





BMJ Open Exploring health locus of control among vaccine-hesitant parents: a scoping review

Camilla Elena Magi ¹, Emanuele Buccione ², Stefano Bambi,¹ Paolo Iovino ¹, Patrizio Zanobini,¹ Federica Cecchi,³ Federica Maria De Blasi,³ Loredana De Marchis,³ Chiara Peduto,³ Domenico Sinisi,³ Antonia Maria Vanella,³ Antonio Bonacaro,³ Chiara Lorini,¹ Guglielmo Bonaccorsi,¹ Laura Rasero,¹ Khadija El Aoufy ¹, Yari Longobucco¹

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¹Department of Health Sciences, University of Florence, Florence, Italy

²Pediatric Intensive Care Unit, Local Health Authority 3 Pescara, Pescara, Italy

³Department of Medicine and Surgery, University of Parma, Parma, Italy

Correspondence to

Dr Paolo Iovino;
paolo.iovino@unifi.it

ABSTRACT

Objectives This scoping review aimed to explore the relationship between health locus of control (HLOC) and vaccine hesitancy among parents of children aged 0–18 years, focusing on the tools and methods used to assess these constructs.

Design The review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines and adhered to established methodologies for scoping reviews, including systematic searches across four electronic databases.

Data sources PubMed, PsycINFO, Web of Science and CINAHL were searched using a comprehensive search strategy to identify relevant studies on 24 September 2024.

Eligibility criteria for selecting studies Studies were included if they examined HLOC and vaccine hesitancy in parents, measured these constructs with validated tools and focused on childhood vaccination.

Data extraction and synthesis Data were extracted into a structured table capturing study characteristics, HLOC and vaccine hesitancy measurements, and key findings. Results were synthesised narratively to highlight associations and patterns.

Results Five studies involving a total of 11 758 parents and caregivers of children aged 0–18 years met inclusion criteria. Higher internal HLOC was consistently associated with lower vaccine hesitancy and higher compliance, while lower chance HLOC correlated with greater hesitancy. Powerful others HLOC (ie, trust in healthcare professionals) emerged as a key predictor of better vaccine adherence.

Conclusions The findings suggest that internal HLOC and trust in healthcare providers are predictors of vaccine acceptance among parents. However, standardised tools and longitudinal studies are needed to further elucidate these relationships and inform targeted interventions to reduce vaccine hesitancy.

INTRODUCTION

Vaccines are widely recognised as one of the most effective public health interventions, preventing millions of deaths annually and significantly reducing the global burden of infectious diseases by controlling, eliminating

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This scoping review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines, ensuring transparency and methodological rigour.
- ⇒ A comprehensive search strategy was implemented across four major electronic databases, increasing the likelihood of identifying relevant studies.
- ⇒ A systematic and blinded selection process was used to minimise selection bias and ensure consistency.
- ⇒ Data extraction was conducted in a structured manner, ensuring reliable and comparable information from the included studies.
- ⇒ This scoping review may have missed more recent studies not yet indexed or available in the selected databases, limiting the scope of the review.

and sometimes, under specific conditions, eradicating infectious agents.^{1 2} Despite these achievements, ensuring comprehensive vaccination coverage remains a persistent challenge. Approximately 1 in 10 children worldwide remains unvaccinated each year, posing a critical threat to global public health.³

Vaccine hesitancy, defined as the delay in acceptance or refusal of vaccines despite their availability, is a major obstacle to achieving full immunisation coverage and exists on a continuum, ranging from complete acceptance to outright refusal.⁴ Over the past decade, several conceptual frameworks have been developed to understand the psychological, social and structural factors that influence vaccine-related decisions.⁵

The 3C model identifies complacency, convenience and confidence as key factors driving vaccine hesitancy.⁴ The 4C model builds on the 3C model by adding calculation, which reflects the extent to which individuals weigh the personal costs and benefits

Table 1 PEO example

P	Parents of children aged 0–18 years
E	Health locus of control
O	Vaccine hesitancy

PEO, Population, Exposure, Outcome.

of vaccination.⁶ The 5C model further introduces collective responsibility, emphasising the role of protecting others in vaccination decisions.⁶ More recently, the 7C model incorporates compliance with vaccination policies, relating to societal measures for monitoring and sanctioning vaccine refusers and conspiracy, which highlights beliefs in vaccine-related misinformation and conspiracy theories.⁷

