Understanding Vaccine Skepticism

A cultural-sociological multi-method study on perspectives regarding the Dutch National Immunization Programme

Josje ten Kate

Propositions to accompany the PhD thesis

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1. Different perspectives on vaccines can inspire identical decisions about childhood vaccination. (*this dissertation*)
2. Risk perceptions regarding childhood vaccination come in two types: risk calculation and a risk typology. (*this dissertation*)
3. How trajectories of vaccine skepticism take shape depends on parents' underlying health views. (*this dissertation*)
4. Large-scale information campaigns about vaccination can decrease support among groups that are specifically targeted. (*this dissertation*)
5. Placing a great value in science and scientific methods may fuel distrust in scientific products such as vaccines. (*this dissertation*)
6. Dutch Catholics are more satisfied with their lives than non-religious Dutch people because of the social benefits of their religion.
7. Praying may harm mental health.
8. Feeling entitled to participate in dominant institutions decreases chances at feelings of depression.
9. The more a society values traditional family and marriage configurations, the smaller the positive effect of marriage on happiness.
10. Cultural sociologists who limit themselves to inductive research undersell the scientific and societal value of a cultural-sociological approach.
11. Sharing an elaborate meal during interviews is positively related to interesting results.

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1. Dezelfde beslissing over kindervaccinaties kan gebaseerd zijn op verschillende perspectieven op vaccinaties. (*dit proefschrift*)
2. Er zijn twee typen risicopercepties met betrekking tot kindervaccinaties: risicocalculatie en een risicotypologie. (*dit proefschrift*)
3. Onderliggende gezondheidsperspectieven bepalen hoe vaccinatiescepsistrajecten van ouders vorm krijgen. (*dit proefschrift*)
4. Grootschalige informatiecampagnes over vaccinatie kunnen steun onder de doelgroep van de informatie ondermijnen. (*dit proefschrift*)
5. Veel waarde hechten aan de wetenschap en wetenschappelijke methoden kan wantrouwen aanwakkeren in wetenschappelijke producten zoals vaccins.. (*dit proefschrift*)
6. Nederlandse Katholieken zijn tevredener met hun leven dan niet-religieuze Nederlanders door de sociale voordelen van hun geloof.
7. Bidden kan schadelijk zijn voor mentale gezondheid.
8. Het gevoel een legitieme deelnemer te zijn in dominante instituties verkleint de kans op depressieve gevoelens.
9. Het positieve effect van het huwelijk op geluk is kleiner in landen waar meer waarde gehecht wordt aan traditionele familiewaarden en het huwelijk.
10. De wetenschappelijke en maatschappelijke waarde van een cultuursociologische benadering worden onderbenut wanneer cultuursociologen zich beperken tot inductief onderzoek.
11. Uitgebreid tafelen tijdens interviews hangt positief samen met interessante bevindingen.

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By Josje ten Kate

Colofon

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Promotoren:	Prof.dr. J. van der Waal Prof.dr. W. de Koster
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Chapter 1

Introduction

1.1 Introduction

The rise in the skepticism toward and fall in the uptake of childhood vaccination are of great concern in the 21st century (Dubé et al., 2014; Sadaf et al., 2013; WHO, 2019a). This concern is particularly notable in the West, including in the United States and a variety of countries across Europe (Gross et al., 2015). Evidence of this can be seen over the last 15 years in worries over the increasing number of applications in the US for non-medical exemptions to the requirement to immunize children in schools and kindergartens (Bednarczyk, King, Lahijani & Omer, 2019; Williams et al., 2019). The picture is similar in Europe, with unprecedent outbreaks of vaccine-preventable diseases occurring over the past 10-15 years (Bechini et al., 2019; Sheikh et al., 2018). These developments have led to a heated public debate and, in countries like Italy and France, the introduction of measures such as mandatory vaccination (Bechini et al., 2019).

In the Netherlands, where the uptake of childhood vaccination has traditionally been relatively high (RIVM, 2019a), concern about a decline in the immunization rate began to emerge before the COVID-19 pandemic and has continued thereafter (RIVM, 2019b; RIVM, 2023a). The Dutch National Institute for Public Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieu; RIVM) collects data on changes in vaccination rates and publishes an annual report on the issue. It first described a drop in the numbers participating in the National Immunization Programme (NIP) in 2015 (RIVM, 2015). Two years later, it further noted that the WHO-recommended standard of a 95% vaccination rate to eradicate measles had not been met since 2016 (RIVM, 2017). The uptake of the MMR vaccine fell even further in 2018 to 92.9% (RIVM, 2019b). The last report published prior to the outbreak of COVID-19 suggested that the overall decline in participation in the NIP had stabilized (RIVM, 2019b), but more recent figures show that vaccination rates in 2022 were slightly lower than in 2021. This trend was confirmed in the RIVM's reports on 2023 and 2024, with the uptake in 2023 2-5 percentage points lower and again a decline in overall uptake among infants and toddlers in 2024. In relation to measles, the vaccination rate among babies had fallen below 90% in 2023, causing the institution to express grave concern about a potential resurgence of the disease (RIVM, 2023a; RIVM, 2024).

This doctoral thesis employs the Netherlands as its context, given the developments described above. Other relevant characteristics of this setting include accessibility to the NIP and the role of religion. In particular, participation in the Dutch NIP is relatively easy and free of charge (RIVM, 2019a), the country is relatively secularized (Inglehart, 1997), and its uptake among the Dutch Orthodox community is rising (Spaan et al., 2017). This means that the factors usually examined first (i.e., privilege and religion) are unlikely to provide a satisfactory explanation of the country's overall decline in the uptake of vaccination and are, therefore, not the focus of the thesis. The strategic focus on the Netherlands also means the researcher needs to be well-versed in the Dutch language and the social debate and sensitivities on the issue of immunization. Accordingly, my childhood in the Netherlands, the fact that Dutch is my native language, and my familiarity with the topic of vaccination and related news coverage prior to the start of this project makes me uniquely qualified to develop and conduct the research at its heart.

The rising concern about vaccine uptake in the Netherlands and elsewhere (Bechini et al., 2019) has led to a growing body of scientific research dedicated to understanding vaccine skepticism. Set out below is an overview of the relevant literature to date, followed by a discussion of my approach to this issue, the main research question and the empirical studies that have informed it. The final chapter provides a summary of the main findings and their implications.

1.2 Research on skepticism toward childhood vaccination

Childhood vaccination is often studied in terms of rates of uptake by parents. Research has examined care-givers whose ability to vaccinate their children is limited by barriers that include economic constraints or problems in travelling to settings where vaccines are administered (Reich, 2012). However, vaccination rates are also affected by an (un)willingness to vaccinate (Reich, 2014), and efforts to understand this issue focus on a variety of concepts, including vaccine refusal, vaccine skepticism, and the WHO-coined umbrella term "vaccine hesitancy", which refers to the "delay or acceptance or refusal of vaccination despite availability of vaccination services" (MacDonald, 2015: 4161). This thesis uses the term vaccine skepticism, which is understood to encompass views ranging from having some doubt about vaccines to being strongly opposed.

Relevant research is rooted in a variety of scientific fields, including medicine, psychology and, more recently, sociology. Psychological approaches focus on cognitive and affective processes that may contribute to people being more or less inclined to accede to the immunization of their children. Rossen, Hurlstone and Lawrence (2016), for instance, provide an overview of the "cognitive constraints" that may contribute to increased levels of distrust. These include the "familiarity backfire effect" (p. 2), where repeated exposure to sources that provide what is commonly viewed as misinformation about vaccination increases the sense of familiarity with these messages and can, as a result, reduce distrust. Other psychological studies have pointed to a variety of biases that might engender a so-called conspiracy mentality and/or skeptical attitudes (Casigliani et al., 2022). These include confirmation bias, i.e., the tendency to interpret information in a way that confirms one's prior convictions (Malthouse, 2022), and omission bias, i.e., the belief that it is worse to incur risk by doing something than by not doing it (DiBonaventura & Chapman, 2008).

Epidemiological research has traditionally mapped the distribution, patterns, and determinants of (vaccine-preventable) diseases (Lahariya, 2016). Meanwhile, epidemiological studies of vaccine skepticism have tended to focus on examining sociodemographic characteristics or the determinants of vaccine refusal (Siddiqui, Salmon & Omer, 2013). This work has shown that factors such as economic position and parental education (Bertoncello et al., 2020) may be relevant to the attitudes people have toward vaccination. Some studies have taken a more ecological approach by mapping vaccination uptake geographically (e.g., Ruijs et al., 2011). A well-known example concerns the Dutch 'Bible Belt', where vaccination rates have generally been lower than in the rest of the country (Klinkenberg et al., 2022; Ruijs et al., 2011), although they have begun to rise more recently (Spaan et al., 2017). This type of research is oriented toward identifying factors that may be relevant and of interest to medical and governmental professionals, which is an approach that means it is still often unclear why and how any of the determinants uncovered actually shape vaccine skepticism.

Sociological studies of vaccine skepticism reveal a shift from (still somewhat persistent) investigations of economic constraints, geographical challenges, or other barriers to participation, to a focus on identifying factors that

explain why parents are *deliberately* opting out of immunizing their children (Reich, 2020a). Research has shown that this rejection of vaccination is increasingly common, especially in rich Western nations (Reich, 2016; Bocquier et al., 2017). As the uptake of vaccination is regarded as a logical or self-evident choice by most scientists, policymakers and, until quite recently, the overwhelming majority of the public, the question of parents' increasing unwillingness to immunize their children and how this can be understood is thus an important issue for both current and future research.

One of the usual suspects in this context is Orthodox religion. Indeed, Orthodox Protestants in the Netherlands have consistently been found to be less willing to vaccinate their children (Ruijs et al., 2012; Spaan et al., 2017). However, while Orthodox religion has been identified as an important driver of its followers' vaccine skepticism, that of their non-religious counterparts is puzzling. Moreover, given that the public role of religion in the Netherlands is significantly less prominent than in countries like the US (Inglehart 1997), a focus on motivations other than religion is particularly relevant. Research also shows that younger generations of Dutch Orthodox Protestants are more willing to vaccinate their children than their earlier counterparts (Spaan et al., 2017; Woudenberg et al., 2017), again strongly suggesting that religion is becoming a less important factor. Furthermore, those in the social groups among which vaccine skepticism is especially prevalent in the current context, i.e., more affluent and/or educated parents, are even less likely to be part of an Orthodox religion (Abramson & Inglehart, 1994; Houtman et al., 2011). Consequently, a focus on non-religious motivations underlying vaccine skepticism is of significant value.

Studies examining the role played by anti-science and anti-institutionalist attitudes in the (un)willingness to participate in childhood vaccination programs have indeed revealed other, non-religious, motivations. Research into distrust of science or anti-science attitudes generally attributes them to a lack of understanding or literacy. This work assumes that "to know science is to love it" (Sturgis & Allum, 2004: 56), and that having a greater knowledge of science translates into holding more favorable views toward immunization. The argument is made that individuals without an adequate degree of knowledge risk reverting to "irrational fears of the unknown" or "mystic beliefs" that may undermine their trust

in science (Sturgis & Allum, 2004: 57). The expected consequence is an overall lack of trust in immunization and, in some cases, misperceptions or so-called conspiracy beliefs about vaccines. Anti-institutionalist attitudes have also been found to shape vaccination attitudes, since they inspire a broader sense of distrust in official institutions, including those involved childhood vaccination programs (Engin & Vezzoni, 2020; Jamison et al., 2019).

As alluded to above, what these strands of the literature have in common are two assumptions: 1) that all of us share and regard as legitimate the core ideas behind vaccination that are central to medical science and public health policy; and 2) that those who do not accept these concepts are misinformed (about vaccination and/or institutions) and can (and should) be corrected. The (mostly) quantitative studies in this field are typically informed by these assumptions, as well as by the researchers' own presumptions about why people do not (or cannot) appreciate the benefits of vaccination. This risks both the (unconscious) imposition of these assumptions on study participants and the overlooking of reasons for vaccine skepticism that researchers have not previously considered. Most importantly, the possibility that vaccine-skeptical parents may not share the commonly accepted science on immunization and instead view vaccines in a completely different way is ignored.

More recently, several authors have focused their efforts on the perspectives of parents, in particular seeking to acquire a more in-depth understanding of the motivations that underlie their vaccine refusal or skepticism. These, often qualitative, studies have moved away from seeking to provide a general or universal explanation, instead delving deeper into the different ways in which vaccination is viewed and approached (often among specific groups). This work has revealed that vaccine skepticism is informed by diverse views on health and healthcare (e.g., Attwell et al., 2021; Ward et al., 2017), going beyond the typical explanations traditionally covered in large-scale surveys on attitudes toward immunization. A number of scholars have for instance found that the decisions made by some parents about childhood vaccination are rooted in concerns about 'naturalness', and an aversion to health measures they perceive to be 'unnatural' (Bobel, 2002; Reich, 2016). This is a clear demonstration of what is referred to above, i.e., that vaccine skepticism may arise from perspectives on vaccination and

health that differ from the views that dominate official policies and communications.

There are also indications that vaccine skepticism is not exclusively rooted in views that are often regarded as 'anti-science' (e.g., a preference for the natural) or lacking an affinity with scientific knowledge (Carrion, 2018a). This possibility is even more likely when account is taken of the reality that vaccine skepticism is especially prevalent among groups that are relatively well-versed in how to navigate dominant institutions and have a strong affinity with the leading (scientific) discourse on issues like vaccination, i.e., more-educated groups (Dubé et al., 2014; Reich, 2018). This suggests that vaccine skepticism is inspired by more than so-called anti-scientific views like a preference for leading a natural lifestyle. This doctoral thesis therefore follows up on the indications signaled above, adopting a cultural-sociological approach to identify the different perspectives underlying the growing skepticism toward childhood vaccination in the Netherlands.

1.3 The need for a cultural-sociological approach

The approach central to this thesis responds to the calls for a new way of looking at vaccine skepticism. Several authors are critical of literacy-based explanations, maintaining that "the refusal rate suggests that the traditional assumption that parents suffer information deficit, lack access to the facts or are misinformed is, at best, an incomplete understanding of vaccination attitudes" (Yaqub et al., 2014: 1; cf. Kitta & Goldberg, 2017). A potential answer can be found in research in which it is claimed that individuals' opinions and reactions to information about issues like vaccination are shaped by pre-existing factors. A well-known example is the theory of motivated reasoning, which states that people might be "motivated to arrive at a particular conclusion" (Kunda, 1990: 482) for a variety of reasons that may affect how they acquire and process information (Epley & Gilovich, 2016; Kunda, 1990).

Inspired by the psychological literature on motivated reasoning and heuristics, Dan Kahan and his colleagues adopted a more collectivist approach by arguing that perceptions of societal risk (about, e.g., vaccines) are shaped by values held by social groups with which individuals identify. An example is the "white-male effect", whereby white men are less fearful about a variety of risks than women and minorities, because identifying with some of them (e.g., gun or

environmental) is integral to their cultural identity (Kahan et al., 2007). Focusing more generally on what they describe as "cultural worldviews", they apply the "cultural cognition thesis" to the fear of the HPV vaccine, which they found to be influenced by "hierarchy-egalitarianism" and "individualism-communitarianism" (Kahan et al., 2010: 505).The typical employment by Kahan et al. of survey-based research means that, despite their leading role in uncovering the relevance of cultural factors to issues like vaccine skepticism, their conclusions are affected by a common blind spot of this methodology: failing to take the participants' own understandings of vaccines as the starting point (Dubé et al., 2014).

This doctoral thesis adopts a cultural-sociological approach that seeks to uncover the perspectives on, or understandings of, vaccination and health that underlie skepticism toward childhood vaccination. To this end, vaccine-skeptical individuals' own understandings were central (cf. Becker, 1998; Charmaz, 2014), thereby answering the literature's calls for research that provides an in-depth insight into the different viewpoints that may underlie this issue. These underlying perspectives on vaccination among skeptical individuals, are unearthed by starting from "the native's point of view" (Geertz, 1983: 55–73), thus providing an *emic* (or "experience-near"; see Geertz, 1983: 57) understanding of vaccine skepticism. Doing so enables me to avoid the issue of basing an understanding of vaccine skepticism solely on survey items predetermined by researchers, which may not go beyond reproducing pre-given categorizations (cf. Sobo, 2019). Importantly, adopting this approach not only means that the points-of-view of skeptics are at the center of the analysis, but also that there is no intent to either advance or condemn them.

This is especially relevant, since pathologizing people who reject vaccination does not help us to acquire an understanding of or explain their views and actions. Individuals who oppose vaccination are often described in ways that imply their behavior is being judged. An example is their characterization as either activists who "misrepresent science" (Kata, 2012: 3778), are afraid of "so-called toxins" and prefer "so-called natural products" (McClure et al., 2017: 1553), or as un- or misinformed and easily misled by "highly publicized antivaccine arguments", including in the, now retracted, Lancet article by Andrew Wakefield linking the MMR vaccine to autism (McClure et al., 2017: 1551). Regardless of

whether or not these descriptions are correct, they are certainly unhelpful when looking to develop an in-depth understanding of how vaccine skeptics view vaccination.

This study therefore seeks to understand, not advocate or pathologize, actions and attitudes that many regard as 'crazy'. This approach is inspired by Howard Becker's (1998) sociological studies of groups labeled as deviant, in which he stresses the importance of "assum[ing] that [their behavior] makes some kind of sense and try[ing] to look for the sense it makes" (p. 28). Becker applies this to the example of cannabis users, examining their development from an individual aligned with a conventional position in society into someone who starts to become a user of the drug and then uses it part time and, ultimately, regularly (Aupers, 2004; Becker, 1963). Studies in this tradition generally focus on "an individual's movement through the deviant experience" (Luckenbill & Best, 1981: 197), thus giving center stage to their own views and perspectives.

In addition to unearthing the perspectives underlying vaccine skepticism among Dutch parents, this thesis examines how these perspectives shape their dealings with the broader vaccination environment. As various studies have indicated, the decision-making process concerning immunization is complex and subject to change over time (e.g., Wiley et al., 2020). In the Dutch vaccination setting, parents face few financial and practical constraints on their decisions about immunizing their children. They are also completely free to choose whether (or not) to do so (RIVM, 2019a). Nonetheless, whatever they decide, they cannot avoid regular encounters with official communications on the issue (RIVM, 2016). Taking this context into consideration, the thesis also explores the ways in which the perspectives on vaccination uncovered play a role in how views on vaccination develop and how individuals navigate the vaccination field. This is a particularly important step given the strongly detraditionalized nature of the Netherlands (Houtman et al., 2011; Inglehart, 1997), which may mean that communications from official institutions are unlikely to just be accepted without challenge.

My cultural-sociological approach to vaccine skepticism thus means there are two general stages in this thesis: 1) I set out to uncover the different perspectives underlying the skepticism toward childhood vaccination; and 2) study their roles in the development of vaccination attitudes and the reactions to

information provision about vaccines. The open, inductive starting-point of the thesis enables me to uncover perspectives in addition to the nature-oriented one highlighted in extant research. Moreover, by also examining how these inductively uncovered perspectives shape the responses to the common characteristics of the vaccination environment, the thesis is a useful complement to recent qualitative studies aimed at revealing the reasons behind vaccine skepticism.

The main research question is set out below, along with a description of how it is answered in the different empirical chapters that follow.

1.4 Research question and outline of thesis

The societal and academic context described above result in the thesis's main research question:

What perspectives underlie skepticism toward childhood vaccination in the Netherlands, and how do these shape the development of vaccination attitudes and reactions to information provision about it?

This question is answered using a multi-method approach in which deductive, quantitative, empirical studies are informed by inductive, qualitative research conducted as part of earlier phases of the broader project. Specifically, chapters 2 through 5 correspond to four empirical studies. Each of these informs the answer to the main research question, which is set out in the concluding chapter. An overview of the research question answered in each empirical chapter and the use of data and methods is provided in Table 1.1. More detail about each of these empirical studies is provided in the paragraphs that follow.

Table 1.1: Overview of the research question, method used, and data analysed per empirical chapter

Chapter	Research question	Data and method
2	What different perspectives underlie skepticism toward childhood vaccination among more-educated Dutch parents, and how do these shape their vaccination decisions?	Inductive analysis of in-depth interviews with 31 more-educated, vaccine-skeptic parents.
3	How do health-related events play a role in the vaccine-skepticism trajectories of more-educated Dutch parents and how are these shaped by parents' pre-existing health views?	Inductive analysis of in-depth interviews with 31 more-educated, vaccine-skeptic parents.
4	Does providing more comprehensive information about the MMR vaccine and the material's institutional source increase its support, and do these elements have less of an effect among individuals with stronger anti-institutionalist attitudes?	Pre-registered information survey experiment with a between-subjects design using data representative of the Dutch population (n=2,567).
5	Does including information on the scientific background of vaccination increase support for the MMR vaccine, and is this effect moderated by nature- and science-oriented worldviews?	Pre-registered information survey experiment with a between-subjects design using data representative of the Dutch population (n=1,722).

1.4.1 Different perspectives underlying vaccine skepticism

Overall vaccination rates are in decline in the Netherlands (RIVM, 2023a), despite a rising acceptance of childhood vaccines among groups that have typically have lower vaccination rates (e.g., Orthodox Protestant communities; Spaan et al. 2017). Specifically, there is growing concern about the emergence of 'new' vaccine-skeptical groups (RIVM, 2018). More-educated parents in particular are the subject of increasing attention from public-health organizations and academics, as they are now more likely than other groups to deviate from or completely opt out of state-prescribed vaccination programs (Sobo, 2015; McNutt et al., 2016). This is puzzling for two reasons: 1) the more educated generally report low levels of religiosity

(Houtman et al., 2011), suggesting that their skepticism is not informed by religion; and 2) they generally have a greater affinity with science and modern institutions than their less-educated counterparts (Lareau, 2015), with the arguable expectation that this would lead to higher levels of trust in scientific products like vaccines and the institutions behind them.

Reflecting the cultural-sociological approach outlined above, the first empirical study in the thesis sought to understand this parental skepticism toward childhood vaccination by uncovering the participants' underlying perspectives on vaccination. Additionally, since the public and academic debate regards the vaccine skepticism of more-educated parents as both a pressing and puzzling issue, the strategic focus in this first study is on skepticism toward vaccines among this specific group. The combination of this focus with the overall cultural-sociological approach in the thesis meant that the question at the heart of the work described in **Chapter 2** was: *What different perspectives underlie skepticism toward childhood vaccination among more-educated Dutch parents, and how do these shape their vaccination decisions?*

In attempting to uncover these perspectives, vaccine-skeptical, more-educated parents first needed to be approached and invited to participate in the study. Adopting definitions developed by other scholars (e.g., MacDonald, 2015), vaccine skepticism was conceptualized as a continuum, ranging from those who are extremely opposed at one end to those who are merely hesitant at the other. Consequently, participants were not only recruited through general channels such as schools and daycare facilities, but also via networks specifically established for (and by) those who distrust vaccination, like the Nederlandse Vereniging Kritisch Prikken (the 'Dutch Association for Being Critical towards Vaccines'; NVKP). The assistance of the NVKP in distributing our call for participants was crucial to the inclusion of those who researchers typically find it difficult to reach. A total of 31 parents were ultimately recruited and then interviewed. As the goal was to unearth underlying perspectives on vaccination, the interviews resembled open conversations in which the views of the participants took center stage. Although earlier ideas about (the substance of) perspectives on vaccination did not inform the interview questions or topics, the interviews nonetheless had general recurring themes for comparability purposes: parents' thoughts about vaccination, (potential

changes in) their attitudes and decision-making, the role played by the outside world, and opinions on relevant institutions. All the interviews were conducted in the period March, 2019 to February, 2020, i.e., they were concluded before the COVID-19 pandemic in the Netherlands. Consequently, reflections on COVID and the (lockdown) measures imposed did not play a part in the respondents' narrations of their views on vaccination.

Given the sensitive nature of the childhood-vaccination issue in the public debate (heated discussions in the media on vaccine refusal and the potential introduction of measures like compulsory vaccination; see Pierik & Verweij, 2017), a special effort was made to ensure that the participants felt comfortable and free to express their opinions. A further factor that could have played a role also had to be considered, i.e., my identity as an academic researcher employed by a university. This carried the risk that vaccine skeptics might be considerably less willing to disclose their personal (honest) views on vaccination. It was therefore crucial to first establish a trusting relationship with the participants. Consequently, I took time at the start of each of interview to explain both the study's goals and the issue of institutional embedding, and then answered any questions that arose. In terms of ensuring that the participants felt at ease, it must also be noted that several personal characteristics were probably helpful: 1) I was like most of them in terms of level of education, ethnicity, and gender, which may have made them more likely to trust me; and 2) while I differed from my participants in that I was not a parent myself, this in fact contributed to establishing a non-judgmental atmosphere: not only was my goal to understand the parents' perspectives without condemnation, I also did not have any personal stake in or involvement with the issue of childhood vaccination at the time of the interviews. The participants' appreciation of my non-judgmental attitude and sincere interest in their stories was reflected in both the length of the interviews (an average of an hour and 45 minutes, with the shortest being over one hour and the longest six hours) and the invitations I received to join them for lunch/dinner.

The interviews demonstrated that all the participants shared an 'individualist epistemology', i.e., they considered the individual to be center stage in terms of obtaining knowledge and determining the truth. Blind acceptance of information or advice from institutions like the RIVM was considered to be unwise.

As the participants felt a strong sense of (individual) responsibility for their children's health, they felt it was only logical that judging the credibility of information and making vaccination decisions were matters for them, not others. Nonetheless, the interviews revealed that the translation of this individualist epistemology into vaccine skepticism was informed by two distinct perspectives on vaccination: 1) a neo-romantic or nature-oriented one, which focuses on using intuition to obtain the truth and aims to follow the most natural path; and 2) a critical-reflexive or science-oriented one, whereby modern scientific methods are guidelines for gaining knowledge and are used to critique what is generally considered to be the scientific consensus. While this second, science-oriented, perspective implies that vaccination decisions are rooted in a commonly accepted form of *risk calculation* (a rationalistic way of assessing which option carries the lowest risk), decisions made from a nature-oriented perspective involve a *risk typology*, in which natural risks (e.g., contracting a disease and experiencing severe symptoms) are distinguished from and preferred to unnatural risks (e.g., incurred when opting for a perceived unnatural solution like vaccination).

1.4.2 The role of vaccination perspectives in the development of vaccination attitudes

Uncovering the two perspectives underlying childhood-vaccine skepticism of more-educated Dutch parents, i.e., nature- and science-oriented, offered insights into the essence of these perspectives (e.g., vaccines are unnatural or vaccines are a product of flawed science). However, as several authors have indicated (Carrion, 2018b; Hausman, 2019; Wiley et al., 2020), vaccination attitudes are not static. On the contrary, recent research highlights that "vaccination trajectories" are both extremely complex and dynamic (Wiley et al., 2020: 9).

Extant research also indicates that health-related events, such as the experience of adverse treatment effects (e.g., Harmsen et al., 2013; Harrison et al., 2015) and (negative) interactions with healthcare professionals (e.g., Mills et al., 2005; Reich, 2020a), can have a pivotal influence on trust in healthcare (providers), or may cause people to change their initially positive or neutral views on vaccination (e.g., Carrion, 2018b). Insights from other fields of research on "cultural frames" (Gitlin, 1980) also suggest that the interpretation of and

responses to diverse phenomena are shaped by pre-existing frames or "principles of selection, emphasis and presentation" (Gitlin, 1980: 6). As the earlier study discussed in this thesis demonstrated that vaccine skepticism among more-educated Dutch parents is rooted in nature- or science-oriented perspectives, it seems likely that these also affect how they deal with health-related events and how vaccine-skepticism trajectories thus take shape. Consequently, the second empirical study (**Chapter 3**) focused on the application of the previously uncovered perspectives (referred to as 'health views' herein) in broader vaccination trajectories. The research question posed was: *How do health-related events play a role in the vaccine-skepticism trajectories of more-educated Dutch parents, and how are these shaped by parents' pre-existing health views?*

The interviews conducted for the first empirical study (Chapter 2) were also used as the data source for the second (Chapter 3), which asked further questions about potential changes in the ways the participants viewed vaccination. This biographical element was thus the focus of the analysis in this second study, which revealed that a variety of different types of health-related events incited the start of parents' questioning of the issue of vaccination. These health-related events not only included those that directly involved the health of the parents or their children (e.g., (perceived) adverse effects), but also the experiences of others that arose in, for example, discussions about vaccination. Moreover, the interviews showed that how the participants experienced these events and how they moved through distinct trajectory stages were shaped by their pre-existing health views. Those with nature-oriented views on health (rooted in the neo-romantic or nature-oriented perspective unearthed in the first study) came to doubt the fundamental principles of vaccination, turning instead to so-called alternative resources and practices that were a better fit with their views. On the other hand, the parents with science-oriented health views (rooted in the critical-reflexive or science-oriented perspective) questioned the potential risks of vaccination and sought answers in sources considered by them to be the most scientifically sound.

1.4.3 The role of an anti-institutionalist perspective in the effects of information provision

The findings on the underlying perspectives of vaccine skepticism discussed in Chapter 2 were applied in Chapter 3, where it was illustrated how they also shape the development of vaccination attitudes. Combined, these two chapters thus show that taking the perspectives of individuals into account is crucial to understanding how they perceive vaccines and make decisions, and how their attitudes develop. In applying this insight to a further factor individuals are faced with when it comes to vaccination, the public provision of information, it seems likely that these underlying perspectives will also play a role in how this information is received. Consequently, chapters 4 and 5 examine the broader relevance of individuals' underlying perspectives by assessing how responses to information provision are shaped by both a perspective highlighted in extant research, i.e., anti-institutionalism (Chapter 4), as well as the perspectives uncovered in Chapter 2, i.e., nature- and science-oriented views (Chapter 5).

Rooted in the information-deficit model, which states that trust in science can be increased by filling knowledge gaps (e.g., Sturgis & Allum, 2004), relevant research has suggested various ways to improve the effectiveness of information campaigns. One example is to offer more comprehensive material, which may counter inaccurate understandings arising from the provision of more parsimonious information (Kitta & Goldberg, 2017; Offit & Coffin, 2003), as well as prevent and correct widespread misconceptions about vaccination (e.g., Boyd, 2021). Providing information about the official institutional source is another suggestion, with the view taken that this would increase its credibility and, therefore, the public's willingness to accept it (De Dobbelaer, Van Leuven & Raeymaeckers, 2018; Metzger, Flanagin & Medders, 2010).

