

ORIGINAL ARTICLE OPEN ACCESS

Development and Validation of POCOKIDS-Q—A Questionnaire to Assess Post COVID-19 Symptoms in Children

C. Angelhoff¹  | M. Jedenfalk² | E. Fernlund² | E. Svensson³ | K. Duchon⁴ | P. Ertzgaard⁵

¹Allergy Center in Linköping and Department of Health, Medicine and Caring Sciences, Linköping University, Linköping, Sweden | ²Crown Princess Victoria's Children and Youth Hospital and Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden | ³Swedish Defense Research Agency (Retired), Stockholm, Sweden | ⁴Allergy Center in Linköping and Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden | ⁵Department of Rehabilitation Medicine in Linköping and Department of Health, Medicine and Caring Sciences, Linköping University, Linköping, Sweden

Correspondence: C. Angelhoff (charlotte.angelhoff@liu.se)**Received:** 21 January 2025 | **Revised:** 3 April 2025 | **Accepted:** 8 April 2025**Funding:** This study was financially supported by Majblommans Riksförbund (Mayflower Charity Foundation for Children), Henry and Ella Margareta Ståhls Stiftelse (Henry and Ella Margareta Ståhl's Foundation), Medical research council of Southeast Sweden (FORSS), and The Joanna Coccozza Foundation for Children's Medical Research.**Keywords:** long COVID | paediatrics | post-COVID condition | questionnaires and surveys

ABSTRACT

Aim: To identify the symptom burden in children and adolescents with post COVID-19, a validated and reliable instrument is needed, particularly to assess symptoms and their impact on the child. The aim of this study was to describe the development, validation, and reliability of the Post COVID-19 in Kids Questionnaire (POCOKIDS-Q), which was designed to assess post COVID-19 symptoms in children and adolescents.

Methods: The POCOKIDS-Q was developed based on literature, clinical experience, and questionnaires for adults with post COVID-19. The linguistic validation involved 9- to 17-year-old children. Children and adolescents with the onset of post COVID-19 symptoms were asked to complete the final version through a web link. Exploratory and confirmatory factor analyses were performed to identify a factor structure that explains the covariances between the variables.

Results: The link to the POCOKIDS-Q was opened 324 times and fully completed by 213 (66%) children and young adults (median age 14 years) with post COVID-19 symptoms. Confirmatory factor analyses revealed four significant and correlated factors: brain fatigue, cognitive impact, physical impact, and emotional impact. The explanatory power of the factor model is high.

Conclusion: The POCOKIDS-Q is applicable for assessing post COVID-19 symptoms in children and young adults.

1 | Introduction

According to the Swedish Public Health Agency [1], about 1.2 million individuals in Sweden developed coronavirus disease (COVID-19) during the pandemic, of whom 14.9% were

children under 19 years. Severe disease was very rare in this group, and no deaths were reported. The disease incidence appeared lowest among children aged between 0 and 9 years, though it increased during the last period of the pandemic [1]. The clinical manifestation in children up to 18 years was often

Abbreviations: CFI, comparative fit index; COVID-19, coronavirus disease; ISPOR, International Society for Pharmacoeconomics and Outcomes Research; MDS, multidimensional scaling; POCOKIDS-Q, Post COVID-19 in Kids Questionnaire; RMSEA, root mean square error of approximation; WHO, The World Health Organisation.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2025 The Author(s). *Acta Paediatrica* published by John Wiley & Sons Ltd on behalf of Foundation Acta Paediatrica.

Summary

- To identify the symptom burden in children with post COVID-19, a validated and reliable instrument is needed to assess symptoms and their impact on the child's daily life.
- POCOKIDS-Q is a valid and reliable tool for evaluating post COVID-19 symptoms, identifying four significant factors: brain fatigue, cognitive impact, physical impact, and emotional impact.
- POCOKIDS-Q can be used in clinical practice to monitor symptom progression and evaluate treatment outcomes.

mild, with a low frequency of hospitalisation [2, 3]. The most common acute symptoms included fever and cough, followed by rhinorrhoea, sore throat, sputum production, gastrointestinal symptoms (such as diarrhoea and vomiting), and dyspnea [4].

