# Professor Sander van der Linden et al – Written Evidence (CVX0016)

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Jointly we represent a leading team in the UK and internationally on the topic of public health, misinformation, and (childhood) vaccination. We summarize key evidence for the committee below on the role of misinformation in childhood vaccine hesitancy.

We rely on common definitions of "vaccine hesitancy", i.e., a delay in acceptance or refusal of vaccination despite availability which often involves a psychological state of indecisiveness (MacDonald et al., 2015; Larson, 2022). Importantly, vaccine hesitancy isn't binary but operates on a graded spectrum. Misinformation refers to information that is either false or misleading in relation to the best available scientific evidence and/or reliance on well-known propaganda tactics (van der Linden et al., 2025). Although valid questions about vaccine side effects should be raised (e.g., see Faksova et al., 2024), anti-vaccination groups often

leverage safety concerns into elaborate conspiracy theories which are statistically implausible (Grimes, 2016, 2021). Importantly, whilst parental trust in childhood vaccines remains relatively high (84%) in the UK (UK Health Security Agency, 2025), the share of **parents expressing concerns about childhood vaccines has increased from roughly 20% to 30% over the last few years (UKHSA, 2025) and confidence in childhood vaccines among the 18-34 year old age group (i.e. potential future parents) has dropped from 75% in 2015 to 58% in 2023** (Vaccine Confidence Project, n.d.). This had led to concerning outbreaks of preventable diseases such as measles (BBC, 2026).

## 2. What is the influence of the media environment on childhood vaccination coverage?

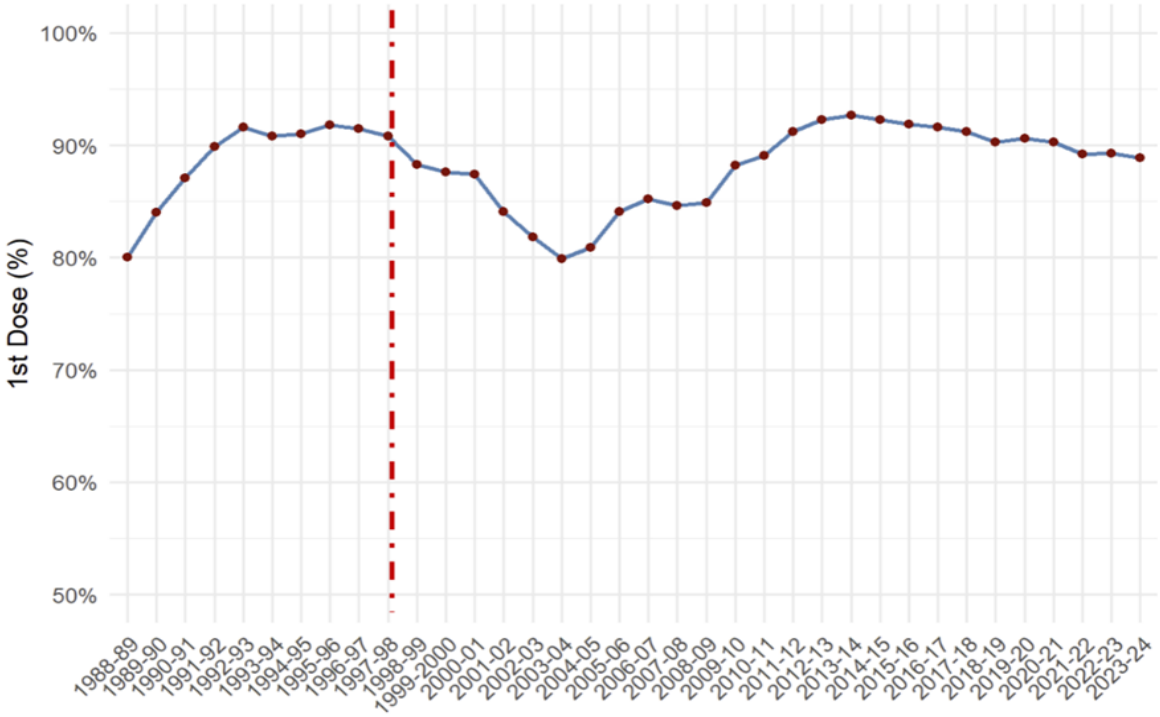
**2.1:** Misinformation about vaccination is not new and can be traced back to the earliest modern vaccines at the turn of the 18th century. Long before generative AI, anti-vaccination activists produced graphic propaganda fearmongering that the cowpox vaccine against smallpox would turn people into human-cow hybrids (Grimes, 2025a). Antivaccination leagues were common across Britain in the Victorian era sparking violent protests against smallpox vaccine mandates, **introducing many of the tropes still common in antivaccine propaganda today**; chief among them the false claims that vaccines are secretly harmful and that doctors profit from their administration (Grimes, 2025a).