Today's detraditionalized contexts are, however, arguably less accepting of official institutions and the information they provide (Beck & Beck-Gernsheim, 1996; Houtman et al., 2011). In a very detraditionalized country like the Netherlands (Houtman et al., 2011; Inglehart, 1997), it remains to be seen whether providing more comprehensive information and information about the institutional source would have a positive effect on trust in vaccination. Moreover, as the previous study shows, pre-existing perspectives may play a significant role in

shaping how vaccination decisions are made and can thus be expected to also shape reactions to information provision about vaccines. Focusing on a view that is known to affect engagement with institutions (Dierkes & Von Grote, 2005), i.e., anti-institutionalism, the study also examines if these attitudes shape the impact of information provision. The MMR vaccine, whose falling uptake is causing widespread concern (Coughlin et al., 2017), is used in the third study (**Chapter 4**) to ask the following two-part question: *1) Does providing more comprehensive information about the MMR vaccine and the material's institutional source increase its support, and 2) do these elements have less of an effect among individuals with stronger anti-institutionalist attitudes?*

A pre-registered information experiment was fielded among a high-quality Dutch probability sample (n=2,567) to answer this question. A double-blind, between-subject design (Haaland et al., 2020) was employed, with participants randomly assigned to one of four groups with forced equal sizes (Alferes, 2012). Three of these groups were used in this third empirical study: Group 1 (the control) was given basic information about measles, mumps and rubella and the MMR vaccine; Group 2 (treatment condition: 'comprehensive') was given the same basic information about the vaccine, as well as additional information about how it works, its effectiveness, potential side-effects, and the scientific research behind it; and Group 3 (treatment condition: 'institutional') received the same basic and comprehensive information as Group 2, along with extra material about the RIVM accompanied by its official logo. All the information used in the treatments was taken from the RIVM's website. Following exposure to these treatments, the participants were asked about: 1) their support for the MMR vaccine; 2) how likely they would be to recommend it to other parents; and 3) their support for compulsory vaccination.

The analysis showed no positive effect of providing more comprehensive information or referencing its institutional source, calling into question the traditional deficit model and the policy measures it informs. Additionally, the provision of comprehensive information on the MMR vaccine had *no effect* on support for compulsory vaccination among those with lower anti-institutionalism scores, and a *negative effect* on this measure in those with higher scores. This suggests that policymakers seeking to counter the rising skepticism toward

childhood vaccination should be cautious about providing (more) information in detraditionalized settings like the Netherlands, as this can actually reduce trust among the groups that are often targeted. It should be noted that the data collection for this study occurred *after* the start of the COVID-19 pandemic, which could have shaped how the RIVM, the body at the heart of official communication about vaccines, was perceived. The RIVM was a constant object of attention and criticism during the pandemic, and continues to be so, making it one of the country's most debated institutions (Van Dijck & Alinejad, 2020). Consequently, providing the public with information about the organisational source may not add to the perceived credibility of material on vaccination that it produces.

1.4.4 The role of nature- and science-oriented perspectives in the effects of information provision

Finally, as well as examining a perspective identified as an important factor in other research (i.e., anti-institutionalism), the thesis also tests empirically how the nature- and science-oriented perspectives revealed in Study 1 play a role in how public information about vaccines is received. This fourth study focuses on the effects of providing a specific type of information about vaccination that has recently been proposed as tools for increasing its effectiveness: information about the science behind vaccination. Dudley et al. suggest the use of a combination of "evidence-based content with evidence-based communication" (2021: 5453). Consequently, again in the Dutch context, this fourth study scrutinizes the effect of this type of information on public acceptance and perceived legitimacy of the MMR vaccine. This is a particularly relevant concern in the Netherlands, where the WHO-recommended 90% threshold for measles immunization was not met in 2021 (RIVM, 2022a). Additionally, the insights obtained in Study 1 are used to examine empirically whether the effects of providing information on the science behind vaccination are shaped by the extent to which individuals hold nature- or science-oriented worldviews. Study 4 (**Chapter 5**) uses specifically designed measures of these views to answer the question: *Does including information on the scientific background of vaccination increase support for the MMR vaccine, and is this effect moderated by nature- and science-oriented worldviews?*

Using the same survey fielded for Study 3, data from a pre-registered survey experiment conducted among members of a high-quality panel representative of the Dutch population (n = 1,722) were analyzed to answer this question. Two of the four groups identified in the data were relevant: the first group (the control) was presented with basic information about measles, mumps and rubella and the vaccine available for children in the Netherlands (MMR); and the second (the treatment) received the same basic information about the vaccine with additional information that discussed the underlying scientific research. The analyses revealed that the stimulus elaborating on the science underlying vaccination did not have a positive effect on support for the MMR vaccine. In fact, there was a non-significant negative effect on support for the vaccine and compulsory vaccination, and a significant negative effect on the likelihood of recommending it to other parents. Moreover, providing information explaining the scientific research had a *negative* effect on support for the vaccine among those with a less science-oriented worldview, which is often the group targeted in campaigns given its generally lower starting levels of support for immunization overall.

2

Chapter 2

“Following your gut” or “questioning the scientific evidence”

Understanding vaccine skepticism among more-educated Dutch parents

Abstract

This study aims to understand vaccine skepticism among a population where it is remarkably prevalent—more-educated Dutch parents—through 31 in-depth interviews. Whereas all respondents ascribe a central role to the individual in obtaining knowledge (i.e., "individualist epistemology"), this is expressed in two repertoires. A neo-romantic one focuses on deriving truth through intuition and following a "natural" path and informing a risk typology: embracing (refusing) "natural" ("unnatural") risks such as "childhood diseases" ("pharmaceutical substances"). A critical-reflexive repertoire centers on scientific methods, but is skeptical about the scientific consensus and informs a risk calculation: opting for the choice perceived to bear the smallest risk. Thus, the same vaccine can be rejected because of its perceived harm to natural processes (neo-romantic repertoire) or because its scientific basis is deemed insufficient (critical-reflexive repertoire). Moreover, these opposing repertoires are likely to inspire different responses to the same health-related information.

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2.1 Introduction

Health organizations and professionals have raised the alarm about falling vaccination rates (Dubé et al., 2014), which are considered a particularly urgent problem in the US and Europe (Gross et al., 2015). In the Netherlands, for example, the vaccination rate among children has fallen below 95%, which is considered to be the threshold required to prevent outbreaks of vaccine-preventable diseases (WHO, 2008). Additionally, the number of parents with serious doubts about vaccinating their children is rising (WHO, 2019), which likely depresses childhood vaccination rates further.

In the Netherlands, vaccine uptake is shaped less strongly by commonly studied factors like orthodox religion and limited access. It is a relatively secularized context (Inglehart, 1997), and vaccine uptake among its orthodox religious minority is actually rising (Spaan et al., 2017). As participation in the Dutch National Immunization Program (NIP) is relatively easy and free of charge (RIVM, 2019a), a lack of access for the less privileged is also not a particularly pressing issue (Reich, 2018). There is, however, growing concern about a "new" vaccine-skeptical group: more-educated parents (Sobo, 2015), who are more likely to intentionally deviate from, or completely opt out of, state-prescribed vaccination programs (McNutt et al., 2016).

The rising vaccine skepticism among more-educated parents is puzzling for several reasons. First, the more educated are among the most secularized groups, suggesting that religious motivations do not underlie their vaccine skepticism. Furthermore, because of their familiarity with science and modern institutions (Lareau, 2015), and greater resources, including cognitive abilities, access to and the uptake of information, and economic capital (e.g., Erola, Jalonen & Lehti, 2016), they are generally expected to have more trust in science, scientific products like vaccines, and governmental institutions.

How, then, can we understand vaccine skepticism among the more educated in the Dutch context? First, we provide an overview of vaccination uptake in the Netherlands. Then, we elaborate on our approach, which puts the views of more-educated vaccine-skeptical Dutch parents at the center of inquiry, before describing our methods and data. Our analysis of in-depth interviews with 31 more-educated Dutch parents reveals, in line with recent research (Attwell, Smith &

Ward, 2021; Duchsherer et al., 2020), that our respondents share an individualist epistemology: the individual plays a central role in obtaining knowledge and determining what is "truth." Yet, it is not uniformly translated into vaccine skepticism. Instead, it is expressed using two distinct repertoires, which are employed to talk about vaccines, inform parents' decisions about vaccination, and aid understanding of how they position themselves in the healthcare field: one neo-romantic (focused on deriving truth through feelings and intuition to follow a "natural" path) and one critical-reflexive (centered on the modern scientific method to acquire knowledge but skeptical about what is considered to be the scientific consensus). Finally, the discussion covers the implications of our findings and suggests avenues for further research.

2.2 Background

All children in the Netherlands have the right to be vaccinated in accordance with the Dutch NIP. Participation in the NIP is free and parents automatically receive an invitation to have their children vaccinated. Within the current program, children receive vaccination at three, five, 11, and 14 months, and at four, nine, and 14 years, with two injections commonly given at the same time. Girls receive an additional vaccine against the Human Papilloma Virus (HPV) when they are 12 or 13 years old (RIVM, 2019a). Table 2.1 provides an overview of the Dutch NIP at the time of this study.

Table 2.1: The Dutch National Immunization Program (NIP)

Age	Injection 1	Injection 2
3 months	DTaP-IPV-Hib-HBV	PCV
5 months	DTaP-IPV-Hib-HBV	PCV
11 months	DTaP-IPV-Hib-HBV	PCV
14 months	MMR	MenACWY
4 years	DTaP-IPV	
9 years	DT-IPV	MMR
12/13 years (girls only)	HPV	HPV (6 months later)
14 years	MenACWY	

Note: DTaP: Diphtheria, Tetanus, Whooping cough; IPV: Polio; Hib: Hib disease; HBV: Hepatitis B; PCV: Pneumococcal disease; MMR: Mumps, Measles, Rubella; MenACWY: Meningococcal disease types A, C, W, Y; HPV: Human Papillomavirus.
Retrieved from https://rijksvaccinatieprogramma.nl/english

Traditionally, the vaccination rate in the Netherlands has been relatively high (RIVM, 2019a). The Dutch National Institute for Public Health and the Environment (*Rijksinstituut voor Volksgezondheid en Milieu*, in short, RIVM) publishes an annual report on changes in vaccination rates, and first revealed a reduction in the numbers participating in the NIP in 2015 (RIVM, 2015). The WHO-recommended standard of a 95% vaccination rate to banish measles has not been met in the Netherlands since 2016 (RIVM, 2017) and fell even further, to 92.9%, in 2018 (RIVM, 2019b). The uptake of the HPV vaccine also dropped in 2016, from 61% to 53.4% (RIVM, 2017), with a further reduction to 45.5% in 2018 (RIVM, 2019b). Although the latest RIVM report suggests that the overall decline in participation in the NIP has stabilized (RIVM, 2019c), there are still concerns about rising levels of vaccine hesitancy and possible further reductions in the vaccination uptake, particularly since the cause for the decline eludes policymakers (RIVM, 2018).

As well as overall vaccination rates, the RIVM also monitors vaccination uptake in different regions. In the area commonly known as the "Bible Belt," which is home to a relatively high number of orthodox Protestants, vaccination rates are traditionally lower than elsewhere in the country: their vaccination rate was approximately 60% in 2012 (Ruijs et al., 2012). In the past, several outbreaks of vaccine-preventable diseases like polio, measles, rubella, and mumps have largely been confined to these communities (Spaan et al., 2017). More recently, however, epidemiological studies in these communities have revealed a rise in both the acceptance of vaccination and the uptake (Spaan et al., 2017). This strongly suggests that the focus should be on other social groups if we are to understand both the overall fall in the vaccination rate and the rise in vaccine hesitancy in the Netherlands.

One fruitful avenue of research that promises to shed light on this phenomenon, is to explore vaccine skepticism among the more educated. Indeed, not only is vaccine skepticism more prevalent among Dutch parents with higher levels of education (Hak et al., 2005), it is also the case that they are more likely to intentionally deviate from, or opt out of, the NIP (Streefland, Chowdhury & Ramos-Jimenez, 1999). However, how we can *understand* their vaccine skepticism is unclear, especially since education generally found to fuel greater trust in (medical)

science and technology (Bak, 2001) and increases the capacity to navigate and use healthcare institutions effectively (Reich, 2018). Given these findings, achieving an understanding of vaccine skepticism among more-educated Dutch parents is a pressing puzzle.

An in-depth exploration of why this group is skeptical towards vaccines requires an approach that enables the investigation of non-hegemonic worldviews. We therefore build on the sociological study of deviant groups by adopting a cultural-sociological approach that places people's own understanding of the world (in this case, relating to health and vaccination) at the center of inquiry (Becker, 1998; Charmaz, 2014). This answers the calls of scholars studying vaccine hesitancy or refusal for a focus on uncovering people's own beliefs and perspectives (e.g., Dubé et al., 2014). Hence, we start from "the native's point of view" (Geertz, 1983:55–73), with the aim being to provide an *emic* understanding (or "experience-near"; see Geertz, 1983:57) of the vaccine skepticism among more-educated Dutch parents.

Importantly, adopting this approach not only implies that we are placing the points-of-view of our respondents at the center of our analysis but also means that we do not intend to either advance or condemn these viewpoints. Pathologization or ridicule would only serve to maintain and increase the barriers to understanding and would do little more than reproduce pre-given categorizations (cf. Sobo, 2019). Becker (1998:28) famously noted that while many are inclined to explain behavior that is commonly considered to be deviant by stating "[t]hey must be crazy," this should instead be seen as a sign that we do not know enough about it and should "assume that it makes some kind of sense and try to look for the sense it makes." Drawing on this research tradition, the goal of our study is not to take sides in a debate on vaccination; instead, our aim is to develop a sociological understanding of vaccine skepticism among more-educated Dutch parents by exploring how *they* view vaccinations and how their actions can be understood in the light of this perspective.

2.2 Data and method

Given the aim of our study, we used qualitative in-depth interviews, which enabled a detailed examination of respondents' points of view (Charmaz, 2014). As our

focus is on exploring the views of more-educated parents, only those with tertiary education were recruited (i.e., a completed (applied) university degree). Moreover, as our focus is on vaccine skepticism, which ranges from strong anti-vaccination sentiments to having doubts about it and implies considerable variation in vaccination decisions (Peretti-Watel et al., 2019; Wiley et al., 2020), we included parents who were hesitant about vaccines as well as others who were opposed to them. Most extant studies only focus on people who reject vaccinations, but as several authors indicate (e.g., Peretti-Watel et al., 2015; Wiley et al., 2020), it is crucial to distinguish between vaccine hesitancy and vaccine rejection because the underlying reasons may differ. This therefore informed our decisions about which channels to use to recruit our respondents.

First, parents were contacted through the *Nederlandse Vereniging Kritisch Prikken* (translated, "Dutch Association for Being Critical towards Vaccines"; in short, NVKP), which is an organization for people who are skeptical towards vaccination. This gave us access to those who are both normally hard to reach and often outspoken about their skepticism toward, and distrust of, the NIP and the (medical and governmental) institutions involved in it. We initially contacted the body's leadership directly with a request to distribute a call among its members. In a series of communications, we were advised to include some information about our affiliations, the university's role in the project, and our relationship with other organizations. The resulting message was then posted on the NVKP's Facebook page by its administrator. The first author was present online at the time the request went live to ensure that we could respond to questions and comments in real time. This was a productive way of making contact as the message led to appointments for interviews with 10 parents. The same message, with minor changes, was also distributed to schools that provide an education based on anthroposophical teachings, which we anticipated would have children registered whose parents are skeptical about vaccination (Dubé et al., 2015; Sobo, 2015).

As the parents who were recruited through the NVKP and the anthroposophical schools were largely opposed to vaccination instead of just having doubts, more general parenting websites, online communities, and schools were also used to enlist respondents. Recruitment was completed when theoretical saturation was achieved, that is, when the interviews no longer brought new

substantive themes to the fore, but instead repeated themes that had already been identified in previous interviews.

The interviews were inductive, resembling open conversations, to enable us to obtain an in-depth understanding of the parents' experiences and views. Our goals were to uncover a wide variety of potential viewpoints and prevent the imposition of *our* ideas onto the participants. However, some themes were discussed in every interview: parents' thoughts about vaccination; potential changes in their attitudes and decision-making; the information they relied on; their views on health and healthcare; the role of others in their decision-making; and their views on relevant institutions. The interviews were conducted over a period of 11 months, from the end of March 2019 until the beginning of February 2020. Consequently, the fieldwork was completed before the 2020 outbreak of SARS-CoV-2 in the Netherlands, which was therefore not a talking point in any of the interviews. Finally, interviews were conducted in line with the ethical guidelines concerning informed consent and (confidential) treatment of data provided by The Association of Universities in the Netherlands (VSNU) and the Netherlands Sociological Association (NSV), of which all authors are members.

All the interviews were conducted by the first author, who invested time and effort in making people feel as comfortable as possible. For some, (non-)vaccination was a sensitive topic, which made her non-judgmental and detached attitude particularly important. To encourage respondents to speak freely, the interviewer took some time at the start of each interview to explain her role and the university's involvement in the research. She also stressed that she would not take sides in any societal debates on vaccination or judge the respondents' views. Her non-judgmental stance was appreciated by the participants: after a sometimes more-reserved start of the interviews, parents' stories became more personal and detailed as the interviews proceeded, with all parents at the end indicating they had enjoyed the interviews and their openness and felt free to share their views and experiences. This was also reflected in the interviews' duration (an average of an hour and 45 minutes, with the shortest being a little over one hour and the longest six hours) and in the multiple invitations to lunch or dinner.

A total of 31 more-educated parents were interviewed. Their views ranged from having (had) doubts about vaccination to being completely opposed to it. Four

interviews were with parents who preferred to be interviewed as a couple. As reported in Table 2.2, this diversity was reflected in parents' vaccination uptake: some eventually decided to participate fully in the state-provided NIP; others opted to only give their children some of the recommended vaccinations, used their own version of the NIP, or delayed the vaccination process; and some decided to not vaccinate their children at all.

The interviews were analyzed using ATLAS.ti. They were transcribed verbatim, coded, and compared iteratively with relevant theories (cf. Glaser and Strauss, 1967). This resulted in 887 pages of transcript, which were first coded openly, generating an initial total of 374 open codes, which were narrowed down to 264 codes through constant comparison. These codes were furthermore categorized into groups corresponding to the overarching themes discussed in the findings, like the main characteristics of the uncovered repertoires and (their relation to) vaccine decisions and health-related behaviors ("axial coding," see Charmaz, 2014). Finally, notes on the interactions during the interviews were coded interpretatively.

Table 2.2: Overview of Respondents (columns continue on next page)

Name	Gender	Age	Education	Number of Children
Katie	Female	50	HBO	2
Sophie	Female	52	HBO	2
Annette	Female	38	HBO	1
Mark	Male	58	HBO	2
Eliza	Female	59	HBO	
Zoe	Female	38	HBO	2
Jennifer	Female	43	WO	1
Chris	Male	58	HBO	1
Annie	Female	27	HBO	2
Mabel	Female	41	HBO	1
Babette	Female	42	WO	1
Faye	Female	53	WO	1
Toon	Male	30	WO	*Expecting first*
Kristel	Female	28	HBO	*child*
Ray	Male	60	HBO	5
Elsemieke	Female	60	WO	2
Gwen	Female	39	WO	1
Layla	Female	30	HBO	2
Iris	Female	30	WO	1
Vicki	Female	57	HBO	2
Crystal	Female	30	WO	1
Michelle	Female	31	HBO	3
Robin	Female	39	HBO	2
Rob	Male	41	WO	2
Mariëlle	Female	40	WO	
Michael	Male	37	HBO	3
Tom	Male	34	HBO	2
Dunya	Female	34	WO	
Jan	Male	58	HBO	3
Sara	Female	35	HBO	2
Lilian	Female	51	HBO	4

Note: To protect the identity of the interviewees, we use pseudonyms. HBO stands for *Hoger Beroepsonderwijs* ("Higher Vocational Education") and is comparable to a university of applied sciences in the American system (HBO is the second highest level of education in the Netherlands). WO stands for *Wetenschappelijk Onderwijs* ("Scientific Education") and corresponds to the highest level of education in the Netherlands (i.e., a bachelor's or master's degree obtained at a research university). NVKP stands for *Nederlandse Vereniging Kritisch Prikken* ("Dutch Association for Being Critical towards Vaccines").

Table 2.2 Continued

Name	Notes	Vaccine Uptake	Recruited Through
Katie		None	NVKP
Sophie		Full	NVKP
Annette		None	NVKP
Mark	*Couple interview*	None	NVKP
Eliza			
Zoe		Partial and delayed	NVKP
Jennifer		Full	NVKP
Chris		None	NVKP
Annie		Partial	NVKP
Mabel		None	NVKP
Babette		None	NVKP
Faye		Partial	oudersvannu.nl
Toon	*Couple interview*	Plan to fully	Snowballing
Kristel		vaccinate	
Ray		None	Snowballing
Elsemieke		Full	mamaforum.nl
Gwen		Full + additional vaccines	Facebook "Vaccineren: ja of nee"
Layla		Partial	Facebook "Vaccineren: ja of nee"
Iris		Delayed (full)	Snowballing
Vicki		Partial	oudersvannu.nl
Crystal		Full	Snowballing
Michelle		Partial	oudersvannu.nl
Robin		Eldest full, youngest none	School
Rob	*Couple interview*	Partial and	School
Mariëlle		delayed	
Michael		Full	School
Tom	*Couple interview*	Full	School
Dunya			
Jan		Partial	School
Sara		None	School
Lilian		Eldest 2 full, youngest 2 partial and delayed	School

Note (continued): The use of different recruitment channels proved useful in achieving a variety in vaccination decisions. Respondents recruited through the NVKP completely opted out of vaccination relatively often. By also recruiting through more general Facebook groups, websites, and schools, we succeeded in also including respondents who made other vaccination decisions (i.e. partial, full, and delayed vaccination). This diverse recruitment approach enabled us to analyze a broad spectrum of vaccine hesitancy (instead of only vaccine refusal). Aside from this purposefully pursued variation, we found no systematic patterns in our findings resulting from different recruitment channels.

2.3 Results

2.3.1 Vaccine skepticism: A shared epistemology

Similar to findings of recent studies on vaccine attitudes (e.g., Attwell et al., 2021; Carrion, 2018a; Duchsherer et al., 2020), our analysis shows our respondents shared an individualist epistemology. More specifically, the role of the individual was considered to be central to obtaining knowledge and, ultimately, determining what is "truth." At the same time, unquestioningly accepting information from institutions or experts was regarded as naive or unwise, which is in line with other studies noting a lack of blind trust in systems driving vaccination (e.g., Attwell et al., 2017). When talking about their views on vaccination, none of our respondents thought it was sensible to only base their views and decisions on the "standard" material provided by governmental or healthcare institutions or to "blindly" follow their advice. When talking about those who participate fully in the NIP, Faye described them as people who "don't think about it at all" and think "it's in the program, so it just happens." Annette similarly said that many of her friends admitted they just "went along with the crowd," and she thought most people "just follow the pack." Participating in the NIP was seen as something "everybody just does" (Annie).

Our respondents did not think it wise to have such "blind faith" (Mabel). Instead they thought it was important to always "think critically for yourself" (Iris) and to "*keep* thinking" (Faye). When it came to information, our respondents for instance often asked themselves, "Is it real? Is what you're reading true?" (Katie) or questioned whether material about vaccines is "fairly reported" (Crystal). Sophie similarly wondered whether such information is "honest and comprehensive." This skeptical attitude closely resembles "epistemological suspicion" and the related "emergence of the self as the source and arbiter of all truth" (Van Zoonen, 2012:56–57) in response to controversies about truth claims or predictions made by institutions to which people are expected to turn in the face of uncertainty and risks.

Our respondents experienced such a sense of epistemological insecurity in relation to vaccines. Katie, for instance, found it hard to determine what the truth was concerning herd immunity, about which she had serious doubts: "I think: who thought of that 95%? If it's 89, why wouldn't that be okay? Just explain that to me .

. . . Herd immunity. . . [laughs] does that even exist? Is it real? Then just prove that to me." Likewise, Iris felt, "there's just a lot of ambiguity" when it comes to vaccines. There was much uncertainty among the parents we interviewed about which elements of the information provided by institutions and experts are "true" or reliable, which went hand-in-hand with determining for themselves whether a source is trustworthy. In discussions about this issue, which the parents described as difficult, Jennifer stressed that she herself "filters the good from the not-so-good sources," while Layla said she and her husband, "just want to look at [their] own situation… and then make [their] own choice." Similarly, emphasizing the central role she herself plays in dealing with information about vaccination, Annette said, "I don't simply accept anything. I want to have it proven for myself . . . . I determine it, not someone else." Sophie likewise explained that although she does consult her GP and lets him "explain to me why he wants to do something or why he thinks something," in the end it is her who "get[s] to make a decision about it."

This central role of the self in producing and judging knowledge reflects the process of individualization in which traditions and institutions become less influential in shaping people's lives (Giddens, 1991). This is thought to not only increase individual freedom and choice but to also bring about a growing sense of responsibility, stress, and anxiety for the individual (Beck, 1992). Consequently, individuals are "condemned to individualization" (Beck & Beck-Gernsheim, 1996:27) and have "no choice but to choose" (Giddens, 1991:75). Applying this to the domain of modern medicine and health, others conclude that today's parents are indeed faced with a growing sense of responsibility for their children's health, which they believe is dependent on their choices (Ward et al., 2018; Reich, 2020a). Indeed, in our study, Annette stressed that she thinks "the parents are responsible for their child. Not the RIVM." Following on from this sense of responsibility, our respondents emphasized that vaccination is a personal choice, which "everyone makes for themselves" (Layla). As Iris put it, "What I find really important is that you have to be able to make a decision yourself. Without being influenced too much."

We can therefore conclude that our respondents share an individualist epistemology, which (1) attributes a central role to the individual in obtaining knowledge and judging what is "true"; and 2) goes hand-in-hand with a skeptical

attitude toward external sources of information. Similar to recent research (e.g., Attwell et al., 2021; Carrion, 2018a), our respondents stressed that their focus is on determining for themselves what is true and also emphasized the importance of not blindly following the advice of others. However, we found that this individualist epistemology was not translated into vaccine skepticism in a uniform way. Instead, our respondents gave substance to it in different and often conflicting ways. First, a neo-romantic repertoire is used where the focus is on deriving truth from individual feelings and intuition in order to follow a "natural" path. The second, critical-reflexive, repertoire is centered on the modern scientific method, which is employed by our respondents to both question what is commonly considered to be the scientific consensus and determine the "truth" for themselves. How each repertoire is used to determine "the truth" about vaccination and to position oneself within the healthcare system is discussed below.

2.3.2 Neo-romantic repertoire

2.3.2.1 Feelings and intuition as the path to the truth

The use of a neo-romantic repertoire to approach vaccination entails a focus on feelings or intuition as the way to gain knowledge and determine the truth, instead of a more generally accepted focus on scientific evidence. When asked about why she started to have doubts about vaccination, Mabel, for instance, stated that it was "basically a bit of a gut feeling." Going on, she explained how she and her partner approached the issue differently, with him being "more about the hard numbers," while she was "more about [her] gut feelings" and vaccination just "[didn't] sit right with [her]." Similarly, Katie explained that she has "a really strong intuition," and first and foremost considers whether something "feels right for [her] or doesn't feel right for [her]."

This was mirrored in how judgments were made regarding the "truth" of the information available about vaccination. Babette, for instance, described how she was initially hesitant about buying a specific book on the topic, but eventually chose to "follow her gut": "Something in my feelings said, "this is for you." So, then I thought, "yes, then it is for me after all!" [laughing] So, I ordered it anyway." Such "gut feelings" or intuitions were experienced as expressions or an extension of nature or what is natural. Vicki, for example, said that her daughter's behavior after

she was vaccinated "didn't feel . . . as if it was normal for her" and that she felt "that [her] child wasn't the way she was supposed to be." After deciding not to let her daughter have the remaining vaccines, Vicki said she "just saw [her daughter] bloom like she was a little flower," and felt that her daughter had returned to her natural self. Her initial feelings thus served as an indication of how her daughter was "naturally" supposed to be. Suggesting this desire to follow what they felt was natural encompassed more than just vaccination, several respondents also applied it to other domains than the human body, for instance, by also keeping their farming practices as natural as possible (e.g., Annette and Ray).

Bobel's (2002) research on natural mothering describes similar observations: the mothers she interviewed based decisions about their children on "embodied knowledge" (Bobel, 2002:86), "gut feelings," or "intuitive sensations" (Bobel, 2002:96). The neo-romantic repertoire used by the parents in our study seems to fit this description when it comes to how they use their feelings and intuition as guidelines when determining the truth about vaccination.

2.3.2.2 Positioning in the healthcare field

As feelings serve as a way to determine the truth or acquire knowledge in the neo-romantic repertoire, they are very important for evaluating healthcare options and practices. The assessments and related decisions of our respondents were primarily based on what felt good or what they "feel to be right" (Vicki). Several parents explained they initially chose to delay their children's vaccination because "something in [them] said . . . [vaccinating] didn't fit in [their child's life]" (Annette), "[vaccinating] didn't feel right" (Mabel), or "it went against their feeling" (Ray). Similarly, after deciding to stop vaccinating her eldest child, Vicki stated she only wanted to (further) vaccinate her children "when it felt right."

When intuition or feelings were not explicitly cited, decisions were supported by invoking a perceived distinction between the natural and the unnatural: parents often chose the option that they perceived to be the most natural or the measure that respected or supported a natural approach the most. In contrast, healthcare measures and practices that were seen as chemical, artificial, or polluting were avoided as much as possible. As Annette explained, she and her husband "kind of base [them]selves on nature." She went on to explain that "[not

vaccinating] is the most natural way" and she "[doesn't] see why [she] should inject such filth into [her daughter's] body." Her goal was to "keep [her] child the way she is—the way she was born." This idea of not disturbing or polluting the natural state of the human body with pharmaceutical substances like vaccines, which contain "toxins" (Mark and Eliza), was also important to Chris, who stressed that "your body will recover by itself—the body is so amazing" and that "with [vaccines] you don't help the body at all." Mabel similarly explained that she wants to "strengthen the immune system in a natural way. . . with as little pharmaceutical influence as possible."

This was mirrored in the idea of "natural" versus "unnatural" immunity, the latter of which was linked to vaccines and seen as "flawed" and "inferior." Mark and Eliza stressed that they only viewed immunity derived from "natural measles" (or other diseases) as "natural" immunity, which they considered to be lifelong. Sophie, Ray, and Annette likewise preferred their children to experience a disease like the measles naturally, rather than vaccinating them against it. Similar attitudes on "natural" immunity have been reported in studies in the U.S. (e.g., Reich, 2016), where the desire for natural immunity inspires some parents to actively seek to infect their children with a virus naturally. None of the parents in our study said they took part in such activities, although some saw them as potentially beneficial.

This desire for the most natural way of dealing with health was also expressed in several respondents' preferences for measures like homeopathic remedies over "mainstream" healthcare, the use of which by vaccine skeptical parents has been noted in previous research (e.g., Attwell et al., 2018). A number of parents described how they used "homeopathic detoxification" (e.g., Vicki and Mabel) after the administration of vaccines or opted for "homeopathic prophylaxis" as an alternative (e.g., Annette). After detoxing her daughter homeopathically after her vaccination, Vicki felt this had helped her child to become "how [she] is supposed to be." Katie similarly preferred the "holistic" approach of a homeopathic doctor who, she feels, pays "real attention to you, and not just to your complaints, but simply to you as a whole." Katie believed that this enabled the underlying causes of illness to be cured, rather than just the symptoms.