In recent years, cases with long-term post COVID-19 symptoms, such as low-grade fever, fatigue, dyspnea, heart palpitations, chest pain, headache, gastrointestinal symptoms, muscle weakness, and muscle and joint pain have been reported in children [5–10]. Diagnostics have been challenging due to the lack of a clear definition of post COVID-19 in children. In 2023, The World Health Organisation (WHO) highlighted the importance of understanding the prevalence, characteristics, and risk factors associated with post COVID-19 in children and adolescents [11]. A globally standardised clinical case definition was developed through expert consensus. Few studies describe how symptoms in paediatric post COVID-19 evolve and cluster [9, 10, 12]. Gross et al. reported that symptoms in children with long COVID cluster into different phenotypes across various age groups [12]. Studies on the impact of the disease on daily life from the paediatric patient's perspective are rare and only partially described [12], with two qualitative studies exploring the impact of post COVID-19 from a family perspective [13, 14].

To identify the symptom burden in children and adolescents with post COVID-19, a validated and reliable instrument is needed, particularly to assess symptoms and their impact on the child's daily life. A literature search revealed no existing instrument meeting these criteria. The aim of this study was to describe the development, validation, and reliability of the Post COVID-19 in Kids Questionnaire (POCOKIDS-Q), which was designed to assess post COVID-19 symptoms in children and adolescents.

2 | Patients and Methods

2.1 | Development and Linguistic Validation of the POCOKIDS-Q

The development, validation, and reliability testing of the POCOKIDS-Q, which is administered in Swedish, is part of the larger multiprofessional Post COVID-19 in Kids

(POCOKIDS) study, which examines the physiological, psychological, and social effects of long-term COVID-19 symptoms in children. Limited information is available on children with post COVID-19 symptoms, and a combination of methods has been used to obtain this information and identify specific symptoms. A purposive literature search was performed to identify reported symptoms in both adults and children. The first version of the POCOKIDS-Q was developed by one of the authors (P.E.), based on the interview protocol used for adults in the Linköping COVID-19 Study [15]. This version was then adapted for clinical use in post COVID-19 care for children and adolescents at Linköping University Hospital, in collaboration with a clinical child psychologist. Clinical experiences were thereafter reviewed by the paediatricians and the paediatric nurses in the research group, all of whom had experience communicating with children and adolescents. The questionnaire was discussed and underwent multiple revisions before being initially read and tested for clarity and understandability by a 17-year-old girl (I.A.). This initial review aimed to incorporate a child's perspective on the linguistic structure of the questions, ensuring they were understandable [16]. Several linguistic changes were made following discussions with the girl and the research group. The revised version was then linguistically tested according to the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) guidelines [17] by 10 children (six girls and four boys) aged 9–17 years to gain perspectives from children of different ages on the questionnaire. The children were interviewed individually by members of the research group (C.A., M.J. and A.W.) and systematically asked about the comprehensibility of the items. Two of the children had a parent present during the interview, who also provided feedback on the vocabulary used in the questionnaire. This process helped us refine the questionnaire to be more comprehensible for the target age group [17]. Field notes were made by the interviewer. Any difficulties in understanding words or interpreting items were discussed with the child, who was asked to suggest revisions and alternative words for clearer understanding. The field notes were compiled and sorted into a list of specific items ($n = 11$) on which the children had provided linguistic opinions. This list was discussed by the research group, and the questionnaire was adjusted, incorporating the children's input until a consensus was reached. The revised version was then read and approved by I.A. (who was engaged in all rounds), members of the research group, and representatives from the board of the Swedish COVID Association. The Swedish Covid Association is a non-profit association representing people affected by COVID-19 and post COVID-19, as well as their relatives. This patient organisation works to promote research and knowledge about all the medical and social consequences of SARS-CoV-2 and advocate for adequate care for patients [18].

Before the POCOKIDS-Q was tested in the target population, it was digitalised using the Internet-based survey tool Webropol. An Internet link and a QR code were provided to members of the research group and to I.A. to test and verify its applicability. Additionally, 28 children and adolescents diagnosed with post COVID-19 (participants in the POCOKIDS study; data not yet published) completed the POCOKIDS-Q to test its suitability for the intended population. They were also given the opportunity to provide written comments at the

end of the questionnaire. No further revisions were made in this step.

The final version of the POCOKIDS-Q contains 34 items on a Likert scale, ranging from 1 (never) to 4 (always), with a total possible score between 34 and 136. To ensure that higher scores consistently reflect more negative outcomes across the questionnaire, one item (item 30) is reverse-scored, with 1 = 4, 2 = 3, 3 = 2, and 4 = 1. Unlike the other items, which ask how often the child experiences various symptoms, this item asks how often the child feels better after resting, thus having a positive outcome. An open-ended question is included at the end of the questionnaire to give children the opportunity to report any additional symptoms not covered in the POCOKIDS-Q.

