**Understanding barriers to influenza vaccination among parents is important to improve vaccine uptake among children**

Stephanie A. Davey**1**, James Elander**1**, Amelia Woodward**1**, Michael G Head\***2** & Daniel Gaffiero\***1**

1Department of Health, Psychology and Social Care, University of Derby, Derby DE22 1GB, United Kingdom

2Faculty of Medicine, University of Southampton, University Road, Southampton, UK S017 1BJ

\*To be recognised as joint last author

Correspondence to Dr Daniel Gaffiero, [d.gaffiero@derby.ac.uk](mailto:d.gaffiero@derby.ac.uk) and Dr Michael G Head [m.head@soton.ac.uk](mailto:m.head@soton.ac.uk)

**Abstract**

The COVID-19 pandemic has significantly altered public perceptions of vaccines, particularly among parents. In high-income countries like the United Kingdom (UK) and Australia, factors such as misinformation, the expedited approval process of COVID-19 vaccines and unique local challenges have contributed to vaccine hesitancy, resulting in uneven uptake across various vaccination programmes. Despite efforts like school-based influenza vaccination programs in the UK and free influenza vaccines in Australia, vaccination rates continue to decline. This is especially concerning given the concurrent circulation of COVID-19 and influenza during the winter months, which places additional strain on healthcare systems. Drawing on existing evidence, this commentary examines key factors influencing childhood vaccination rates and provides preliminary policy recommendations to address these challenges. Three actionable recommendations are outlined, including strategies to counter misinformation, improve accessibility, and strengthen public trust in vaccination programmes. These insights aim to guide the development of effective interventions to increase vaccination uptake.

**Keywords**

Influenza; child health; vaccination; vaccines; vaccine hesitancy

**Introduction**

The COVID-19 pandemic, which began in December 2019, fundamentally changed public perceptions of health and vaccination, particularly parental views on vaccines, introducing new barriers to paediatric immunisations.1 As vaccine hesitancy continues to rise in the wake of the pandemic, understanding parents’ concerns has become increasingly important. Many parents, including those in higher-income settings, now express heightened concerns about vaccine safety and efficacy.2,3 These concerns are primarily related to safety trials, potential side effects and expedited vaccine development, complicating efforts to maintain high immunisation rates for childhood vaccines.4–7 Additionally, logistical barriers such as limited access to healthcare services, inconvenient clinic hours, and transportation challenges further complicate vaccination uptake.8

This shift in parental views poses a serious challenge to healthcare systems, as it strains hospital resources, increasing demand for medical staff, hospital beds and equipment.9–11 Vaccination plays an important role in safeguarding individual health, reducing healthcare system pressures and ensuring stable and accessible care for vulnerable populations such as children and the elderly. The World Health Organisation12 defines vaccine hesitancy as “the delay in acceptance or refusal of vaccines despite the availability of vaccination services”. In 2019, the WHO13 listed vaccine hesitancy as one of the top ten global health threats. A 2022 survey in the United States reported a rise in childhood vaccine hesitancy during the pandemic, with 43% of parents citing safety concerns,14 up from 30% pre-pandemic.15 Similar trends were observed in the UK, where vaccine confidence declined significantly across all demographic groups.16 In Australia, 31.9% of individuals reported reduced willingness to get the COVID-19 vaccine between August 2020 and January 2021, shifting from ‘definitely’ to ‘probably’ willing.17

The pandemic also gave rise to a significant surge in misinformation, or what the WHO18 referred to as an “infodemic”. Misinformation about both the virus and vaccines, including medical misconceptions, vaccine-related fears and conspiracy theories, has further complicated public understanding and response efforts.19 A study analysing fact-checked COVID-19 related posts on X (formerly Twitter) found that misleading information spread more rapidly than partially false claims, often disseminated by verified accounts, including those of organisations and celebrities.20 This misinformation has fostered fear and confusion, presenting a major barrier to achieving widespread vaccination and further complicating public health response.21 Therefore, engaging in meaningful discussions with parents is crucial to addressing vaccine hesitancy and improving childhood immunisation rates.22,23