"Mainstream" medicine and medication, on the other hand, were often seen as being about "I'm in pain and I'll just take something to take that pain

away," but "that's not taking away the cause." (Katie). In line with this, several respondents expressed a strong reluctance to use different types of "mainstream" (chemical) medication, because "that's an assault on your health" (Chris). Layla also explained that she "doesn't just grab medication for [her]self either" and described herself as "reluctant" when it comes to using medication like paracetamol. Nevertheless, many parents did see curative measures as being a benefit of "mainstream" healthcare, with Jennifer, for instance, saying that she "[has] great faith in the healthcare system . . . . In *repairing* humans, they're really good at that" (emphasis added). Preventative measures, on the other hand, were seen as interfering with the natural state and processes of the human body. This also applied to vaccines: the parents who were particularly set on not meddling too much in these natural processes by using preventative (and thus "unnatural") measures, were also inclined to not participate at all in the government-run NIP.

This neo-romantic focus on nature as a specific way to give substance to an emphasis on individual choice and responsibility was expressed in the vaccination decisions in different ways: while some parents chose to completely opt out of the NIP because they viewed vaccines as "chemical" and disruptive of natural processes, others gave their children some of the recommended vaccines based on their distinction between vaccines they consider to be more or less respectful of natural child development. More specifically, some parents argued that children should not be vaccinated against "childhood diseases" like measles or mumps because contracting them naturally is viewed as a vital element of child development. "Childhood diseases" were thought to "serve a certain purpose, children really experience growth because of them" (Sophie); are "not called "childhood diseases" for nothing" (Annie); and are essential for children to catch because "your immune system has to be trained" (Babette). Based on this distinction between diseases that are "natural" and "essential" to child development and those that are not, which has its origins in anthroposophical ideas about the role played by illness in the development of children (Byström et al., 2014; Gross et al., 2015), some respondents decided to only vaccinate their children against diseases that they did not see as conducive to the natural development process (e.g., polio).

In a neo-romantic repertoire, vaccination decisions are thus based on "what feels right" and what is considered to respect and support natural (health) processes the most. In light of this, respondents' final vaccination decisions ranged from assembling their own vaccination schedule (i.e., one that excludes vaccines against diseases that are seen as essential to natural development or those containing the most "dangerous" toxins) to opting out of the NIP completely.

2.3.3 Critical-reflexive repertoire

2.3.3.1 The scientific method as the path to the truth

In a critical-reflexive repertoire, the individual quest for truth and knowledge is expressed by a focus on rationalistic and "mainstream" scientific methods. So, instead of relying on feelings as expressions of the natural, this repertoire denotes a person's use of scientific methods and principles to individually determine the truth. Expressing an individualist epistemology, Faye explained that she does not like relying on the advice of others. However, in contrast with the neo-romantic repertoire, she does not rely on her feelings when determining what is "true": "Let's all just please not follow our gut feelings!" As Iris explained, "[she]'d rather use [her] own mind" because she "can trust that." Zoe, while thinking about people who focus on their feelings and experiences, also stated she does not like it when sources on vaccination contain "zero arguments" or say "things that are just dumb" and she prefers to be "well-read" on the topic. Being rational and using "common sense" are thus valued over intuition or feelings as ways of determining the truth.[1]

A notable characteristic of the critical-reflexive repertoire is its strong affinity with methods that are commonly seen as "scientific." Importantly, however, the individual is still considered to be the ultimate arbiter of truth (reflecting an individualist epistemology), while scientific information on vaccination is not followed blindly, but reflected upon critically, thus applying a critical and scientific

[1] The critical-reflexive repertoire clearly differs from the neo-romantic repertoire in that it focuses on a rationalistic, scientific approach to knowledge and truth instead of an intuitive and natural one. Most of the respondents clearly focused on one of the two repertoires. Some of the neo-romantically oriented participants did, however, occasionally use a critical-reflexive repertoire to justify their vaccine-related decisions. This normally had a specific pattern: the interviews started with the respondents using elements of a critical-reflexive repertoire to formulate justifications they expected would generally be regarded as legitimate; later on they spoke in more detail about their views on vaccination and health using a neo-romantic repertoire, only occasionally "switching" back to a critical-reflexive repertoire to formulate additional justifications (e.g., when asked about the reactions of the outside world).

attitude to science itself. This was most clearly illustrated by the notion of "doing your own research," which was a widely-used term expressed by our respondents. This emphasized the importance of conducting (scientific) research and using scientific sources to determine *oneself* which advice is trustworthy and what the "truth" about vaccines is (instead of relying on others to do this for you). Both Iris and Gwen said they "informed" themselves and "research[ed]" vaccines after having some concerns, while Toon believed it was important to "consciously read up on [vaccination]." This "own research" was preferably based on scientific studies or methods. As Zoe explained, she reads a lot of books but "skipped the experience-stories" because she "read[s] a book to have it scientifically substantiated." When asked about the kinds of source she uses to get information, Iris said she looked for "scientific studies," while Annie and Gwen explained that, as far as possible, they try to use scientific resources like PubMed. Their resulting perception of the strength of scientific evidence on the risks and benefits of a vaccine was central to their final vaccination decisions.

2.3.3.2 Positioning in the healthcare field

In a critical-reflexive repertoire, evaluations of healthcare practices are based on the perceived (lack of) scientific foundation and scientific quality of the underlying arguments or research. More specifically, our respondents' judgments on healthcare measures depended on the extent to which they were perceived to be based on scientific research. Crystal, for instance, explained her doubts about a lot of medication by stating that "research, for example, shows that 95% of the medication people take hasn't been tested on a large scale, nor has the effect been proven." Iris also mentioned a lack of "large-scale research" as one of the main sources of her insecurity about vaccination. Parents also sought out specific studies, the scientific soundness of which was then examined critically. "Double-blind experiments" were frequently mentioned as being the gold standard. Moreover, some felt that children are treated like "guinea pigs" because "no double-blind studies are being done into those vaccinations" (Mabel). Babette similarly criticized a study for not comparing the vaccinated group to a "fully unvaccinated control group," while Zoe questioned research she had read that was based on "only about 20 people." Studies that the parents thought were conducted "with blinders on"

(Annie) or were "not neutral" (Iris) were also queried, because they were viewed as not meeting the scientific standards for independent research.

These doubts about enough "good" scientific research being done into vaccinations can create uncertainty, which was expressed by respondents as a "wish [that vaccination] was better researched" (Katie) or as a desire to see "more scientific evidence" (Zoe). Annie also thought we should "have more research done," especially because "there's a very large population that you can test." These feelings of uncertainty about the scientific evidence on vaccination led some parents to put off vaccinations or to not give vaccines they feel have not been subjected to adequate scientific scrutiny. As Zoe explained, "what eventually made [her] decide not to vaccinate anymore" was a medical professional stating, "We don't know. We don't know what the long-term effects of vaccination are." Faye also said she decided not to give the HPV vaccine to her daughter because she was in the first group of girls scheduled to receive it, and "that group of 12-year-olds hadn't been studied well at all." As our respondents were all highly educated, and as most higher education institutions are based on and teach scientifically derived knowledge and the scientific method, this focus on scientific research and rigor may not come as a surprise. Institutes like universities also instill a reflexive attitude (Achterberg, De Koster & Van der Waal, 2017), enabling individuals to also think critically about science itself. This may explain why, within a critical-reflexive repertoire, the scientific method and attitude are not only highly valued but are also used to critique products of science (like vaccines).

The central role of scientific methods was also visible in the strategies used by parents for "researching" vaccinations and other healthcare practices: these were modeled after what is considered to be "best practice" in modern science. Mabel, Faye, and Zoe, for instance, "collect[ed]" information and advice from "different sources," reflecting the scientific practice of data triangulation, while Kristel thought a statement was "more reliable" when she found "different sources" that had "the same answers." In addition, parents often use (an array of) "mainstream" medical resources and professionals in their search for the "best" healthcare for their child. In contrast to the neo-romantic repertoire, these experts are often highly valued, and are seen as the most, or the only, reliable resources. Zoe's most valued source, for instance, was a healthcare professional whose

background she considered "absolutely, entirely scientific, medical," while Gwen said that she asked around among people "she valued highly," like "the pediatrician," "a professor," and "the GP."

Measures that are often labeled as "alternative" were also employed, albeit sparingly. This is not, however, because their use represents an approach that is a better fit with the parents' views of health than practices regarded as "mainstream." Instead, and taking specific characteristics of such remedies into account, they are used as part of a "it-doesn't-hurt-to-try" approach in which potentially beneficial practices are employed strategically to manage their children's health. Toon, for instance, indicated that he thinks homeopathic remedies can work because of a "placebo effect," while Gwen used them after vaccinating her child "just to be on the safe side." Parents also carefully adapted their (children's) lifestyle to protect them from the potential side-effects of vaccinations or from diseases they may contract if they decide to delay them. Zoe, who had postponed most of her children's vaccinations, said she "give[s] [her children] probiotics every day, you know, everything to just keep that immune system high," and still breastfeeds her son "because . . . then [he] gets my antibodies!" Eating mainly organic foods and avoiding sugar were also strategies used by parents to mitigate the risks of their children becoming ill (e.g., Babette, Toon, Kristel, Iris, and Zoe).

When decisions about vaccinations are made, questioning the scientific basis from a critical scientific perspective can inspire uncertainty and doubt. When these concerns were considered to be too great, and parents were unconvinced by scientific and/or medical resources that their children would not experience any (long-term) side-effects, they usually decided to not vaccinate them at all or to delay the decision so they had longer to conduct more detailed research. This approach was mostly applied to specific vaccines that parents felt were particularly risky or had not received enough scientific scrutiny. Often-mentioned vaccines were the HPV (particularly just after its 2008 introduction in the Netherlands), MMR, and DTaP vaccines (especially the component against whooping cough (pertussis)). Vaccines that were seen as being better researched and "having proven their worth" (Toon and Kristel) were usually doubted less (e.g., polio).
Similar to the neo-romantic repertoire, a critical-reflexive repertoire can thus inspire parents to create personalized vaccination schedules. However, the choices

for particular vaccines were based on fundamentally different considerations (i.e., perceptions of scientific substantiation instead of views that experiencing certain diseases are part of natural child development).

2.4 Discussion

This study used in-depth interviews to explore vaccine skepticism among more-educated Dutch parents. In line with recent studies (e.g., Attwell et al., 2021; Carrion, 2018a; Duchsherer et al., 2020), we found that our respondents share an individualist epistemology, which entails a central role of the individual in obtaining knowledge and determining the "truth" and a skeptical attitude toward the Dutch NIP. However, we found that this epistemology is not translated into vaccine skepticism in the same way by everyone but is instead expressed in two distinct repertoires: (1) a neo-romantic, which focuses on obtaining the truth from feelings and intuition in order to follow the most "natural" path (to health); and (2) a critical-reflexive, whereby modern scientific methods are used to arrive at the truth and which parents simultaneously use to question what is commonly considered to be the scientific consensus. Distinguishing between these two repertoires enables resolving the paradoxical dual focus on science and (maternal) intuition found in individualist epistemologies by previous research (e.g., Carrion, 2018a). In addition, insight in these repertoires is crucial as they inform all vaccination decisions that are made by our respondents.

Underscoring the value of an in-depth inductive approach and distinguishing between these two repertoires, our study furthermore shows that the same decisions about vaccination can be informed by distinct ways of looking at vaccines. Indeed, although several parents in this study describe how they arrived at their decision to not give their children the MMR vaccine (against mumps, measles and rubella), their underlying motivations proved to be different: whereas the idea that vaccinating against "childhood diseases" (like MMR) could interfere with the natural development process was informed by a neo-romantic repertoire, uncertainty about the vaccine's scientific basis is brought to the fore in a critical-reflexive repertoire. Our analysis thus shows that while vaccine-skeptical parents may share an individualist epistemology and regularly make the same decisions about vaccinations, they do so for different reasons. That the neo-romantic and

critical-reflexive repertoires are not drawn upon occasionally but inform a wide range of vaccination decisions suggests that respondents' views on issues in other scientific domains, like pollution or radiation, are also inspired by one of the two repertoires, although future research is required to explore this in-depth.

Additionally, while decision-making rooted in a critical-reflexive repertoire implies a more commonly accepted focus on *risk calculation* aimed at assessing which choice bears the smallest risk relative to the projected benefits, decisions made within a neo-romantic repertoire are based on a *risk typology*: "natural" risks, which exist when processes that are understood as natural are left undisturbed, are distinguished from (and preferred over) "unnatural" risks, which are associated with measures that are considered to be artificial and disrupting nature. This difference in dealing with risks is likely to have wider relevance than vaccination decisions, which is for future research to explore.

More generally, our findings have implications for recommendations about information campaigns on vaccination, in which homogenous information is expected to minimize doubt (Giambi et al., 2018). Our results suggest parents' different perspectives on health and vaccination serve as filters through which parents differently interpret information: giving considerations of the "natural" a more prominent place in information provision may, for instance, fit within the neo-romantic repertoire, but this is in stark contrast with the critical-reflexive repertoire's focus on modern science. This is in line with quantitative studies in the tradition of cultural cognition, indicating that interpretation of information is strongly shaped by cultural frames (Gauchat and Andrews 2018). Finally, the more educated's receptivity to information intended to disprove their views may be limited, as research indicates that education inspires "hyperconsistency": the more educated strongly value their social identity and defend their group's views (e.g., Gauchat, 2015).

Our findings are also relevant because both uncovered repertoires speak to extant literature. First, the focus on intuition and the reverence for nature that are central to the neo-romantic repertoire resonate with other findings that conceptions of naturalness play a role in skepticism about vaccines and science (e.g., Attwell et al., 2018; Ward et al., 2017). More specifically, our study adds to literature linking vaccination behavior to broader behaviors (e.g. Attwell et al.,

2018) by showing that views of naturalness are part of a broader, mostly non-spiritual, worldview in which parents also make connections to caring for the environment and adopting a natural lifestyle. This can be related to the increased attention paid by society to the natural environment or a "rehabilitation of nature," which values animals and more "nature-friendly" living and eating practices (Campbell, 2007:68). In this way, although vaccine skepticism may be at odds with dominant discourses on vaccination, it reflects major cultural developments in Western societies.

Second, our study uncovers a critical-reflexive repertoire among highly-educated parents revolving around commonly-accepted scientific principles. This illustrates that vaccine skeptics are not only part of a fringe, "anti-science" phenomenon as often assumed (Carrion, 2018a), but can in fact have a great affinity with generally accepted scientific methods. Additionally, the fact that our respondents are not only highly educated but also consume a great deal of scientific information about vaccines is at odds with literature that relates vaccine refusal to ignorance and a lack of education (Gottlieb, 2016). The skepticism of parents applying a critical-reflexive repertoire is not because they are uninformed or have an aversion to modern science. Instead, their doubts about the Dutch NIP arise from the view that the science upon which it is based is not scientific enough.

Our findings on the critical-reflexive repertoire also have important implications for theorizing on the role played by higher education in phenomena like vaccine skepticism. While our more-educated respondents would generally be expected to have a greater affinity with scientific products like vaccines, they are in fact highly critical of the information provided by institutional science. More specifically, attending a higher education institution seems to have taught them that "[science] depends not [only] on the inductive accumulation of proofs but [also] on the methodological *principle of doubt*" (Giddens, 1991:21; emphasis added), which is a principle our respondents often apply to the (scientific) information on vaccines provided to them. Our findings thus illustrate that socialization in universities does not unequivocally translate into a trust in science but can instill a critical-reflexive attitude that is used to criticize science and its products. This challenges the widespread assumption that "sufficient" knowledge and education are directly translated into trust and/or participation in vaccination

programs (e.g., Motta, Callaghan & Sylvester, 2018). Two context conditions are potentially relevant in this regard.

The first is the extent to which science and technology are debated in a country and how widely available information is (i.e., a country's level of reflexive modernization), with the Netherlands, Scandinavian nations, and the UK scoring relatively highly (Makarovs & Achterberg, 2017). Individual attributes such as education matter more in individualist societies (Durant et al., 2000; Noy & O'Brien, 2019), which substantially overlap with reflexively modern ones. It is therefore to be expected that higher education instills a critical-reflexive repertoire and influences vaccination decisions accordingly in such countries in particular.

A second potentially relevant context characteristic is access to healthcare. In more privatized healthcare systems like that in the U.S., education is often viewed as an indicator of (economic) privilege, which aids access to vaccination (Reich, 2018). Nevertheless, the critical-reflexive repertoire it instills can simultaneously inspire vaccine skepticism, as demonstrated in this study. Consequently, a cross-pressure between a higher vaccination uptake enabled by financial means and a lower uptake inspired by a critical-reflexive repertoire could be present in countries where economic privilege makes it easier to vaccinate children. The different ways through which education may play a role in vaccine uptake across institutional contexts could be a fruitful avenue for future internationally-comparative research.

Another salient context characteristic is the degree to which scientific debates are politicized: although it is subject to fierce societal debate, the issue of vaccination is not a prominent point of contention in the Dutch political arena, unlike for instance climate change. The recent COVID-19 crisis may, however, have the potential to change this. This could be relevant for public attitudes on vaccination, given the phenomenon of partisan motivated reasoning: "individuals interpret information through the lens of their party commitment" (Bolsen, Druckman & Cook, 2014:235). Future research could assess whether the different repertoires distinguished here become incorporated in party positions and how public responses are shaped by the interplay of partisanship and citizens' prior perspectives on vaccinations.

Building on our inductive uncovering of two contrasting repertoires that inspire vaccine skepticism, future research could furthermore identify their social bases and prevalence among the population at large, for example, by using population-based surveys including novel survey items that are informed by the insights provided by our analysis. It could also provide more insight into the regional concentration of vaccine refusal. The RIVM, for instance, shows that, along with areas denoted as being part of the Dutch "Bible Belt," vaccine refusal is also relatively high in the area around the Dutch capital of Amsterdam (RIVM, 2019c) and relates to the clustering of educational groups (CLO, 2019). These variations could also be linked to the geographical distribution of the repertoires we have identified.

In summary, this study adds to a more in-depth understanding of vaccine skepticism by demonstrating that an individualist epistemology among more-educated vaccine-skeptical parents is expressed using two repertoires: a neo-romantic one, revolving around intuition and a natural approach, and a critical-reflexive one, which is centered on the use of scientific methods. Our findings thus add to research stressing that vaccine skepticism is a multi-faceted phenomenon that is not merely prevalent in movements on the outskirts of society (Wiley et al., 2020). Future research can shed light on the relevance of our findings beyond the Dutch case and for other health-related decisions than those related to vaccination uptake

3

Chapter 3

Becoming skeptical towards vaccines

How health views shape the trajectories following health-related events

Abstract

Recent studies on skepticism towards childhood vaccination urge scholars to analyse vaccination trajectories. Focusing on a social group that recent studies point out as being especially relevant because of their relatively high levels of skepticism toward childhood vaccination, we use in-depth interviews resembling open conversations to explore how more-educated parents' views on vaccination came about. Providing an in-depth understanding of these vaccine-skepticism trajectories, we additionally analyse 1) how health-related events play a role in parents' trajectories, and 2) how these are shaped by parents' pre-existing health views. Interviews with 31 more-educated Dutch parents reveal that different types of events incite respondents to start questioning vaccinations. Next to more commonly studied events that directly involve parents' or their children's health (e.g., (perceived) adverse effects of treatments), events that are also related to the topic of health or vaccination but do not involve parents' or their children's health (e.g., when health issues come up in a conversation) may incite parents to start questioning vaccination. Moreover, how respondents experience (different types of) health-related events, and how they go through distinct stages after this, proves shaped by their pre-existing health views: parents with nature-oriented health views came to doubt the fundamental principles of vaccination, turning instead to 'alternative' resources and practices; parents with science-oriented views queried the potential risks of vaccination and sought out what they viewed as the most scientifically sound information. We discuss the implications of our findings for scholarly debates and provide suggestions for further research.

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3.1 Introduction

Recent studies on skepticism towards childhood vaccination urge scholars to focus on "vaccination trajectories" (e.g., Wiley et al., 2020) to supplement a large body of research focused on mapping and explaining vaccine-skepticism differences across social groups. To advance our understanding of vaccine skepticism, authors have recommended that future research should begin by examining "vaccination *stories*" (Hausman, 2019:5; emphasis added) or "*trajectories* of non-acceptance" (Streefland, 2001:161; emphasis added), and thus focusing on the question of *how* individuals *become* skeptical towards vaccines. Focusing on a social group that recent studies point out as being especially relevant because of their relatively high levels of skepticism toward childhood vaccination (Reich, 2018), we use in-depth interviews resembling open conversations to explore how more-educated parents' current views on vaccination came about. With this approach, we aim to account for the high degree of "complexity of vaccination trajectories", thus adopting a "personalized [research] approach" that scholars indicate as being crucial to understanding "parents' lived experiences" (Wiley et al., 2020:9).

We answer these calls for a more process-based approach by exploring vaccine-skepticism trajectories in-depth, and further contribute by analysing how health-related events play a role in these trajectories. The importance of health-related events in (changing) attitudes towards health care is apparent from studies from different disciplines. These have, for instance, noted the potentially pivotal impact of health-related events such as adverse effects of treatments (e.g., Harmsen et al., 2013; Harrison et al., 2015), medically unexplained symptoms or illnesses (e.g., Dumit, 2006; Moulin et al, 2015), and (negative) interactions with health-care professionals (e.g., Mills et al., 2005; Reich, 2020b) on trust in health-care (providers). Others focusing more specifically on vaccination attitudes have found that such events caused some individuals to reconsider both their initially positive or neutral views on vaccination (e.g., Carrion, 2018b) and other (health-related) parenting practices (Bobel, 2002).

In addition, literature in the fields of cultural sociology, communication studies, and political science shows that how individuals interpret and respond to diverse phenomena, is not universal but shaped by cultural frames or "principles of selection, emphasis and presentation composed of little tacit theories about what

exists, what happens, and what matters" (Gitlin, 1980:6; also see, e.g., De Koster et al., 2016; Hall, 2006; Van Noord et al., 2018). Integrating this with recent indications that parents hold starkly contrasting views on health (e.g., nature-oriented health views vs. science-oriented views; cf. Attwell et al., 2018; Ten Kate et al., 2021), suggests that while health-related events may prompt vaccine-skepticism trajectories, how this happens exactly is shaped by individuals' pre-existing health views.

Following up on the above, we answer the following research question: *how do health-related events play a role in vaccine-skepticism trajectories of more-educated Dutch parents, and how are these shaped by parents' health views?*

We conducted in-depth interviews with 31 Dutch parents. Vaccination is widely available and free to access in the Netherlands. This means that decisions about whether to vaccinate their children are made by the parents themselves, which means they have no choice but to adopt a stance on the issue. This makes the Netherlands a strategic case for this study.

Our interviews show that health-related events indeed play a role in vaccine-skepticism trajectories, revealing that different types of events incite respondents to start questioning vaccinations. Notably, next to more commonly studied events that directly involve parents' or their children's health, such as experiencing (perceived) adverse effects of treatments, we show that some of our respondents are induced to question vaccination by events that do not involve their own or their children's health but are related to the topic of health or vaccination, such as discussions with others about vaccination. Moreover, how respondents experience (different types of) health-related events, and how they go through distinct stages after this, proves to be shaped by their pre-existing health views: parents with nature-oriented health views came to doubt the fundamental principles of vaccination, turning instead to 'alternative' resources and practices that fit their views better, while parents with science-oriented health views queried the potential risks of vaccination and sought out what they viewed as the most scientifically sound information to answer their questions. This study therefore demonstrates that: 1) different types of health-related events incite parents' vaccine-skepticism trajectories; and 2) pre-existing health views shape both how

these events are experienced and how subsequent stages in vaccine-skepticism trajectories take substance.

3.2 Research context and method

The municipal health service in the Netherlands invites parents at specific times to have their child(ren) vaccinated. Falling vaccination rates have sparked a societal debate on making vaccination a precondition for accessing childcare services and schools, with vaccination rates against measles falling below the WHO-recommended standard of 95% in 2016-2019. Uptake of the HPV vaccine dropped from 61% to 53.4% in 2016 and 45.5% in 2018. Although recent reports suggest the decline in participation has stabilized, public institutions still voice concern about rising levels of hesitancy and skepticism (see RIVM, 2021). In spite of societal discussions, childhood vaccination is not mandatory in the Netherlands. Dutch parents receive an invitation to have their children vaccinated according to the Dutch National Immunisation Programme (NIP), but vaccination is also available to children who are not officially registered. Moreover, participation in the NIP is free of charge for everyone (RIVM, 2019a).

As our goal was to study vaccine-skepticism trajectories among more-educated parents, a key inclusion criterion concerned their educational level. We only included parents who were, or had been, skeptical about childhood vaccination *and* who had attended tertiary education at a university of applied sciences (in Dutch: hogeschool or HBO) or research university (in Dutch: wetenschappelijk onderwijs or WO). Responses to our recruitment messages (also see below) almost exclusively consisted of more-educated parents. When a parent responded who did not meet our criteria, we informed them of this (this only occurred in two cases). As we also included parents who had been skeptical in the past, we did not impose a limit on child age.

Since what vaccination skepticism actually implies varies greatly, ranging from having some doubts about (some) vaccinations to being strongly opposed to the very process, our recruitment sought to achieve diversity in vaccination decisions. We therefore recruited our participants in two stages. We first contacted the *Nederlandse Vereniging Kritisch Prikken* (translated: “Dutch Association for Being Critical towards Vaccines”; in short, NVKP). The NVKP is a Dutch

organisation with a national membership, that was established in 1994 and is "open to anyone with questions and problems related to childhood vaccination" (NVKP, n.d.). The organisation is not bound to any specific region (or religion) in the Netherlands, although it does organise local events and maintains contact with similar organisations from other countries. Among its goals are the provision of information about its views on: disease, vaccination, and the consequences of vaccination; alternatives to vaccination; and freedom of choice and individual responsibility. In addition, the organisation stimulates societal acceptance of what it views as vaccine damage, and the registration of (perceived) harmful effects of vaccines. Means by which the organisation aims to achieve this are (among others): distributing newsletters, listing (alternative) practitioners on their website, following and collecting relevant medical literature, collecting and providing funds to actors that can contribute to the organisation's goals, and offering means for members to connect (e.g. through social media) (NVKP, n.d.).

We anticipated that NVKP members would be distrustful of representatives from institutions like universities (i.e., scientific researchers). Consequently, we initially approached the NVKP's leaders, who helped us to amend our contact message by adding information about our academic affiliations and the university's role in the study. Subsequently, our message was posted in the NVKP's Facebook group by its moderator. The first author was present online at the time the message was posted, to be able to answer people's questions about the message and the research project in real time. Ultimately, we were able to recruit 10 respondents who are vocal about their distrust of vaccination and the institutions involved. A similar message was circulated in schools based on anthroposophical teachings (i.e., a philosophy founded by Rudolf Steiner that assumed the existence of an objective spiritual world that is accessible to humans, which is implemented in education by a focus on arts, attention to personal growth, stimulating a sense of community and an integrated approach to education; e.g., see, Uhrmacher, 1995), which resulted in the recruitment of six more parents. This first step thus ensured we recruited respondents who are typically regarded as hard to reach by scholars, such as "activist non-vaccinators who might be more strident but [mistrust] [researchers'] motives" (Wiley et al., 2020).

The second step was aimed at reaching parents who are less outspokenly against vaccination and may just have some doubts about vaccinating their children. We reached this group by distributing messages at schools and day-care facilities and posting on online parenting communities and websites. These schools and day-care facilities (a total of 37) were located in different parts of the Netherlands, ranging from the most urbanized regions (in Dutch: the 'Randstad') to more rural areas in the East, North and South of the Netherlands. In areas of the country that are known for their anthroposhopical communities (more specifically the cities of Zutphen and Zeist and their surroundings), a relatively large number of flyers was distributed (total: 18) since we expected there would be more vaccine-skeptical parents there. Schools and day-care facilities were contacted in different ways: while some were approached 'offline' (by a visit from the first author), other were requested to distribute flyers over email and/or over the phone. The recruitment process was brought to an end when the interviews no longer generated any new themes (i.e., when theoretical saturation was achieved). Ultimately, we interviewed 31 more-educated parents, whose views ranged from (at some point) experiencing doubts about vaccination to being firmly against it. More specifically, ten respondents indicated they had refused all vaccinations for one, some, or all of their children, nine had opted to partially vaccinate one, some, or all of their children, and 12 had opted for full (if sometimes delayed) vaccination. Eight parents preferred to be interviewed as a couple. 23 of our respondents were female, while eight were male. Respondents' age ranged from 27 to 60 at the time of the interview, with an average age of 43. An overview of our respondents and their vaccine-skepticism trajectories is presented in Table S3.1 in the Appendix.

Their finding that vaccination trajectories vary across parents led Wiley et al. (2020: p. 2) to recommend a "nuanced personalized engagement with non-vaccinating parents" rather than a "one-size-fits-all approach" that relies on pre-determined (answer) categories. In view of both this and established methodological literature's endorsement of qualitative interviews for acquiring an in-depth knowledge of individuals' (changing) attitudes (Charmaz, 2014), we conducted open, inductive interviews that included a 'biographical approach': the respondents were asked to talk about their views on vaccination and how they had developed over time. This enabled the interviewees to elaborate on how *they*

understand *their* vaccine skepticism, thus shedding light on "people's own (retrospective) understanding of how [their] process unfolded subjectively" (Harambam, 2017:143).

The issue of non-vaccination is socially controversial in the Netherlands, illustrated by often polarized discussions in the media and public space between "pro" and "anti" vaccination groups (see, e.g., Pierik & Verweij, 2017). This is also visible in places where individuals who are skeptical towards vaccines come together, particularly online, and seek like-minded people and share information and support in Facebook groups, online fora, etc. Interaction between skeptical individuals and people who support vaccination is often polarized, and often centers on discussions about obligating vaccination at daycare facilities and/or schools, and on interests of the individual and the community.

Given this context, it can be difficult to talk about this issue with an outsider. To address this, the first author (who conducted the interviews) invested time and effort at the start of each interview to make the respondents comfortable and ensure they did not feel judged. This for instance included answering questions about the first author's motivations for the research and the research goals, emphasizing her genuine interest in the experiences and perspectives of the respondents. It also meant that the first author suspended any judgment on the issue of vaccination (including its usefulness, desirability, etc.). When explicitly asked, the first author answered questions as to whether she was vaccinated herself as a child and her own thoughts about childhood vaccination, while simultaneously making sure to stress her position and aim as a (cultural-sociological) researcher: the goal of the interviews was to hear about parents' views and their opinions, and not to 'test', judge, legitimize or commend these or their decisions, which we deemed especially important in light of the controversial character of the topic.

To further ensure parents felt comfortable, they were given the chance to decide the location of the interview beforehand themselves. In all but two cases, this resulted in face-to-face interviews at respondents' homes, and in two cases the first author met with a parent in a restaurant or café. During and after the interviews, participants all said they had experienced the interviews as very pleasant and open and that they felt free to share their stories. The benefit of our approach was also illustrated by the course of the interviews: the parents were

sometimes guarded at the start, but then increasingly felt safe enough to share more personal and in-depth stories. The average interview duration of 1h 45 min (the shortest was a little over an hour and the longest over six hours) and the invitations for lunch and dinner received by the first author are further indications of a positive rapport.