The consequences of vaccine hesitancy for public health are substantial. Reduced vaccination coverage undermines herd immunity, leading to the resurgence of previously controlled diseases, such as measles and pertussis.⁸ Moreover, vaccine hesitancy increases morbidity and mortality from vaccine-preventable illnesses, threatening the sustainability of global immunisation efforts.⁹ Cultivating and maintaining public trust in vaccines is therefore essential for the sustainment of high vaccination rates and to ensure population-level protection.¹⁰

Among the various factors that influence health-related behaviours, the concept of health locus of control (HLOC) has gained prominence in recent years.¹¹ HLOC is defined as an individual's perception of the extent to which they can influence their own health.^{11 12} Individuals with a strong internal HLOC believe their actions and decisions directly influence their health status. In contrast, those with an external HLOC attribute health outcomes to external forces, such as other people (eg, doctors, family members), institutions or societal structures. Alternatively, people with a chance HLOC believe that health outcomes are primarily determined by luck, fate or random factors beyond personal or external control. Evidence demonstrates the role of HLOC in guiding health behaviours, including adherence to medical advice and risk avoidance. For instance, adolescents with a strong internal HLOC tend to adopt health-promoting behaviours (eg, avoiding smoking and excessive alcohol consumption) more frequently than

those with an external HLOC.¹³ Children with asthma who perceive greater personal control over their health are more likely to adhere to prescribed treatment plans.¹⁴

Given the role of HLOC in guiding health behaviours, it is crucial to understand how Parent HLOC (PHLOC) influences parents' attitudes towards vaccination, as they play a critical role in influencing their children's health decisions or directly decide for them¹⁵ or directly decide for them, as in the case of minors. Understanding PHLOC could offer insights into how parental beliefs shape vaccine-related decisions and suggest potential strategies for targeted interventions to enhance vaccine acceptance.

Parents, as primary caregivers, profoundly influence their children's health behaviours during formative years.¹⁶ Parental attitudes and beliefs strongly shape children's health outcomes, as parents mediate access to healthcare services, provide necessary care and model health-related behaviours.¹⁷ Understanding PHLOC, the extent to which parents believe they can influence their child's health, offers valuable insights into factors contributing to vaccine hesitancy. However, given the relatively recent development of this concept, a comprehensive overview of the available evidence is still lacking.

Aim

The present scoping review aimed to explore studies reporting the relationship between HLOC and vaccine hesitancy in parents, focusing on the tools and methods used.

METHODS

This scoping review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines¹⁸ and adhered to the methodology outlined for scoping reviews.^{19 20}

Research question

The research question was structured using the PEO methodology (table 1), which defines the Population (P) as parents or legal guardians of children and adolescents aged 0 to 18 years, the Exposure (E) as HLOC, encompassing internal dimensions (self-perceived control) and external dimensions (beliefs in external factors such as healthcare professionals or chance) and the Outcome

Table 2 Eligibility criteria

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> ▶ Studies involving parents or legal guardians of children and adolescents aged 0–18 years. ▶ Studies examining the relationship between health locus of control and vaccine hesitancy in parents. ▶ Primary research articles (longitudinal studies, cohort studies, case-control studies, experimental studies, cross-sectional studies, qualitative studies) or secondary research (narrative reviews, systematic reviews, scoping reviews, meta-analyses, etc). ▶ Articles published in Italian or English. 	<ul style="list-style-type: none"> ▶ Conference abstracts, opinions, editorials, letters, comments, theses. ▶ Studies that do not involve parents or legal guardians of children aged 0–18 years (e.g., studies on adults without children, elderly individuals). ▶ Studies that do not specifically address the relationship between health locus of control and vaccine hesitancy. ▶ Studies related to COVID-19.

(O) as vaccine hesitancy, previously defined as the delay, refusal or doubt regarding vaccination.

Search strategy

A comprehensive search string was developed and adapted for each of the following four electronic databases: PubMed (via Medline), PsycINFO (via EBSCOhost), Web of Science (via EBSCOhost) and CINAHL (via EBSCOhost). The complete search string used for all the electronic databases on 24 September 2024 is detailed in online supplemental table 1.