**Summary of existing evidence**

A specific area of concern in this context is influenza vaccination uptake among children. In the United Kingdom, influenza vaccination for children aged 4 and older is delivered through the school system in partnership with UKHSA and local NHS trusts. This programme has been rolled out in phases following promising results in reducing transmission among children and the wider community.24 The nasal spray flu vaccine is typically offered to children aged 2 to 18 years.25 Although there are no specific targets for influenza vaccine uptake in children, UKHSA aims to meet or exceed previous year’s uptake rates.26 During the COVID-19 pandemic, public health officials aimed to increase influenza vaccination rates to prevent a “twindemic” of simultaneous influenza and COVID-19 outbreaks.27 While the UK offers these vaccinations for free, many parents remain reluctant to vaccinate, limiting the programme’s reach and effectiveness. 28

Data from the England 2023–24 winter season show a slight decline in vaccination uptake among primary school children, with a decrease of 1.2 percentage points compared to previous years. While vaccination rates for secondary school children increased, this was partly due to the expansion of eligibility to include Years 10 and 11, resulting in an overall uptake of 49.9% across all school years. Some regions, such as London (40%) North East and Yorkshire (46.4%), Midlands (47.4%) and North West (48.3%), reported even lower rates.26 Evidence suggests that vaccinating children aged 5–16 could lead to a reduction of 0.70 infections per dose and 1.95 deaths per 1,000 doses.29 Therefore, addressing parental concerns and increasing vaccine uptake would help reduce both the incidence and severity of influenza across the UK population, leading to improved public health outcomes.

In Australia, similar trends in vaccine hesitancy have emerged post-COVID, with public health authorities facing challenges in promoting influenza vaccination amongst children.30 A 2021 survey of general practitioners and general practice nurses revealed multiple barriers to vaccination, including perceived hesitancy among parents and competing clinical demands.31 Despite free influenza vaccines being offered to children 6 months to 5 years, the gap between parents’ intentions to vaccinate their children and the actual uptake had widened.32 A 2023 global systematic review indicated that while 64% of parents intended to vaccinate their children, hesitancy remained high, with 34% of parents reluctant to vaccinate.33 Amongst parents who intended to vaccinate, only 41% of children received the vaccine in the last influenza season.

While substantial research has explored vaccine hesitancy, particularly during the COVID-19 pandemic,34 the widening gap between intention and behaviour, as highlighted by Walters and colleagues32 present a complex challenge that has not been fully addressed. Existing research has primarily focused on attitudes and beliefs but often overlooks practical, systemic and psychological barriers, such as difficulties in accessing healthcare services,35 fear of side effects,36 mistrust in medical professionals,37,38 and exposure to misinformation.39

Our forthcoming research seeks to address this gap by examining both logistical and psychological barriers to childhood influenza vaccination in the UK. We will explore how regional disparities, socioeconomic factors and concerns about vaccine safety influence vaccination decisions, particularly in areas with lower coverage. We will also consider how the success of the HPV vaccine programme delivered in schools can inform influenza vaccination strategies. This research aims to identify key barriers and facilitators that influence parental decisions and inform the development of interventions to increase vaccine uptake.

To bridge the intention-behaviour gap, future interventions must address the specific barriers preventing parents from vaccinating their children, such as safety concerns, fear of side effects, and misinformation. Engaging community-level health workers in vaccine education and improving health literacy among high-risk underserved populations can also play a critical role. By addressing these challenges, public health strategies will become more effective, increasing vaccination rates and reducing the spread of influenza.