**2.2:** Although a vocal antivaccine fringe remained highly active throughout the 20th century, a defining moment for the spread of vaccine misinformation was a fraudulent 1998 *Lancet* study published by Andrew Wakefield falsely suggesting that MMR vaccines cause autism, **which has been identified as one of the most consequential hoaxes in the history of medicine** (Flaherty, 2011). This myth persists in the public consciousness of parents to this day, in part because it took nearly 12 years for the paper to be retracted, but also because it provided (false) clues for parents as to why autism cases appear to be increasing. Amplification by the mainstream media through false norms of 'journalistic balance' caused significant public confusion about the vaccine-autism link (Clarke, 2008; Dube et al., 2013). At the time,

national surveys revealed that about half of the UK public thought there was equal evidence on 'both sides' of the debate (Lewis & Speers, 2003).

In terms of its influence on MMR vaccination, we plot vaccination uptake below based on NHS immunisation data, **which fell from 92% in 1995 to 80% in 2003 and as low as 58% in some areas of London**. It recovered since then but is **again** showing evidence of **decline**. Although not causal evidence, there is no other known reason that can explain the large drop in MMR coverage following the autism-vaccine coverage. Attempted causal analyses also suggest that negative media attention and adverse vaccine events reporting (VAERS) spiked following the Wakefield controversy compared to the period before which was not the case for a placebo analysis with the HIB vaccine (Motta & Stecula, 2021).

*MMR (1st dose) vaccination coverage from 1988 to 2024 (dotted line indicates publication of Wakefield paper in 1998)*. Visualisation produced by the authors based on data from the NHS website (Table 7 in the .xlsx file on childhood vaccination coverage).




Crucially, these effects are **not** isolated to the MMR vaccine. Concentrated **misinformation** campaigns around the HPV vaccine (which offers protection against cervical cancer) caused **vaccination coverage to drop from 70% to 1% in Japan and from 87% to 50% in Ireland** (Grimes, 2019) following false reports of serious side effects from anti-vaccination groups which prompted the government in Japan to

discontinue proactive recommendation of the HPV vaccine despite no credible scientific evidence of harm (Normile, 2017), resulting in an estimated **24,000 to 27,000 extra cases of cervical cancer** and approximately **5,000** preventable **deaths** (Simms et al., 2020).

**2.3:** Systematic reviews show that childhood vaccination decisions are complex, covering **psychological**, **sociocultural**, and **political** factors (Larson et al., 2011), including safety and efficacy perceptions, trust in vaccines and healthcare, perceived risks and benefits, socioeconomic status, religion, past experience, cultural values, and prior attitudes (Brown et al., 2010; Dube et al., 2013; Larson et al., 2014; Kilich et al., 2020; Obohwemu et al., 2022). For these reasons, there has been debate about isolating the impact of misinformation as a causal agent. Nonetheless, in addition to the above case studies, there is now plenty of controlled experimental evidence that **misinformation causes lower vaccination intentions** (Allen et al., 2024; Loomba et al., 2021; Schmid et al., 2023) and that online misinformation exposure is associated with real-world reductions in vaccination uptake (Pierri et al., 2022). Performance on validated assessments of misinformation susceptibility also strongly predicts regional vaccine uptake in the UK (Loomba et al., 2023).

**2.4.** A recent systematic review in BMJ highlighted substantial evidence for the negative effects of vaccine misinformation spread on social media (Ruggeri et al., 2024). Indeed, research **has strongly implicated social media in spreading and amplifying misinformation about (childhood) vaccinations** (Suarez-Lledo & Alvarez-Galvez, 2021) with many websites featuring negative and fallacious information about vaccines (Dube et al., 2013). A study in *Nature* mapped anti-vaccination networks across three billion Facebook users observing rapid growth of anti-vaccination clusters compared to pro-vaccine clusters, **predicting that anti-vaccination views will increasingly dominate online discourse** because of their entanglement with other forms of pseudoscience (e.g., alternative medicine) and appeal to undecided users (Johnson et al., 2020). Research which has combined experimental data with real-world exposure data on Facebook estimates that **exposure to a vaccine-skeptical URL, on average, lowered vaccination intentions by about 2%** (95% CI: -1% to -3%) per user (Allen et al., 2024). Importantly, the impact of manipulative content in the mainstream media that, for example, falsely implies causation based on mere co-occurrence (e.g., "*healthy doctor died two weeks after COVID-19 vaccine*") was much more influential than fact-checked fake news (van der Linden &

Kyrychenko, 2024). This reveals the limits of fact checking because it cannot capture misleading content that does not cross the boundary into overt falsehood.

