Letters

A reply to 'Previously healthy unvaccinated adults have significant functional limitations in the medium and long term after mild COVID-19'

The article 'Previously healthy unvaccinated adults have significant functional limitations in the medium and long term after mild COVID-19'[1] published in July 2024 is the topic of discussion in this letter. The identification of persistent symptoms in unvaccinated, community-managed patients after COVID-19 infection was the aim of this research study by Bower et al. The study had a focus on anxiety, quality of life, tiredness and cognition. The findings demonstrated that many individuals had persistent symptoms between seven and 13 months following infection, with no discernible improvement over time. Individuals experiencing extreme exhaustion also had considerably lower quality of life. Furthermore, throughout a seven-month period, one in four patients experienced minor cognitive impairment, suggesting a potential influence of COVID on cognitive function.

The study's shortcomings include its comparatively small sample size of 62 participants and the absence of a comparative control group. Additionally, the study did not account for potential confounding variables that could have an impact on the findings, such as comorbidities or pre-existing medical issues. Furthermore, it is possible that the techniques utilised to evaluate physical and cognitive impairment were not sufficiently sensitive or thorough. Using a range of assessment methods, such as standardised instruments, longitudinal designs and technology-enhanced measurements, might have improved the quality of the evaluation of physical and cognitive impairments, leading to more accurate and reproducible study results. By addressing potential confounding factors and incorporating qualitative observations, the researchers could have acquired a more complete understanding of the health status of the participants.

More advanced statistical analyses, such as multivariate regression or propensity score matching, could also have improved the accuracy, generalisability and overall validity of the study. Furthermore, thorough health evaluations at regular intervals over 18 months might have provided a more complete picture of the progression of symptoms over time. A larger and more varied study population would have also been advantageous.

Using a multi-centre study design could also have improved the generalisability and validity of the results. Collaboration with other research organisations is important; working with international consortia, such as the International Severe Acute Respiratory and emerging Infection Consortium (ISARIC) can assist in gathering information and resources to examine the wider health and economic impacts of COVID-19.

Investigating COVID-19's underlying mechanisms for generating symptoms, such as inflammation and immune system malfunction,[2] was one of the other research objectives, along with understanding the neurological consequences of COVID-19. Future research might also examine how immunisation affects long-term outcomes, and whether a person's immunisation history affects the duration of symptoms.

Exploring access to medical care and social support over time can help provide a more comprehensive picture of the impacts of COVID-19 and might help researchers to identify health disparities. This could improve our understanding of how socioeconomic influences shape the impact of the virus on different populations, ultimately contributing to a more nuanced understanding of the pandemic's effects.

Future research should also aim to explore and address the knowledge gaps in understanding the long-term impacts of COVID-19 on specific demographic groups and the mechanisms driving this. Additionally, we need to investigate novel approaches to identify and address persistent symptoms. Effective strategies must be innovative and tackle the complexities and evolving nature of these long-term symptoms. Such approaches could involve integrating technology, such as wearable health monitors or virtual reality, to gather real-time data on participant experiences and engagement.

Authors

Hinpetch Daungsupawong PhD, Private Academic Consultant, Phonhong, Lao People's Democratic Republic

Viroj Wiwanitkit MD, Adjunct Honorary Professor, Department of Research Analytics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, India

Competing interests: None.

References

1. Bower WF, D'Souza AN, Barson E, et al. Previously healthy unvaccinated adults have significant functional limitations in the medium and long term after mild COVID-19. Aust J Gen Pract 2024;53(7):491–97. doi: 10.31128/AJGP-07-23-6900.
2. Gusev E, Sarapultsev A, Solomatina L, Chereshnev V. SARS-CoV-2-specific immune response and the pathogenesis of COVID-19. Int J Mol Sci 2022;23(3):1716. doi: 10.3390/ijms23031716.

Reply

We would like to thank Drs Daungsupawong and Wiwanitkit for their interest in our recent publication 'Previously healthy unvaccinated adults have significant functional limitations in the medium and long term after mild COVID-19'.[1]

This study was conducted in non-hospitalised people in Melbourne during a surge of local cases (February to September 2021) and prior to COVID-19 vaccine availability. An institutional imperative meant that this study was nested within another fixed-duration COVID-19

study (investigating immune system parameters), hence the sample size and study timepoints were determined by this umbrella study parameters (N=111). A larger cohort with longitudinal data collection would have been ideal to provide a larger data set for comprehensive analysis and modelling.