2.2 | Validation and Reliability Test

To validate and test the reliability of the POCOKIDS-Q, children and young adults in Sweden who experienced post COVID-19 symptoms before the age of 18 years were invited to complete a national survey. An email containing research information and a link to the POCOKIDS-Q was sent twice to members of the Swedish COVID Association [18]. As the survey was filled in anonymously, it was not possible to obtain formal informed consent. The study was also advertised on the Swedish COVID Association's official website and social media platform from March to June 2023. In addition to the POCOKIDS-Q, the survey included epidemiological background data, data about the primary infection, post-COVID-19 status of other family members, how participants perceived contact with healthcare, school attendance and support from school, and the impact of symptoms on daily life. In total, the national survey included 53 items, 34 of which were related to POCOKIDS-Q. The additional questions were included to identify how symptoms affected the children and the adolescents, but only the 34 items included in POCOKIDS-Q were included in this validation study.

2.3 | Statistical Analysis

Statistical analyses were performed with IBM SPSS Statistics, LISREL, and SYSTAT software. Descriptive statistics were used to describe the study population and are reported as medians, quartiles (Q_1 – Q_3), frequencies (n), and percentages (%).

The factor structure and construct validity of the POCOKIDS-Q were established using confirmatory factor analyses following the LISREL model [19]. To initially explore the factor structure of the 34 items in the POCOKIDS-Q, exploratory factor analyses with oblique rotation were performed. This method helps identify underlying factors by allowing them to be correlated. Additionally, we used multidimensional scaling (MDS) to visually represent the similarities between these factors in a two-dimensional space [20]. The open-ended responses were analysed using summative content analysis [21, 22]. Responses were reviewed thoroughly, and newly added symptoms, not included in the POCOKIDS-Q, were identified, coded, and categorised into symptoms (Table 1). Thereafter, each response within the respective categories was counted and reported.

3 | Results

In this study, the link to POCOKIDS-Q was opened 324 times and fully completed by 213 (66%) children and young adults (median age 14 years) with post COVID-19 symptoms, of whom 57% were girls. The median age was 14 years (Q_1 – Q_3 = 12–16 years).

3.1 | Multivariate Analyses—Explorative and Confirmatory Factor Analyses

In the first step, exploratory factor analysis was used to simplify the 34-item questionnaire into fewer underlying factors. We found that a four-factor structure was optimal based on the Scree test, which identifies the point where the explained variance levels off, indicating the number of factors to retain. However, despite using oblique rotation to spread out the loadings over the factors, we found that 17 of the variables had their highest loadings on the first factor. Accordingly, in a sub-analysis, we analysed the factor structure of these 17 variables separately. In this sub-analysis, we found that two factors represented an optimal solution. These two factors formed the basis of our hypothetical factor structure model.

Item 5 ('I experience a different sensation on the skin. It can be when you touch the skin or feel hot or cold.'), item 6 ('What I eat and drink tastes different or nothing'), and item 7 ('Things smell different or nothing') had low response rates. After discussions within the research group, these three items were removed

TABLE 1 | Description of content analysis.

Examples	Code	Category/symptom	<i>n</i>
Persistent sore throat despite no other cold symptoms	Sore throat	Throat problems	18
Sore throat that worsens during relapse	Sore throat		
Lump in the throat	Globus sensation		
Excessive mucus in the throat that is difficult to cough up	Mucus in the throat		
Spots (rash along the hairline)	Skin rash	Skin problems	21
Occasional rashes resembling hives	Skin rash		
Mottled skin with redness in the cheeks	Skin abnormalities		

from the model, as they were considered more relevant to acute COVID-19 than to post COVID-19 symptoms.