The interviews took place between March 2019 and February 2020, i.e., before the outbreak of SARS-CoV-2 in the Netherlands. Before participating in an interview, each respondent gave their written informed consent using a form that detailed the goals and main interview themes (i.e., their views and decisions regarding vaccination) and information on how the data would be used and stored. There was also a section where the participants were asked to confirm they had understood what they were told. They were encouraged to ask any questions they had via both the form and email, and the interviewer again checked their understanding and consent before starting the interviews. In taking these steps, we followed the ethical guidelines established by the Netherlands Sociological Association (NSV) and The Association of Universities in the Netherlands (VSNU). Approval from a research ethics committee was not required when we collected our data.

The verbatim transcripts of the interviews (887 pages in total) were analysed using ATLAS.ti. The first author coded the transcripts and compared them interatively with relevant theories (cf. Glaser and Strauss, 1967). Open coding generated an initial 284 codes, which were narrowed down to 143 through constant comparison. These codes mainly referred to different health views and their underlying assumptions (e.g., nature-oriented health views and ideas about what is considered natural and what is not), elements and characteristics of different phases respondents went through in their development of vaccine-skeptical attitudes (e.g., different sources respondents used to look for information), and vaccination decisions (e.g., delayed vaccination), and were categorised in accordance with the different trajectories uncovered and the underlying stages ("axial coding"; see Charmaz, 2014).

The analysis was primarily conducted by the first author, in close collaboration with the co-authors and members of the research group by way of frequent discussions. Notes on the interactions during the interviews were also

discussed among the authors and coded interpretatively. We interpreted preliminary findings using different theoretical concepts during the data collection and analysis, ranging from Becker's ideas on 'deviant careers' (Becker, 1963; Harambam, 2017; Kemmers et al., 2016) and literature on health-related events and 'cues' to vaccine refusal (e.g., Carrion, 2018b; Dumit, 2006; Harmsen et al., 2013) and natural approaches to health (cf., Attwell et al., 2018; Bobel, 2002; Fionda & Furnham, 2014; Ten Kate et al., 2021; Ward et al., 2017), to Reich's work on motivations behind vaccine refusal and how vaccine-refusing individuals cope with stigma (see, Reich, 2018; 2020a; 2020b). Based on this, small adjustments were made to what themes were discussed during interviews. Data collection and analysis thus took the form of an iterative process.

3.3 Findings

3.3.1 'It just opened my eyes': Being triggered to question vaccination

During the interviews, all the respondents described experiencing a health-related event that triggered them to question vaccination. Like the findings of recent studies on "cues" of non-vaccination (e.g., Carrion, 2018b), all of the parents we interviewed recounted "being triggered" (Chris) by something or someone to look into vaccination or "encouraged to start thinking for the first time (…) about the option of not vaccinating" (Mabel), while they "never even thought about [not vaccinating] before" (e.g., Katie, Michelle and Elsemieke). What such a trigger actually entailed varied. Some parents talked about a negative or emotional experience or health issue in the health-care system directly involving their own or their children's health, resembling what is sometimes referred to in extant literature as a 'health event' (Seys et al., 2013). Annie, for instance, explained how her youngest son stopped breathing after being vaccinated earlier in the day: "It was really intense. And the doctors didn't know what it was at all, but the paramedics said 'Oh, it was the vaccine.'" This traumatic experience and subsequent contact with medical professionals, whom Annie experienced as unsympathetic and unhelpful, raised questions for her about the safety of vaccination. This finding of being triggered by an event that directly involves one's own or a loved one's health relates to a broader literature, which stresses the

importance of events ranging from experiencing adverse reactions (e.g, Mills et al., 2005) to negative interactions with health-care professionals (e.g., Bobel, 2002; Harsh et al., 2016; Reich, 2020a) in inspiring distrust in health care in general and/or vaccination more specifically.

Other parents, however, discussed an event that not directly involved their or their children's health. Sophie, for instance, described coming into contact with "people who questioned vaccination, who didn't think it was self-evident" through her education in homeopathy (i.e., an often labelled as 'alternative' form of medicine based on the idea that a substance that causes particular symptoms of a disease can cure similar symptoms of illness and makes use of homeopathic dilutions; e.g., see, Merell & Shalts, 2002). Similarly, Jennifer recalled how her yoga teacher advised her "to really think about it before she vaccinated [her son]" after she had just given birth, which made Jennifer realise that she did not think "it was okay that vaccination was sort of self-evident" and that she wanted to "decide for [her]self if [her son] would be vaccinated". This suggests that events directly involving (problems with) parents' own or their children's health do not constitute the only type of experience that can trigger parents to start questioning vaccination, but that other events related to the topic of health or vaccination (e.g., during social interactions or in sources such as books) can serve as an equally significant inception of vaccination trajectories.

The notion of events serving as 'triggers' that set into motion a subsequent process resonates with what Becker called 'deviant careers', which are incited by an introduction to non-mainstream behaviour, ideas or milieus. In this strand of literature, such 'careers' or trajectories are taken as a focal point of study, resulting in analyses of how (deviant) trajectories unfold in different stages, including how social groups that are labelled as 'deviant' deal with being labelled this way by the outside world, or, in other words, how they deal with stigmatization (cf. Becker, 1963; Harambam, 2017; Kemmers et al., 2016).

However, as we demonstrate below, our respondents' accounts of how they experienced or interpreted a health-related event, and how their subsequent trajectories unfolded, were not uniform, but instead shaped by differences in their views on health, which have been previously identified in recent research. While some participants held what we call a 'nature-centred' view, which we

conceptualize as aiming to protect the natural state of things and therefore adopting the most 'natural' approach to health-related matters (as described in extant research, e.g., see, Attwell et al., 2018; Bobel, 2002; Fionda & Furnham, 2014; Ten Kate et al., 2021; Ward et al., 2017), others held what we call a 'science-centred' view, which refers to making health decisions by critically assessing and questioning the scientific evidence behind each option (cf. Ten Kate et al., 2021). Generally, we found that each respondent adopted one of these two (often strongly-felt) health views. In some cases, however, a nature-oriented respondent occasionally used a more science-oriented argument as a rhetorical device, to justify their vaccine-related decisions in a setting where they felt this would be considered more acceptable (e.g., in response to someone who they felt would dismiss nature-oriented views).

Below, we discuss how these health views first shaped parents' interpretations of health-related events, and, second, the trajectories that are set into motion thereafter.

3.3.2 Becoming an "ex-vaxxer": A nature-oriented trajectory

3.3.2.1 "Vaccination is just unnatural": Awakening to 'the truth' about vaccination

Central to what we call a 'nature-centred' view on health (cf. Attwell et al., 2018; Bobel, 2002; Ten Kate et al., 2021; Ward et al., 2017), several parents aimed to protect and strengthen natural health processes and avoid unnatural or 'chemical' interventions as much as possible. Those with such a perspective frequently described a health-related event that caused them to question what the (medical) scientific community considers to be the fundamental principles and benefits of vaccination. These events were experienced as "awakening" and "really shaking things up" (Sophie), or as making the parent realise that "vaccines can't bring about actually functioning immunity" (Babette).

Explicitly referencing her pre-existing views on health when asked how her vaccination journey started, Eliza described being "really woken up" during her first pregnancy by the content in a magazine she had been subscribed to for years that focused on "a lot of alternative things, spiritual things." This made her realise that "vaccination was just nonsense" and "dangerous to your health." Similarly,

Mabel discussed how experiencing health issues of her own at the age of 23 caused her to "start delving deeper into health" and "alternatives (…) to pharmaceuticals and pills" such as homeopathic remedies. Years later, she "really started to think [about vaccination]," which she felt she "could no longer trust," when she "read something about the Hep-B vaccination" in a book by a doctor promoting natural remedies. Illustrative of how pre-existing, nature-centred health views can shape how parents experience a health-related event, Eliza, Mabel and several others spoke about how they had come to regard vaccination as "unnatural."

Although many of the parents talked about the more general nature-centred health views they had acquired earlier in life when asked to elaborate on their vaccination story, they also stressed that they had never 'consciously' thought about the specific issue of (non) vaccination before being triggered to do so. Chris, for instance, explained how his previous involvement in "holistic health" instilled a "certain perspective on what a healthy human being should be like." Nonetheless, it was not until years later, when he and his wife were expecting their daughter, that a comment from their neighbours "opened [his] eyes to (…) the truth about [vaccination]" and he started to apply his previously acquired health views to vaccination. Similarly, Eliza mentioned that in the 1990s, years before she first got pregnant, she was already reading magazines "about spiritual things" and "alternative foods", while reading a book on the potential disadvantages of vaccination triggered her to "start to dive into [vaccination]."

3.3.2.2 Learning about vaccination: Going on a "journey of discovery"

Questioning the benefits of vaccination, parents embarked on a search for answers. For those with a nature-centred worldview, this was mostly driven by intuition. When asked how she assessed whether information was reliable, Layla said she "just focused on [her] own feelings." This approach was similar to that of Katie, who described having "a really strong intuition" that she used to determine "what's right according to my feelings, and what isn't right." Moreover, the sources and information they searched for mostly reflected their pre-existing views on health, such as information based on anthroposophical teachings or distributed by those with homeopathic or holistic (i.e., a type of health care that takes the physical,

emotional, social, economic and spirituals needs of a patient into account; e.g., see, Ventegodt et al., 2016) views on health. For some of the nature-centred respondents, this went hand-in-hand with a distrust of information from scientific or governmental institutions like the National Institute for Public Health and the Environment (RIVM), which Mabel felt "had been exposed" as "not acting in the interests of the people" and Vicki said "didn't give all the information."

Following up on their sparked skepticism about vaccination, nature-centred parents' quests were mostly focused on finding out more about "what *is* true [about vaccination]" (Annette) and "the whole theory behind vaccination" (Chris). This hunt for information on vaccination often meant that these respondents delved deeper into the field of what is regarded as 'alternative' medicine, e.g., based on homeopathic or anthroposophical principles, which most of these parents were familiar with before their vaccination research. Some described this as a very intense process, like Babette, who explained that, during this process, she had "wrestled with [the question of whether to vaccinate] for years, lay awake at night, read, had ethical dilemmas and (…) had to rewrite [her] entire paradigm." Mabel, who also found the process "overwhelming," added that "when you really dive into it, you just discover so much." For most of these parents, these discoveries confirmed their skepticism and impression that vaccination "doesn't make sense at all" (Chris) or "actually damages the immune system" (Babette).

3.3.3.3 Re-interpretation and validation: "Looking through those glasses"

After researching the issue of vaccination for what was often a long period of time, parents with nature-centred views acquired a new perspective on vaccination: it was seen as "unnatural" and "damaging" to health in general, and the immune system more specifically. This new viewpoint was applied to both future and past experiences with vaccination and issues that the parents felt were related. Elaborating on how her newly-acquired views on vaccination made her feel differently about her past decision to give her daughter her first vaccines, Sara for instance said: "When I look back at that time, I think: How could I have been so naive? How could I have [vaccinated her]? Sometimes I really blame myself [for

giving my daughter the first vaccines].” Many parents not only re-interpreted their own circumstances, but also the world around them. As Babette put it, she “just start[ed] to see it… start[ed] looking through those glasses. Fine motor skills, gross motor skills, speech issues, dyslexia, ADHD, autism. And [it’s not like this] never occurs in unvaccinated children, but it’s just so much less prevalent.” For some parents, this broader perspective included views on the economy, politics and life in general. As Robin explained, she started “putting it all together. All the pieces of the puzzle. And then [she] started to understand, to become aware of what is actually going on in this world.”

The respondents’ newly-acquired views on vaccination were confirmed by their subsequent experiences with ‘conventional’ and ‘alternative’ medicine. Several stated that vaccination was “just not something [doctors] wanted to talk about” (Vicki) and medical professionals “were really pushy” (Annette). For some, these experiences confirmed that ‘regular’ doctors “only repeat what [they] hear and see, what [they] were taught as a doctor”, which made conversations with them (about vaccination) “really difficult” (Sophie). Several parents therefore “just went and looked for someone else” because, as Katie explained: “If I can’t go to [the GP] when it comes to [vaccination], and [the GP] doesn’t take that seriously… then there’s really no point [in going].” Having sought out a homeopathic doctor instead, Katie felt that “homeopathic and holistic doctors just look at the cause much more,” which “just appealed to [her] more.”

Interactions with ‘regular’ health care professionals and experiences with ‘alternative’ professionals thus validated and strengthened these parents’ views on health, which were centred more on strengthening “the natural immune system” by “looking at the person as a whole” (Katie); this was contrasted to ‘regular’ health care, which was regarded as “just targeting symptoms” (Chris) or trying to prevent “[diseases] that can actually be good for you” by using means like vaccination that “are potentially harmful” (Sophie).

3.3.3.4 "We're not just some spiritual soft-boiled eggs": Navigating challenges to being a vaccine skeptic

Nature-centred parents were very much aware that their views were not seen as legitimate by (some) other people, both in the health-care system and their social networks (cf. Wiley et al., 2021). To avoid direct stigmatisation, many of the respondents said that they were always very careful and selective when deciding whether to disclose their views on vaccination to others. When they did, some parents supported them with arguments they believed would be accepted more easily by others. Mabel, for instance, said she looked up sources and arguments to support her decisions that were "die-hard science" because "[while I] believe in (…) spiritual soft-boiled eggs, [I] know the rest of the Netherlands wants nothing to do with that. So [I] needed someone who is higher up, who has 'professor' in front of their name, who's at an institution that's trusted." By using a discourse they felt was regarded as more 'legitimate', some of the parents thus sought to defend their choices to the outside world and mitigate any stigmatisation they might otherwise attract.

This strategy was not, however, used by all the respondents with nature-centred views. Those who were more dissatisfied with and/or estranged from 'regular' (health-care) institutions, for example because of very negative experiences, described seeking out like-minded people and alternatives to 'regular' health and child care, instead of trying to be accepted by others who did not share their views. Ray, for instance, explained that he became "a member of the NVKP" because "that provides [him] with support." Vicki said she "didn't feel heard" by her GP when she felt her daughter had been negatively affected by vaccination, and now prefers a homeopathic doctor over a paediatrician "because then [she] would[n't] get the same problem as [she] had [with her GP]." Sara similarly said she "went to a children's health centre based on anthroposophical views" instead of a 'regular' one because she "felt really alone and judged back then." A few parents took a more confrontational approach (cf. Reich, 2020b) and had started sharing their views and trying to achieve (social) change, for instance by studying 'alternative' therapies to try to "coach others and remove blockages" or to "commit [her]self completely against vaccination (…) to achieve change and awareness" (Robin).

3.3.3 Becoming "hesitant": A science-oriented trajectory

3.3.3.1 "Believing in the principles" of vaccination, but "questioning the risks"

In contrast to the parents with nature-centred views, other respondents explained that their health-care decisions were based on critical evaluations of the quality of the scientific evidence, and then ideally choosing the option that they believed had the strongest scientific basis (cf. Ten Kate et al., 2021). The parents with such science-centred views mostly described their experience of a health-related event as something that had made them question the safety and potential risks of vaccination, and not necessarily its benefits or principles as communicated by scientific sources.

Michael, for instance, stressed that he and his wife "believe[d] in the principle of vaccination" communicated by medical science and institutions, but felt "apprehensive about things that could go wrong" after attending an information session at the children's health-care centre when they were expecting their first child. Similarly, Faye said that stories about girls becoming ill after receiving the HPV vaccine around the time of its introduction "really triggered something," causing her to decide not to give it to her daughter because of her "worries about side-effects" and perception that her "12-year-old daughter was basically a guinea pig." Nevertheless, she was keen to stress that she viewed a blanket rejection of vaccination as "unwise", because she was convinced that vaccines are very good at "protecting children so they don't get ill."

For the parents with science-oriented health views, experiencing a health-related event generally incited concerns about vaccines not being completely safe and free of risk. However, in contrast to the experiences described by nature-oriented respondents, it did not cause any fundamental questioning of scientific explanations on vaccination, immunity and health more broadly.

3.3.3.2 Going after "the real experts": Researching the risks of vaccination

In order to answer the questions that arose after experiencing a health-related event, science-oriented parents looked for more information on the potential risks of vaccination preferably from sources they perceived to be "as scientific as

possible" (Zoe). This is illustrated by the preference of these for "sources like PubMed" in their search for information "supported by scientific articles" (Annie). Similarly, Zoe said she read books "to have things scientifically substantiated" and much preferred sources that are "completely scientific, medical" over those that "aren't scientifically detailed."

As well as seeking out scientific articles and other written resources, these parents made a great effort to contact scientific experts. In particular, they favoured experts of the highest scientific quality and regard: Faye explained that she "spoke to people who really know [about vaccination]" and "people with a medical background," because she felt "there was no point in just talking to my next-door neighbour [laughing]." Gwen spoke about looking for more information by contacting "people [she] rated highly," like "the doctor at the children's health-care centre, but also the professor who did the [fertility treatment]." She also joined a Facebook group where "real scientists" explained "the real story" and shared "scientific pieces." Some parents were critical of, or hesitant about, professionals they feared would not have enough expertise on the issue of vaccination (e.g., GPs). One mother, for instance, said she felt "much more comfortable" talking about vaccination with the paediatrician at the children's health-care centre than with her GP, who she believed "was not very well-informed" and "couldn't say exactly what was in those vaccines" (Zoe).

To answer the questions about vaccination that had arisen after experiencing a health-related event, parents with science-oriented views thus aimed to use scientific avenues to search for information they deemed to be of (sufficient) scientific quality.

3.3.3.3 Re-interpreting vaccination: "There's always a risk"

The extensive search for scientific sources often went hand-in-hand with the parents coming to see risk and uncertainty as inherent to vaccination and health care, as well as to science more generally. This re-interpretation centred on two related ideas: 1) that it is not possible for science to ever prove something beyond any doubt; and 2) that there are (harmful) side-effects with all forms of pharmaceuticals (including vaccines). Many respondents described a struggle with what they view as the limitations of science. Crystal, for example, said she came to

realise that "all of us tend to overestimate science," because it can only offer "temporary truths." After attending a medical convention, where she heard about the medical community discovering a new organ, Zoe said this validated her sense that (medical) science could not offer her certainty: "I thought [doctors] had all that figured out already [laughing]! Yeah, you know, there's so much we don't know yet. And then I think: how can you say that a vaccine that's been introduced 40 years ago (…) is safe now? How do you know?!"

The uncertainty that these parents had come to see as inherent to science was also extended to broader views on pharmaceuticals (and vaccines) by some of them. Crystal, for instance, worried "that the effects of medications are often not known," while Elsemieke said she felt increasingly ambivalent towards pharmaceuticals in general after her search for more information on (the risks of) vaccination: "What I never knew is that… many drugs are of course just a fluke." Parents had different ways of dealing with this sense that risk is an unavoidable aspect of science and vaccination. The hesitancy of some parents towards vaccination was more enduring, leaving them feeling unable to make a decision. In a few cases, this meant parents postponed vaccination to give themselves more time to try to achieve greater certainty about which decision posed the least risk. When explaining why she decided to delay vaccinating her child, Zoe said that, in her view, "[scientists] don't know what the long-term effects are… that really scares me." Others chose not to give their children the HPV vaccine (e.g., Faye) or others about which they felt less confident, but did permit some that they believed carried less risk. A few parents instead embraced science and tried to use it to mitigate their uncertainty, employing whatever the scientific means at their disposal to lower the perceived risks for their children. Gwen, who was initially hesitant about vaccination but then changed her mind and administered all the recommended vaccinations, for instance said she eventually decided to give her son additional vaccines that were not part of the NIP "for extra safety," like "the chickenpox (…) because when you read about it, you see that they *do* give it in other countries. And you *could* die from chickenpox, the chance isn't very big, but it's possible."

Parents who focused on assessing the potential risks of vaccination during their information-seeking journey thus came to see it and science as inherently uncertain. For some, this lessened their trust in (medical) science, as exemplified

by the postponement of decisions and/or the creation of personalised vaccination schedules, while others embraced science further as a solution to this uncertainty.

3.3.3.4 "I know how they see me": Dealing with challenges to one's identity by distancing oneself from "crazies"

When it came to dealing with the reactions of the outside world to their vaccine attitudes, science-oriented parents, like parents with nature-oriented views, also often believed that they are portrayed and treated negatively. Annie felt that she and others who choose not to administer all the recommended vaccines are portrayed as "anti-vaxx crazies" in the media. Zoe, meanwhile, indicated she had created "a fake profile" for when she looked on social media for more information, because she "didn't want to be out there with my own name" and "there's a real witch hunt going on against so-called 'anti-vaxxers.'"

In an effort to reduce this sense of stigmatisation, these respondents not only avoided disclosing their views on vaccination to people they felt would react negatively (like nature-oriented parents), but also tried to distance themselves from those they referred to as "anti-vaxx crazies." One way of doing this was comparing themselves to 'others' who were seen as "extremely fanatical" (Gwen), while parents characterized themselves as "just thinking consciously and critically" (Elsemieke). In this manner, they made a distinction between 'anti-vaxxers' who were seen as having 'irrational beliefs' in for instance "experience stories" and "wishy-washy stuff" (Zoe), and their own 'rational' approach, which was viewed as more in line with a 'mainstream' way of thinking.

As well as focusing on a distinction between 'irrational belief' and 'rational doubt', some science-oriented parents stressed they did see benefits of vaccination, unlike others, who they called "fanatical anti-vaxxers" (Gwen). Crystal said she often explained to others that she "believe[ed] that we have a lot to benefit from the fact that many people have taken vaccines for years," which, according to her, meant that she could not be characterised "as some conspiracy thinker." In a similar way, while Toon and Kristel said they felt it was "important to consciously read about [vaccination], so that when you make a decision, you know what you're doing and what the risks are," they were nevertheless convinced that "vaccines had

proven their worth" and that "the [vaccination] programme was created for a good reason."

In summary, science-oriented parents aimed to mitigate stigma by choosing not to share their opinions, or by distinguishing themselves from a group they viewed as 'irrational' and 'fanatical anti-vaxxers,' who did not see any benefits of vaccination.

3.4 Conclusions

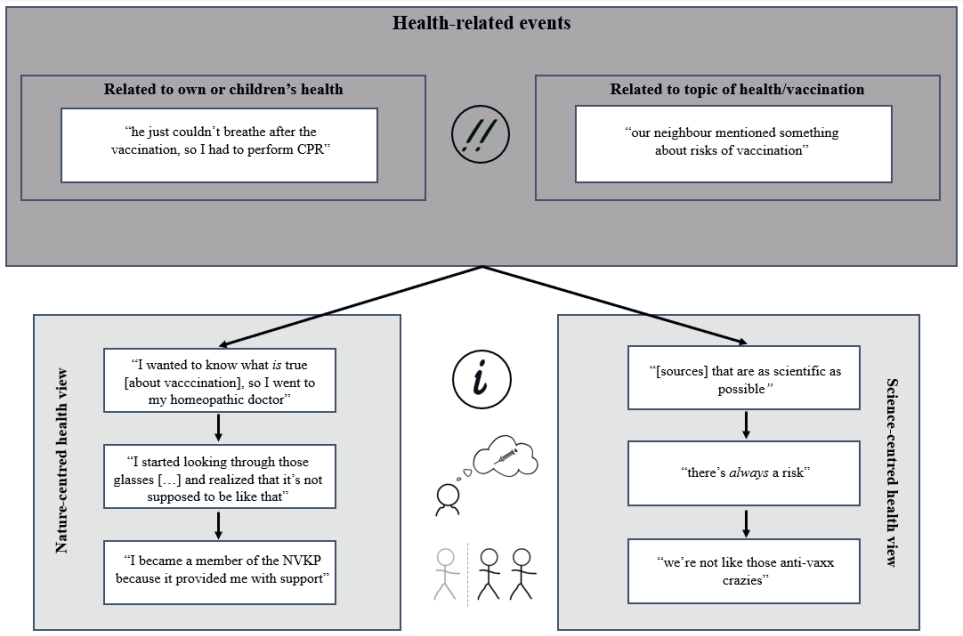
Using in-depth interviews with 31 parents who were, or had been, skeptical towards vaccination, we demonstrate that their vaccine-skepticism trajectories were incited by a health-related event and shaped by their pre-existing health views. This not only adds to the extant body of research that has identified factors influencing vaccine skepticism, but particularly answers calls by scholars to add a focus on "vaccination trajectories" (e.g., Wiley et al., 2020; cf. Hausman, 2019; Streefland, 2001). Additionally, our findings resonate with research that highlights the crucial role of health-related events or "cues" (e.g., Carrion, 2018b).

Mirroring studies with a focus on health-related events that directly involved someone's health, such as the experience of (perceived) adverse effects of treatments (e.g., Harmsen et al., 2013), multiple interviewees in our research described how such events triggered them to question vaccination. Adding to this, other respondents instead talked about events that did not involve their own health or that of their loved ones, but were related to the topic of health or vaccination, e.g., when the issue of vaccination came up on conversation or in materials used for informational purposes. As our findings demonstrate, even though the latter category of events does not directly involve the experience of health problems or official health care institutions, they prove to be relevant in triggering trajectories of vaccine skepticism among our respondents. Building upon this finding, future studies could scrutinise in more detail under what circumstances and for whom different types of events play a role in (trajectories of) vaccine skepticism and other health attitudes.

These different types of health-related events set in motion a process in which parents searched for information, re-interpreted vaccination based on what they discovered, and found ways of dealing with the reactions of the outside world

to their newly acquired perspective (see Figure 3.1). Each of these stages has a broader relevance to literature on vaccine skepticism, vaccine communication, stigma and broader health behaviour.

Figure 3.1: How health views shape trajectories following health-related events



First, our study shows that *how* events are interpreted and *how* the subsequent trajectory unfolds depend on parents' pre-existing views about health. While some of our respondents took their preference for the most 'natural' approach to health as a guideline (i.e., a 'nature-centred' view; cf. Attwell et al., 2018; Ten Kate et al., 2021), others used their perception of the quality of scientific evidence to make health decisions (i.e., a 'science-centred' view; cf. Ten Kate et al., 2021). While the event caused the former group to question the fundamental principles of vaccination and turn to 'alternative' resources and practices that reflected their views better, the latter came to question the potential risks of vaccination and used (their perception of) scientific evidence as the basis for their search for information and their (changing) views on vaccination. This elucidates the variation in our respondents' vaccination decisions. Most notably, the parents with nature-centred views more often chose to reject vaccination entirely or selectively vaccinate. The

science-oriented parents, meanwhile, instead more often opted to either delay or fully vaccinate their children, as they still trusted the basic principles communicated by medical institutions, but nevertheless questioned the (unknown) risks.

In relation to information-seeking behaviour, we found that our respondents used channels that reflected their pre-existing views. This resonates more with the notion of confirmation bias (Meppelink et al., 2019) and the idea that values shape how they deal with information (i.e., cultural cognition; e.g., Kahan et al., 2009; 2010), than with the idea that vaccine skepticism is the result of consuming (mis)information (e.g., Kata, 2010; Pluviano, Watt, Della Sala, 2017). Consequently, public-information campaigns on vaccination need to take these views into account (cf., Lazić & Žeželj, 2021), as they probably shape how such communications are perceived (cf., Kahan et al., 2010).

Finally, our interviewees indicated they often experience stigmatisation, but like a recent study on the experience of stigmatization among non-vaccinating parents in Australia (Wiley et al, 2021), we found that parents use various strategies to deal with this. Like previous studies (e.g., Reich, 2020b), we identified that some prefer not to disclose their views to avoid stigma, while others are more vocal and others still actively try to change other people's minds (cf. "witnessing"; Bobel, 2002:146-147). Moreover, while our nature-centred parents tended to turn to alternatives to 'regular' health care when they experienced stigmatisation, those with science-centred views generally used commonly accepted rhetoric to carve out a path through 'mainstream' institutions. This suggests that the reactions of health-care professionals can play an important role in individuals' vaccine-skepticism trajectories (cf. Mills et al., 2005; Reich, 2020b). Achieving a greater understanding of such dynamics may be useful for identifying ways of establishing or maintaining contact with vaccine-skeptical parents, and would thus be a fruitful avenue for future research.

This study shows that pre-existing health views shape both how events are experienced, and how the subsequent stages of vaccine-skepticism trajectories are formed. Applying this finding more generally to issues other than vaccination could generate significant insights into how a wide variety of health-related events can trigger processes shaped by pre-existing views. These events might range from

experiencing medically unexplained symptoms (see, e.g., Dumit, 2006) to (perceived) unequal health-care treatment (see, e.g., Bhatt, 2013), or simply events related to other types of vaccinations (e.g., against COVID-19). This may help us to understand why specific triggers ultimately cause some individuals to move away from 'mainstream' (health-care) institutions, immersing themselves in what is commonly considered to be the 'alternative' milieu, while others delve deeper into the science behind health issues and try to navigate 'mainstream' institutions to find a solution to their issues. Our study could therefore serve as a stepping stone for future research, adding to our understanding of how people make decisions in the broader field of health behaviour.

4

Chapter 4

Information deficit, anti-institutionalism and support for the MMR vaccine

A pre-registered information experiment conducted among a high-quality Dutch probability sample

Abstract

Our pre-registered information experiment fielded among a high-quality Dutch probability sample (*n*=2,567) examined whether: 1) providing more comprehensive information about the MMR vaccine, and 2) referencing its institutional source increases the vaccine's support. Additionally, given the growing questioning of official institutions in very detraditionalized countries like the Netherlands, we also examined whether 3) this differed between more or less anti-institutionalist citizens. Contrary to our expectations, neither strategy increased the vaccine's support (measured as: personal support; the likelihood of recommending it to others; and support for hypothetical compulsory vaccination with the vaccine). Giving more comprehensive information to the most anti-institutionalist citizens negatively impacted their support for compulsory vaccination. Consequently, providing detailed information about vaccination may not be an effective strategy for increasing its support in a detraditionalized context.

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4.1 Introduction

Given declining childhood vaccination rates following the COVID-19 pandemic, increasing support for childhood vaccination is an important concern globally (Chiappini et al., 2021). The fall in the uptake of the measles vaccine (a component of the MMR vaccine) is seen as a particular challenge (Coughlin et al., 2017). As (a lack of) knowledge about vaccination is viewed as a root cause of vaccine hesitancy (Kitta & Goldberg, 2017; Rossen et al., 2016; Simis et al., 2016), a common measure in attempts to increase uptake is providing the public with relevant information (Dubé, Gagnon & MacDonald, 2015). More comprehensive information may counter inaccurate understandings that may arise from more parsimonious material (Kitta & Goldberg, 2017; Offit & Coffin, 2003). It may also prevent and correct widespread misconceptions about vaccination (e.g., Boyd, 2021), particularly the MMR vaccine that faces persistent public concern about a (long-disproven) relationship with autism (Offit & Coffin, 2003). Providing information about the official institutional source of the information is another suggestion, with the view being that this would increase its credibility and, therefore, the public's willingness to accept it (De Dobbelaer, Van Leuven & Raeymaeckers, 2018; Metzger, Flanagin & Medders, 2010).

In today's detraditionalized contexts, however, institutions face questioning from much of the public, who no longer regard institutions as self-evident sources of guidance and authority (Beck & Beck-Gernsheim, 1996; Houtman et al., 2011). As the current cultural context is less hospitable towards official bodies, scrutinizing the anticipated positive effects on support for childhood vaccination of the provision of more comprehensive information, and including information about the institutional source, is crucial. Consequently, this study tests these expectations in the highly detraditionalized context of the Netherlands (Houtman et al., 2011; Inglehart, 1997), specifically focusing on the role played by anti-institutionalism in shaping the impact of information provision on support for the MMR vaccine. To this end, a pre-registered information experiment using treatments based on official information was conducted among a sample (n=2,567) drawn from a high-quality panel sampled from the official Dutch population register. We asked the following two-part question: 1) *Does providing more comprehensive information about the MMR vaccine and the material's*

institutional source increase its support, and 2) do these elements have less of an effect among individuals with stronger anti-institutionalist attitudes?