Outcome measures used in our study were selected based on their ability to detect change in known common symptoms, as there were limited validated outcome measures for long COVID at the time. Due to lockdown restrictions, measures also needed to be suitable for telephone or email collection. Subsequent literature has recommended a long COVID core outcome measure set.[2] While there is some overlap between the measures we selected and the core outcome measure set, it is possible that selection of the Symptom Burden Questionnaire for Long COVID might have been more appropriate if it were available and validated at that time.[3]

We agree that identifying ongoing medical and social supports accessed by patients with COVID-19 would provide a more comprehensive overview of health needs and in turn define gaps in services. Later studies from our institution examined the feasibility of a time-limited multidisciplinary allied-health-led outpatient service for people with long COVID.[4] We found this service to be safe and acceptable to participants; and while participants reported an overall improvement in their understanding of long COVID, not all participants experienced a reduction in symptoms. This is similar to other findings of a similar outpatient exercise and psychological-based intervention.[4,5]

Further research will address knowledge gaps in the management of long COVID and the health and social impacts so that targeted interventions can be offered to individuals with ongoing dysfunction.

Authors

Wendy F Bower FACP, PhD, Grad Dip Epid & Biostat, BAppSc (Physio), Associate Professor, Physiotherapy Research Lead, Department of Physiotherapy, Royal Melbourne Hospital, Melbourne, Vic; Associate Professor, Department of Medicine, Dentistry and Health Science, University of Melbourne, Melbourne, Vic

Aruska N D'Souza PhD, BPhysio, Allied Health Research and Knowledge Translation Lead, Department of Allied Health, Royal Melbourne Hospital, Melbourne, Vic

Competing interests: None.

References

1. Bower WF, D'Souza AN, Barson E, et al. Previously healthy unvaccinated adults have significant functional limitations in the medium and long term after mild COVID-19. Aust J Gen Pract 2024;53(7):491–97. doi: 10.31128/AJGP-07-23-6900.
2. Gorst SL, Seylanova N, Dodd SR, et al; PC-COS study group. Core outcome measurement instruments for use in clinical and research settings for adults with post-COVID-19 condition: An international Delphi consensus study. Lancet Respir Med 2023;11(12):1101–14. doi: 10.1016/S2213-2600(23)00370-3.
3. Hughes SE, Haroon S, Subramanian A, et al. Development and validation of the symptom burden questionnaire for long covid (SBQ-LC): Rasch analysis. BMJ 2022;377:e070230. doi: 10.1136/bmj-2022-070230.
4. D'Souza AN, Merrett M, Griffin H, et al. Recovering from COVID-19 (ReCOV): Feasibility of an allied-health-led multidisciplinary outpatient rehabilitation service for people with long COVID. Int J Environ Res Public Health 2024;21(7):958. doi: 10.3390/ijerph21070958.
5. Compagno S, Palermi S, Pescatore V, et al. Physical and psychological reconditioning in long COVID syndrome: Results of an out-of-hospital exercise and psychological-based rehabilitation program. Int J Cardiol Heart Vasc 2022;41:101080. doi: 10.1016/j.ijcha.2022.101080.

WE READ WITH CONCERN 'An approach to common sleep presentations in infants and toddlers' by Wong et al in the *AJGP* June 2024 issue. While the authors provide useful commentary on medical and surgical problems affecting sleep in childhood, they perpetuate non-evidence-based beliefs about sleep, which derive from first-wave behavioural or sleep-training approaches. They take this approach despite six systematic reviews showing that prescribed strategies intended to teach self-settling and longer blocks of sleep at night don't decrease the frequency of night waking, and also research showing these strategies increase parent anxiety.[1,2]

Responsive alternatives are described but misrepresented. Methods focussed on regulating the circadian biorhythm and reframing parental expectations are acknowledged by Wong et al to be critical elements of managing infant and toddler sleep. However, they neglect to mention any validated programs that parents and clinicians can use. The Possums Baby and Toddler Sleep Program, an Australian program built from the Neuroprotective Developmental Care Contextual Model of Infant Sleep and developed in a general practice context, is an example of such a validated program.[3–6] It remains the only infant program mentioned by the Academy of Breastfeeding Medicine Protocol for supporting night-time breastfeeding,[7] and has been adapted for the UK context as 'Sleep, Baby & You'.