**2.5:** The U.S. Secretary of Health and Human Services, Robert F. Kennedy Jr. has **repeatedly spread influential misinformation about public health** and vaccination leading over 5,000 U.S. employees from the CDC and other health agencies to write an open letter to U.S. Congress asking him to stop spreading "**dangerous and deceitful**" misinformation (Lewis, 2025; Tanne, 2025). A recent policy paper in *Science* provides direct causal evidence that exposing people in an experimental setting to the new official **institutionalized CDC pages** referring to "uncertain" links between MMR vaccination and autism increases perceived risks of side effects and **lowers vaccination intentions with spillover to greater endorsement of science denial tactics** (Böhm et al., 2026). What's important for the inquiry to understand is that much of this content is not 'organic'. Analyses of anti-vaccination websites show that they use highly similar strategies and tactics (e.g., fearmongering and safety denial). **Anti-vaccination propaganda is highly networked and well-funded** and a crucial driver of the MAHA ("Make America Great Again") movement (Grimes, 2025b). RFK JR's foundation is the world's leading funder of anti-vaccination propaganda (Jamison et al., 2020) and production is highly concentrated with, for example, 12 accounts being responsible for over 65% of pandemic misinformation on social media (CCDH, 2021). The make-up of MAHA is ideologically diverse from personal liberty and "health freedom" campaigners to bereaved parents to natural medicine advocates (Grimes, 2025b). Importantly, given that misinformation now travels on social media across geographical boundaries without friction and with easily accessible translation, conspiracy theories are not confined to the U.S. but metastasise globally, including the UK, representing a **destabilising force in international vaccination confidence** (Larson & Piatek, 2025).

**3. What would be the best ways to support confidence and to address misinformation and disinformation about childhood vaccination in the media environment?**

**3.1**: Several reviews have now pointed out that the traditional approach of informing people about benefits and harms of vaccinations—and the associated probabilities—is important for being trustworthy (Kerr et al., 2022) **but is not going to be sufficient to address the misinformation problem** (Larson et al., 2011; Ruggeri et al., 2024). Research has shown that *trust* in experts, as well as trust in the safety, efficacy, and importance of vaccines, are crucial factors in explaining vaccination decisions (Wilder-Smith & Qureshi, 2018; de Figueiredo et al., 2020). However, a recent household study from the Dutch Ministry of Health found that **misinformation susceptibility** and trust in vaccination are **two important but independent** factors that predict vaccine hesitancy, i.e. greater trust did not mitigate the negative impact of misinformation susceptibility on vaccine hesitancy (Roozenbeek et al., 2025). In other words, it's not necessarily the case that the "real" problem with vaccine hesitancy is something else (e.g., inequality, polarization, distrust), it is more likely that there are many concurrent interrelated problems that need a variety of different solutions.

**3.2:** A range of evidence-based approaches have been developed, including debunking and fact-checking, prebunking or psychological "inoculation", empathic interviewing, and behavioral interventions to encourage vaccine uptake. Yet, reviews have pointed out that **many evidence gaps remain in part due to lack of access to social media data by researchers and insufficient funding**, as well as the incentives that enable rapid production of misinformation compared to developing and communicating validated empirical insights (Ruggeri et al., 2024; van der Linden et al., 2025).

**3.3:** A large body of research, including meta-analyses, has evaluated the efficacy of debunking and fact-checking (Chan et al., 2017; Walter et al., 2020). **The general conclusion is that debunking misinformation can be helpful but is rarely sufficient due to the continued influence of misinformation:** people often continue to rely on falsehoods even when having seen a correction (Lewandowsky et al., 2020). Fact-checking individual claims also does not scale easily and typically does not receive the same level of engagement as the original misinformation, remaining mostly contained to audiences already familiar with the facts. Debunking is more effective when it not just tells people that information is wrong but offers a detailed coherent alternative explanation instead while minimizing repetition of misinformation (Lewandowsky et al., 2020).

**3.4:** For these reasons it can be more advantageous to **prebunk** misinformation (Jolley & Douglas, 2017) to prevent people from embracing falsehoods in the first place (Lewandowsky & van der Linden, 2022; Roozenbeek & van der Linden, 2024). **Prebunking follows the vaccination analogy: by pre-emptively exposing people to a weakened dose of misinformation—or the tactics used to produce misinformation—people can cultivate cognitive "antibodies**" and become more resistant to misinformation in the future (Roozenbeek et al., 2022; van der Linden, 2022). Meta-analyses have affirmed the efficacy of psychological inoculation interventions (Simchon et al., 2025), including those that expose the playbook of anti-vaccination and have been tested and scaled by the World Health Organization and UK government to hundreds of millions of people worldwide (Basol et al., 2021; GCS, 2021). One example includes Bad Vaxx, a free inoculation-inspired game funded by the CDC, EU, and UK government that breaks down anti-vaccination techniques for players in an entertaining fashion (Appel et al., 2024). Some inoculation videos have shown that they can also increase intentions to get vaccinated (Piltch-Loeb et al., 2022).