The Dutch context was employed for two strategic reasons: 1) it is a highly detraditionalized setting wherein institutions face broad public skepticism (Achterberg et al., 2017; Inglehart, 1997); and 2) its immunization program is widely available, costs parents nothing and they have complete freedom to make decisions about vaccinating their children (RIVM, 2023b). The effects of information provision on three different aspects of support for the MMR vaccine were scrutinized: 1) personal support (cf. Betsch et al., 2018); 2) broader acceptance, as measured by the likelihood of recommending it to others (cf. Shetty et al., 2019); and 3) support for a hypothetical scenario where it is compulsory (Fridman, Gershon & Gneezy, 2021; Sarathchandra et al., 2018).

This study adds to the extant research in two ways: 1) we test empirically the impact on three widespread measures of support for the MMR vaccine of two common suggestions concerning how to increase the effectiveness of information about vaccination – a) providing more comprehensive information and b) including explicit references to the institutional source; and 2) we test the role played by anti-institutionalism by examining whether the effects of these two forms of information provision are moderated by anti-institutionalist attitudes. This speaks to criticism that the traditional information-deficit model is "rather simplistic" (Sturgis & Allum, 2004: 55), because it does not take into account the potential role of "moderating factors" (p. 58) that may shape the effects of the information provided (see, also, Schultz, 2002).

4.2 Two strategies to increase the effectiveness of vaccination information

4.2.1 Offering more comprehensive information

In the information-deficit model, providing information to the public is expected to increase support for measures like childhood vaccination, because it has the potential to fill knowledge gaps or deficits (Schultz, 2002). As Sturgis and Allum (2004) explain, government initiatives to increase the public understanding of science assume that "to know science is to love it" (p. 56), and that more scientific knowledge translates into more favourable attitudes. An assumed risk of a

'deficient' understanding mainly lies in the public's perceived tendency to revert to "irrational fears of the unknown" or "mystic beliefs" that may undermine trust in science (Sturgis & Allum, 2004: 57). Following this interpretation, more comprehensive information about the MMR vaccine would probably have a greater effect on its uptake than more parsimonious information material. This is for two reasons: 1) it increases the public's knowledge, making the vaccine seem less 'scary' and more trustworthy (alleviating "fears of the unknown"); and 2) it might correct misperceptions (combating "mystic beliefs").

Studies in the energy-consumption field found that providing households with more detailed information did indeed make them more likely to change their behaviour (Desmedt et al., 2008; Ek & Söderholm, 2010). A similar approach may thus be warranted in attempts to improve (and increase the accuracy of) the public's understanding and familiarity with vaccines by providing them with more detailed information about, e.g., side-effects (Coughlin et al., 2017; Offit & Coffin, 2003). Additionally, more comprehensive information is regarded by several authors as a remedy to misconceptions about science and vaccination (e.g., Rosenbaum, 2021; Van Stekelenburg et al., 2020). This may be especially relevant for the MMR vaccine, concerning which persistent misunderstandings are prevalent among the public (e.g., its disproven relationship with autism; Coughlin et al., 2017; Offit & Coffin, 2003).

Building on the deficit model of public trust in science, we thus anticipate that individuals who receive more comprehensive information on the MMR vaccine are more positive towards: the vaccine (H1a), advising others to administer the vaccine (H1b), and compulsory vaccination (H1c), than those who only receive basic information on the MMR vaccine.

4.2.2 Referring to an authoritative source

Communication research suggests that providing information about an authoritative source can help to improve perceptions of the credibility of a message (Flanagin & Metzger, 2008; Hovland et al., 1953; Metzger et al., 2010). In psychological research, source credibility is often referred to as a 'cue': it serves as a mental shortcut for assessing the believability of information (Sundar, 2008). Generally, two main components of a source's credibility are distinguished: 1) its

perceived expertise or "ability to know the truth," and 2) its perceived trustworthiness or "motivation to tell the truth" (Metzger et al., 2003: 297). In the case of information provision on the MMR vaccine, both dimensions could be improved by referring to the source of official communications in the Netherlands, i.e., the 'National Institute for Public Health and the Environment' (RIVM; in Dutch: 'Rijksinstituut voor Volksgezondheid en Milieu').

First, research has identified that the perceived expertise of a source depends on its reputation, as well as on whether it is institutional or personal and displays the appropriate credentials (Metzger et al., 2003). In the Netherlands, the RIVM is responsible for the National Immunization Program (the national program for childhood immunization), which includes the MMR vaccine. The RIVM is an official body that advises the government and bases its knowledge on independent scientific research (RIVM, 2023b). Given its expressed scientific underpinnings, explicitly referring to the RIVM in information about the MMR vaccine may improve perceptions of expertise and credibility.

Second, the trustworthiness of an information source can be communicated by explicitly referring to its goals and/or function (relating to the material's subject-matter), and by the absence of advertising that would point to a commercial dimension (Metzger et al., 2003). Referring to the RIVM and including a concise explanation of its role in information about the MMR vaccine may tackle these two factors: it would both address the RIVM's goal of improving public health and stress that the source of the material is governmental, not commercial. This might be further improved by not only including a brief paragraph of text about the RIVM, but also displaying its logo, which reflects the official format of Dutch governmental agencies and is therefore highly recognizable.

Consequently, we anticipate that individuals who receive additional information about the official institution involved in the MMR vaccine are more positive towards: the vaccine (H2a), advising others to take the vaccine (H2b), and compulsory vaccination (H2c) than those who only receive comprehensive information on the MMR vaccine.

4.3 The role of anti-institutionalism in the uptake of vaccination information

In the current cultural climate, official institutions and the information they provide may not be as effective as anticipated with the deficit model. The dominance of traditional sources of knowledge and authority (e.g., traditions and modern institutions) in guiding behaviour is now being challenged, with many members of the public regarding them and the information they produce as less incontrovertible and legitimate, instead adopting a more skeptical attitude towards them (Beck & Beck-Gernsheim, 1996; Houtman et al., 2011). Consideration of the role that anti-institutionalist attitudes may play in how information from institutions is received thus seems to be warranted, and neatly aligns with an often-voiced criticism of the traditional deficit model: its lack of focus on potential "moderating factors" (Sturgis & Allum, 2004: 55) that might shape the impact of information, e.g., the personal beliefs of the recipient (Schultz, 2002). Indeed, various fields have demonstrated that "cultural frames", i.e., "principles of selection, emphasis and presentation composed of little tacit theories about what exists, what happens, and what matters" (Gitlin, 1980: 6; cf. Van Noord et al., 2018), play a role in how prepared individuals are to accept information as legitimate or form positive opinions about it (e.g., Achterberg, 2014; De Koster et al., 2016).

These findings mirror recent qualitative research on attitudes towards and decisions made about vaccination. Lehner et al. (2021), e.g., found that midwives are not "neutral information brokers" (p. 1674), with their engagement with vaccine information shaped by their views on parenthood and care. Consequently, we theorize that an individual's pre-existing levels of trust in official institutions will shape the effects of: 1) providing more comprehensive information about the MMR vaccine, and 2) referring to the official body involved in the vaccine's distribution (the RIVM).

Providing people with more comprehensive material about the MMR vaccine over and above just basic information may remind them of institutional forms of (public) communication, which traditionally consist of high-density information in a formalized style and one-sided communication (Betsch et al., 2012; O'Leary et al., 2019). Indeed, written, and often wordy, explanations in

public-health communications are characteristic of official institutions (Calderón & Beltrán, 2004), and do not reflect the behaviour and communication styles prevalent among social groups with less of an affinity with such bodies (Lareau, 2015). Accordingly, the recognizable institutional approach of providing elaborate information arguably leads to a stronger evocation of positive attitudes in people who have more trust in institutions than among those who are less trusting. Consequently, we hypothesize a negative interaction between receiving more comprehensive information in addition to only basic information on the MMR vaccine and having stronger anti-institutionalist attitudes on: more positive towards the vaccine (H3a), advising others to administer the vaccine (H3b), and compulsory vaccination (H3c).

Similarly, adding an explicit reference to the official body involved in the MMR vaccine's distribution (herein: an explanation of the RIVM's work accompanied by its official logo) probably evokes or reinforces associations with official institutions. This is more likely to have a negative effect on the willingness to accept information among those who trust such bodies less. Consequently, we also anticipate that there is a negative interaction between receiving additional information about the institution involved in the MMR vaccine instead of receiving only comprehensive information on the MMR vaccine, and having stronger anti-institutionalist attitudes on: more positive towards the vaccine (H4a), advising others to administer the vaccine (H4b), and compulsory vaccination (H4c).

4.4 Methods

4.4.1 Data

The study's preferred sample size, variables, hypotheses and analysis plan were pre-registered on the Open Science Framework prior to data collection.[2] The data were obtained via a survey conducted in March 2022 among members of the Longitudinal Internet Studies for the Social Sciences (LISS) panel, which is administered by Centerdata (an independent scientific-research institute affiliated with Tilburg University in the Netherlands). The panel comprises about 7,500 individuals and is composed of a true probability sample of Dutch households

[2] An anonymized version of the pre-registered project is available through: https://osf.io/2eh34/?view_only=d672daf376c048aea7208bacded2ab3f

based on the official population register produced by Statistics Netherlands. Panel members are paid for completing questionnaires and, to ensure the panel is representative, computers and internet connections are provided to those who need them. For the current study, a sample was drawn from LISS panel participants aged 18 or older.

The data for this study were collected in the second wave of a bigger project on vaccination attitudes. Wave 1 (conducted in February 2022) comprised data obtained from 3,729 panel members. All these respondents were contacted about participating in Wave 2 which was used for the current study, and 92.5% of them (n= 3,448) then also completed our survey. These respondents were assigned to one of four groups, with the data from three of them (n= 2,567 prior to listwise deletion) used in the analyses herein.

4.4.2 Procedure

We conducted an experiment using a double-blind, between-subject design (Haaland et al., 2020). After being given some information about the study, the respondents were randomly assigned to one of four groups with forced equal sizes (Alferes, 2012). Three of these groups are relevant to the current research. Group 1 (the control) was given basic information about measles, mumps and rubella and the MMR vaccine; Group 2 (treatment condition 'comprehensive') was given the same basic information about the vaccine, as well as additional information about how it works, its effectiveness, potential side-effects, and the scientific research behind it; finally, Group 3 (treatment condition 'institutional') received the same basic and comprehensive information as Group 2, along with extra material about the RIVM accompanied by its official logo. All the information used in the treatments was taken from the RIVM's website.

After receiving the group-specific information treatments, the respondents were asked about: 1) their support for the MMR vaccine; 2) how likely they would be to recommend it to other parents; and 3) their support for compulsory vaccination. We also included a treatment-irrelevant manipulation check to assess if they had actually read the information they were given. We used three items from the most recently administered LISS Core Studies (performed before our data collection) to create a scale measuring the moderating variable (institutional trust).

This prevented any priming of the respondents immediately prior to our experiment.

4.4.3 Measures

4.4.3.1 Independent variables

The experimental treatments were measured with two dichotomous variables. The first, *treatment comprehensive*, measured whether the respondents only received basic information about measles, mumps, rubella and the MMR vaccine (the control condition), or the same basic information and additional information about how the vaccine works, its effectiveness, potential side-effects, and the scientific research behind it. The second variable, *treatment institutional*, measured whether the respondents only received basic and comprehensive information (as measured by *treatment comprehensive*), or the same basic and comprehensive information as well as additional information about the RIVM accompanied by its official logo.

The texts used in the information treatments were written in the Dutch language based on material on the RIVM's official website. English translations are available in Figure S4.1 in the Appendix.

4.4.3.2 Dependent variables

We used three dependent variables that measured varying levels of support for the MMR vaccine, all on a scale ranging from 1 ('strongly disagree') to 7 ('strongly agree').

First, *support for the MMR vaccine* was measured by asking the respondents to indicate the extent of their agreement with the following: 'It's a good thing the MMR vaccine is offered to all children in the Netherlands' (cf. Betsch et al., 2018). Higher scores indicated more support.

Second, the likelihood of *advising others to administer the MMR vaccine* was measured by asking the respondents to indicate to what extent they agreed with the following: 'I would advise parents to have their children vaccinated with the MMR vaccine' (cf. Shetty et al., 2019). Higher scores again indicated a greater likelihood of recommending the vaccine.

Finally, we measured *support for compulsory vaccination* by first telling the respondents that the MMR vaccine is not currently mandatory in the Netherlands

(cf. Fridman et al., 2021; Sarathchandra et al., 2018). We then asked them to indicate the extent of their agreement with the following statement: 'It would be good if the MMR vaccine was made compulsory', with higher scores again indicating more support.

4.4.3.3 Moderating variable

We included *anti-institutionalism* as a moderating variable to assess to what extent the effects of the comprehensive information and institutional information treatments were moderated by the degree to which the respondents held anti-institutionalist attitudes. Following Van Meurs et al. (2022a), we measured this with a scale based on questions about three different institutions. The respondents were asked to indicate, on a scale from 0 ('no confidence at all') to 10 ('complete confidence'), their level of personal confidence in the Dutch government, the legal system and science. A principal component analysis (PCA) produced a single factor with an explained variance of 72% and an eigenvalue of 2.15. We combined these items into a reliable scale (Cronbach's alpha = 0.80) by calculating the average score for the respondents who provided valid answers for all three items. Items were reverse-coded so that higher scores represented more anti-institutionalist attitudes.

An overview of all the measures included in this study is provided in Table 4.1 on the next page.

Table 4.1: Descriptive statistics

	Control group				Treatment group 'comprehensive'				Treatment group 'institutional'			
	Mean	SD	Range	*n*	Mean	SD	Range	*n*	Mean	SD	Range	*n*
Anti-institutionalism	3.08	1.53	0 – 10	812	3.23	1.74	0 – 10	817	3.11	1.64	0 – 10	830
Support for MMR vaccine	6.57	0.84	1 – 7	855	6.52	0.93	1 – 7	854	6.51	0.91	1 – 7	858
Likelihood of recommending it to others	6.39	1.02	1 – 7	855	6.28	1.14	1 – 7	854	6.28	1.14	1 – 7	858
Support for compulsory vaccination	4.93	1.78	1 – 7	855	4.77	1.82	1 – 7	854	4.79	1.82	1 – 7	858

4.4.4 Manipulation check

We used the following question to assess whether the respondents had actually read the information treatments: 'What was the text that you read about?' The answer options were: 'About the use of different types of painkillers for the flu'; 'About vaccination against different diseases in children' (the only correct answer); 'About different treatments for shingles among the elderly'; and 'Don't know.' The order of the first three answer categories was randomized in the questionnaire. Respondents were coded as '0' if they gave the wrong answer or said they didn't know (n = 90), and as '1' if they answered the question correctly. Those in the first group were excluded from the sensitivity analyses employed to assess whether the results were different without them.

4.4.5 Analytic strategy

We conducted ordinary least squares (OLS) regression analyses to test our hypotheses. Respondents with missing values for the independent, dependent or moderating variable in a specific model were excluded from the confirmatory analyses used to test that model (i.e., listwise deletion). The models run to test the hypotheses are outlined below. Each model was run separately for each of the three dependent variables.

As different comparisons are made in the different hypotheses, we ran different models with different treatment conditions as the reference categories. Specifically, in H1a-c and H3a-c, we compared the treatment condition 'comprehensive information' to the 'basic information' (reference category; see models 1 and 3 below). Meanwhile, in H2a-c and H4a-c, we compared the treatment condition 'institutional information' to the 'comprehensive information' (reference category; see models 2 and 4 below).

We examined the main effects of 'comprehensive information' vs. 'basic information' in Model 1:

(1) $Y = \beta 0 + \beta 1 Treatment\ Comprehensive + \varepsilon$

where 'Y' is support for the MMR vaccine (H1a), advising others to administer the vaccine (H1b), or support for compulsory vaccination (H1c); 'Treatment Comprehensive' is a dichotomous variable indicating whether the respondents received both the comprehensive information and basic information (instead of only the latter); and 'ε' is the error term.

We examined the main effect of 'institutional information' vs. 'comprehensive information' in Model 2:

(2) $Y = \beta 0 + \beta 1 Treatment\ Institutional + \varepsilon$

where 'Y' is support for the MMR vaccine (H2a), advising others to administer the vaccine (H2b), or support for compulsory vaccination (H2c); 'Treatment Institutional' is a dichotomous variable indicating whether the respondents received both information about the RIVM (accompanied by its official logo) and the comprehensive information (instead of only the latter); and 'ε' is the error term.

In Model 3, we examined the interaction effect between 'comprehensive information' (vs. 'basic information') and anti-institutionalist attitudes:

(3) $Y = \beta 0 + \beta 1 Treatment\ Comprehensive + \beta 2 Anti\text{-}institutionalism + \beta 3(Treatment\ Comprehensive * Anti\text{-}institutionalism) + \varepsilon$

where 'Y' is support for the MMR vaccine (H3a), advising others to administer the vaccine (H3b), or support for compulsory vaccination (H3c); 'Treatment Comprehensive' is a dichotomous variable indicating whether the respondents received both comprehensive and basic information about the MMR vaccine (instead of only basic information); 'Anti-institutionalism' indicates anti-institutionalist attitudes; 'Treatment Comprehensive*Anti-institutionalism' is the interaction term between these two variables; and 'ε' is the error term.

In Model 4, we examined the interaction effect between 'institutional information' (vs. 'comprehensive information') and anti-institutionalist attitudes:

(4) $Y = \beta 0 + \beta 1 Treatment\ Institutional + \beta 2 Anti\text{-}institutionalism + \beta 3 (Treatment\ Institutional * Anti\text{-}institutionalism) + \varepsilon$

where 'Y' is support for the MMR vaccine (H4a), advising others to administer the vaccine (H4b), or support for compulsory vaccination (H4c); 'Treatment Institutional' is a dichotomous variable indicating whether the respondents received both information on the RIVM (accompanied by its official logo) and comprehensive information (instead of only comprehensive information); 'Anti-institutionalism' indicates anti-institutionalist attitudes; 'Treatment Institutional*Anti-institutionalism' indicates the interaction term between these two variables; and 'ε' is the error term.

Recent research has demonstrated that excluding respondents from analyses based on post-treatment measures like a manipulation check may introduce bias (Aranow, Baron & Pinson, 2019; Montgomery, Nyhan & Torres, 2018). Consequently, we first estimated the models without removing any participants. We then conducted additional sensitivity analyses to check whether the uncovered treatment effects held when we excluded those who answered the manipulation check incorrectly or with 'I don't know'.

4.5 Results

4.5.1 Main effects of comprehensive and institutional information

Table 4.2 provides an overview of the regression analyses conducted for each of our four models. The results for each of the three dependent variables are presented under the corresponding model.

As seen in models 1a-c in Table 4.2, the effects of providing comprehensive information on the MMR vaccine were negative for each dependent variable, although this was only significant for the likelihood of recommending it to others. This means that the respondents who received more comprehensive information about the vaccine (how it works, potential side-effects and the scientific research behind it) were, on average, less likely to recommend it than those who only received basic information. As hypotheses 1a-c anticipated a *positive*, not a

negative, effect of receiving comprehensive information (i.e., *higher*, not *lower*, levels of support for the MMR vaccine among this group), they must be rejected.

In relation to models 2a-c, Table 4.2 shows that providing the respondents with both institutional and comprehensive information had virtually no effect on our three measures of support for the MMR vaccine: the coefficients were very close to zero for each dependent variable. Consequently, hypotheses 2a-c, which anticipated positive effects of institutional information on support for the vaccine, must also be rejected.

4.5.2 Moderation by anti-institutionalism

4.5.2.1 The role of anti-institutionalism in the effects of comprehensive information

Our findings regarding the role of anti-institutionalism in shaping the effects of providing more comprehensive information on the MMR vaccine are presented in models 3a-c. These show that none of the three modelled interaction terms were significant, although the coefficient in Model 3c (where support for compulsory vaccination is the dependent variable) is close to being so. Interpreting interaction effects is easier when visualization is employed alongside regression coefficients (Brambor, Clark & Golder, 2006). Figure 4.1 therefore contains a visual representation of the interaction effects.

Table 4.2: The effect of providing comprehensive information and institutional information about scientific research on: a) support for the MMR vaccine; b) the likelihood of recommending the vaccine to other parents; and c) support for compulsory vaccination, and the role of anti-institutionalism (columns continue on next page)

	Model 1			Model 2			Model 3		
	a	b	c	a	b	c	a	b	c
Independents									
Constant	6.57***	6.39***	4.93***	6.52***	6.28***	4.77***	7.03***	6.98***	5.13***
	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.06)	(0.07)	(0.08)	(0.14)
Information treatment									
Comprehensive info (ref. = basic)	-0.05	-0.11*	-0.16				0.03	0.02	0.19
	(0.04)	(0.05)	(0.09)				(0.09)	(0.11)	(0.19)
Institutional info (ref. = comprehensive)				-0.01	-0.00	0.01			
				(0.04)	(0.06)	(0.09)			
Anti-institutionalism							-0.14***	-0.19***	-0.06
							(0.02)	(0.02)	(0.04)
Interaction terms									
Information treatments * anti-institutionalism									
Comprehensive info (ref. = basic)							-0.02	-0.03	-0.10
							(0.03)	(0.03)	(0.05)
Institutional info (ref. = comprehensive)									
R^2 (adjusted)	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.10	0.01
n	1,709	1,709	1,709	1,712	1,712	1,712	1,629	1,629	1,629

Method: Ordinary Least Squares (OLS) regression. Dependent variables: a) dependent variable 'support for MMR vaccine'; b) dependent variable 'likelihood of recommending vaccine to others'; c) dependent variable 'support for compulsory vaccination'.
* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$

Table 4.2 Continued

	Model 4		
	a	b	c
Independents			
Constant	7.06***	7.00***	5.32***
	(0.06)	(0.08)	(0.13)
Information treatment			
Comprehensive info (ref. = basic)			
Institutional info (ref. = comprehensive)	-0.04	-0.05	-0.09
	(0.09)	(0.11)	(0.19)
Anti-institutionalism	-0.16***	-0.21***	-0.17***
	(0.02)	(0.02)	(0.04)
Interaction terms			
Information treatments * anti-institutionalism			
Comprehensive info (ref. = basic)			
Institutional info (ref. = comprehensive)	0.00	0.00	0.03
	(0.03)	(0.03)	(0.05)
R^2 (adjusted)	0.09	0.10	0.02
n	1,647	1,647	1,647

Method: Ordinary Least Squares (OLS) regression. Dependent variables: a) dependent variable 'support for MMR vaccine'; b) dependent variable 'likelihood of recommending vaccine to others'; c) dependent variable 'support for compulsory vaccination'.
* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$

The first row of Figure 4.1 sets out the marginal effects of providing more comprehensive information about the MMR vaccine per different levels of anti-institutionalism. This demonstrates that the impact on support for the vaccine (Model 3a) and the likelihood of recommending it to others (Model 3b) does not differ significantly from zero for all values of anti-institutionalism. Anti-institutionalism does not, therefore, appear to shape the effect of having more comprehensive information on these two measures of support. The figure for Model 3c does, however, show that there is a negative marginal effect of providing more comprehensive information on support for compulsory vaccination for those with higher levels of anti-institutionalism. Specifically, a negative effect was observed in respondents who scored >4.0 on the anti-institutionalism scale, which was the case for 404 out of 1,709 respondents (about 24%). This indicates that providing both comprehensive and basic information on the MMR vaccine had *no effect* on support for compulsory vaccination in those with less anti-institutionalist attitudes, while the impact was *negative* among those with more anti-institutionalist views (scores >4.0). Although this is in line with H3c (a negative interaction between the effect of providing more comprehensive information and anti-institutionalism), the conditions we set out in our pre-registered analysis plan mean it must be rejected as the interaction coefficient in Model 3c is not significant. Hypotheses 3a and 3b can likewise not be accepted.

4.5.2.2 The role of anti-institutionalism in the effects of institutional information

Models 4a-c relate to the findings on the role played by anti-institutionalist attitudes in the effects resulting from the provision of information about the RIVM in addition to the comprehensive and basic information. None of the interaction coefficients are significant, with all three being close to zero. This suggests that anti-institutionalist views do not shape the impact of institutional information on either support for the MMR vaccine, the likelihood of recommending it to others or support for compulsory vaccination. To aid interpretation, we again plotted the marginal effects of giving the respondents information about the RIVM on our three dependent variables (models 4a-c) for the full range of scores on our measure of anti-institutionalism. The bottom row in Figure 4.1 shows that the effects of such

information on our three measures of support for the MMR vaccine do not produce values that differ significantly from zero, regardless of how high or low the respondents scored for anti-institutionalism. We can thus conclude that anti-institutionalist attitudes did not play a role in the impact made by providing institutional information alongside comprehensive and basic information. As negative interactions were anticipated in hypotheses 4a-c, they must be rejected.

4.5.3 Sensitivity analyses

To examine whether excluding the respondents who failed our manipulation check produced different outcomes, we conducted the same analyses as in Table 4.2 for only those who gave the correct response. Ninety individuals were thus excluded. The results of these analyses did not, however, cause us to reach different conclusions about the tenability of our hypotheses (for an overview, see Table S4.2 in the Appendix).

4.6 Discussion

4.6.1 General discussion of results

Following up on the common advice about how to increase the effectiveness of vaccination communications (see Kitta & Goldberg, 2017), this study employed the detraditionalized Dutch context to examine the impact of providing more comprehensive information about the MMR vaccine on three different measures of trust. In doing so, we built on and tested empirically an implication of the information-deficit model that still informs public information provision (Kitta & Goldberg, 2017; Rossen et al., 2016; Simis et al., 2016). In contrast to the thinking behind that model, our findings demonstrate that if there is any effect of providing more comprehensive information on support for the MMR vaccine, it is more likely to be negative than positive.

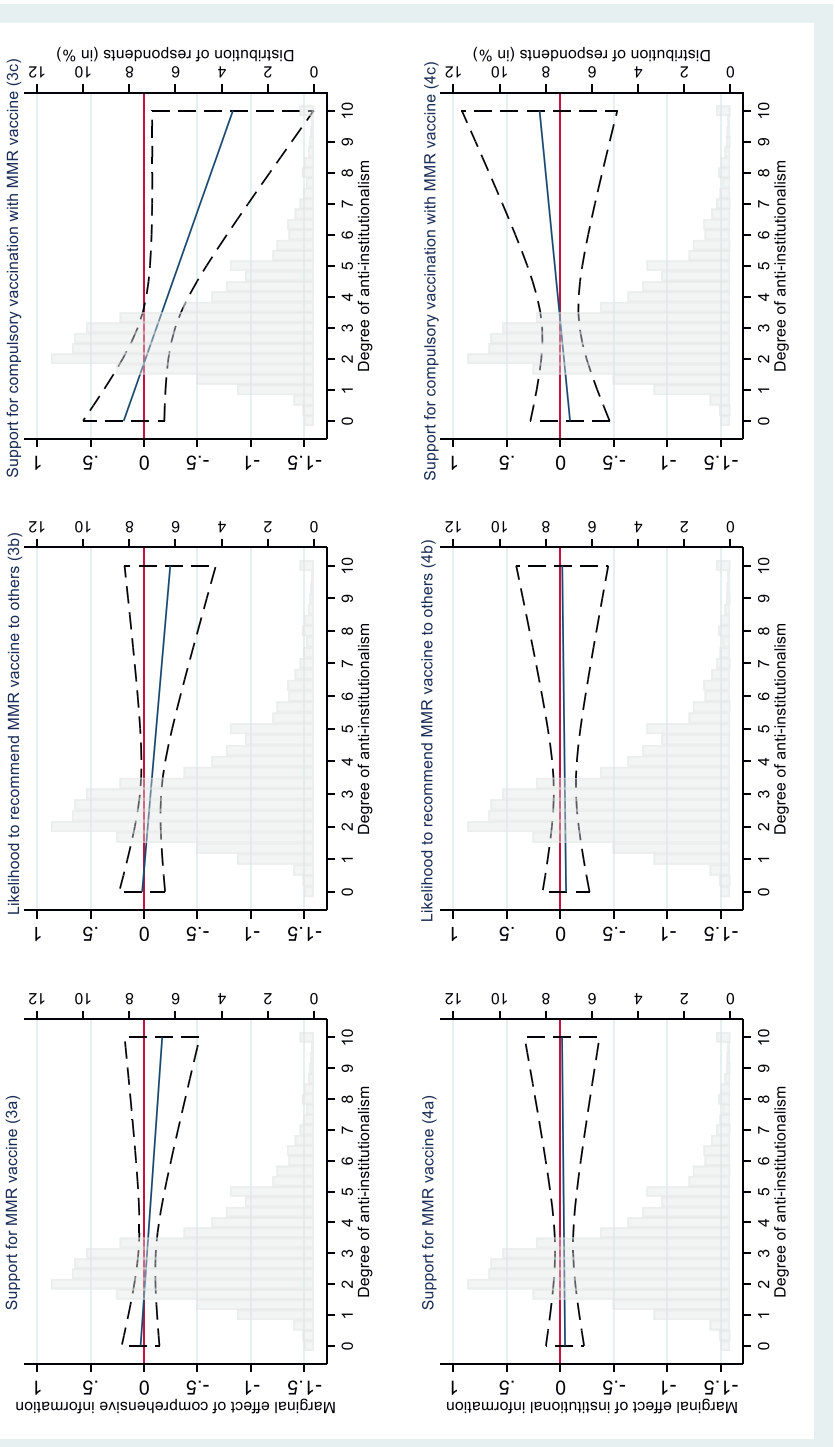

Figure 4.1: Marginal effects of providing comprehensive and institutional information on support for the MMR vaccine, per anti-institutionalism

This speaks to literature on detraditionalization processes (Beck & Beck-Gernsheim, 1996; Houtman et al., 2011): the information provided by institutions may be less readily accepted because their epistemological and moral authority is eroding (Houtman et al., 2011). Moreover, recent studies on vaccine skepticism (e.g., Attwell et al., 2021; Duchsherer et al., 2020) also found that parents no longer have (or advocate) blind trust in the institutions involved in national vaccination programs. This aligns with recent research demonstrating that an individualist approach underlies childhood vaccination decisions among vaccine-skeptical parents, suggesting that this may also shape how parents utilize information about vaccination (Ten Kate et al., 2021). For policy-makers, it may thus be wise to reflect critically on the conventional ways in which information is provided. In particular, the central, and highly visible, role given to major institutions in such information should be reconsidered, with the focus instead on more personalized (and, therefore, individualized) ways of communicating with the public about vaccination.