**Recommendations for policymakers and for research funders**

The planned research will provide valuable insights to guide specific policy recommendations to increase vaccine uptake. Based on existing knowledge, several broad recommendations can be made:

i. Policymakers should allocate funding to develop communication strategies that address regional disparities in influenza vaccine uptake, particularly in areas with historically low vaccination rates. Utilising local community leaders and trusted healthcare providers to disseminate these messages could improve credibility and message receptivity.6

ii. Policymakers should prioritise reducing logistical barriers to vaccination, such as transportation, clinic hours and service availability, while also tailoring interventions to be culturally sensitive and responsive to the specific needs of communities to maximise their effectiveness. 28 Simultaneously, investment in enhancing vaccine education and digital health literacy among parents and high-risk populations is essential.40 Strengthening these efforts can empower individuals to make informed health decisions, foster public trust in vaccines and improve vaccination uptake. 41

iii. Funders should prioritise research into both the practical and psychological barriers preventing parents from vaccinating their children. Behavioural science interventions, such as reminders or ‘nudges’, have been shown to positively impact vaccine uptake.42,43 Using behaviour change techniques (BCTs) to create transparent, credible messages will help build trust in the vaccination process.44

**Conclusion**

In conclusion, the COVID-19 pandemic has presented significant challenges to childhood immunisation efforts. Parental concerns about vaccine safety, coupled with the pervasive spread of misinformation, have intensified vaccine hesitancy. These issues are further compounded by systemic and logistical barriers that disproportionately affect certain regions and socioeconomic groups. Addressing these challenges requires a multifaceted approach that directly tackles safety concerns, builds trust in medical systems and reduces logistical obstacles to vaccination. Tailored, evidence-based interventions - grounded in behavioural science and informed by robust research - are essential to bridging the gap between intention and behaviour. By fostering trust, enhancing education and improving access to vaccination services, policymakers and researchers can design more effective public health strategies. Such efforts will not only increase vaccine uptake but also reduce the prevalence and severity of preventable diseases like influenza, ultimately safeguarding the health and wellbeing of communities across the UK and beyond.

**Short biographical note**

Dr. Daniel Gaffiero is a Lecturer in Health Psychology at the Department of Health, Psychology and Social Care at the University of Derby. His PhD focused on exploring cognitive biases in chronic pain, but his research has since expanded to include health promotion and public health, with a particular emphasis on psychological factors influencing vaccination. Gaffiero has recently published in high-impact academic journals, contributing to key developments in these areas of health psychology.

In addition to his research, Gaffiero serves as the Deputy Programme Director for the MSc Health Psychology on-campus programme, where he plays a key role in programme delivery, curriculum development, and student support. His teaching approach emphasises the integration of theory and practice, aiming to foster critical thinking and applied skills in students. Gaffiero is also the Deputy Chair of the Midlands Health Psychology Network (UK), where he actively collaborates to inspire the next generation of health psychologists.

His future research interests include examining the barriers and facilitators impacting breast screening uptake across multiple countries and exploring cognitive biases in the context of endometriosis. Gaffiero is committed to addressing psychological factors that influence healthcare behaviours, with the aim of improving public health outcomes through targeted interventions.

**Acknowledgements**

The authors thank Human Vaccines and Immunotherapeutics for the invitation to contribute this commentary.

**Declaration of interest statement**

The authors declare there are no conflicts of interest regarding the publication of this commentary.

**Declaration of funding statement**

No funding was received.

**Ethical approval statement**

Not applicable.