Eligibility criteria

Eligibility criteria (table 2) were defined to ensure alignment with the research question and to select studies relevant to the scope of the review.

Article selection process

Articles identified from each database were imported into the Rayyan platform.²¹ After duplicate removal, titles and abstracts were systematically screened for relevance, followed by full-text assessment based on inclusion and exclusion criteria. The authors conducted these phases in a blinded manner, with collaborative decision-making

to enhance consistency and accuracy, ensuring alignment with the research aims.

Data extraction

Data from the included studies were systematically extracted in tabular form, encompassing authors and publication year, study title, country, aim(s), study design, sample, HLOC measurement(s), vaccine hesitancy measurement(s) and main results.

Registration of the scoping review

This scoping review was registered on the Open Science Framework platform to ensure transparency and replicability (<https://doi.org/10.17605/OSF.IO/38NQG>) on 24 September 2024.

FINDINGS

The study selection process is summarised in figure 1. A total of 11 303 records were retrieved from the four electronic databases, and 2825 duplicates were removed. After screening titles and abstracts, 8478 articles were evaluated, leading to 194 articles selected for full-text

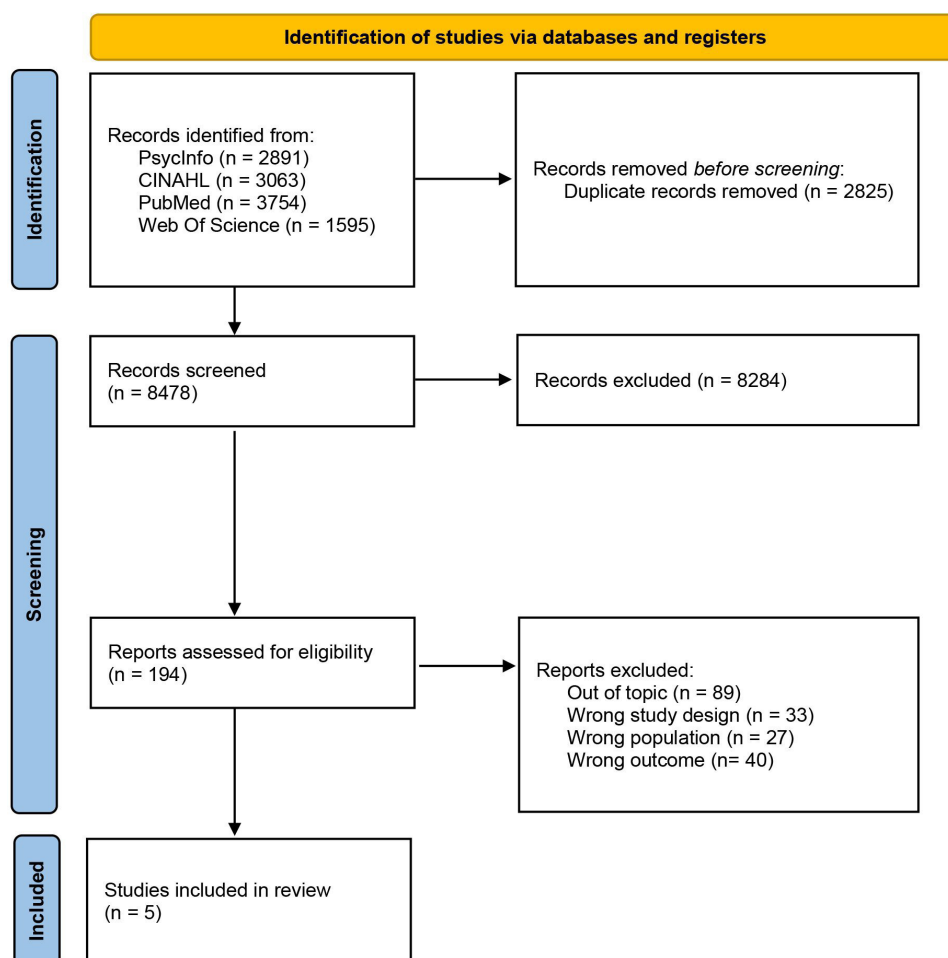


Figure 1 PRISMA flow diagram ScR. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.

assessment. Finally, five studies were included in this scoping review.