In the second and final step, confirmatory factor analyses, following the LISREL model [19], were performed. In these analyses, the hypothetical structure derived from the explorative analyses was used as the foundation for our final factor structure model. In the confirmative analyses, two Goodness-of-Fit indices were used: Root Mean Square Error of Approximation (RMSEA) and Comparative Fit Index (CFI). The RMSEA

value of 0.036, which indicates how well the model, with its estimated parameters, approximates the observed data, was below the commonly accepted threshold of 0.05, suggesting a good fit. Similarly, the CFI value of 0.95, which compares the proposed model to a baseline model where all variables are uncorrelated, exceeded the threshold of 0.90, further indicating a good model fit. These results demonstrate that the proposed four-factor model effectively explains the covariance among the observed 31 variables [20, 23]. Table 2 presents the final factor structure, and Table 3 presents the factor

TABLE 2 | Factor loadings from the Post COVID-19 Kids Questionnaire (POCOKIDS-Q).

Item	Content	Factor 1	Factor 2	Factor 3	Factor 4
18	I find it difficult to focus/concentrate, for example at school	0.82			
27	I find it hard to hang out with family or friends	0.75			
28	I have a hard time keeping up with schoolwork	0.75			
14	I get tired when I read	0.73			
17	It bothers me to be in places where there are a lot of people	0.71			
29	I get so tired that I need to rest during the day	0.67			
12	Too much noise bothers me	0.65			
26	I find it hard to wash and dress myself	0.64			
13	Bright light such as sunlight or bright ceiling lights bothers me	0.61			
11	I have a headache	0.51			
30	It helps me to rest when I get tired	-0.32			
21	I don't keep up when other people talk to me		0.80		
19	I find it difficult to do several things at the same time		0.76		
20	I find it hard to remember things		0.76		
22	I find it hard to think of what to say when I talk to others		0.69		
16	I get tired of looking at the screen		0.64		
15	My vision is blurry or double when I'm tired		0.53		
1	I feel weak in my body, (e.g., my arms and legs get tired quickly)			0.72	
23	I get short of breath easily when I move			0.72	
25	I find it hard to walk long distances			0.71	
3	I feel dizzy and then it can be difficult to keep my balance			0.60	
24	I get palpitations quickly when I move			0.57	
2	It feels strange in my body, for example like pain or muscle cramps			0.50	
4	I have fainted or felt like I was going to faint			0.50	
10	I feel feverish or have a fever			0.45	
9	My tummy hurts			0.36	
8	I have problems with my poo habits (e.g., hard or loose stools)			0.27	
33	I feel sad or depressed				0.60
34	I sleep poorly				0.59
31	I am easily stressed and irritated				0.59
32	I feel nervous or anxious				0.47

Note: The items are directly translated from the Swedish POCOKIDS-Q and are not linguistically validated for an English population.

TABLE 3 | Factor intercorrelations.

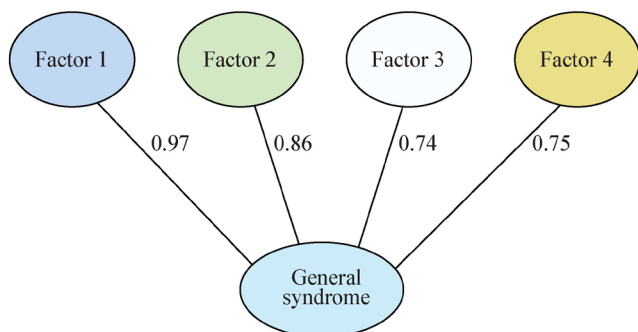
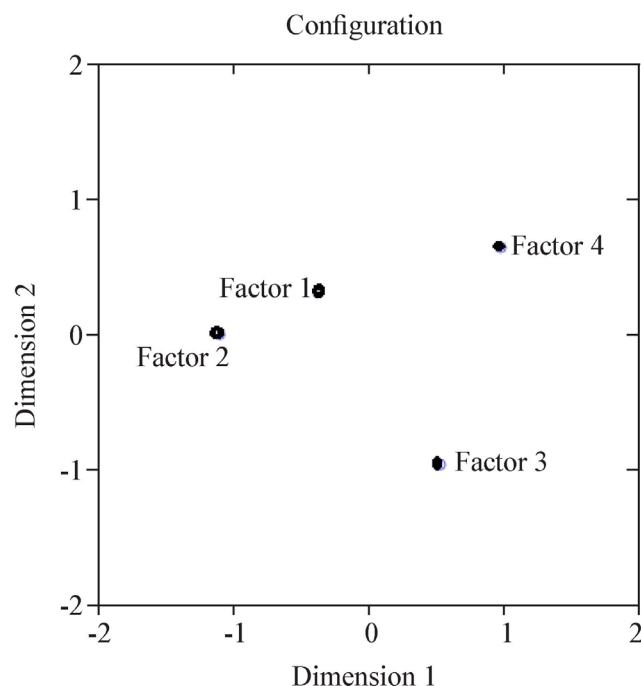
Factors	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1.00			
Factor 2	0.84	1.00		
Factor 3	0.70	0.64	1.00	
Factor 4	0.73	0.59	0.68	1.00

intercorrelations. The items in Table 2 have been translated into English to facilitate comprehension for non-Swedish-speaking readers, while the validation of the items was conducted in Swedish.