**References**

1. Centers for Disease Control and Prevention. CDC Museum COVID-19 Timeline. Atlanta (GA): 2023 Mar [accessed 2024 Oct 21]. <https://www.cdc.gov/museum/timeline/covid19.html>.
2. Skirrow H, Lewis C, Haque H, Choundary-Salter L, Foley K, Whittaker E, Costelloe C, Bedford H, Saxena S. The impact of the COVID-19 pandemic on UK parents' attitudes towards routine childhood vaccines: A mixed-methods study. PLoS One. 2024 Aug 13;19(8):e0306484. doi: 10.1371/journal.pone.0306484. PMID: 39137199; PMCID: PMC11321586.
3. Humble RM, Scott SD, Dubé E, Olson J, MacDonald SE. The impact of the COVID-19 pandemic on parents' perceptions and acceptance of routine childhood vaccination in Canada: A national longitudinal study. Vaccine. 2023 Jan 9;41(2):407-415. doi: 10.1016/j.vaccine.2022.11.052. Epub 2022 Nov 24. PMID: 36462954; PMCID: PMC9684123.
4. Galanis P, Vraka I, Siskou O, Konstantakopoulou O, Katsiroumpa A, Kaitelidou D. Willingness, refusal and influential factors of parents to vaccinate their children against the COVID-19: A systematic review and meta-analysis. Prev Med. 2022 Apr;157:106994. doi: 10.1016/j.ypmed.2022.106994. Epub 2022 Feb 18. PMID: 35183597; PMCID: PMC8861629.
5. Davey SA, Hampson C, Christodoulaki ME, Gaffiero D. Investigating the predictors of COVID-19 vaccine decision-making among parents of children aged 5-11 in the UK. Vaccine. 2024 Sep 17;42(22):126021. doi: 10.1016/j.vaccine.2024.05.069. Epub 2024 Jun 14. PMID: 38876837.
6. Davey SA, Gaffiero D. COVID-19 vaccination in children aged 5-11: a systematic review of parental barriers and facilitators in Western countries. Ther Adv Vaccines Immunother. 2024 Oct 11;12:25151355241288115. doi: 10.1177/25151355241288115. PMID: 39421135; PMCID: PMC11483841.
7. Goldman RD, Marneni SR, Seiler M, Brown JC, Klein EJ, Cotanda CP, Gelernter R, Yan TD, Hoeffe J, Davis AL, Griffiths MA, Hall JE, Gualco G, Mater A, Manzano S, Thompson GC, Ahmed S, Ali S, Shimizu N; International COVID-19 Parental Attitude Study (COVIPAS) Group. Caregivers' Willingness to Accept Expedited Vaccine Research During the COVID-19 Pandemic: A Cross-sectional Survey. Clin Ther. 2020 Nov;42(11):2124-2133. doi: 10.1016/j.clinthera.2020.09.012. Epub 2020 Oct 3. PMID: 33067013; PMCID: PMC7532744.
8. Wagner NM, Dempsey AF, Narwaney KJ, Gleason KS, Kraus CR, Pyrzanowski J, Glanz JM. Addressing logistical barriers to childhood vaccination using an automated reminder system and online resource intervention: A randomized controlled trial. Vaccine. 2021 Jun 29;39(29):3983-3990. doi: 10.1016/j.vaccine.2021.05.053. Epub 2021 May 28. PMID: 34059372; PMCID: PMC8237696.
9. Ghebrehewet S, Thorrington D, Farmer S, Kearney J, Blissett D, McLeod H, Keenan A. The economic cost of measles: Healthcare, public health and societal costs of the 2012-13 outbreak in Merseyside, UK. Vaccine. 2016 Apr 4;34(15):1823-31. doi: 10.1016/j.vaccine.2016.02.029. Epub 2016 Mar 2. PMID: 26944712.
10. Fleming DM, Elliot AJ. The impact of influenza on the health and health care utilisation of elderly people. Vaccine. 2005 Jul 8;23 Suppl 1:S1-9. doi: 10.1016/j.vaccine.2005.04.018. PMID: 15908058.
11. Boserup B, McKenney M, Elkbuli A. The financial strain placed on America's hospitals in the wake of the COVID-19 pandemic. Am J Emerg Med. 2021 Jul;45:530-531. doi: 10.1016/j.ajem.2020.07.007. Epub 2020 Jul 9. PMID: 32712239; PMCID: PMC7347328.