Characteristics of included studies

The included studies were conducted across three regions: Europe (n=2, 40%), Asia (n=2, 40%) and North America (n=1, 20%). The publication years ranged from 1992 to 2018. The studies predominantly employed cross-sectional surveys (n=4, 80%), while one study used an experimental design (n=1, 20%). The study involved a total of 11 758 parents and caregivers of children aged 0–18 years. Specifically, the sample size varied from 124 to 8204 participants and included caregivers of healthy children (n=3, 60%), parents of children with chronic conditions such as asthma (n=1, 20%) and general populations engaged in immunisation campaigns (n=1, 20%). Target vaccines included those for measles, mumps and rubella (MMR) (n=1, 20%), influenza (n=1, 20%), meningococcal C (n=1, 20%) and broader vaccination schedules (n=2, 40%), including vaccines for Diphtheria, Tetanus and acellular Pertussis, polio and others. The characteristics of the included studies are summarised in [table 3](#).

Instruments used for measuring HLOC and vaccine hesitancy

More than half of the studies (n=3, 60%) employed the Multidimensional Health Locus of Control Scale (MHLC), an instrument developed by Wallston *et al*, which assesses HLOC in the domains of internal, chance and powerful others. Other approaches included the domain-specific HLOC scale by Ferring and Filipp in one study (n=1, 20%) and structured questions to assess perceived control in another (n=1, 20%). For vaccine hesitancy, all studies used tools informed by theoretical frameworks, with 80% (n=4) incorporating constructs from the Health Belief Model (HBM). These tools included Visual Analogue Scales,²² structured interviews,²³ HBM-based surveys²⁴ and Likert-scale surveys.²⁵ One study (20%) employed Lewin's Theory of Behaviour Forces to develop a 71-item questionnaire on MMR vaccination (Weitkunat *et al*).

Relationship between HLOC and vaccine hesitancy

Higher internal HLOC was associated with lower vaccine hesitancy and higher vaccination compliance in more than half of the studies (n=3, 60%). Specifically, Weitkunat *et al* found that compared with those with lower internal HLOC, parents with higher internal HLOC were more likely to vaccinate their children against MMR, and Paek *et al* observed a similar association with caregivers of older children. Amit Aharon *et al* demonstrated that a higher internal HLOC contributed to increased vaccine compliance by shaping more positive attitudes towards vaccination. In contrast, greater chance HLOC, representing reliance on fate or luck, was associated with greater vaccine hesitancy in three studies (n=3, 60%). Szilagyi *et al* and Amit Aharon *et al* both reported that higher chance HLOC was linked to lower vaccine compliance. Trust in healthcare professionals, as measured by powerful others HLOC, was a strong predictor of vaccine

compliance in the majority of studies (n=4, 80%). Amit Aharon *et al* and Weitkunat *et al* both found that reliance on paediatricians' advice significantly influenced vaccine uptake. Additionally, mediating factors such as perceived disease severity, susceptibility and the reliability of information sources were found to shape these relationships. Timmermans *et al* showed that higher perceived vulnerability to meningococcal infection enhanced favourable evaluations of vaccination campaigns, while greater perceived control over disease prevention reduced reliance on vaccination.

DISCUSSION

This scoping review explored the relationship between HLOC and vaccine hesitancy among parents of children aged 0–18 years, providing an overview of the tools and methods employed. Our findings suggest that perceived control over health plays a significant role in parents' vaccination decisions. To the best of our knowledge, this is the first study to systematically map the literature on the influence of HLOC on vaccine hesitancy among parents.

Our results revealed significant heterogeneity among the tools adopted to measure HLOC and vaccine hesitancy. The MHLC scale emerged as the most widely applied tool, highlighting the centrality of internal control, trust in external authorities and perceptions of fate in shaping health behaviours. The frequent use of the HBM underscores the importance of psychological factors such as perceived vulnerability and the perceived benefits of vaccination.²⁶ On the other hand, Lewin's theory of behavioural forces, which offers a unique perspective on the interplay between external and internal forces, remains underexplored but could provide valuable insights into vaccine decision-making.