The authors cite the Queensland Safe Sleep guidelines when discouraging co-sleeping but ignore the focus on risk minimisation through parent education about safest possible co-sleeping. Seventy-five per cent or more of parents bedshare with their baby at some time. In the absence of hazardous factors, there appears to be no increased risk of sudden unexplained death in infancy (SUDI) with bed sharing – the risk is highest for families who might unintentionally co-sleep unsafely if not provided with safe strategies.[5] The Australian Breastfeeding Association also promotes safe bed-sharing strategies.

The importance of responsive infant care for best possible mental health outcomes long term is widely accepted by parents, clinicians and researchers. There is parental demand for flexible approaches to sleep – not just the binary options of sleep training and responsive care alone. It is disappointing that Wong et al overlook an innovative, evidence-based model originating from Australian general practice, which has garnered international attention.

Authors

Kaitlyn Brunacci MBBS, BMedRes, SCHP, NDC, Conjoint Associate Lecturer, School of Medicine, Western Sydney University, Sydney, NSW

Cassie Rickard MBBS (Hons), DRANZCOG, DCH, MPHTM, FRACGP, FARGP, Perinatal General Practitioner, Gladstone Street Medical Clinic, Warragul, Vic; Senior Medical Educator, The NDC Institute, Brisbane, Qld

Pamela Douglas FRACGP, IBCLC, PhD, Medical Director, The NDC Institute, Brisbane, Qld; Associate Professor (Adjunct), School of Nursing and Midwifery, Griffith University, Gold Coast, Qld; Senior Lecturer, General Practice Clinical Unit, The University of Queensland, Brisbane, Qld

Competing interests: PD is the developer of The Possums Baby and Toddler Sleep Program and Medical Director of The NDC Institute, which sells the program for parents at possumssleepprogram.com and as part of health professional education at ndcinstitute.com.au. CR provides educational consultation to The NDC Institute. KB has no conflicts of interest to declare.

References

1. Kempler L, Sharpe L, Miller CB, Bartlett DJ. Do psychosocial sleep interventions improve infant sleep or maternal mood in the postnatal period? A systematic review and meta-analysis of randomised controlled trials. Sleep Med Rev. 2016;29:15–22. doi: 10.1016/j.smrv.2015.08.002.

2. Park J, Kim SY, Lee K. Effectiveness of behavioral sleep interventions on children's and mothers' sleep quality and maternal depression: A systematic review and meta-analysis. Sci Rep 2022;12(1):4172. doi: 10.1038/s41598-022-07762-8.
3. Öztürk M, Boran P, Ersu R, Peker Y. Possums-based parental education for infant sleep: Cued care resulting in sustained breastfeeding. Eur J Pediatr 2021;180(6):1769–76. doi: 10.1007/s00431-021-03942-2.
4. Ball HL, Taylor CE, Thomas V, Douglas PS; SBY working group. Development and evaluation of 'Sleep, Baby & You'—An approach to supporting parental well-being and responsive infant caregiving. PLoS One 2020;15(8):e0237240. doi: 10.1371/journal.pone.0237240.
5. Whittingham K, Palmer C, Douglas P, Creedy DK, Sheffield J. Evaluating the 'possums' health professional training in parent–infant sleep. Infant Ment Health J 2020;41(5):603–13. doi: 10.1002/imhj.21885.
6. Whittingham K, Douglas P. Optimizing parent–infant sleep from birth to 6 months: A new paradigm. Infant Ment Health J 2014;35(6):614–23. doi: 10.1002/imhj.21455.
7. Zimmerman D, Bartick M, Feldman-Winter L, Ball HL; Academy of Breastfeeding Medicine. ABM Clinical Protocol #37: Physiological Infant Care-Managing Nighttime Breastfeeding in Young Infants. Breastfeed Med 2023;18(3):159–68. doi: 10.1089/bfm.2023.29236.abm.

Reply

As the authors of 'An approach to common sleep presentations in infants and toddlers',[1] we would like to address the concerns raised by Brunacci et al in their letter response. The concerns raised in Dr Brunacci's letter included a failure to promote safe bed-sharing strategies, perpetuating non-evidence-based beliefs about sleep and failing to mention a specific commercial program that provides alternatives to behavioural sleep interventions. Brunacci et al also describe 'The Possums Baby and Toddler Sleep Program' (hereinafter referred to as 'the Possums Program') as a validated and evidence-based model. Our response emphasises the importance of impartial, high-quality scientific evidence to inform general practice management strategies for infant sleep problems.