**3.5:** Importantly, **the goal of many misinformation interventions continues to focus on informing rather than persuading and addressing misperceptions, rather than focusing on how to drive vaccination uptake**. Because public health has an advocacy component (Walsh et al., 2024), this is an important distinction because as previously noted, although misinformation is one barrier to uptake, it is not the only driver (van der Linden et al., 2025). For that reason, other interventions should be considered in parallel. **For example, the empathetic refutational interview (ERI), affirms a patient's values and beliefs by showing empathy for their concerns and refuting misinformation in a way that is tailored to the underlying psychological 'roots' that may drive hesitancy** (Holford et al., 2024), which range from fears to morality concerns to distorted risk perceptions to religious or ideological drivers (Fasce et al., 2023). Research with health practitioners shows that the ERI increases vaccine acceptance, and the persuasiveness of the refutations (Holford et al., 2024). In a field test, the ERI increased the rate of vaccination appointments by half, from 50% in a control condition to 78% after the ERI (Fasce et al., 2025). Other research bypasses misinformation correction entirely. For example, some of the **most effective interventions to increase vaccination uptake are simply vaccine appointment reminders** (Milkman et al., 2021). Many reviews also highlight the benefit of using **trusted messengers** to

address vaccine misinformation (Pertwee et al., 2022), such as religious leaders or social media influencers (van der Linden et al., 2025).

**3.6:** Reviews have pointed out important evidence gaps, such as modest effects of any single intervention and **lack of real-world population-level health campaign trials that go beyond laboratory conditions to measure real-world vaccination outcomes** (Ruggeri et al., 2024). These efforts are complicated by lack of funding for this research and lack of access to social media data (van der Linden et al., 2025). In addition, a substantial portion of health care practitioners are vaccine hesitant themselves (Elizondo-Alzola et al., 2021; Paterson et al., 2016) which further complicates uptake of interventions.

**3.7:** The weaponization of bots and generative AI to drive coordinated inauthentic activity to polarize vaccination debates (Broniatowski et al., 2018) **speaks to the need for system-level solutions**. Recent advances in exposing the grey market of online manipulation (Olejnik, 2025), such as the Cambridge Trust and Safety Index, has shown how inexpensive it is to create (fake) accounts online and allows for policy-makers and platforms to design policies to increase the cost of online manipulation, for example by cracking down on "SIM farms" (Dek et al., 2025) as well as addressing platform and **algorithmic incentives** that exploit outrage to diffuse misinformation (McLoughin et al., 2025; Rathje et al., 2022).

**3.8:** Lastly, it is important to note that narratives of refusal, hesitancy, distrust, and misleading claims of harm have proliferated across traditional and social media. Such **outsized media attention may inadvertently increase the reach of misinformation**, and lower trust of expert consensus among the public. For example, during the pandemic, widely published reports of vaccine refusal ignored the generally high adherence rates. Research shows that the vaccine-hesitant often misperceive adherence norms (Vriens et al., 2023). **Highlighting expert consensus is known to reduce misperceptions and increase (childhood) vaccination uptake, including among the vaccine hesitant** (Bialek et al., 2023; Bartoš et al., 2021; van der Linden et al., 2015). **More representative reporting on adherence, benefits, and consensus (expert and public) should be demanded from public broadcasters**. In addition, there are benefits to **coordinated campaigns**. In response to the HPV confidence crisis, for example, Ireland formed an HPV vaccine alliance with buy-in from parent groups,

doctors, politicians, and other relevant stakeholders to launch a successful coordinated campaign to promote the HPV vaccine (Grimes, 2019).

## 4. Conclusion and recommendations

4.1: Childhood vaccine uptake remains relatively high in the UK but declining confidence and coverage is leading to the resurgence of deadly but preventable diseases. Vaccination decisions are complex, but research has identified a **clear causal role of misinformation** in reducing vaccine uptake, necessitating a coordinated **policy** response.

4.2: Anti-vaccination campaigns are **highly networked** and on the rise globally, and recently have become institutionalized in the US. The consequences of official health authorities spreading influential misinformation should be formally investigated with **imminent risks** of negative spillover to the United Kingdom via transatlantic anti-vaccination networks.

4.3: When it comes to countering misinformation, decades of research shows that **prevention is better than cure**. Much more investment is needed in setting up public health infrastructure to **monitor and counter misinformation in real-time**, including randomized trials that evaluate evidence-based approaches (e.g., prebunking, empathetic interviewing) to counter vaccine misinformation and cultivate vaccine confidence at population-level.

4.4: **Regulators** should also address guidelines for public broadcasters, tackle the online **manipulation market,** and demand **algorithmic transparency** and access to data from social media companies in order for independent researchers to quantify and trace the viral spread of health misinformation and its links with population-level health outcomes.

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