12. World Health Organisation. Vaccine hesitancy: A growing challenge for immunization programmes. Geneva: 2015 Aug 18 [accessed 2024 Oct 21]. <https://www.who.int/news/item/18-08-2015-vaccine-hesitancy-a-growing-challenge-for-immunization-programmes>.
13. World Health Organisation. Top ten threats to global health in 2019. Geneva: 2019 [accessed 2024 Oct 21]. <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>.
14. He K, Mack WJ, Neely M, Lewis L, Anand V. Parental Perspectives on Immunizations: Impact of the COVID-19 Pandemic on Childhood Vaccine Hesitancy. J Community Health. 2022 Feb;47(1):39-52. doi: 10.1007/s10900-021-01017-9. Epub 2021 Jul 23. PMID: 34297272; PMCID: PMC8299444.
15. Grills LA, Wagner AL. The impact of the COVID-19 pandemic on parental vaccine hesitancy: A cross-sectional survey. Vaccine. 2023 Sep 22;41(41):6127-6133. doi: 10.1016/j.vaccine.2023.08.044. Epub 2023 Aug 31. PMID: 37659897; PMCID: PMC10954085.
16. Siani A, Tranter A. Is vaccine confidence an unexpected victim of the COVID-19 pandemic? Vaccine. 2022 Nov 28;40(50):7262-7269. doi: 10.1016/j.vaccine.2022.10.061. Epub 2022 Oct 31. PMID: 36333226; PMCID: PMC9618445.
17. Biddle N, Edwards B, Gray M, & Sollis K. Change in vaccine willingness in Australia: August 2020 to January 2021. medRxiv. 2021 Feb. 2021.02.17.21251957. doi: 10.1101/2021.02.17.21251957.
18. World Health Organisation. An ad hoc WHO technical consultation managing the COVID-19 infodemic: call for action. Geneva: 2020 Apr 7-8 [accessed 2024 Nov 11]. <https://www.who.int/publications/i/item/9789240010314>.
19. Skafle I, Nordahl-Hansen A, Quintana DS, Wynn R, Gabarron E. Misinformation About COVID-19 Vaccines on Social Media: Rapid Review. J Med Internet Res. 2022 Aug 4;24(8):e37367. doi: 10.2196/37367. PMID: 35816685; PMCID: PMC9359307.
20. Shahi GK, Dirkson A, Majchrzak TA. An exploratory study of COVID-19 misinformation on Twitter. Online Soc Netw Media. 2021 Mar;22:100104. doi: 10.1016/j.osnem.2020.100104. Epub 2021 Feb 19. PMID: 33623836; PMCID: PMC7893249.
21. Cunniff L, Alyanak E, Fix A, Novak M, Peterson M, Mevis K, Eiden AL, Bhatti A. The impact of the COVID-19 pandemic on vaccination uptake in the United States and strategies to recover and improve vaccination rates: A review. Hum Vaccin Immunother. 2023 Aug 1;19(2):2246502. doi: 10.1080/21645515.2023.2246502. PMID: 37671468; PMCID: PMC10484032.
22. Olson O, Berry C, Kumar N. Addressing Parental Vaccine Hesitancy towards Childhood Vaccines in the United States: A Systematic Literature Review of Communication Interventions and Strategies. Vaccines (Basel). 2020 Oct 8;8(4):590. doi: 10.3390/vaccines8040590. PMID: 33049956; PMCID: PMC7712553.
23. Tuckerman J, Kaufman J, Danchin M. Effective Approaches to Combat Vaccine Hesitancy. Pediatr Infect Dis J. 2022 May 1;41(5):e243-e245. doi: 10.1097/INF.0000000000003499. PMID: 35213864; PMCID: PMC8997018.
24. MacDonald P. Extension of influenza immunization program to children in England - Future plans. Hum Vaccin Immunother. 2016 Oct 2;12(10):2707-2708. doi: 10.1080/21645515.2016.1218099. PMID: 27548837; PMCID: PMC5084989.