Additionally, our finding that providing more comprehensive information has no, or a negative, effect is contrary to one of the deficit model's key assumptions: more and better explanations of scientific topics like vaccination will increase the public's understanding and support (Coughlin et al., 2017; Offit & Coffin, 2003). This could indicate that vaccination attitudes are not (only) shaped by factual knowledge. This is also proposed by Kitta and Goldberg who, in a critique of the predominance of the deficit model in vaccine policy, argue that there are widespread misconceptions concerning the "root causes of belief formation that fuel anti-vaccination", meaning that policy responses are "likely to be poorly formed from the outset" (2017: 507). Recent research reveals vaccine skepticism is informed by a variety of views on health and healthcare (e.g., Attwell et al., 2021; Ten Kate et al., 2021; Ward et al., 2017), implying that vaccination policy should focus less on distributing factual information and more on catering for different perspectives on vaccination and health.

Two lines of social-scientific research may offer valuable insights. Elaborate explanations about vaccination by official institutions might be experienced as 'meddling' and 'paternalistic' (cf. Van Meurs et al., 2022b), thus negatively affecting its support. Alongside being taken as paternalistic, more comprehensive material

about vaccination may increase the chances of a perceived information overload, which may also have a negative impact (Kim et al., 2020; Zheng, Jiang & Rosenthal, 2022). Future research could thus seek to disentangle the different positive and negative effects, and their relative importance, of providing more comprehensive information about childhood vaccination.

As well as examining the effects of offering more comprehensive information on the MMR vaccine, we also assessed the impact of providing institutional information (herein: the RIVM, the Dutch body responsible for the national childhood-immunization program). Our analyses show that there were no effects on any of our three measures of support for the vaccine. This is notable in light of the literature on the impact of using an authoritative source on information's credibility, which focuses on "traditional authority indicators" as important markers of credibility (Flanagin & Metzger, 2008:140) or 'cues' (Sundar, 2008). Including authority markers is often suggested as a way to increase the effectiveness of information (Metzger et al., 2003), but we demonstrate that references to an authoritative source may, in fact, not have the anticipated or desired impact.

This study also undertook an empirical test of the role played by anti-institutionalist attitudes in shaping the effects of information provision. Although we identified no significant interaction coefficients, visualization demonstrated that the impact of offering more comprehensive information on support for compulsory vaccination with the MMR vaccine was not significant in those who are less anti-institutionalist and negative among those who are more so. Interestingly, those who are less trusting of institutions are common target groups for information campaigns, because they are less easy to reach via other means (Siciliani et al., 2020).

4.6.2 Limitations and future directions

First, we deliberately chose to focus on the Netherlands, as it is generally regarded as a prime example of a very detraditionalized context (Houtman et al., 2011). Nonetheless, we recommend research into the effects of information provision on vaccination across other countries, which may elucidate the role of country

characteristics like detraditionalization or the types of vaccination programs employed.

Second, the data collection for this study occurred after the start of the COVID-19 pandemic, which could have shaped how the RIVM was perceived. The RIVM has been a constant post-pandemic object of attention and criticism, making it one of the most debated institutions in the Netherlands (Van Dijck & Alinejad, 2020). Its involvement in (childhood) vaccination may thus be so well-known to the public that additional information explaining its role may not actually be providing information that is 'unknown'. Future research could investigate whether a link with official institutions is automatically assumed in both how information about vaccination and other health issues (where the relevant institutions may be less well-known) is received and how this shapes its effects.

4.7 Conclusion

This study on support for the MMR vaccine in the detraditionalized Dutch context identified no positive effect of providing more comprehensive information or referencing its institutional source. This not only calls into question the use of the dominant information deficit model in such settings, but also the policy measures informed by it: they may not be as effective as anticipated. Additionally, we found that providing comprehensive information on the MMR vaccine had *no effect* on support for compulsory vaccination among those with lower anti-institutionalism scores, and a *negative effect* on this measure in those with higher scores.

Our findings suggest that policy responses to rising skepticism towards childhood vaccination should be cautious about providing the public with (more) information on the issue in detraditionalized settings like the Netherlands. Alternatives to large-scale campaigns about vaccination, e.g., more localized and tailored initiatives in which people's personal views and concerns are heard (cf. Cutts et al., 2021), could be considered to avoid prevent the evocation of the negative associations with leading institutions that are increasingly a feature of the public's views.

5

Chapter 5

The effect of providing information about the science behind vaccination

A population-based survey-experiment on support for the MMR vaccine

Abstract

This study examines the effects of including information about the scientific research behind vaccination in information provision about the MMR vaccine on societal acceptance and perceived legitimacy of the vaccine. We also test whether these effects are shaped by nature-oriented or science-oriented worldviews. Employing a pre-registered survey experiment conducted among members of a high-quality Dutch panel established using official population register data (n = 1,722), we found that receiving the informational stimulus did not positively affect support for the MMR vaccine. Moreover, providing information explaining the scientific research behind vaccination had a *negative* effect on support for the MMR-vaccine among those with a less science-oriented worldview.

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5.1 Introduction

Rising vaccine hesitancy was flagged as a threat to public health even before the COVID-19 pandemic (WHO, 2019). Information campaigns are a frequently recommended and used measure to attempt to increase levels of support for state-provided vaccination programs such as those offered to children (Siciliani et al., 2020), not just historically, but also more recently in the context of COVID-19 (Boyd, 2021). These campaigns are a key measure in attempts to maintain and increase positive attitudes toward childhood vaccination in countries like the Netherlands, which is the strategic setting for this research, because Dutch parents have complete freedom to choose whether or not to vaccinate their children (RIVM, 2019a).

However, evidence of the effectiveness of information provision in relation to vaccination is ambivalent at best (Siciliani et al., 2020). In a specific variation on the traditional information-deficit model (Allum et al., 2008), it has recently been suggested that giving a more prominent role to the provision of information about the science behind vaccination could improve the effectiveness of campaigns; in other words, it is a way to "unite evidence-based content with evidence-based communication" (Dudley et al., 2021). Providing this type of information may help to prevent or correct public misconceptions about science and scientific research (Rosenbaum, 2021; Van Stekelenburg et al., 2020; 2021) that are rooted in unfamiliarity with the scientific process (Boyd, 2021). It may also serve to provide more detailed information about the safety of childhood vaccines, a concern that has been identified as a key factor in the vaccination intention (e.g., Mostafapour, Meyer & Scholer, 2019).

This study therefore scrutinizes systematically the effect of providing information about the scientific research underlying vaccination on societal acceptance and perceived legitimacy of the MMR vaccine in the Netherlands, a context where acceptance of childhood vaccination has been relatively high traditionally (RIVM, 2019a) but where uptake of childhood vaccination has been declining even more sharply than before COVID-19 (RIVM, 2022d). Official institutions have expressed concern about this trend because of the high thresholds required to prevent outbreaks (see WHO, 2019). The MMR vaccine has long been part of state-prescribed childhood vaccination programs and yet is also one of those

questioned the most by Dutch parents (RIVM, 2022a; 2023a), resulting in the Netherlands failing to meet the WHO recommended threshold for measles of 90% (RIVM, 2022a; WHO, 2008).

In addition to our empirical examination of the effectiveness of providing information about the scientific background of vaccination, we use the concept of "cultural frames" (Gitlin, 1980: 6) to theorize and also test empirically whether or not everyone responds to this type of information provision in the same way. Evidence from political science and health research has demonstrated that cultural frames, i.e., "principles of selection, emphasis and presentation composed of little tacit theories about what exists, what happens, and what matters" (Gitlin, 1980: 6), play a role in how open individuals are to accepting certain information or forming a positive opinion about it (e.g., Achterberg, 2014; De Koster et al., 2016). In this study, we therefore examine two ways in which cultural frames may shape the effects of information provision on the science behind vaccination in the Netherlands. While extant research suggests political ideology and religiosity are relevant factors in vaccine skepticism (e.g., Levin & Bradshaw, 2022) and thus potentially shape how information on scientific research on vaccination is received, this finding (mostly based on data collected in the US) is not necessarily applicable to the Dutch context. Studies conducted here for instance show that vaccination is considerably less politicized in the Netherlands (Afonso & Votta, 2022), and that it is a highly secularized context (Inglehart, 1997). Moreover, recent research shows that other factors play a key role in vaccine skepticism in this context, most notably nature-oriented and science-oriented views.

Regarding nature-oriented views, recent studies show that ideas about the 'naturalness' of health care measures like vaccines play a role in how some individuals form opinions and make decisions about childhood vaccination (Rosenbaum, 2021; Ten Kate et al., 2021). From this view, the perception of vaccinations as chemical and unnatural is a key factor fueling vaccine skepticism. If conceptions of naturalness thus drive opinions about vaccination, we do not anticipate that stressing the science behind it will increase trust; it may even serve to exacerbate concerns about the perceived unnaturalness of vaccines. Turning to the science-oriented views, recent in-depth qualitative research indicates that a focus on scientific methods also plays a role. More specifically, some parents make

choices concerning the vaccination of their children based on their own critical evaluations of the scientific evidence underlying different vaccines (Ten Kate et al., 2021), which appears to be particularly well-matched to information provision campaigns referencing scientific research into vaccines. We thus expect that what we call 'nature-oriented' and 'science-oriented' worldviews will play contrasting roles in shaping the effects of providing scientific information about childhood vaccination.

This study extends the research in this field in four ways. First, it scrutinizes systematically whether including information on the scientific background of vaccination increases the effectiveness of information provision campaigns on vaccination, a measure that has recently been described as promising by several authors, but has not yet been tested empirically. Second, we examine the effects of providing such information on three different aspects of societal acceptance and perceived legitimacy of the MMR vaccine: a) personal support for the MMR vaccine (cf. Betsch et al., 2018); b) broader acceptance of the MMR vaccine, measured by the likelihood of recommending it to others (cf. Shetty et al., 2019); and c) support for (hypothetical) compulsory vaccination (which does not exist in the Netherlands, but is regularly discussed) in order to assess the perceived legitimacy of public policy (see Fridman, Gershon & Gneezy; Sarathchandra et al., 2018). Third, informed by insights on cultural framing, we expand theorizing on the effects of information provision by being sensitive to their potential moderation by two different worldviews: nature-oriented and science-oriented. Fourth, we perform a pre-registered information experiment involving treatment texts modelled after official information employed by the Dutch National Institute for Public Health and the Environment (in Dutch: 'Rijksinstituut van Volksgezondheid en Milieu', mainly recognized by the general public as 'RIVM'). The treatments provide information about the method of the underlying scientific research into vaccines (RIVM, 2022c). Additionally, we use a sample (n = 1,722) from members of a high-quality panel representative of the Dutch population (established using official population register data). These two elements strengthen external validity and enable the study of effects in the broader Dutch population in line with population-wide usage of information campaigns. Following our theoretical focus on studying the effect of offering more in-depth information about the science that

underlies vaccination, the treatment text focuses on offering information about the method of the underlying scientific research and does not include a statement about the outcome of this research (i.e., about the vaccine being safe).

Contrary to recent optimistic theorizing, our analyses show that the effect of providing information that includes a discussion of the scientific research behind vaccines is not significant (with support for the MMR vaccine or for compulsory vaccination as dependent variables), or is even negative (on likelihood to recommend the vaccine to others). Moreover, although nature-oriented worldviews play no moderating role, providing information stressing the science behind vaccines has a negative effect on support for the MMR vaccine among those with a less science-oriented worldview. We elaborate on the practical implications of these findings for informational campaigns in the Discussion.

5.2 Theoretical framework

5.2.1 Providing information on scientific research and support for vaccination

Different measures have been employed in attempts to mitigate vaccine skepticism and increase support for vaccination programs, including designing and offering specialist training to health care professionals and making vaccination compulsory (for access to certain services or institutions, or generally; Siciliani et al., 2021). Among the most common measures is the provision of information about vaccination and vaccines by official (governmental) institutions (Siciliani et al., 2021). Such measures are commonly based on the traditional information-deficit model, which supposes that providing the public with information increases trust in scientific products like vaccines by filling a knowledge gap (Bauer et al., 2007; Allum et al., 2008). In this approach, distrust in science is considered an "irrational" fear that can be attributed to limited scientific literacy (Sturgis & Allum, 2004: 57). From that perspective, increasing knowledge through large-scale information campaigns may thus increase support for vaccination.

However, the information-deficit model faces long-standing critiques (e.g., Wynne, 2016) in order to understand why information provision does not always have the desired impact (Pluviano et al., 2019). Various authors have examined ways of increasing the effectiveness of information campaigns (e.g., Van

Stekelenburg, 2020; 2021; Siciliani et al., 2021). One promising variation on the traditional deficit model that is suggested in multiple studies, is to include information stressing the science behind vaccination (e.g., Rossen, Hurlstone & Lawrence, 2016; Siciliani et al., 2021), which may be effective for several reasons.

First, giving people information about the scientific research behind vaccines may address a public need. More specifically, several studies show that one of the main drivers of vaccine hesitancy is rooted in questions about risks and safety (Majid & Ahmad, 2020). Bond et al. (2008), for instance, found that mothers who chose not to vaccinate their children mainly did so because they were concerned about long-term side-effects. Moreover, a meta-analysis found that perceptions about the risks of vaccination were a significant predictive factor in vaccine behavior (see Brewer et al., 2007), while prioritizing risk over benefit has also been identified as a crucial aspect of what has been labeled as "anti-vaccination misinformation" (Kata, 2010: 1709). The provision of information about the scientific research into the safety and effectiveness of vaccines may thus address key concerns among the public.

Additionally, there is growing concern about public misconceptions around vaccination (e.g., Boyd, 2020; Dudley et al., 2021). Information on the science behind vaccines may thus be a useful way to address incorrect ideas about the scientific process generally and the scientific research behind vaccines specifically. Several authors have indicated that the likelihood of someone agreeing to vaccination is positively related to them having correct knowledge about it (e.g., Ashkenazi et al., 2020). In an experimental study, Van Stekelenburg et al. (2020) also showed that it is possible to correct the misperception that childhood vaccines can 'overload' a child's immune system (p. 33) by providing information that specifically addresses this point. Consequently, general misconceptions about the scientific process and scientific research, which are widely prevalent (Oreskes, 2019) and thought to play a role in current vaccine skepticism (Boyd, 2021), may be addressed by providing general information on the scientific research behind vaccination, thereby increasing the public's support.

In summary, we expect that individuals who are given information about the MMR vaccine that also explains the scientific research underlying vaccination will be more positive toward: the vaccine (H1a), advising others to administer the

vaccine (H1b), and compulsory vaccination (H1c) than those who receive the same information without such an explanation.

5.2.2 Cultural frames: nature- and science-oriented worldviews as moderators?

5.2.2.1 The importance of cultural frames

Although providing people with information about the scientific research behind vaccination may address several issues and thus have a positive influence on support for vaccination, the notion of a universal effect of information provision has been questioned by authors in multiple disciplines. In fact, studies in several social-scientific fields use the concept of "cultural frames" (Gitlin, 1980) to illustrate and explain differences in effects of information provision. Research on various issues does indeed show that the same situation or information is not viewed in the same way by all, and that "different frames underlie different interpretations" (Van Noord et al., 2018: 74). Several studies focusing specifically on the varying effect of information provision show that the same information about certain technologies or policies leads to greater acceptance of them among citizens with a particular worldview, but not among those who have a different worldview (Achterberg, 2014; De Koster et al., 2016). Accordingly, we theorize that the same principle will apply to information provision about vaccination.

Two specific applications of the notion of cultural frames that we anticipate are relevant to the effect of providing scientific information to the public about vaccination are explained below.

5.2.2.2 The role of a nature-oriented worldview

One of the factors addressed in research about vaccine skepticism is a preference for nature and natural remedies. Several studies have found that views on 'natural living' and how natural vaccination is perceived to be play an important role in skeptical attitudes toward vaccines (e.g., Majid & Ahmad, 2020). Some researchers point to such views as being part of a more encompassing lifestyle and worldview, linking them to lifestyle characteristics and preferences, including eating organic food, avoiding preservatives and the use of plastic products, and using natural sunscreen (Peretti-Watel et al., 2019; Reich, 2018; Ward et al., 2018). When it

comes to health care, those with a preference for the natural have often been found to reject biomedicine and avoid pharmaceutical substances (Attwell, Meyer & Ward, 2018; Reich, 2018). In some cases, this goes hand-in-hand with the use of complementary and/or alternative treatments instead of allopathic medicine (Attwell, Meyer & Ward, 2018). In summary, then, a general sense of nature and that natural ways of living are important and preferable appear to play an important role in vaccine skepticism.

In view of the wide variety of research relating to the application of what we call a 'nature-oriented worldview' to attitudes toward vaccination, it is reasonable to assume that such a worldview also plays a role in how information about it is perceived. Arguably, adding explanations of the scientific research into vaccines to information provided to the public would be of no value to those who are more nature-oriented, because they form their opinions mainly based upon their assessments of 'naturalness' and not so much on considerations of scientific evidence. Furthermore, one might even expect the provision of scientific information to have an adverse effect among those with such views: elaborating on the scientific research behind pharmaceutical measures like vaccines could bring to mind in this group associations with laboratory research and chemical substances, and therefore the (perceived) 'chemical', 'artificial' and 'unnatural', character of vaccination. This, then, runs directly counter to the values and preferences of people with more nature-oriented views.

We, therefore, hypothesize a *negative interaction* between receiving information that includes a reference to the underlying scientific research and having more nature-centred views on: being positive towards the MMR vaccine (H2a), recommending it to others (H2b), and compulsory vaccination (H2c).

5.2.2.3 The role of a science-oriented worldview

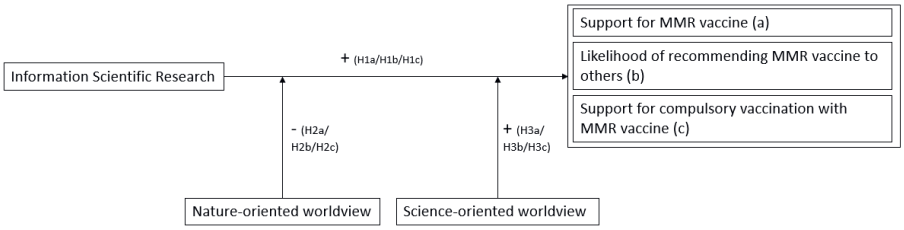
While nature-oriented views have been considered relevant to the issue of vaccine skepticism for several years now, views that are more oriented toward science and scientific methods have only been addressed more recently. In an inductive study of vaccine skepticism among more-educated parents, Ten Kate, De Koster and Van der Waal (2021) showed that while some make decisions regarding vaccinating their child(ren) using a natural vs. unnatural typology, others weigh the risks of

(non-)vaccination based on their assessment of (the quality of) the scientific evidence on the effectiveness and safety of vaccines. Additionally, parents who were more science-oriented regarded scientific methods as the most appropriate way of generating (reliable) knowledge, which is in sharp contrast to the preference for more intuitive ways of acquiring knowledge that is often related to nature-oriented views (Ten Kate et al., 2021). This is reflected in more recent studies on attitudes toward COVID-19 vaccines, which show that concerns about the scientific research behind them and being able to assess the risks of (long-term) side-effects play an important role in the public debate (e.g., Fedele et al., 2021).

Unlike having more nature-oriented views, the provision of information on the scientific research behind vaccination is arguably highly compatible with having views that are more oriented toward science. Since those with a more science-oriented worldview generally base their (vaccination) decisions on their judgments of the soundness of the scientific evidence and how well-researched vaccines are, their decision-making process requires them to have (more detailed) information on the scientific background. Additionally, studies indicate that science-oriented views often go hand-in-hand with questions about if and how (well) the risks of vaccines have been investigated (e.g., Lin, Tu & Beitsch, 2020; Ten Kate et al., 2021). Information on the research behind vaccination is more likely to address these issues than information that does not include such explanations.

Consequently, we expect a *positive* interaction between receiving information that includes a reference to the underlying scientific research and having more science-centred views on: support for the MMR vaccine (H3a); the likelihood of recommending it to others (H3b); and supporting compulsory vaccination (H3c). An overview of our hypotheses is presented in Figure 5.1.

Figure 5.1: Overview of hypotheses



5.3 Method

5.3.1 Data collection

The study's desired sample size, variables, hypotheses, and analysis plan were pre-registered on the Open Science Framework prior to the collection of any data.[3] We obtained our data via an online survey conducted in March 2022 among members of the Longitudinal Internet Studies for the Social Sciences (LISS) panel, which is administered by Centerdata (an independent scientific research institute affiliated with Tilburg University in the Netherlands). The LISS panel is composed of a true probability sample of Dutch households, based on the official population register produced by Statistics Netherlands, and contains about 7,500 individuals in total. Panel members are paid for their participation in questionnaires, and computers and internet connections are provided to those who need them to ensure the panel is representative. Data were obtained for the current study from a sample drawn from the LISS panel among of participants aged 18 or older.

The data for this particular study were collected during the second wave of a broader project on attitudes toward vaccination. A total of 3,729 respondents participated in Wave 1 of the data collection (in February 2022), which was also used in a different study. The participants in that wave were all contacted about being involved in Wave 2, which collected the data employed in this study. Of those approached, 92.5% completed our survey (in total, 3,448 individuals). Attrition between waves thus was minimal. The participants in Wave 2 were assigned to

[3] An anonymized version of the pre-registered project is available through: https://osf.io/pb3sv/?view_only=1b6712ec74044a42b7a9ea419b158e1e. Please note that although the hypothesized effects presented in this paper are the same as those included in the pre-registration, we have changed the order in which they are discussed herein, resulting in different numbering of the hypotheses.

different groups used for different studies. This left us with a dataset roughly half the total size of Wave 2 for the present study (1,722 respondents prior to listwise deletion). Approval from the institutional Ethics Committee was obtained prior to conducting the study.

5.3.2 Experimental procedure

We conducted an information provision experiment with a double-blind, between-subject design (Haaland et al., 2020). After reading an opening statement with brief information about the study, the respondents were randomly assigned to one of four groups with forced equal sizes (Alferes, 2012). Two of these groups were relevant to the current research (the other two were used in a different study). The control group was presented with basic information about measles, mumps and rubella and the vaccine available for children in the Netherlands (the MMR vaccine) to combat these diseases. The treatment group received the same basic information about the vaccine with additional information that delved into the underlying scientific research. All the information employed was derived from official governmental resources, more specifically the National Institute for Public Health and the Environment, the body responsible for public health and the environment in the Netherlands.

After being given the information treatments, all the respondents were asked questions about: their support for the MMR vaccine (1); how likely they would be to recommend parents to administer it (2); and their support for compulsory vaccination (3). Additionally, we included a treatment-irrelevant manipulation check to assess whether the respondents had read the information given to them. It should be noted that the moderating variables (scales measuring nature-oriented and science-oriented worldviews) were included in the previous wave of data collection from the same panel, which took place a month before the wave for this study. This prevented the priming of respondents immediately before the experiment described in this paper.

5.3.3 Measures

5.3.3.1 Independent variables

Our experimental treatment was measured with a dichotomous variable indicating whether the respondents received only basic information about measles, mumps, rubella and the MMR vaccine (the control condition), or whether they received the same basic information and additional information about the underlying scientific research (the treatment condition). Based on the official information page of the Dutch National Institute for Public Health and the Environment about the MMR vaccine, we assembled a piece of text containing basic information that explained the procedure for administering the vaccine and the diseases against which it provides protection (see, RIVM, 2022a). The other text used in the experiment included additional information about the research that has been conducted to ascertain the MMR vaccine's safety and effectiveness. To ensure this treatment's external validity, we modelled it after official information provided by the National Institute for Public Health and the Environment (RIVM, 2022c). In line with this and following our theoretical focus on studying the effect of offering more in-depth information about the science that underlies vaccination, the treatment text focuses on offering information about the method of the underlying scientific research and does not include a statement about the outcome of this research (i.e., about the vaccine being safe). The text containing the basic information provided to the control group and the additional text on the scientific research given to the treatment group are set out in Figures 5.2 and 5.3 on the following page.

Since the treatment variables were randomized, the inclusion of control variables was not required for testing the hypotheses about our main effects (hypotheses 1a-c). For the hypotheses concerning the moderations (2a-c and 3a-c), we were interested assessing in conditional average treatment effects (or CATE; Kam & Trussler, 2017:792). Since this type of model implies a descriptive question about variation in the effect of a treatment across levels of a moderating variable, the inclusion of control variables is not required (Kam & Trussler, 2017). Therefore, we did not include control variables in the statistical models testing our hypotheses. However, we did perform extra sensitivity analyses in which we controlled for gender, age, income, education, migration background and religiosity. The results of these analyses can be found in the Appendix (Table S5.2).

Figure 5.2: Basic information (translated from Dutch)

Mumps, measles and rubella are diseases that are especially prevalent among children. In the Netherlands, the MMR vaccine is available to vaccinate against these diseases:

- Children of 14 months can receive the MMR vaccine at the well-baby clinic.
- The vaccine is administered from the age of 14 months because it is not effective until that age. Before then, children have antibodies from their mother.
- To increase its effectiveness, a second dose of the vaccine is administered at the age of nine.

Mumps

Children who contract mumps usually do not experience any serious problems. The mumps virus can, however, sometimes cause complications like meningitis, or inflammation of the pancreas, testicles or ovaries.

Measles

Infected children almost always become ill after one to two weeks. Children mostly recover from the measles without any further problems. Sometimes, complications do arise, such as a serious case of meningitis. The measles virus temporarily weakens the immune system, which makes you more vulnerable to other serious infectious diseases like pneumonia. These complications can cause disabilities among children or even death.

Rubella

Infected children usually present with symptoms of general illness. A temporary shortage of platelets, meningitis or joint inflammation are rare complications. If pregnant women contract the virus, they are at risk of miscarrying and the unborn child is at risk of deafness, blindness and impaired mental development.

Figure 5.3: Information about the underlying scientific research (translated from Dutch)

Scientific research

To find out how safe and effective the MMR vaccine is, scientists have been conducting research about it for years. This is done in what scientists call 'clinical studies' (also called: 'randomized controlled trials'), in which they perform experiments. This means that one group of people is administered an injection that contains the MMR vaccine, while another group is given an injection that does not contain the vaccine (also called a 'placebo'). After this, the scientific researchers monitor whether people who were given the MMR vaccine experience more side-effects than those who were not, and how well protected they are against mumps, measles and rubella.

5.3.3.2 Dependent variables

To measure varying levels of support for the MMR vaccine, we included three separate outcome measures, each of which speaks to contemporary public debates about childhood vaccination (Weberling-McKeever et al., 2016). Additionally, using these three measures means we not only include a personal judgment of vaccination referring to the individual choice, but also more collective aspects of vaccination (Betsch et al., 2018). Based on this, we started by asking respondents about their support for the MMR vaccine in their own personal context, followed by querying support for vaccination with the MMR vaccine in a context that extends to other parents (asking how likely one is to recommend it to others). Finally, we included a question about support for the vaccine in the broadest sense (through asking respondents' opinion about compulsory vaccination for all children). The three dependent variables that measured varying levels of support for the MMR vaccine were all measured on a scale ranging from 1 ('strongly disagree') to 7 ('strongly agree').

First, we measured individual *support for the MMR vaccine* by asking the respondents to indicate the degree to which they agreed with the following statement: 'It's a good thing the MMR vaccine is offered to all children in the Netherlands' (cf. Betsch et al., 2018). Higher scores indicated a higher level of support for the MMR vaccine. Second, the likelihood of *advising others to administer the MMR vaccine* was measured by asking the respondents to indicate to what extent they agreed with the following: 'I would advise parents to have their children vaccinated with the MMR vaccine' (cf. Shetty et al., 2019). Higher scores again indicated a higher degree of likelihood of recommending the vaccine. Finally, we measured *support for compulsory vaccination* by first informing respondents that the MMR vaccine is not currently mandatory in the Netherlands (cf. Fridman et al., 2021; Sarathchandra et al., 2018). We then asked them to indicate to what extent they agreed with the following statement: 'It would be good if the MMR vaccine was made compulsory', with higher scores indicate more support for compulsory vaccination with the MMR vaccine.

5.3.3.3 Moderating variables

Finally, we included two moderating variables to examine to what extent the main information effects were moderated by: 1) a nature-oriented worldview, and 2) a science-oriented worldview. Items for these scales had been included in Wave 1 of data collection among the same panel members, preventing that respondents were primed directly prior to the experiment.

Two scales were developed to test our expectations regarding the moderation of the effects of providing scientific information. These were based on a variety of studies into the role of a preference for the natural in vaccine skepticism and on recent in-depth qualitative research into the different views underlying the vaccination decisions made by vaccine-skeptical parents (Ten Kate et al., 2021). Several studies show that some parents highly valued nature and aimed to protect what they viewed as natural (see Attwell, Ward, Meyer, Rokkas & Leask, 2018; Ward et al., 2017). In this way of thinking, nature is seen as being extremely valuable and important, inextricably linked to human beings and their lives, and as something that should be protected instead of adapted through human intervention (e.g., Attwell, Ward, Meyer, Rokkas & Leask, 2018; Ten Kate et al., 2021; Ward et al., 2017). We translated these characteristics of a nature-oriented worldview to novel survey items reflecting the value attributed to nature, the relationship between humans and nature, and the extent to which nature should (not) be adapted.

Additionally, recent in-depth qualitative research shows that highly valuing science and viewing the scientific method as the only reliable way of obtaining knowledge play a role in vaccination decisions among other vaccine-skeptical parents (see Ten Kate et al., 2021). From this perspective, science is seen as the most reliable way of acquiring knowledge and determining what is true, and to help humans understand and deal with our circumstances and environment (Ten Kate et al., 2021). These aspects of a science-oriented worldview were translated into items about the value of science and scientific methods to finding truth.

We measured the *nature-oriented worldview* with a scale based on four items. Respondents were asked to what extent they agreed (on a 7-point scale, ranging from 1 to 7) with the following statements: ‘Humans should live in harmony with nature’; ‘Nature has value of itself’; ‘Humans and nature are one

whole'; and 'It's not right to adapt the natural environment to humans.' A principal component analysis (PCA) produced a single factor with an explained variance of 58% and an eigenvalue of 2.31. We combined these items into a reliable scale (Cronbach's alpha = 0.71) by calculating the average score for the respondents who provided valid answers on all four items. Higher scores indicated a more nature-oriented worldview.

The *science-oriented worldview* was measured with a scale composed of four items. The respondents were asked to what extent they agreed (on a 7-point scale, ranging from 1 to 7) with the following statements: 'We can only trust what we can scientifically prove'; 'To understand reality we need science'; 'Only the scientific method leads to reliable knowledge'; and 'Science is the best way to find the truth.' A PCA produced a single factor with an explained variance of 77% and an eigenvalue of 3.08, indicating the items measured one underlying dimension. Additionally, a Cronbach's alpha of 0.90 indicated the four items formed a reliable scale. Therefore, we created a scale by calculating the average score for the respondents who gave valid answers to all four questions. Higher scores on this composite measure indicated a more science-oriented worldview.

A pairwise correlation analysis indicated that the two scales were only very weakly related (Pearson's r = 0.06).

5.3.3.4 Manipulation check

We used the following question to assess whether the respondents had actually read the information presented to them: 'What was the text that you read about?' The answer options were: 'About the use of different types of painkillers for the flu'; 'About vaccination against different diseases among children' (the only correct answer); 'About different treatments of shingles among the elderly'; and 'Don't know.' The order of the first three answer categories was randomized in the questionnaire. Respondents who gave the wrong answers or said they didn't know were coded as '0' on the manipulation check variable (n = 90), while those who gave the right answer were coded as '1'. Those in the former group were excluded from our sensitivity analyses to enable us to check whether the results without them differed from the analyses when they were included.