The construct reliability was 0.89 for Factor 1, 0.85 for Factor 2, 0.83 for Factor 3, and 0.65 for Factor 4. Reliability values above 0.60 indicate good explanatory power [24]. The factors are named: Factor 1, brain fatigue; Factor 2, cognitive impact; Factor 3, physical impact; and Factor 4, emotional impact. The factors are highly and significantly intercorrelated ($p < 0.001$) as shown in Table 3. The high correlation between Factor 1 (brain fatigue) and Factor 2 (cognitive impact) is expected since they form one common factor in the initial analysis.

Based on the significant factor intercorrelations, it is reasonable to assume that a second-order factor lies behind and can explain the correlations between the four first-order factors. In a subsequent analysis, we found that this second-order factor significantly influenced the four first-order factors. The effects were 0.97 for brain fatigue, 0.86 for cognitive impact, 0.74 for physical impact, and 0.75 for emotional impact, all significant ($p < 0.001$). Figure 1 illustrates the influence of the second-order factor (general syndrome) on the first-order factors. Accordingly, the second-order factor can be considered a syndrome factor integrating the symptoms of the four first-order factors. The 'post COVID-19 general syndrome factor' significantly affected all items of the questionnaire ($p < 0.001$).

Using multidimensional scaling (MDS), the similarities between the factors are presented in a plane or Euclidean space (Figure 2). As previously observed, Factor 1 and Factor 2 are closer to each other than to the other factors, reflecting their strong correlation.

**FIGURE 1** | Influence of the second-order factor (general syndrome, i.e., post COVID-19) on the four first-order factors.**FIGURE 2** | Similarities between the factors in a two-dimension Euclidean space.

When analysing differences between genders with respect to factor means, significantly higher values were found for girls on Factor 1 (brain fatigue) and Factor 4 (emotional impact) ($t = 2.305$, $df = 184.6$, $p = 0.022$; $t = 3.625$, $df = 208$, $p < 0.001$, respectively). When analysing the effects of age on the factors, small but significant effects for Factor 1 (brain fatigue) and Factor 2 (cognitive impact) were found ($r = 0.17$, $p = 0.017$; $r = 0.16$, $p = 0.025$, respectively). This indicates that the intensity of reported symptoms increases with age.

3.2 | Analysis of Open-Ended Questions

The results of the open-ended questions about additional symptoms are presented in Table 4. The most frequently reported symptom was nausea, which was the given example. Some children mentioned symptoms already included in the POCOKIDS-Q, such as anxiety (items 31–33), eye problems (items 14–16), joint pain (item 2) and myalgia (items 1, 2, and 25). Furthermore, some children reported experiencing fatigue and brain fog, which were integrated into several items and summarised under Factor 1 (brain fatigue).

4 | Discussion

The purpose of this study was to develop and validate an instrument for evaluating post COVID-19 symptoms in children and adolescents. This is necessary due to the lack of biological markers and solid evidence on the underlying mechanisms of the disorder. Therefore, we must rely on the subjective reporting of symptoms and their impact on daily life, such as the ability to attend school or engage in leisure activities. For clinical and research purposes, a valid and reliable instrument is needed to monitor the clinical course of post COVID-19 as well as evaluate treatment outcomes.

TABLE 4 | Additional symptoms derived from open-ended questions.

Additional symptom	n (%)
Nausea ^a	89 (41.8%)
Skin problems	21 (9.9%)
Infection susceptibility	19 (8.9%)
Throat problems	18 (8.5%)
Post exertional malaise	14 (6.5%)
Affected temperature regulation	11 (5.2%)
Loss of appetite	10 (4.7%)
Dry mucous membranes (nose and mouth)	6 (2.8%)
Reflux	5 (2.3%)
Seizure	3 (1.4%)
Tinnitus	3 (1.4%)
Sweating	2 (0.9%)
Hair loss	1 (0.005%)

^aIncluded example in the open-ended question.