Our article promotes safe sleep practices and acknowledges that bed-sharing is a culturally acceptable practice for many.[1] Brunacci et al suggest that the safest possible bed-sharing should be focussed upon as a harm-minimisation strategy. However, their statement in support of this, 'In the absence of hazardous factors, there appears to be no increased risk of sudden unexplained death in infancy (SUDI) with bed-sharing', is misleading, with the citation provided not relevant to the claim. In a meta-analysis of 11 studies with 2464 cases and 6495 controls, all studies found an increased risk of sudden infant death syndrome (SIDS) in bed-sharing infants (OR 2.89; 95% CI, 1.99–4.18).[2] Regarding the caveat that bed-sharing is not associated with SIDS *in the absence of hazardous* factors, Dr Robert Platt, an independent biostatistician with expertise in perinatal epidemiology, concluded that 'there is some evidence of an increased risk in the no-other-risk-factor setting, in particular in the youngest age groups. However, based on concerns about sample size limitations, we are not able to say how large that increased risk is'.[3] More recently, bed-sharing was found to neither positively nor negatively influence later externalising and internalising emotional/behavioural problems in childhood.[4] While bed-sharing might have other benefits, we believe parents deserve the right to make informed choices for themselves and their children following the provision of evidence-based information.

Regarding the claim that behavioural and sleep-training strategies lack evidence, infant sleep problems are amenable to behavioural sleep interventions and are supported by peer-reviewed publications by the American Academy of Pediatrics[5] and the American Academy of Sleep Medicine.[6,7] The systematic reviews[8,9] cited by Brunacci et al did not show a statistically significant decrease in night waking. However, they did show that these sleep interventions reduced child sleep problems, increased infant total sleep time, and improved maternal sleep quality and mood. These are outcomes parents might consider important.

Regarding the claimed omission of the Possums Program, our review aimed to provide an impartial overview of evidence-based strategies to address sleep problems in young children.[1] We avoided discussing specific, commercially available sleep programs or strategies with limited evidence of efficacy. The Possums Program, one of many marketed sleep programs, states, 'The target is not sleep duration or infant signalling but is sleep efficiency, supporting parent and infant to fall asleep efficiently'.[10] However, none of the four studies cited by Brunacci et al demonstrate improvements in sleep efficiency. Whittingham et al 2014[11] describe the Possums Program without providing efficacy data or comparison to other techniques. Ball et al 2020[12] discuss consumer feedback from health professionals using the Possums Program to manage postpartum fatigue and infant-related sleep disruption, noting interest in the program but lacking evidence of effectiveness. Whittingham et al 2020[10] describe consumer feedback on the Possums Program from 144 health professionals but lacks objective measurement of sleep efficiency. Finally, Ozturk et al 2021[13] compared the Possums Program to usual care in 157 mother-infant dyads. Sleep efficiency was not measured and, after adjustment for confounders, there were no significant infant sleep outcome differences between the two groups. Consequently, the Possums Program might be acceptable to health professionals and families but evidence regarding its ability to improve sleep efficiency in infants is currently lacking.

Authors

Matthew Wong MBBS, BSc, FRACP, Respiratory and Sleep Paediatrician, Department of Respiratory and Sleep Medicine, Queensland Children's Hospital, Brisbane, Qld; Senior Lecturer, Child Health Research Centre, Faculty of Medicine, The University of Queensland, Brisbane, Qld

Ajay Kevat MBBS, MMed, MPH, FRACP, Respiratory and Sleep Paediatrician, Department of Respiratory and Sleep Medicine, Queensland Children's Hospital, Brisbane, Qld; Senior Lecturer, Children's Health Queensland Clinical Unit, Faculty of Medicine, The University of Queensland, Brisbane, Qld

Rifat Chaudry MBChB, MRCPCH, MD, FRACP, Paediatric Respiratory and Sleep Staff Specialist, John Hunter Children's Hospital, Newcastle, NSW; Clinical Research Affiliate, The Hunter Medical Research Institute, Newcastle, NSW

James Best MBBS, FRACGP, DipPaed, General Practitioner, Junction Street Family Practice, Nowra, NSW

Moya Vandeleur MBBCh, BAO, MRCPCH, FRACP, PhD, Respiratory and Sleep Paediatrician, Department of Respiratory and Sleep Medicine, The Royal Children's Hospital, Melbourne, Vic; Senior Lecturer, Murdoch Children's Research Institute, Melbourne, Vic