Table 5.1 below shows the descriptive statistics of the variables needed to test our hypotheses for the control group and treatment group separately, while Table S5.3 in the Appendix compares the socio-demographic characteristics of the sample with those of the Dutch population at large. The sample proves to be somewhat older, more-educated, religious and tilted towards non-immigrants. In addition to these common characteristics of population-based samples, net household income is somewhat lower in our sample than it is among the general Dutch population.

Table 5.1: Descriptive statistics

	Control group				Treatment group			
	Mean	SD	Range	*n*	M	S	Range	*n*
Nature-oriented worldview	5.52	0.88	1 – 7	858	5.45	0.88	2,25 – 7	860
Science-oriented worldview	5.03	1.19	1 – 7	858	4.94	1.19	1 – 7	860
Support for MMR vaccine	6.57	0.82	1 – 7	861	6.52	0.93	1 – 7	861
Likelihood to recommend to others	6.39	0.98	1 – 7	861	6.28	1.14	1 – 7	861
Support for compulsory vaccination	4.84	1.79	1 – 7	861	4.77	1.82	1 – 7	861

5.3.4 Data analyses

We conducted OLS regression analyses to test our hypotheses. Respondents with missing values for the independent, dependent or moderating variables included in a specific model were excluded from the confirmatory analyses used to test it (i.e., listwise deletion). The models run to test our hypotheses are outlined below. Each model was run separately for each of our three dependent variables.

We examined the main effects (H1a-c) in Model 1:

(1) $Y = \beta 0 + \beta 1 Treatment\ Scientific + \varepsilon$

where Y is support for the MMR vaccine (H1a), advising others to administer the vaccine (H1b), or support for compulsory vaccination (H1c); Treatment Scientific is a dichotomous variable indicating whether the respondents received the information explaining the scientific research behind the vaccine; and ε is the error term.

After investigating the main effects, we turned to the hypothesized interaction effects between the information treatment and the two worldviews. In order to explore the relationships between the variables of interest, we first examined the pairwise correlation (Pearson's *r*) between the dependent variables and the nature and science-oriented worldviews. Thereafter, in Model 2, we tested hypotheses H2a-c on the role of nature-oriented views:

(2) $Y = \beta 0 + \beta 1 Treatment\ Scientific + \beta 2 Nature\text{-}oriented\ views + \beta 3 (Treatment\ Scientific * Nature\text{-}oriented\ views) + \varepsilon$

where Y is support for the MMR vaccine (H2a), advising others to administer the vaccine (H2b), or support for compulsory vaccination (H2c); Treatment Scientific is a dichotomous variable indicating whether the respondents received the information that included an explanation of the scientific research underlying the vaccine; Nature-oriented views represents the extent to which the respondents had such views; Treatment Scientific*Nature-oriented views indicates the interaction term between these two variables; and ε is the error.

We then examined the role of science-oriented worldviews in Model 3 (H3a-c):

(2) $Y = \beta 0 + \beta 1 Treatment\ Scientific + \beta 2 Science\text{-}oriented\ views + \beta 3 (Treatment\ Scientific * Science\text{-}oriented\ views) + \varepsilon$

where Y is support for the MMR vaccine (H3a), advising others to administer the vaccine (H3b), or support for compulsory vaccination (H3c); Treatment Scientific is a dichotomous variable showing whether the respondents received the information that included an explanation of the scientific research behind the vaccine; Science-oriented views indicates the extent to which the respondents had science-oriented views; Treatment Scientific*Science-oriented views represents the interaction term between these two variables; and ε is the error.

5.3.5 Sensitivity analyses

Recent research has demonstrated that removing respondents from analyses based on post-treatment measures leads to bias (Aranow, Baron & Pinson, 2019; Montgomery, Nyhan & Torres, 2018). We therefore estimated the treatment effects using the models outlined above, without excluding any respondents based on their answer to the manipulation check (Aranow, Baron & Pinson, 2019; Montgomery, Nyhan & Torres, 2018). We then conducted additional sensitivity analyses to ascertain whether the uncovered treatment effects held when those who answered the manipulation check question incorrectly were not included.

Additionally, we estimated the models containing interactions (models 2a-c and 3a-c) while controlling for gender, age, income, education, migration background and religiosity.

The results of both sensitivity analyses are presented in the Appendix (Tables S5.1 and S5.2).

5.4 Results

5.4.1 Main effects of information about the scientific research

Table 5.2 contains an overview of the regression analyses, with those for each of the three dependent variables presented under the corresponding model.

As models 1a-c in Table 5.2 show, the direction of the effect of providing information about the scientific research behind vaccines was negative for each dependent variable, signifying that the respondents in the treatment group generally had lower scores for support for the MMR vaccine, the likelihood of recommending it to others, and support for compulsory vaccination. The negative effect was only significant for the likelihood of recommending the MMR vaccine.

This means that hypotheses 1a-c must be rejected, since our expectation was that the effect would be positive (i.e., *higher*, not *lower*, levels of support among those who received the treatment text).

5.4.2 Interaction effects with worldviews

5.4.2.1 The role of a nature-oriented worldview

In relation to the hypothesized interaction effects, the results for the role of having a more nature-oriented worldview are presented in models 2a-c. These show that none of the three interaction terms were significant and the coefficients were close to zero. This suggests that having a more (or less) nature-oriented worldview does not shape the effect of receiving information about the scientific research behind vaccination on the various dimensions of support for the MMR vaccine. Since interpretation of interaction effects is better done using a visualization than compared to relying solely on regression coefficients (Brambor, Clark and Golder 2006), we present a visualization in Figure 5.4.

As shown in the first row of Figure 5.4, the marginal effect of providing information about the scientific background of vaccination does not differ significantly from 0 for the full range of scores on having a nature-oriented worldview in models 2a-c. Indeed, irrespective of how high or low the respondents' scores were for this worldview, providing information on the science behind vaccination appeared to have no significant effects on the various measures of support for the vaccine. This finding is not in line with the negative interactions we anticipated in hypotheses 2a-c, which must therefore be rejected.

Table 5.2: The effect of providing information about scientific research on: a) support for the MMR vaccine; b) likelihood to recommend the vaccine to other parents; and c) support for compulsory vaccination, and the roles of nature- and science-oriented worldviews

	Model 1			Model 2			Model 3		
	a	b	c	a	b	c	a	b	c
Independents									
Constant	6.57***	6.39***	4.84***	6.31***	6.21***	5.08***	5.87***	5.17***	3.29***
	(0.03)	(0.04)	(0.06)	(0.19)	(0.23)	(0.39)	(0.13)	(0.15)	(0.26)
Information treatment									
Treatment scientific	-0.05	-0.11*	-0.08	-0.27	-0.42	0.33	-0.47***	-0.39	-0.17
	(0.04)	(0.05)	(0.09)	(0.27)	(0.33)	(0.55)	(0.18)	(0.21)	(0.37)
Nature-oriented worldview				0.05	0.03	-0.04			
				(0.03)	(0.04)	(0.07)			
Science-oriented worldview							0.14***	0.24***	0.31***
							(0.02)	(0.03)	(0.05)
Interaction terms									
Information treatments * nature-oriented worldview									
Information scientific research				0.04	0.06	-0.08			
				(0.05)	(0.06)	(0.10)			
Information treatments * science-oriented worldview									
Information scientific research							0.09**	0.06	0.02
							(0.03)	(0.04)	(0.07)
R^2 (adjusted)	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.10	0.04
n	1,722	1,722	1,722	1,718	1,718	1,718	1,718	1,718	1,718

Method: Ordinary Least Squares (OLS) regression. Dependent variables: a) dependent variable 'support for MMR vaccine'; b) dependent variable 'likelihood to recommend'; c) dependent variable 'support for compulsory vaccination'.* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$

5.4.2.2 The role of a science-oriented worldview

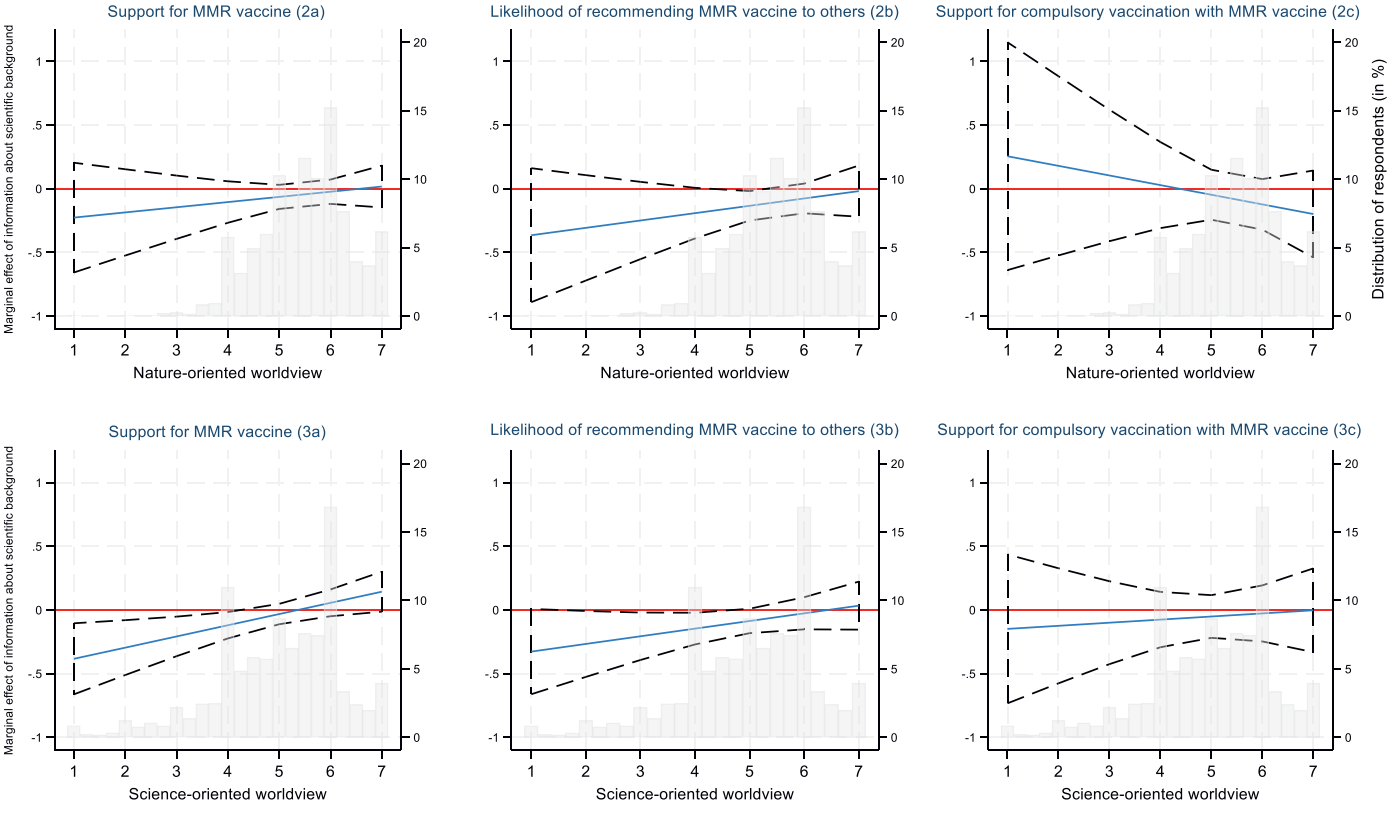
The role of science-oriented worldviews was examined in models 3a-c. What initially stands out is that the direction of the coefficients is in line with our expectations. When support for the MMR vaccine was modeled as the dependent variable, this positive interaction effect is significant. To help us to interpret these findings, we plotted the marginal effects of providing information about the scientific background of vaccines on our three dependent variables (models 3a-c) for the full range of scores on having a science-oriented worldview (see the second row of Figure 5.4).

As already indicated by the regression analyses, Figure 5.4 shows a positive interaction between providing information on the scientific background of vaccination and having a science-oriented worldview on support for the MMR vaccine. This is particularly clear in the plot for Model 3a, which shows a negative effect of our information treatment among respondents who scored below 4.5 on having a science-oriented worldview, which was the case for just over a third of our respondents (619 out of 1,722). This means that, although giving people information on the scientific background of vaccination had *no effect* on support for the MMR vaccine among those with a *more* science-oriented worldview (scores higher than 4.5), there was a *negative effect* on support for the MMR vaccine among those who had a *less* science-oriented worldview. Our findings were thus in line with the positive interaction we hypothesized (H3a) for supporting the MMR vaccine (Model 3a). Although the plots for models 3b and 3c show a similar pattern to that for Model 3a (i.e., a positive interaction), hypotheses 3b and 3c cannot be accepted given our preregistered analysis plan, because the interaction coefficients in models 3b and 3c were not significant.

5.4.3 Sensitivity analysis

We conducted the same analyses as those presented in Table 5.2 for a sample that excluded the respondents who answered our manipulation check question incorrectly (see Table S5.1 in the Appendix). Ninety respondents were thus excluded from the analyses. Based on these analyses, there were no differences in terms of the tenability of our hypotheses to the results of the analyses with all the respondents. In addition, we estimated the models with interaction effects in Table.

Figure 5.4: The marginal effect of providing information about scientific research on support for the MMR vaccine, by worldview



5.2 while also controlling for age, income, education, migration background and religiosity (see Table S5.2 in the Appendix). We do so for two reasons. Firstly, to complement the models for testing our pre-registered interest in conditional average treatment effects with models that approach a more causal exploration of the effect of the interaction terms. Secondly, to complement it with an analysis more sensitive to the difference found between the sample and Dutch population regarding socio-demographic characteristics. Like in the main analysis and the previous sensitivity analysis, the interaction effect between the treatment and a science-oriented worldview positively and significantly affects support for the MMR vaccine (in accordance with hypothesis H3a). In addition, that interaction effect also significantly and positively affects the likelihood to recommend the vaccine to other parents (supporting hypothesis H3b).

5.5 Discussion

Governments often use information campaigns in their attempts to increase support for state-provided vaccination programs (Siciliani et al., 2020), especially in contexts such as the Netherlands, where childhood vaccination rates are traditionally high but are characterized by a recent sharp decline (RIVM, 2022a), which inspires concerns about failing to reach the WHO recommended vaccination threshold for diseases like the measles. One suggested way of improving the effectivity of such measures is to give the science behind vaccination a more prominent place in the information presented to the public (Dudley et al., 2021). The present study did not, however, find a positive effect on societal acceptance and perceived legitimacy of the MMR vaccine of providing individuals with information on the scientific research behind vaccination in the context of the Netherlands. In fact, our analyses show that, if there is any effect at all, it is negative. More specifically, we found there was a non-significant negative effect on support for the MMR vaccine and compulsory vaccination, and a significant negative effect on the likelihood of recommending it to other parents. These findings are especially significant given the high vaccination rates that are required to prevent outbreaks of vaccine-preventable diseases (WHO, 2008), which in turn demand high levels of public acceptance and perceived legitimacy of childhood vaccination

Our findings stand in contrast to recent suggestions that communication about vaccination should focus on the science behind it to improve public support (e.g., Boyd, 2021; Dudley et al., 2021). A potential explanation for not finding a positive effect of offering information about the scientific background is that processes of individual empowerment drive a preference for trusting one's own interpretation of the information over information offered by institutions (cf. Cole et al., 2023). On the one hand, such an explanation might be even more relevant for our treatment because it did not emphasize that the science behind it resulted in a safe vaccine. On the other hand, the MMR vaccine has been part of the Dutch National Immunization Program for almost 50 years, and its uptake has been relatively high as compared to other countries, making perceptions that the science behind it did not lead to a safe vaccine unlikely. Future experimental research can assess whether explicit statements about safety spur negative or positive reactions, whether this differs depending on how recently the vaccine was developed, and how processes of individual empowerment play a role in this. Additionally, comparing the effects information offered by governmental institutions versus the same information coming from other sources might provide insight into the role played by anti-establishment attitudes in shaping information uptake (cf. Van Meurs et al., 2022a, 2022b).

A related question concerns the multidimensionality of trust in science. As several studies show, trust in science does not mean the same thing to everyone (e.g., Mann & Schleifer, 2020). Some may for instance report trust in scientific methods but distrust in scientific institutions (Achterberg et al., 2017). Experimental research using treatments and/or outcome measures aligned with different aspects of trust in science could explore whether (different types of) information provision (differently) impact separate aspects of vaccination skepticism. Similarly, scholars argue that science literacy consists of (seven) different aspects (Dibner & Snow, 2016). To gain more detailed insight into the effects of information provision, an additional fruitful avenue of study would be to disentangle effects of information on these different dimensions of science literacy.

Our findings also stand out in light of a recent online experiment that attempted to correct misperceptions about vaccines using a sample recruited through online crowdsourcing, which found that adding a statement about the

scientific consensus on vaccination improved the correcting effect of the information (Van Stekelenburg et al., 2020; 2021). Comparing these findings to ours could suggest that it is not so much the substantive information about scientific research that matters, but instead the overall judgment of the scientific community or perceptions thereof (cf. Kobayashi on the effects of a perceived scientific consensus on scientific beliefs, 2018). Indeed, giving people information about scientific consensus arguably aligns better with the heuristic processes that are employed to form opinions based on complex information, e.g., relying on an authoritative source or expert judgment (Cummings, 2014; Tversky & Kahneman, 1974).

The lack of a positive effect of providing information on the scientific research behind vaccination is also notable in light of recent public debates on COVID-19 vaccines, during which questions about effectiveness, safety, and the quality of the scientific research played a prominent role (e.g., Lin, Tu & Beitsch, 2020; Mostafapour, Meyer & Scholer, 2019). Indeed, our study does not substantiate the idea that information provision addressing such issues increases support for vaccination. It should, however, be noted that the type of vaccine could be relevant here. As noted above, the MMR vaccine has been in use for a relatively long period of time, while COVID-19 vaccines are relatively new. Moreover, some of the COVID-19 vaccines are based on novel technologies that are unfamiliar to the wider public (e.g., mRNA vaccines; see Schmid & Betsch, 2022). Persistent doubts and skepticism about vaccines that use novel technologies might be amplified by stressing the underlying science in information campaigns because they highlight the relative 'newness' of the science behind such technologies (e.g., Bendau et al., 2021; Sasaki et al., 2020). Additionally, the increased attention vaccination in general has received because of the COVID pandemic (Puri et al., 2020) could mean communication about vaccines of all types is received with greater skepticism. This means that caution is required here, too. Consequently, research is recommended to gain greater insight into the effects of information provision regarding different types of vaccines, and how perceptions of one vaccine might impact perceptions of others.

Alongside potential differences relating to vaccine types, psychological mechanisms might also have played a role in our finding that there was no positive

effect of providing information about the scientific research behind vaccination. Recent research into the online information on COVID-19 for instance shows that a perceived information overload may have a negative effect on an individual's intention to be vaccinated (Kim et al., 2020; Zheng, Jiang & Rosenthal, 2022). Although we deliberately kept our information treatments concise and easy to understand, providing additional information (on the scientific background of the MMR vaccine) may, nonetheless, have triggered a sense of information overload among some respondents, offsetting any potentially positive effects. Research suggests that information overload depends on an individual's subjective feelings about the topic of the information or the information itself (Zheng et al., 2022). Examples of relevant subjective feelings include pre-existing worldviews, as discussed in this study, as well as other aspects such as personal experiences with vaccination. Studies examining whether and how personal characteristics like nature- and science-oriented worldviews or personal experiences with vaccination play a role in a sense of being overloaded with information could provide further valuable insights into the varying effects of information provision.

Finally, not finding a positive main effect of our information treatment as well as finding a moderating role of scientific worldview aligns with longstanding critiques on the traditional information-deficit model that information is not received in a vacuum. Studies on other scientific topics such as climate change and Genetically Modified Organisms (GMO) for instance confirm that effects of information are not universal across populations (e.g., Diamond, Bernauer & Mayer, 2020; Sturgis, Brunton-Smith & Fife-Schaw, 2008). Similarly, a case-study on how scientific advice following Chernobyl was received shows that individuals reflect upon their social relationships towards the (scientific) source of the information in terms of credibility and on how their own social identity is affected by the information (Wynne, 2016). In-depth (qualitative) research could focus on uncovering whether similar mechanisms are at play in information provision about childhood vaccines.

In addition to investigating the main effects of providing information about scientific research on support for the MMR vaccine, we also examined the role of nature and science-oriented worldviews in this relationship using scales newly developed for this purpose. We expected these two worldviews, which have been

found in recent qualitative research to be a factor in the vaccination decisions of vaccine-skeptical parents (Ten Kate et al., 2021), to play contrasting roles. First, we expected a negative interaction between the effect of providing information on the science behind vaccines on support and having a more nature-oriented worldview, because this type of information stresses elements that are not important to, or are even in conflict with, such a worldview. These expectations were not, however, confirmed by our results: having a more nature-oriented worldview did not appear to play a significant role in how the information was received. It may be the case that more nature-oriented individuals do not generally relate their focus on nature to information about a topic like vaccination, or do so only in specific circumstances, e.g., in relation to spirituality, which has been found to be associated with science skepticism (e.g., see, Rutjens & Van der Lee, 2020). Future research could test whether this is indeed the case.

In contrast, a science-oriented worldview did shape the effect of information provision. More specifically, providing information about the scientific research behind vaccination had a negative impact on support for the MMR vaccine among those with a less science-oriented worldview. This finding is particularly notable for two reasons: it indicates that information provision on vaccination may have a negative effect on attitudes toward vaccination; and it shows that this is more likely to occur among groups that are often targeted by information campaigns, i.e., those who are less oriented towards science and have lower levels of support for vaccination to begin with.

The uncovered negative effect of information on scientific research into vaccination among those who are less science-oriented is not in line with suggestions that providing people with more information on the science behind measures like vaccination may help to prevent or correct public misconceptions about such research (Rosenbaum, 2021) that are rooted in unfamiliarity with the scientific process (Boyd, 2021). On the contrary, our findings show that information on scientific research is more likely to encourage a negative response among individuals who are unfamiliar with and/or less focused on science. This may be explained by processes of "identity-protective motivated reasoning" (Kahan, Jenkins-Smith & Braman, 2011:149), via which someone might dismiss information they view as threatening to their cultural values (e.g., receiving

information stressing the scientific background of vaccines may threaten the idea that science is not integral to acquiring knowledge), enabling them to protect their cultural identity and social standing (Kahan et al., 2011; Kahan et al., 2007).

It also aligns with recent research on information provision concerning environmental issues, which revealed that the persuasive effects of information were stronger when the information was framed in a way that was congruent with another type of view that is relevant to vaccine skepticism: respondents' (political) ideology (Luong, Garrett & Slater, 2019). This suggests that political views may also be a relevant moderator to include in information experiments that measure the effect of offering scientific information on support for vaccines. This is especially likely to be relevant in contexts where vaccination and science are strongly politicized, like the United States (Agley, 2020; Bolsen & Palm, 2022; Nisbet et al., 2015), which is less the case in the current Dutch context (Afonso & Votta, 2022). An application of such "ideology-based framing" (Luong, Garrett & Slater, 2019:493) to information provision on vaccination may be a fruitful avenue to explore in future studies and development of future policies. Additionally, studies into the interrelations between the different worldviews addressed here and political ideologies may offer valuable insights into the potential broader significance of these worldviews.

All in all, as pre-existing views in the population can play a crucial role in shaping the effects of information provision, it is important to ensure that policy measures like the provision of information on vaccinations are tailored to the worldviews prevalent among the different social groups to which the information is directed.

6

Chapter 6

Conclusion and discussion

In light of the growing concern about the decline in the uptake of childhood vaccination, this doctoral thesis has studied the perspectives that underlie skepticism toward childhood vaccination in the Netherlands, as well as how these shape the development of vaccination attitudes and responses to official information provided on the issue. Calls in the literature to investigate vaccine skepticism from the points-of-view of skeptics themselves are answered in this project. Specifically, the research was guided throughout by a cultural-sociological approach where developing an understanding based on skeptical individuals' own perspectives was always central. This approach had two stages: 1) achieving an *emic* (or "experience-near") understanding of the perspectives underlying vaccine skepticism among a group demonstrated to be highly skeptical, i.e., more-educated parents (**Chapter 2**); and 2) applying the perspectives unearthed in the first stage to a wider vaccination context. **Chapter 3** does so by describing how these perspectives shape attitudes to vaccination, while **chapters 4** and **5**, respectively, assess how reactions to official information provision are shaped by a perspective featured in extant research (anti-institutionalism), and by the perspectives identified in Chapter 2.

Section 6.1 below summarizes the main findings produced by the empirical studies presented in chapters 2 to 5. There is then a discussion of the implications of these findings: for the academic debate about skepticism toward childhood vaccination (6.2); beyond vaccine skepticism and the factors studied here (6.3); and for practice (6.3).

6.1 Summary of the main findings

The first empirical study conducted for this doctoral research project sought to achieve an understanding of the skepticism toward childhood vaccination among more-educated Dutch parents' by identifying their underlying perspectives on the issue (**Chapter 2**). In-depth interviews with 31 parents revealed that they all: placed the role of the individual center-stage in terms of acquiring knowledge and determining the truth; and deemed it to be unwise to have blind trust and automatically participate in the NIP. However, this individualist epistemology was expressed in the form of two distinct perspectives, each of which guided different ways of managing risk. Some parents had a neo-romantic/nature-oriented

perspective, where the focus is on obtaining the truth using intuition. This enables these parents to follow a 'natural' path and informs a risk typology: embracing natural risks like contracting a childhood disease and, where feasible, rejects 'unnatural' risks, including pharmaceutical treatments. Other parents had a critical-reflexive/science-oriented perspective on vaccines, where modern scientific methods are used to determine the truth and simultaneously question the scientific consensus. This then informed risk calculation, i.e., they sought to adopt the approach that they perceived as posing the least risk to their child(ren)'s health.

Extant research has proposed both that attitudes toward vaccination are dynamic, not static, and that health-related events like (perceived) side-effects are pivotal to the development of such attitudes Consequently, the project's second empirical study (**Chapter 3**) examined: the role played by health-related events in the vaccine-skepticism trajectories of more-educated Dutch parents; and how these are shaped by pre-existing health views rooted in the nature- or science-oriented perspectives identified in Chapter 2. To this end, an analysis was performed of the biographical elements of the in-depth interviews conducted for the first study with 31 more-educated Dutch parents who were (or had been) childhood-vaccine skeptics. This demonstrated that different types of health-related events inspired respondents to start their questioning of childhood vaccination. These events ranged from those directly involving their or their children's health (e.g., perceived adverse effects), to those affecting the health of others and health more generally (e.g., emerging in conversations about vaccination). Furthermore, their pre-existing health views shaped how they experienced these events and how their vaccine-skepticism trajectories developed thereafter. The participants with nature-oriented views started to question the fundamental principles of vaccination and turned to resources and practices that are commonly viewed as alternative to the mainstream. Those with science-oriented views, meanwhile, queried the potential risks of vaccines while still being convinced of their benefits, using what they regarded as the most scientifically sound resources to answer their questions. This confirms both that vaccine-skepticism trajectories are not only dynamic, but are also not universal, instead depending on pre-existing views on health.

Having provided insight into perspectives underlying vaccine skepticism in Chapter 2, this thesis showed they also shape the development of attitudes toward

vaccination in Chapter 3. This finding illustrates the value of considering the role played by such perspectives in a wider vaccination context. An examination of the broader relevance of pre-existing perspectives is presented in chapters 4 and 5, with the focus on investigating how relevant underlying perspectives shaped the response to the provision of official information. The work described in these chapters studied both a perspective that the extant literature suggests plays a role, i.e., anti-institutionalism, as well as the nature- and science-oriented perspectives identified in Chapter 2.

Extant studies suggest that providing the public with more comprehensive information and including information about the institutional source can increase its effectiveness. The research in **Chapter 4** therefore examined the impact of including these two elements alongside basic information about the MMR vaccine. In particular, the effects on three aspects of support were considered: personal support for the vaccine; the likelihood of recommending it to others; and support for a hypothetical scenario where vaccination is compulsory. This was tested in the highly detraditionalized Dutch context to provide insight into whether these common proposals are effective in a cultural environment where official institutions are facing growing skepticism.

Building on research which demonstrates that institutional trust is relevant to vaccination attitudes, the study in Chapter 4 also tested whether the effects of providing more comprehensive information and information about the institutional source were shaped by the extent to which individuals held anti-institutionalist attitudes. Information retrieved from the RIVM website was employed in a pre-registered information survey experiment fielded among a high-quality Dutch probability sample (n=2,567). Analyses showed that neither the provision of more comprehensive material, nor the inclusion of information about the institutional source increased support for the MMR vaccine. More specifically, the effect of these two treatments was negative, albeit insignificantly so in all but one case - providing comprehensive information had a significant negative impact on the likelihood of recommending the vaccine to others. Additionally, giving more comprehensive material to the most anti-institutionalist citizens negatively affected their support for making the MMR vaccine compulsory. These findings speak to the information deficit model that still influences the utilization of information

campaigns. However, the results of this doctoral project suggest that materials from official institutions may be accepted less readily because the epistemological and moral authority of these bodies has eroded. In addition, offering more comprehensive information may actually have a negative effect on the support of those with the least trust in institutions, who are often targeted by communication campaigns. This highlights the need for caution when considering the employment of information provision in detraditionalized settings like the Netherlands.

Finally, **Chapter 5** examined whether the previously uncovered nature- and science-oriented perspectives play a role in the reception of official information about vaccines. In line with suggestions in recent studies on effectiveness, this was done by focusing on the impact of providing information about the science behind vaccination. Specifically, this study analyzed the effect on support for the MMR vaccine in the Netherlands of providing this type of material alongside basic information. This is an important issue, since the country did not meet the WHO-recommended vaccination threshold for measles of 90% in 2022 The three measures of support for the MMR vaccine described in Chapter 4 were again employed in this study: personal support for the vaccine, the likelihood of recommending it to others, and support for (hypothetical) compulsory vaccination. Data from a pre-registered survey experiment conducted among members of a high-quality panel representative of the Dutch population (n = 1,722) were analyzed to assess empirically the impact of providing scientific information and whether this was shaped by their nature- or science-oriented worldviews. The results identified a non-significant negative effect on support for the MMR vaccine and compulsory vaccination, and a significant negative effect on the likelihood of recommending it to other parents. Additionally, while nature-oriented views did not shape the impact of being provided with information explaining the scientific research behind vaccination, the analysis did reveal a *negative* effect of this treatment on support for the MMR vaccine among those with a less science-oriented worldview. In line with Chapter 4, the findings in Chapter 5 thus suggest that the use of information campaigns should be given careful consideration, as they may actually have a negative impact on attitudes to vaccination among groups that tend to be targeted because they are less supportive of immunization generally.

Taken together, the four studies presented in the thesis answer the following main research question:

What perspectives underlie skepticism toward childhood vaccination in the Netherlands, and how do these shape the development of vaccination attitudes and reactions to information provision about it?