25. UK Health Security Agency. National flu immunisation programme 2024 to 2025 letter. London: 2024 Jun 18 [accessed 2024 Nov 03]. <https://www.gov.uk/government/publications/national-flu-immunisation-programme-plan-2024-to-2025/national-flu-immunisation-programme-2024-to-2025-letter>.
26. UK Health Security Agency. Seasonal influenza vaccine uptake in children of school age in England: winter season 2023 to 2024. London: 2024 May 23 [accessed 2024 Nov 03]. <https://www.gov.uk/government/statistics/seasonal-influenza-vaccine-uptake-in-children-of-school-age-winter-season-2023-to-2024/seasonal-influenza-vaccine-uptake-in-children-of-school-age-in-england-winter-season-2023-to-2024>.
27. UK Health Security Agency. Over 30 million people urged to take up ‘vital’ flu and COVID-19 vaccines. London: 2022 Sep 22 [accessed 2024 Oct 21]. <https://www.gov.uk/government/news/over-30-million-people-urged-to-take-up-vital-flu-and-covid-19-vaccines>.
28. Price T, McColl E, Visram S. Barriers and facilitators of childhood flu vaccination: the views of parents in North East England. Z Gesundh Wiss. 2022;30(11):2619-2626. doi: 10.1007/s10389-022-01695-2. Epub 2022 Feb 18. PMID: 35194545; PMCID: PMC8853737.
29. Baguelin M, Flasche S, Camacho A, Demiris N, Miller E, Edmunds WJ. Assessing optimal target populations for influenza vaccination programmes: an evidence synthesis and modelling study. PLoS Med. 2013 Oct;10(10):e1001527. doi: 10.1371/journal.pmed.1001527. Epub 2013 Oct 8. PMID: 24115913; PMCID: PMC3793005.
30. Mohammed H, McMillan M, Andraweera PH, Elliott SR, Marshall HS. A rapid global review of strategies to improve influenza vaccination uptake in Australia. Hum Vaccin Immunother. 2021 Dec 2;17(12):5487-5499. doi: 10.1080/21645515.2021.1978797. Epub 2021 Oct 8. PMID: 34623221; PMCID: PMC8904008..
31. Ruiz H, Halcomb E, Seale H, Horgan A, Rhee J. Knowledge, beliefs and attitudes of general practitioners and general practice nurses regarding influenza vaccination for young children. Aust J Prim Health. 2021 Aug;27(4):276-283. doi: 10.1071/PY20175. PMID: 33653508.
32. Walters M, Rhodes A, Hoq M, Measey MA. Caregiver's intention and uptake of influenza vaccination for children in Australia before and after introduction of free vaccination. Public Health. 2024 Sep 30;237:94-96. doi: 10.1016/j.puhe.2024.08.022. Epub ahead of print. PMID: 39353232.
33. Chan PS, Fang Y, Kawuki J, Chen S, Liang X, Mo PK, Wang Z. Parental Acceptance, Parental Hesitancy, and Uptake of Seasonal Influenza Vaccination among Children Aged 6-59 Months: A Systematic Review and Meta-Analysis. Vaccines (Basel). 2023 Aug 13;11(8):1360. doi: 10.3390/vaccines11081360. PMID: 37631928; PMCID: PMC10459009.
34. Sallam M. COVID-19 Vaccine Hesitancy Worldwide: A Concise Systematic Review of Vaccine Acceptance Rates. Vaccines (Basel). 2021 Feb 16;9(2):160. doi: 10.3390/vaccines9020160. PMID: 33669441; PMCID: PMC7920465.
35. Ekezie W, Awwad S, Krauchenberg A, Karara N, Dembiński Ł, Grossman Z, Del Torso S, Dornbusch HJ, Neves A, Copley S, Mazur A, Hadjipanayis A, Grechukha Y, Nohynek H, Damnjanović K, Lazić M, Papaevangelou V, Lapii F, Stein-Zamir C, Rath B, For The ImmuHubs Consortium. Access to Vaccination among Disadvantaged, Isolated and Difficult-to-Reach Communities in the WHO European Region: A Systematic Review. Vaccines (Basel). 2022 Jun 28;10(7):1038. doi: 10.3390/vaccines10071038. PMID: 35891201; PMCID: PMC9324407.