Nicole Lovato B Psych, PhD, Associate Professor, Flinders Health and Medical Research Institute, Adelaide Institute for Sleep Health, Flinders University, Adelaide, SA

Jasneek Chawla MBBS, BSc (Hons), FRACP, PhD, Paediatric Respiratory and Sleep Specialist, Department of Respiratory and Sleep Medicine, Queensland Children's Hospital, Brisbane, Qld; Associate Professor, Child Health Research Centre, Faculty of Medicine, The University of Queensland, Brisbane, Qld

Competing interests: JC reports research funds from Fisher & Paykel that are unrelated to this publication. The other authors have no conflicts of interest to disclose.

Acknowledgements

The authors acknowledge and thank the Australasian Sleep Association Education Committee and Board for reviewing and approving this submission.

References

1 Wong M, Chaudry R, Kevat A, et al. An approach to common sleep presentations in infants and toddlers. Aust J Gen Pract 2024;53(6):371–78. doi: 10.31128/AJGP-05-23-6825.

2. Vennemann MM, Hense HW, Bajanowski T, et al. Bed sharing and the risk of sudden infant death syndrome: Can we resolve the debate? J Pediatr 2012;160(1):44–8.e2. doi: 10.1016/j.jpeds.2011.06.052.

3. Moon RY, Darnall RA, Feldman-Winter L, Goodstein MH, Hauck FR; Task Force on Sudden Infant Death Syndrome. SIDS and other sleep-related infant deaths: Evidence base for 2016 updated recommendations for a safe infant sleeping environment. Pediatrics 2016;138(5):e20162940. doi: 10.1542/peds.2016-2940.

4. Bilgin A, Morales-Muñoz I, Winsper C, Wolke D. Associations between bed-sharing in infancy and childhood internalizing and externalizing symptoms. Attach Hum Dev 2024;26(5):403–22. doi: 10.1080/14616734.2024.2380427.

5. Gradisar M, Jackson K, Spurrier NJ, et al. Behavioral interventions for infant sleep problems: A randomized controlled trial. Pediatrics 2016;137(6):e20151486. doi: 10.1542/peds.2015-1486.

6. Morgenthaler TI, Owens J, Alessi C, et al; American Academy of Sleep Medicine. Practice parameters for behavioral treatment of bedtime problems and night wakings in infants and young children. Sleep 2006;29(10):1277–81.

7. Mindell JA, Kuhn B, Lewin DS, Meltzer LJ, Sadeh A; American Academy of Sleep Medicine. Behavioral treatment of bedtime problems and night wakings in infants and young children. Sleep 2006;29(10):1263–76.

8. Kempler L, Sharpe L, Miller CB, Bartlett DJ. Do psychosocial sleep interventions improve infant sleep or maternal mood in the postnatal period? A systematic review and meta-analysis of randomised controlled trials. Sleep Med Rev 2016;29:15–22. doi: 10.1016/j.smrv.2015.08.002.

9. Park J, Kim SY, Lee K. Effectiveness of behavioral sleep interventions on children's and mothers' sleep quality and maternal depression: A systematic review and meta-analysis. Sci Rep 2022;12(1):4172. doi: 10.1038/s41598-022-07762-8.

10. Whittingham K, Palmer C, Douglas P, Creedy DK, Sheffield J. Evaluating the 'possums' health professional training in parent–infant sleep. Infant Ment Health J 2020;41(5):603–13. doi: 10.1002/imhj.21885.

11. Whittingham K, Douglas P. Optimizing parent–infant sleep from birth to 6 months: A new paradigm. Infant Ment Health J 2014;35(6):614–23. doi: 10.1002/imhj.21455.

12. Ball HL, Taylor CE, Thomas V, Douglas PS; SBY working group. Development and evaluation of 'Sleep, Baby & You'—An approach to supporting parental well-being and responsive infant caregiving. PLoS One 2020;15(8):e0237240. doi: 10.1371/journal.pone.0237240.

13. Öztürk M, Boran P, Ersu R, Peker Y. Possums-based parental education for infant sleep: Cued care resulting in sustained breastfeeding. Eur J Pediatr 2021;180(6):1769–76. doi: 10.1007/s00431-021-03942-2.

correspondence **ajgp@racgp.org.au**