This review identifies a significant association between internal HLOC and vaccine hesitancy. Parents who perceive greater control over their health decisions are more likely to vaccinate their children. Our finding aligns with previous research demonstrating that a strong internal locus of control is associated with healthier behaviours, including vaccination.²⁷ Additionally, the perception of control over health outcomes has been shown to positively influence engagement in preventive health behaviours.²⁸

Conversely, an external HLOC, particularly the chance HLOC, is associated with increased vaccine hesitancy. Fatalistic beliefs, where health outcomes are perceived as determined by external forces or luck, diminish individuals' sense of empowerment and reduce their likelihood of engaging in preventive behaviours, such as vaccination.²⁹ Parents with high chance HLOC scores were less likely to vaccinate their children, often due to negative perceptions of vaccine effectiveness.³⁰

Trust in healthcare professionals and health authorities (powerful others HLOC) emerged as a pivotal factor in vaccine adherence. Trust in health authorities is consistently linked to positive vaccination decisions.³¹

Table 3 Characteristics of the included studies

Authors (years)	Title	Country	Aim(s)	Study design	Sample	HLOC measurement(s)	Vaccine hesitancy measurement(s)	Main results
Amit Aharon <i>et al</i> (2018) ²⁵	A path analysis model suggesting the association between health locus of control and compliance with childhood vaccinations	Israel	To examine the association between parents' HLOC and vaccination compliance in children.	Cross-sectional study	731 parents of 3–4-year-old children.	18 items (Internal HLOC, Chance, External HLOC).	Vaccine beliefs questionnaire: 3 dimensions (Pro-Vaccine Attitudes, Anti-Attitudes, Anti-Vaccine Attitudes, Mandatory Vaccination).	External HLOC is directly associated with vaccine compliance, while internal HLOC and chance HLOC have indirect effects through vaccine attitudes.
Paek <i>et al</i> (2015) ²⁴	Determinants of caregivers' vaccination intention with respect to child age group: a cross-sectional survey in South Korea	South Korea	To examine how knowledge, risk perception, health beliefs and HLOC influence parents' vaccination intentions.	Cross-sectional study	1017 caregivers of 0–12-year-old children.	Modified MHLC scale for vaccination context: 6 items (Internal HLOC, Chance, External HLOC).	Vaccine intention assessed with three items.	Internal HLOC is positively associated with the intention to vaccinate older children (7–12 years), while external HLOC is negatively associated with the intention to vaccinate younger children (0–3 years).
Szilagyi <i>et al</i> (1992) ²³	Improving Influenza Vaccination Rates in Children with Asthma	USA	To test the effectiveness of a reminder system in improving influenza vaccination rates in children with asthma.	RCT	43 parents of children with asthma aged 1–18 years.	MHLC: 18 items (Internal, Chance, Powerful Others).	Vaccine registration (via medical records), items on perceived barriers and concerns about vaccine side effects.	No significant association between HLOC and vaccine compliance. Asthma concerns were a positive predictor for vaccination.
Timmermans <i>et al</i> (2008) ²²	Parents' perceived vulnerability and perceived control in preventing Meningococcal C infection	Netherlands	To examine parents' perceptions of vulnerability and control regarding Meningococcal C infection and their evaluation of vaccination.	Cross-sectional study	1763 parents of 6–14-year-old children.	Three open-ended questions on perceived control classified into internal, external, and other control.	Four questions assessing vaccine safety, efficacy, and usefulness for Meningococcal C.	Parents with internal HLOC were more critical of vaccination, while higher vulnerability perceptions led to more positive evaluations of vaccination.

Continued

Table 3 Continued

Authors (years) Title	Country	Aim(s)	Study design	Sample	HLOC measurement(s)	Vaccine hesitancy measurement(s)	Main results
Weitkunat <i>et al</i> (1998) ⁴⁰ Psychological Factors Associated with the Uptake of Measles Immunization	Germany	To examine psychological and sociological factors influencing the choice to vaccinate against measles.	Cross-sectional study	8204 parents or guardians of 0–6-year-old children.	FEGK: 20 items for external and internal control.	3 questions regarding the perception of measles danger, likelihood of contracting the disease, and trust in the vaccine.	Parents with a more internal HLOC were more likely to vaccinate.

FEGK, Fragebogen zur Erfassung gesundheitsbezogener Kontrollüberzeugungen that is, Questionnaire for Assessing Health-Related Locus of Control Beliefs; HLOC, Health Locus Of Control; MHLC, Multidimensional Health Locus of Control Scale; RCT, Randomised Controlled Trial.

