 0: Possible; 1: Probable, 2: Likely	**Start of symptom** [a] Symptoms present since acute SARS-CoV-2 infection or developed thereafter	**Testing** [a] At least one positive COVID-19 test	**Burden of symptoms** [a] The young person has symptoms that continue or develop after COVID-19 which impact their physical, mental or social well-being	**Burden of symptoms** [a] The young person has symptoms that are interfering with some aspect of daily living (eg, school, work, home, relationships)	**Duration** [a] Persist for a minimum duration of 12 weeks after initial testing
1	0	0	1	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1
2	0	1	1	1	0	1	1	1	1	1	0	1	0	1	1	1	1	0
3	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1
4	0	0	1	0	0	1	0	1	1	1	0	1	0	0	1	0	0	1
5	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1
6	0	-	-	-	-	-	0	0	1	-	-	1	0	0	1	0	0	0
7	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1
8	0	0	1	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1
9	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	0	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1
11	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	-	-	-	1	1	1	1	1	1	1	1	1	-	-	1
13	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1
14	0	0	1	0	0	1	0	1	1	1	1	1	0	0	1	0	0	0
15	0	1	1	0	0	1	0	1	1	1	0	1	0	1	1	0	0	1
16	0	1	1	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1
17	2	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
18	0	-	-	-	-	-	0	0	1	1	1	1	0	0	1	1	1	0
19	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	0	1
20	0	0	1	-	1	1	0	0	1	1	1	1	0	0	1	-	0	1

[a] The different answer options mean: 0: No, 1: Yes, -: No categorization possible