36. Nurmi J, Harman B. Why do parents refuse childhood vaccination? Reasons reported in Finland. Scand J Public Health. 2022 Jun;50(4):490-496. doi: 10.1177/14034948211004323. Epub 2021 Apr 12. PMID: 33845701; PMCID: PMC9152597.
37. Reuben R, Aitken D, Freedman JL, Einstein G. Mistrust of the medical profession and higher disgust sensitivity predict parental vaccine hesitancy. PLoS One. 2020 Sep 2;15(9):e0237755. doi: 10.1371/journal.pone.0237755. PMID: 32877412; PMCID: PMC7467323.
38. Verger P, Botelho-Nevers E, Garrison A, Gagnon D, Gagneur A, Gagneux-Brunon A, Dubé E. Vaccine hesitancy in health-care providers in Western countries: a narrative review. Expert Rev Vaccines. 2022 Jul;21(7):909-927. doi: 10.1080/14760584.2022.2056026. Epub 2022 Mar 28. PMID: 35315308.
39. Ferreira Caceres MM, Sosa JP, Lawrence JA, Sestacovschi C, Tidd-Johnson A, Rasool MHU, Gadamidi VK, Ozair S, Pandav K, Cuevas-Lou C, Parrish M, Rodriguez I, Fernandez JP. The impact of misinformation on the COVID-19 pandemic. AIMS Public Health. 2022 Jan 12;9(2):262-277. doi: 10.3934/publichealth.2022018. PMID: 35634019; PMCID: PMC9114791.
40. Marzo RR, Su TT, Ismail R, Htay MNN, Essar MY, Chauhan S, Patalinghug ME, Kucuk Bicer B, Respati T, Fitriyana S, Baniissa W, Lotfizadeh M, Rahman F, Salim ZR, Villela EFM, Jermsittiparsert K, Aung Y, Hamza NAE, Heidler P, Head MG, Brackstone K, Lin Y. Digital health literacy for COVID-19 vaccination and intention to be immunized: A cross sectional multi-country study among the general adult population. Front Public Health. 2022 Sep 16;10:998234. doi: 10.3389/fpubh.2022.998234. PMID: 36187686; PMCID: PMC9523876.
41. Adeyanju GC, Engel E, Koch L, Ranzinger T, Shahid IBM, Head MG, Eitze S, Betsch C. Determinants of influenza vaccine hesitancy among pregnant women in Europe: a systematic review. Eur J Med Res. 2021 Sep 28;26(1):116. doi: 10.1186/s40001-021-00584-w. PMID: 34583779; PMCID: PMC8477621.
42. Gallant AJ, Flowers P, Deakin K, Cogan N, Rasmussen S, Young D, Williams L. Barriers and enablers to influenza vaccination uptake in adults with chronic respiratory conditions: applying the behaviour change wheel to specify multi-levelled tailored intervention content. Psychol Health. 2023 Feb;38(2):147-166. doi: 10.1080/08870446.2021.1957104. Epub 2021 Jul 30. PMID: 34328044; PMCID: PMC9970185.
43. Wang B, Andraweera P, Danchin M, Blyth CC, Vlaev I, Ong J, Dodd JM, Couper J, Sullivan TR, Karnon J, Spurrier N, Cusack M, Mordaunt D, Simatos D, Dekker G, Carlson S, Tuckerman J, Wood N, Whop LJ, Marshall H. Nudging towards COVID-19 and influenza vaccination uptake in medically at-risk children: EPIC study protocol of randomised controlled trials in Australian paediatric outpatient clinics. BMJ Open. 2024 Feb 17;14(2):e076194. doi: 10.1136/bmjopen-2023-076194. PMID: 38367966; PMCID: PMC10875525.
44. Michie S, Wood CE, Johnston M, Abraham C, Francis JJ, Hardeman W. Behaviour change techniques: the development and evaluation of a taxonomic method for reporting and describing behaviour change interventions (a suite of five studies involving consensus methods, randomised controlled trials and analysis of qualitative data). Health Technol Assess. 2015 Nov;19(99):1-188. doi: 10.3310/hta19990. PMID: 26616119; PMCID: PMC4781650.