4.1 | Interpretation of Findings

In developing the instrument, clinical experiences from adults [15] were used to reduce the numbers of items and adapt it for a younger population. The process involved multiple steps, including review by age-relevant children, to optimise language and minimise the risk of misinterpretation of the items. Children's participation in developing questionnaires is crucial as it enhances the tool's quality and relevance by incorporating their perspectives and ensuring it meets their needs and understanding [16]. In this step, multiple changes were suggested and included in the final version. Additionally, the POCOKIDS-Q was tested in a smaller group of children with post COVID-19 to test its applicability within an actual patient group. To validate the instrument, a national survey was performed with the support of the Swedish COVID Association [18]. The study was anonymous, and 213 individuals responded.

Statistical analysis revealed a four-factor structure, labelled 'brain fatigue', 'cognitive impact', 'physical impact' and 'emotional impact'. All factor loadings and factor intercorrelations were significant. The significant intercorrelations indicate the presence of a second-order factor, the 'post COVID-19 general syndrome factor,' suggesting that post COVID-19 is a distinct entity [25]. This is further supported by Buonsenso et al. who recently reported with high accuracy a specific proteomic profile as a signature of ongoing general and endothelial inflammation in paediatric long COVID conditions [26]. The bio-physiological background of some of these post COVID symptoms has been examined and evaluated by other research groups. For instance, Cociolillo et al. examined three children suffering from long COVID and found hypometabolism in the left orbito-frontal region using fluoro-deoxyglucose positron emission tomography/computed tomography, exemplifying 'brain fatigue' in long COVID [27]. Similarly, Baldi et al. evaluated 61 children

with long COVID and found impaired functional capacity using cardiopulmonary exercise testing, primarily indicating signs of deconditioning and lower oxygen uptake during exercise [25]. Additionally, three of the factors reflect symptoms of autonomic dysfunction, as recently described by Delogu et al. who examined 56 paediatric long COVID patients without prior cardiac symptoms and found altered cardiac autonomic activity with a relative predominance of parasympathetic tone compared to healthy controls, measured by heart rate variability parameters using 24-h ECG [28].

Three questions did not fit the model and were excluded from the factor analysis: affected taste, affected smell, and altered skin sensation. This exclusion supports the model, as affected taste and smell are more acute symptoms with a distinct biological correlation, such as disturbance of the olfactory and gustatory pathways [29].

In the open-ended responses, symptoms such as nausea, skin problems, and infection susceptibility were the most reported additional symptoms not directly queried in the questionnaire. However, the high frequency of reported nausea could reflect a bias, as this was the given example in the question prompt. Future development of the POCOKIDS-Q should consider including some of these symptoms, which would necessitate a new factor analysis to validate its application in children with post COVID-19 and other postinfectious disorders. Moreover, validation against a control group without symptoms would provide insight into how the measures of POCOKIDS-Q can be interpreted.

The results of the present study indicated that gender and age influenced responses. Specifically, girls had higher factor means in brain fatigue and emotional impact, while older participants had higher factor means in brain fatigue and cognitive impact. This result is in line with previously published studies in adults reporting that female sex and advanced age are associated with a greater prevalence of persistent symptoms [30].

4.2 | Strengths and Limitations

This study has several strengths. During the development of the instrument, children of various ages were included to provide feedback. Every item was discussed, and the children independently gave examples of how to revise the items and alternative words for terms they found difficult to understand or interpret. Moreover, members of the board of the Swedish COVID Association were consulted during the development and approved the final version, and distributed the POCOKIDS-Q to their members.

This study also has limitations. The proposed advantage of anonymous data collection was to simplify the process and increase the number of respondents. However, this meant that post COVID-19 diagnoses could not be verified, making it impossible to confirm whether some individuals completed the survey multiple times. Nonetheless, a review of the data showed that no surveys were identical. Additionally, the respondents constitute a self-selected sample from an unknown population of potential respondents, which may introduce bias into the results. Another

limitation is that the POCOKIDS-Q has not been translated and validated in English, limiting its use in other countries.

4.3 | Conclusion

In conclusion, this study showed that POCOKIDS-Q is a valid instrument for post COVID-19 screening in children and adolescents, effectively distinguishing four clinically relevant factors: brain fatigue, cognitive impact, physical impact, and emotional impact. The results should be confirmed through studies on reliability and prevalence across different age groups and with controls, as diffuse symptoms like fatigue and headache are common among adolescents.