Furthermore, trust in healthcare providers plays a crucial role in shaping vaccine-related attitudes,³² and trust in family and friends acts as a protective factor against vaccine hesitancy.³³

Institutional trust is a distinct but critical component of trust that is strongly associated with vaccine acceptance. A deficit in institutional trust is often linked to vaccine hesitancy, as individuals with low trust in institutions may turn to interpersonal belief systems or sources of information that conflict with scientific evidence.³³ This highlights the importance of maintaining public confidence in healthcare systems to improve vaccination coverage.³⁴ Strengthening institutional trust requires transparent communication, consistent public health messaging, and efforts to address misinformation effectively.

The role of consistent and reliable health messaging cannot be overstated. Clear and authoritative communication from trusted sources is key to combating misinformation and increasing vaccine uptake.^{35 36} Parents who feel supported by competent and trustworthy professionals are more likely to follow vaccination recommendations.³⁷ A positive patient–provider relationship, characterised by trust and open communication, significantly reduces vaccine hesitancy among parents.³⁸

Perceptions of disease severity and susceptibility play a central role in vaccine decision-making. Parents who perceive a higher risk of preventable diseases are more likely to vaccinate their children.³⁹ This is closely linked to the perception of control over preventive measures; when individuals feel empowered to influence health outcomes, such as through vaccination, they are more likely to adopt preventive behaviours.²⁸ These findings highlight the importance of vaccination campaigns that not only emphasise the risks of preventable diseases but also communicate how vaccination enables parents to take control of their children’s health. Accordingly, the concept of vaccination literacy provides a useful lens to understand how knowledge, competencies and the broader health literacy environment shape vaccine decisions. As vaccination literacy goes beyond individual awareness, encompassing community, population and organisational factors, strengthening vaccination literacy at multiple levels allows for the enhancement of the perception of control, building trust in healthcare institutions and reinforcing vaccination as a shared social practice, ultimately helping to address vaccine hesitancy.¹⁰

Strengths and limitations

One of the key strengths of this scoping review is its comprehensive approach, offering a thorough overview of the relationship between HLOC and vaccine hesitancy. The review followed the PRISMA-ScR guidelines, which ensure methodological rigour, and employed a broad search strategy across multiple databases. By synthesising results from various studies with different instruments and theoretical frameworks, the review ensures a holistic perspective on the issue.

There are some limitations to consider in this review. First, the absence of recent studies, which could provide new insights into the relationship between HLOC and vaccine hesitancy. This gap is noted both as a limitation and as an area that this review attempts to address by including available studies up to 2024. Further, the small number of studies included limits the generalisability of the findings. Additionally, the heterogeneity in the tools and methods used across the studies presents challenges in making direct comparisons. Furthermore, because the studies included vaccines targeting different diseases, the findings may not be directly applicable to specific vaccination campaigns.

Impact

This scoping review highlights the need for further research into the relationship between HLOC and vaccine hesitancy, particularly through larger, longitudinal studies and the development of standardised measurement tools.

For clinical practice, understanding the role of HLOC can help healthcare providers tailor communication strategies to reduce vaccine hesitancy. By addressing parental concerns and building trust, clinicians can promote vaccine acceptance and improve vaccination rates, ultimately enhancing public health outcomes.

CONCLUSIONS

This scoping review underscores a significant relationship between HLOC and vaccine hesitancy. Specifically, internal HLOC is associated with lower vaccine hesitancy, suggesting that strengthening parents' sense of control over health may improve vaccine acceptance. Additionally, trust in healthcare professionals and the perception of disease severity are crucial factors influencing vaccine decisions. This scoping review emphasises the importance of interventions that aim to build trust and educate parents about the risks of preventable diseases. Further research is needed to explore causal relationships and test targeted interventions aimed at reducing vaccine hesitancy.

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ORCID iDs

Camilla Elena Magi <http://orcid.org/0009-0007-5599-2405>

Emanuele Buccione <http://orcid.org/0000-0003-4146-8948>

Paolo Iovino <http://orcid.org/0000-0001-5952-881X>

Khadija El Aoufy <http://orcid.org/0000-0003-3278-8296>

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