Author Contributions

C. Angelhoff: conceptualization, investigation, funding acquisition, writing – original draft, methodology, validation, visualization, data curation, formal analysis, project administration, writing – review and editing. **M. Jedenfalk:** conceptualization, investigation, writing – review and editing. **E. Fernlund:** conceptualization, writing – review and editing, investigation, validation. **E. Svensson:** conceptualization, writing – original draft, methodology, validation, visualization, software, formal analysis, data curation, writing – review and editing. **K. Duchén:** conceptualization, writing – review and editing, project administration, validation, funding acquisition, investigation. **P. Ertzgaard:** conceptualization, investigation, funding acquisition, writing – original draft, methodology, validation, visualization, writing – review and editing, project administration, formal analysis.

Acknowledgements

The authors want to thank the children Isabelle (I.A.), Alma, Ebba L, Ebba Z, Helmer, Knut, Oliver, Otto, Tilde, and Tora for their participation in the linguistic validation of the POCOKIDS-Q, and research nurse Anneli Wärdig (A.W.) for valuable help with interviewing and incorporating the children's input. We also want to thank the Swedish COVID Association for help with input and distribution of the national survey.

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. Folkhälsomyndigheten (Public Health Agency of Sweden), "Covid-19 in schoolchildren. A Comparison Between Finland and Sweden," 2020, <https://www.folkhalsomyndigheten.se/contentassets/c1b78bffbde4a7899eb0d8ffdb57b09/covid-19-school-aged-children.pdf>.
2. Y. Chen, S. L. Klein, B. T. Garibaldi, et al., "Aging in COVID-19: Vulnerability, Immunity and Intervention," *Ageing Research Reviews* 65 (2021): 101205.
3. W. J. Wiersinga, A. Rhodes, A. C. Cheng, S. J. Peacock, and H. C. Prescott, "Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavirus Disease 2019 (COVID-19): A Review," *JAMA* 324, no. 8 (2020): 782–793.
4. J. Yasuhara, T. Kuno, H. Takagi, and N. Sumitomo, "Clinical Characteristics of COVID-19 in Children: A Systematic Review," *Pediatric Pulmonology* 55, no. 10 (2020): 2565–2575.
5. J. F. Ludvigsson, "Case Report and Systematic Review Suggest That Children May Experience Similar Long-Term Effects to Adults After Clinical COVID-19," *Acta Paediatrica* 110, no. 3 (2021): 914–921.

6. J. Nogueira López, C. Grasa, C. Calvo, and M. García López-Hortelano, "Long-Term Symptoms of COVID-19 in Children," *Acta Paediatrica* 110, no. 7 (2021): 2282–2283.
7. M. Bygdell, J. M. Kindblom, J. Martikainen, H. Li, and F. Nyberg, "Incidence and Characteristics in Children With Post-COVID-19 Condition in Sweden," *JAMA Network Open* 6, no. 7 (2023): e2324246.
8. A. Haddad, A. Janda, H. Renk, et al., "Long COVID Symptoms in Exposed and Infected Children, Adolescents and Their Parents One Year After SARS-CoV-2 Infection: A Prospective Observational Cohort Study," *eBioMedicine* 84 (2022): 104245.
9. A. Camporesi, R. Morello, A. La Rocca, et al., "Characteristics and Predictors of Long Covid in Children: A 3-Year Prospective Cohort Study," *EClinicalMedicine* 76 (2024): 102815.
10. L. Borch, M. Holm, M. Knudsen, S. Ellermann-Eriksen, and S. Hagstroem, "Long COVID Symptoms and Duration in SARS-CoV-2 Positive Children—A Nationwide Cohort Study," *European Journal of Pediatrics* 181, no. 4 (2022): 1597–1607.
11. World Health Organization, "A Clinical Case Definition for Post COVID-19 Condition in Children and Adolescents by Expert Consensus," 2023, <https://www.who.int/publications/i/item/WHO-2019-nCoV-Post-COVID-19-condition-CA-Clinical-case-definition-2023-1>.
12. R. S. Gross, T. Thaweethai, L. C. Kleinman, et al., "Characterizing Long COVID in Children and Adolescents," *Journal of the American Medical Association* 332, no. 14 (2024): 1174–1188.
13. C. Angelhoff, K. Duchén, P. Ertzgaard, and P. Rytterström, "Navigating an Unfamiliar World—Parents' Experiences of Having a Child With Post COVID-19," *Journal of Pediatric Nursing* 77 (2024): e565–e572, <https://doi.org/10.1016/j.pedn.2024.05.023>.
14. A. Faux-Nightingale, B. Saunders, C. Burton, et al., "Experiences and Care Needs of Children With Long Covid: A Qualitative Study," *BJGP Open* 8, no. 1 (2023): BJGPO.2023.0143, <https://doi.org/10.3399/BJGPO.2023.0143>.
15. A. Divanoglou, A. P. K. Samuelsson, P. E. R. Sjö Dahl, C. Andersson, and P. R. Levi, "Rehabilitation Needs and Mortality Associated With the Covid-19 Pandemic: A Population-Based Study of all Hospitalised and Home-Healthcare Individuals in a Swedish Healthcare Region," *EClinicalMedicine* 36 (2021): 100920.
16. R. K. Olsen, "The Value of Child Participation in Research—A Qualitative Child-Centered Approach to the Early Development of an Empowerment Inventory for Children," *Child & Youth Services* 1-22 (2024): 1–22.
17. D. Wild, A. Grove, M. Martin, et al., "Principles of Good Practice for the Translation and Cultural Adaptation Process for Patient-Reported Outcomes (PRO) Measures: Report of the ISPOR Task Force for Translation and Cultural Adaptation," *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research* 8, no. 2 (2005): 94–104.
18. S. Covidföreningen, "xxx," 2023, <https://covidforeningen.se/>.
19. K. Jöreskog and D. Sörbom, *LISREL 8: Structural Equation Modeling With the SIMPLIS Command Language* (Lawrence Erlbaum Associates, Inc, 1993).
20. L. Wilkinson, *SYSTAT: The System for Statistics* (SYSTAT, Inc, 1990).
21. H. F. Hsieh and S. E. Shannon, "Three Approaches to Qualitative Content Analysis," *Qualitative Health Research* 15, no. 9 (2005): 1277–1288.
22. N. L. Kondracki, N. S. Wellman, and D. R. Amundson, "Content Analysis: Review of Methods and Their Applications in Nutrition Education," *Journal of Nutrition Education and Behavior* 34, no. 4 (2002): 224–230.
23. J. B. Schreiber, "Core Reporting Practices in Structural Equation Modeling," *Research in Social & Administrative Pharmacy* 4, no. 2 (2008): 83–97.

24. A. Diamantopoulos and J. Siguaw, *Introducing LISREL* (SAGE Publications Ltd., 2009).
25. F. Baldi, C. De Rose, F. Mariani, et al., “Cardiopulmonary Exercise Testing in Children With Long COVID: A Case-Controlled Study,” *Pediatric Infectious Disease Journal* 43, no. 8 (2024): 795–802.
26. D. Buonsenso, N. Cotugno, D. Amodio, et al., “Distinct Pro-Inflammatory/Pro-Angiogenetic Signatures Distinguish Children With Long COVID From Controls,” *Pediatric Research* (2025), <https://doi.org/10.1038/s41390-025-03837-0>.
27. F. Cociolillo, D. Di Giuda, R. Morello, C. De Rose, P. Valentini, and D. Buonsenso, “Orbito-Frontal Cortex Hypometabolism in Children With Post-COVID Condition (Long COVID): A Preliminary Experience,” *Pediatric Infectious Disease Journal* 41, no. 8 (2022): 663–665.
28. A. B. Delogu, C. Aliberti, L. Birritella, et al., “Autonomic Cardiac Function in Children and Adolescents With Long COVID: A Case-Controlled Study,” *European Journal of Pediatrics* 183, no. 5 (2024): 2375–2382.
29. T. Jung, B. Y. Choi, M. Jang, T. Kim, E. Seo, and J. K. Kim, “Comparative Analysis of Olfactory and Gustatory Function of Patients With COVID-19 Olfactory Dysfunction and Non-COVID-19 Postinfectious Olfactory Dysfunction,” *Journal of Korean Medical Science* 38, no. 43 (2023): e352.
30. D. Luo, B. Mei, P. Wang, et al., “Prevalence and Risk Factors for Persistent Symptoms After COVID-19: A Systematic Review and Meta-Analysis,” *Clinical Microbiology and Infection* 30, no. 3 (2024): 328–335.