The first part of the research uncovered a shared individualist epistemology, which was expressed in two different ways of viewing vaccines: one where a preference for the natural was central and another that high valued scientific methods and used them to question the scientific consensus. These perspectives were also found to shape how parents' attitudes to vaccination developed. More specifically, when those with nature-oriented views experienced a health-related event, this inspired them to question childhood immunization and doubt the fundamental principles behind it and turn to resources and practices that were a better fit with their views. On the other hand, parents with science-oriented views started to question the potential risks of vaccination and sought out information in resources regarded by them as the most scientifically sound. Finally, the shaping role played by pre-existing (anti-institutional, nature-oriented and science-oriented) perspectives in how official information is received were also examined. This revealed that the provision of additional (comprehensive or scientific) information is more likely to have a negative than a positive impact on support for vaccination, with the chances of this effect being higher among those with the lowest levels of affinity with institutions or science.

6.2 Implications for the academic debate on vaccine skepticism

The results of this research have a number of implications for the academic field concerning skepticism toward childhood vaccination in specific, and toward vaccines in general. Discussed below are the repercussions of the perspectives uncovered and their relevance in a broader vaccination context, as well as my reflections on the cultural-sociological approach employed in the thesis.

6.2.1 Uncovering underlying perspectives: Individualist attitudes, returning to nature, and the paradox of modern science

As **Chapter 2** shows, the parents who participated in the first study shared an individualist epistemology, which places the individual at the heart of the obtention of knowledge and determining the truth. Simultaneously, blind trust in institutions was considered to be unwise. This can be related to broader cultural developments theorized by sociologists, commonly labelled as processes of modernization (Inglehart, 1997), which encompass a wide range of economic and social changes. Individualization, a process through which economic and cultural changes encourage a shift from collectivist to individualist values, is commonly seen as a key factor and, therefore, a crucial characteristic of modern Western societies (Inglehart, 1997). The finding in this thesis that an individualistic way of thinking about knowledge is central to vaccine skepticism thus echoes this body of sociological theory, since it confirms the weight individuals assign to their own judgment.

Chapter 2 also stresses that the strongly felt importance of the notion of individual choice in matters of health and vaccination is accompanied with an equally strong sense of individual responsibility. In this way, the uncovered individualist epistemology aligns with research concluding that today's parents feel a growing sense of personal responsibility for their children's health and increasingly believe that this largely depends on the choices they make (e.g., Ward et al., 2018; Reich, 2020a). This also speaks to both the academic and the social debate concerning the role played in vaccine skepticism by individual choice versus (social) responsibility. The thesis revealed that the participants in this study viewed their choices in a different way: instead of revolving around weighing responsibility to the community against personal freedom, their skepticism was rooted in an increased sense of individual responsibility for, and an accompanying anxiety and fear about, their children's health. As one parent said: "I am so afraid I am doing something wrong for my children (…), isn't that the greatest fear of all parents?". Regardless of whether their resulting decisions are seen as 'right' or 'wrong', or as (not) being in line with the scientific consensus, the thesis adds to the extant literature on vaccine skepticism by providing an *emic* understanding of the issue based on an in-depth study of the views of vaccine-skeptical parents themselves.

An important note here concerns the fact that an individualist epistemology was found to be present among vaccine-skeptical, more-educated Dutch parents, which begs the question as to what extent this finding can be generalized to a broader population and to issues other than vaccination. In terms of the former, whether an individualistic way of determining truth is as central to others as it is to more-educated Dutch parents is a key question. Some studies suggest that individualistic values are more prevalent among some social groups than others; for example, a positive association has been found between education and individualism (e.g., Davis & Williamson, 2019), suggesting that the less educated are less likely to hold individualist values as strongly as their more-educated counterparts. Additionally, growing attention is being paid to the study of contexts other than so-called modern, Western nations, with the results showing that individualistic values are not a universal phenomenon. In East Asian countries, for example, Kyung-Sup (2014) argues that "individualization without individualism" is characteristic of social change there, with particular reference to changes in family structures due to modernization processes in other institutions that are not tied to individualism as a cultural basis (p. 38).

An individualist epistemology seems to be broadly applicable (at least, within cultural contexts where individualism is prevalent) when it comes to generalization to issues other than vaccination. As argued in different sources, individualization is typically considered to be a broad and encompassing process that characterizes various aspects of contemporary social life (Beck, Giddens & Lash, 1994; Inglehart & Welzel, 2005). Indeed, if the importance of the individual is central to epistemological questions in general (i.e., those concerning the nature and accrual of knowledge), it could also be characteristic of any type of issue that requires individuals to make decisions, ranging from health to political and economic matters. Future research could thus explore empirically the applicability of an individualist epidemiology to different issues or decisions, and in different contexts, and among various social groups.

One of the perspectives uncovered in this thesis is a nature-oriented perspective on health and vaccines. This aligns well with qualitative studies focusing on understanding vaccine skepticism, which also show that considerations of naturalness play a role (e.g., Attwell, Ward, Meyer, Rokkas & Leask, 2018;

Ditlevsen et al., 2020; Meier et al., 2021; Ward et al., 2017). Although a preference for the natural has chiefly been examined using qualitative methods, recent quantitative studies have also set out to measure it, for instance by developing a scale for measuring a preference for naturalness in medicine, food, and household products (Bayerman et al., 2023). Recent research in the field of psychology has included measures of a 'naturalness bias', which involves questions directly related to vaccines (e.g., "Knowing that the proposed vaccine is composed of natural components and not produced in [a] laboratory would positively influence my choice to vaccinate my child"; Casigliani et al., 2022: page 3 of Supplementary Materials). However, as suggested by Trzebiński (2022), including a measure that treats a preference for the natural as an independent (world)view and scrutinizing whether it shapes responses to communication may do this factor more justice and provide important insights. As discussed, the study in Chapter 5, which includes such a measure, did not identify a significant interaction between nature-oriented views and the effect of information about the scientific background behind vaccination. To better understand this finding, future research could assess whether the opposite outcome occurs, i.e., if there is a more positive effect of messages that stress naturalness (instead of science) among those who have more nature-oriented views, as suggested by Trzebiński (2022).

Additionally, the finding that some parents make vaccination decisions based on a nature-oriented perspective can be related to sociological work on broader trends of (re)valuing nature and the natural. For example, Western societies are considered by some authors to be undergoing a process of "Easternization" (Campbell, 2007). This refers to (among other things) the increased popularity of nature-oriented living and eating practices, which is part of a larger shift to Eastern (more holistic) values from an ideal-typical modern, Western dichotomy of technology versus nature. More recently, terms like 'natural mothering' (Bobel, 2002) seem to have experienced a resurgence in the academic and social debates on trends like the growing demand for 'holistic midwives' and more natural birthing practices, as seen in the Netherlands (Hollander et al., 2019). This shows that a nature-oriented perspective is not only relevant to attitudes toward vaccination, but also plays a role in a broader sphere of health and parenthood.

Perhaps counter-intuitively, the thesis's first study uncovered that a focus on science and scientific methods also played a role in vaccine skepticism, next to a nature-oriented perspective. This finding was particularly unexpected given the strand of research that has associated 'anti-science' views with vaccine skepticism (e.g., Erviti, Codina & León, 2020; Hornsey, Harris & Fielding, 2018; Hotez, 2023). In contrast, the participants in the empirical study described in Chapter 2 linked an affinity with modern science to skepticism toward both science generally and scientific products like vaccines. This highlights that the positive association identified in earlier studies between anti-science attitudes and vaccine skepticism is not universal. These two possible relationships between science attitudes and vaccine skepticism are reflected in recent research on COVID-19 vaccines, which demonstrated that both those with pro- and anti-vaccine views had a positive regard for science (Maciuszek et al., 2021). As Chapter 2's study reveals, the participants with science-oriented views emphasized the importance of scientific methods when assessing the 'truth' and choosing, what is to them, the safest or best option. While this may be very similar to parents who are simply positive about vaccination, a potential distinction is the active and critical approach adopted by my participants in utilizing their knowledge of science and scientific methods: their familiarity with science does not automatically translate into higher levels of trust (in vaccines), but is instead employed to critique the quality of underlying scientific research and may have the consequence of causing them to doubt what is communicated to them. Notably, this type of critical attitude, or "methodological principle of doubt," is at the heart of the majority of the education provided at scientific institutions like universities (Giddens, 1991: 21). Future studies could thus examine for whom, and under what conditions, an affinity with scientific methods in fact inspires doubt (versus trust) about science.

It may be possible to identify a further explanation by conducting a closer investigation of a commonly employed theoretical framework for explaining differences in the levels of support for measures like vaccination, i.e., the information-deficit model. According to this model, having more scientific knowledge translates into having more favorable attitudes (Sturgis & Allum, 2004). However, the analysis of the interviews conducted for this thesis suggests that this assumption is problematic, since all the vaccine-skeptical interviewees were

educated at university or at a university of applied science (in Dutch: a WO or HBO education), placing them among those with the most scientific knowledge. This calls into question the supposition that there is a positive relationship between scientific knowledge and trust in science in every group and in all circumstances, aligning with the findings of other scholars who criticize the deficit model (e.g., Simis et al., 2016; Sturgis & Allum, 2004).

Finally, a legitimate question concerns whether the science-oriented perspective the thesis identifies as underlying vaccine skepticism (for some) is just a result of coincidence and has very limited generalizability or relevance. Inevitably, since the findings described in Chapter 2 are based on data gathered from a group of 31 vaccine-skeptical, more-educated Dutch parents, they cannot simply be generalized to the broader population. Nevertheless, since the data used in the empirical study described in Chapter 5 were obtained from a high-quality sample representative of the Dutch population, it thus seems clear that such science-oriented views also play a role in shaping the responses to the provision of information more generally and not just among a limited 'fringe' group of vaccine-skeptical parents. This is therefore an indication that a science-oriented perspective is not only relevant to vaccine skepticism, but might also be a factor in opinions on issues like climate change. Consequently, a valuable starting point for future studies would be to examine the role played by this perspective in other (science-related) attitudes, which can be measured using the scale specifically developed for this purpose in the thesis.

6.2.2 Beyond the uncovering of perspectives: Their relevance in a broader vaccination context

In addition to **Chapter 2**'s identification and illustration of the two perspectives underlying the vaccine skepticism of more-educated Dutch parents, the thesis goes on to demonstrate that underlying perspectives also play an important role in the broader vaccination context within which parents are embedded. The study described in Chapter 3 did this by examining parents' vaccine-skepticism trajectories and how they are shaped by their pre-existing nature- or science-oriented views. This particular study identified that these journeys were often incited by a health-related event, for example experiencing an unpleasant side-

effect or a conversation about vaccination with friends. This led to the development of a trajectory in which parents sought out more information about vaccines, came to view them differently, and found ways to navigate any stigmatization they received from the outside world. Importantly, how these trajectories took shape was different for the parents with a focus on nature and the natural than for those with science-oriented views. While the former came to doubt the fundamental principles behind vaccination and looked for information via channels often viewed by others as 'alternative', the latter started to question whether the potential risks of vaccines outweighed their benefits and sought out resources they considered to be the most scientifically sound.

These findings demonstrate that taking into account the role played by pre-existing views in the development of attitudes to vaccination can help us to understand why vaccine-skepticism trajectories vary so widely. They also provide insight into the highly complex nature of these journeys (e.g., Wiley et al., 2020) by highlighting how they are shaped by pre-existing health views. Moreover, the findings in Chapter 3 can help to explain why some parents who start to question vaccination after a health-related event eventually decide to reject all childhood vaccines, while others opt for partial vaccination, and others still choose to fully vaccinate their children. By highlighting that these processes and their outcomes are shaped by pre-existing views, the thesis may also help us to understand why specific triggers ultimately cause some individuals to distance themselves from mainstream healthcare institutions more generally, turning instead to what is commonly considered to be an alternative milieu, while others delve deeper into the science and try to navigate these mainstream organizations. The thesis could thus serve as a stepping-stone for future research into decision-making processes in the broader field of health behavior.

Some, albeit limited, insight into the origins of the perspectives studied in Chapter 3 is provided by the interviews conducted for the study described. Since the main focus of the interviews was on the vaccination trajectories of parents, most of whom indicated that they only started to question childhood vaccines around the time of the birth of their (first) child, it was not possible to conduct any in-depth analysis of the development of the underlying perspectives that shaped these trajectories. Nevertheless, some participants did talk about how their views

(centering on the natural or the scientific method) progressed. In some cases, they had grown up in a family context where there was a strong focus on nature (or science) that was passed on to them. This suggests that early-life socialization plays an important role, which is reminiscent of theories on the acquisition of an array of other views, including political attitudes (Sapiro, 2004), basic trust (Giddens, 1991), and food preferences (Ochs, Pontecorvo & Fasulo, 1996). However, other participants recounted a different kind of experience whereby their views were acquired or changed later in life. These interviewees for instance described how they came to value science when at university or gradually adopted more nature-oriented views on life when trying to get to the bottom of personal health issues that mainstream health organizations had been unable to resolve to their satisfaction. This latter way of developing new views not only resembles the research conducted into trajectories of (religious) conversion, via which individuals come to re-interpret reality and feel part of a new community (e.g., DeGloma, 2014), but also that on 'deviant' careers in which individuals gradually acquire and develop different views (e.g., Becker, 1963; Harambam, 2017; Kemmers et al., 2016).

Research that adopts a biographical approach could map systematically the acquisition and development of nature- and science-oriented perspectives, examining whether and how these differ. It may, for instance, be the case that perspectives more commonly considered to be alternative or deviant (e.g., nature-oriented) develop through more radical processes of ideological change or conversion, where views and social relationships move more dramatically (cf. DeGloma, 2014) than those regarded as more socially acceptable (e.g., science-oriented). Alongside this, future studies could examine which perspectives are relevant to the development of which issues (e.g., vaccination), and in which circumstances. More specifically, whether every individual who holds nature-oriented views applies these to the issue of vaccination would be an interesting line of research, as would an examination of why and when they came to apply such views to this particular issue. Recent studies indicate that both types of perspectives feature in the public debate about vaccines (Keselman et al., 2023), or even play a role in attitudes toward them (e.g., Wong et al., 2021; Zimand-Sheiner et al., 2021). This suggests that these views are not only limited to specific, often

labelled as alternative, social circles, although it is unlikely that they inspire skepticism about childhood vaccination in everyone with nature- or science-oriented views. It would therefore be useful to study the (individual and contextual) characteristics that might shape these effects, for example, the strength of such views and the extent to which they match those of family members or peers.

After the determination that pre-existing perspectives are relevant to the development of attitudes to vaccines, the studies described in chapters 4 and 5 go on to examine the bearing of pre-existing perspectives on reactions to official information provided about vaccination. Focusing on a perspective that features prominently in extant research, Chapter 4 reveals that providing more comprehensive material in addition to basic information about the MMR vaccine actually had a negative effect on support for compulsory vaccination among those with the strongest anti-institutionalist attitudes. Employing the perspectives identified in Chapter 2, the study in Chapter 5 demonstrates that providing information about the scientific background of vaccination has a negative effect on the likelihood of recommending the MMR vaccine to others among those with the least science-oriented views. These findings not only make it clear that official information about vaccination does not necessarily have a positive effect, but that this effect is also shaped by pre-existing views.

This is in line with criticism of the information-deficit model stressing that the traditional model does not account for any potential moderators of the effects of information provision (e.g., Sturgis & Allum, 2004; Schultz, 2002). This thesis provides an answer to questions about precisely which moderating factors (Sturgis & Allum, 2004: 55) shape how official information is received. This is achieved by investigating among a representative sample of the Dutch population the role played by both a perspective proposed as relevant by other studies (anti-intuitionism) and the perspectives inductively uncovered in the study described in Chapter 2 (nature- and science-oriented). The demonstration of the relevance of pre-existing perspectives to the reactions to information on vaccination means that the project also adds to the literature on other fields. In particular, cultural frames or "principles of selection, emphasis and presentation composed of little tacit theories about what exists, what happens, and what matters" (Gitlin, 1980: 6; cf. Van Noord et al., 2018) are known to play a role in how willing people are to accept

official information (e.g., Achterberg, 2014; De Koster et al., 2016). Chapters 4 and 5 indicate that anti-institutionalist and science-oriented perspectives do indeed shape how information is received, suggesting that the fundamental idea of cultural frames (i.e., that the same piece of information does not mean the same thing to everyone) applies to a wide range of topics, including vaccination.

On the question of which perspectives matter, the thesis shows that while anti-institutionalist and science-oriented views play a role in the impact of information provided about the MMR vaccine in the Netherlands, nature-oriented views do not. It was beyond the scope of this project to develop and test empirically explanations of why this is the case, but I can make some suggestions for future investigations. A first factor is the context in which the research was conducted, since a preference for the natural may be more salient in certain geographical areas of the Netherlands. Several elements of nature-oriented views, i.e., a focus on intuition and the perceived importance of childhood diseases to child development, also feature prominently in anthroposophical teaching (a philosophy assuming the existence of an objective spiritual world that is accessible to humans; e.g., Klomp, Van Lier & Ruijs, 2014; Uhrmacher, 1995). This philosophy is especially prevalent in and around the Dutch cities of Zutphen, Zeist, and The Hague (Akkerman, 2016; Van Velzen et al., 2008). As a consequence, participants from these areas were specifically recruited for the interviews described in chapters 2 and 3. Future work could also add to the findings in Chapter 5, which measured nature-oriented views and their extent among a sample representative of the Dutch population. In particular, comparative research could explore whether these views are more relevant to responses to official vaccination communications in specific geographical regions.

Moreover, work into the role of perspectives other than those examined herein would be a valuable addition to the conclusions drawn. As the project did not focus on religious motivations, given the relatively limited and declining role they play in vaccine skepticism in the Netherlands (Inglehart, 1997; Spaan et al., 2017), it has also not scrutinized their role in shaping the effects of official information provided about vaccination. However, since religion is known to play a role for at least one social group in the Netherlands, an analysis of its effects in more religious societies like the US would be a worthwhile endeavor. It would also

be valuable to consider religions other than those traditionally included in research, for example, Islam and New Age, both of which are increasingly prevalent in Western societies (Coenders et al., 2008; Houtman & Mascini, 2002; Huss, 2014). Three of the interviewees in this project said they were Muslim, but they all also stated that their religious beliefs did not discourage them to consider vaccination (if anything, they felt inspired by their faith to explore scientific options to improve their children's health). However, studies conducted in Muslim-majority countries like Malaysia have found that Islamic beliefs might encourage vaccine skepticism, including because of concerns about whether vaccines are Halal (Wong et al., 2020). More in-depth research is thus required to examine the relationships between different religions and vaccine skepticism (in different countries) and the potential role they play in shaping the effects of official communications on the topic.

Unlike the data collected for chapters 2 and 3, the data used for the research in chapters 4 and 5 was obtained after the start of the global COVID-19 pandemic in 2020. This may well have implications for the findings in these chapters; for instance, science-oriented and anti-institutionalist views might have increased in prominence in the public debate, therefore also becoming more important to attitudes toward vaccines in general. While studies show that arguments about (the untrustworthiness of) institutions and science play a role in the (anti-)vaccination discourse (e.g., Küçükali et al., 2022; Wawrzuta et al., 2022), the same can also be said about a preference for natural ways of addressing health issues (Smith & Reiss, 2020). Longitudinal research examining both the prevalence and role of different perspectives in vaccine attitudes and the effects of information provision could shed some light on these considerations.

Finally, the decision to focus on the MMR vaccine in the information-provision studies may be relevant to the finding that only anti-institutionalist and science-oriented views play a role. Although concern about the declining uptake of the MMR vaccine has increased in the Netherlands (RIVM, 2022a), this particular vaccine has been available in the country for a relatively long time (RIVM, 2022b). This may mean that it is not regarded as a new form of science or technology. On the other hand, vaccines developed against COVID-19 might be viewed as much more 'technological' or 'artificial', particularly the mRNA vaccines that employ a

technique that is (as yet) unfamiliar to the wider public (see Schmid & Betsch, 2022). It is reasonable to anticipate that perceptions such as these are a greater trigger in those with more nature-oriented attitudes, meaning it would be valuable to conduct research examining: 1) different perceptions of different (types of) vaccines; 2) the effects of information provided about different (types of) vaccines; and 3) the roles of pre-existing views in shaping these effects.

6.2.3 The value of a cultural-sociological approach

The findings presented in this thesis demonstrate that different perspectives play a role not only in vaccine skepticism, but also in how attitudes to vaccines develop and the reactions to official information provided on vaccination. This has implications for different strands of academic research on vaccine skepticism (as outlined in sections 6.2.1 and 6.2.2), and also gives rise to reflections on the cultural-sociological approach central to this project.

In the first phase of the work, inductive research which took the views of vaccine-skeptical parents as its starting-point (i.e., providing an *emic* or "experience-near" understanding; Geertz, 1983: 57) uncovered and illustrated two different perspectives underlying vaccine skepticism: 1) nature-oriented, echoing findings in other qualitative studies (e.g., Attwell, Ward, Meyer, Rokkas & Leask, 2018; Ditlevsen et al., 2020; Ward, et al., 2017); and 2) science- and the scientific method-oriented, which is not (yet) the focus in much of the academic research on vaccine skepticism. The identification of this second perspective not only speaks to studies that highlight 'anti-science' attitudes as the cause of distrust in vaccines (e.g., Erviti, Codina & León, 2020; Hornsey, Harris & Fielding, 2018; Hotez, 2021), but also to the information-deficit approaches that assume "to know science is to love it" (Sturgis & Allum, 2004: 56). Regarding these strands of literature, this thesis shows that having an affinity with science and scientific methods does not automatically translate into trust in scientific inventions like vaccines or for everyone with such views. Adopting a cultural-sociological approach that put the views of vaccine-skeptical parents at its core was of great value in reaching this conclusion, since it was not particularly anticipated given the findings of the different strands of the extant research. Consequently, the approach enabled me to develop an understanding of vaccine skepticism based on the views of vaccine-

skeptical parents themselves, and which is a better reflection of their reality. This helps to do the complex nature of vaccine skepticism justice, for instance, by offering insights into why different views (i.e., seeing the vaccine as a danger to natural processes vs. having doubts about the scientific evidence on its safety) can inspire the same vaccination decisions (e.g., rejecting the MMR vaccine). Such findings are not only relevant to the development of academic knowledge, but can also help researchers to make more effective recommendations to the experts and institutions involved in the practice of vaccination (discussed further in section 6.4).

The thesis also examined how underlying perspectives played a role in shaping the development of vaccine-skeptical attitudes and reactions to the official information provided about it. This demonstrates that a cultural-sociological approach does not have to be limited to inductive research focusing on exposing the views of individuals. In fact, incorporating insights into these underlying views by conducting an empirical examination of their impact on other factors relevant to vaccination attitudes allows this inductively uncovered knowledge to also be used to answer other (types of) questions and test its broader relevance. This speaks to the concern of some scholars about inductive empirical approaches like in-depth interviews, i.e., limits to the generalizability of any findings (although several authors argue that this simplification does not do justice to the potential value of qualitative research; see, e.g., Gheondea-Eladi, 2014; Smith, 2018). Based solely on the insights garnered from my interviews with 31 more-educated, vaccine-skeptical Dutch parents, it is not possible to conclude that the perspectives identified also play a significant role among the wider population. However, by measuring these quantitatively, it was possible to illustrate the prevalence of these perspectives among the wider Dutch population, in particular demonstrating that these perspectives are not just characteristic of small, fringe groups. Additionally, this enabled me to perform an empirical examination of the role of pre-existing perspectives in the reception of official information about vaccines, which revealed that science-oriented and anti-institutionalist views do indeed play a role, but nature-oriented attitudes do not. This finding, which would not have been uncovered by just the interview data discussed in chapters 2 and 3, is especially

interesting in light of the extant literature on the importance of a preference for the natural in vaccine skepticism.

Finally, using a cultural-sociological approach to both identifying underlying perspectives and scrutinizing their role in a broader (vaccination) environment allows researchers to take into account the wider context of vaccination wherein individuals are embedded, including the different ways in which their attitudes develop and the effects of different types of information provision by official institutions. Accordingly, the approach employed in this project has helped me to formulate conclusions rooted in the experiences of vaccine-skeptical individuals themselves. This adds to the relevance of these findings to the ongoing academic debates about vaccination and how it is practiced.

6.3 Wider implications

Alongside their applicability to the academic debates on vaccine skepticism, the results of this doctoral research are relevant in a broader context. First, they have value to the medical field in which vaccination is embedded, for instance, the literature on the relationships between medical professionals and patients. As Chapter 2 shows, the participants did not adopt a subservient approach in their dealings with medical practitioners. Indeed, while most of the nature-oriented parents preferred practitioners commonly regarded as 'alternative' (like homeopathic doctors), those who strongly valued science and the scientific method did not automatically accept the advice that medics provided either. In fact, they often actively sought out professionals they thought would have more expertise than those who were the most easily accessible (e.g., looking for pediatricians and/or immunologists, instead of their general practitioner). Moreover, some of the science-oriented parents used strategies aimed to resemble scientific methods (e.g., data triangulation) to critique the information provided by medical institutions and professionals. In practice, this meant that they sought to acquire knowledge from different (scientific) sources. Since research indicates that the patient-provider relationship plays a crucial role in a wide range of (medical) outcomes (Murray & McCrone, 2015), it is important to take seriously any changes in the ways patients view medical professionals and their expertise. While "strong physician recommendations" are still seen as important to boosting public support

for vaccination (DeRoo, Pudalov & Fu, 2020: 2459), other studies have highlighted the reduction in the trust in the traditional (medical) authority (Garett & Young, 2021). The findings of this doctoral research imply that different perspectives underlie this decline in trust. Consequently, to determine if and how the perspectives uncovered here (alongside others) play a role, research into the patient-provider relationship should delve deeper into different perceptions of medical professionals and expertise and their role in (dis)trust in these professionals.

Turning specifically to a recent medical event with global consequences, this research also speaks to the COVID-19 pandemic. As recent studies show, concerns about unnaturalness (Wawrzuta et al., 2022), doubts about the scientific process (Küçükali et al., 2022), and distrust in governmental institutions (Wawrzuta et al., 2022) all feature in the social media discourse on COVID vaccines. This suggests that the underlying perspectives studied in this thesis are also relevant to the skepticism toward vaccination against COVID-19. The results may also have been shaped by the pandemic, since it started after the interviews had been conducted, but before the data for chapters 4 and 5 were collected. Consequently, the interviews may have garnered different outcomes if they had been performed during or after the pandemic, since recent investigations of its impact show that skepticism toward childhood vaccination may also have increased (He et al., 2022). The pandemic may thus have served as an event that incited skepticism, causing more parents to have doubts about childhood vaccines. This may also mean that a wider range of perspectives is relevant to today's skepticism toward the vaccination of children more generally.

Data collection for the other chapters might also have been affected. In particular, there may have been an impact on the information treatments used in Chapter 4, since attitudes to institutions like the RIVM have become more critical since the start of the COVID-19 pandemic (Van Dijck & Alinejad, 2020). This could, therefore, mean that a relatively large part of the Dutch population now has negative views on the organization, thus hindering any positive (or strengthening the negative) effects of information provision that refers to it explicitly. It must also be noted that the Dutch context is relatively detraditionalized (regardless of the pandemic), meaning that institutions are no longer regarded as obvious sources of

guidance and authority (Beck & Beck-Gernsheim, 1996; Houtman et al., 2011). Indeed, since Chapter 4 identified no positive effects of providing comprehensive information about the MMR vaccine or including information about the RIVM, it may be the case that this type of material is less likely to have the desired impact in a detraditionalized context. However, as the study in Chapter 4 did not measure the level of national detraditionalization specifically, no conclusions can be drawn about the effect of this characteristic. Research comparing contexts (regions and/or countries) with varying levels of detraditionalization would thus be worthwhile.

Alongside the cultural context, the role played by social media in information provision should also be examined more closely. As several authors have indicated (e.g., Durach et al., 2022; Teoh, 2019), various forms of social media are an important source of both positive and negative messages about vaccines. Accordingly, given the finding that more traditional forms of information may not have the desired impact, the possible effects of using social media for this purpose should be looked at further, instead of only focusing on the impact of misinformation spread through these channels (cf., Steffens et al., 2020). Special attention should be paid to (the effects of) features that make these media formats stand out from traditional sources (e.g., the opportunities for interaction, focus on images, and tailoring messages to specific groups).

When it comes to Chapter 5, which employed a treatment with information about the scientific background of vaccination, popular concern about the scientific process behind the development of COVID-19 vaccines (Küçükali et al., 2022) may have made such information less convincing to the public. Studies into the effect of the pandemic on trust in science have reported mixed results: it appears to have increased in Germany (Bromme et al., 2022), but has remained relatively stable in the US (Agley, 2020; although this was strongly shaped by political affiliation; also see Hamilton & Safford, 2021). A broader examination of trends in scientific trust shows a steady decline from the 1970s onwards (Gauchat, 2012), suggesting that the findings of this thesis should be interpreted within the wider context of questioning the authority of science. However, extant research shows that it is important to distinguish between trust in scientific methods and principles and (dis)trust in scientific institutions (e.g., Achterberg et al., 2017; Houtman et al., 2021). This distinction is reflected in Chapter 2, where parents with science-

oriented views regarded methods of modern science as the most reliable (and sometimes the only) way of acquiring knowledge. This trust in scientific methods inspired distrust in science as an institution, for instance, when parents were not convinced that scientific research had been conducted according to the highest or appropriate scientific standards (i.e., they thought the research methods were flawed). This thesis thus provides a more in-depth illustration of *how* trust in scientific methods may go hand-in-hand with distrust in scientific institutions.

When it comes to the role of political factors in vaccine skepticism, the public debate on vaccination in the Dutch context is generally less politicized than in the US, where political affiliations and views play an important role (Agley, 2020; Bolsen & Palm, 2022). While skepticism toward vaccination and science have become more prevalent in the Dutch political arena since the COVID-19 pandemic, this is mostly because it has been discussed by one (right wing-populist) political party, the Forum for Democracy, which has a small social support base (Afonso & Votta, 2022). This is unlike the US context, where the issue is widely contested by prominent political actors (Bolsen & Palm, 2022). In terms of the generalizability of the findings of this research, it is thus conceivable that anti-institutionalist views are more important in the US, since (more) political actors are vocal about their distrust in vaccination and the institutions involved (e.g., the Center of Disease Control; Bolsen & Palm, 2022). Additionally, individuals who do not regard science as the most valuable and reliable source of knowledge (e.g., those with less science-oriented views) are likely to respond more negatively to official information about vaccines in a context where views on science are so strongly politicized. In summary, both anti-institutionalist and science-oriented views are likely to have a stronger effect on how information is received in a context where trust in science and other institutions are more hotly contested in the political arena. This expectation could be scrutinized empirically through cross-national research and would be a worthwhile endeavor.

An additional characteristic of the Dutch context concerns the accessibility of the National Immunization Program (NIP): childhood vaccination is relatively easy to access and free of charge, but is not compulsory. In terms of availability, nations with publicly funded healthcare systems, for example the Nordic countries (Sander et al., 2012), are probably comparable to the Netherlands in the sense that

considerations of cost and access play less of a role in vaccine skepticism. On the other hand, in countries where access to healthcare is less equally distributed, like the US (Chokshi, 2018), issues revolving around cost and privilege may be more important. Several authors, for instance, frame consciously opting out of childhood vaccination as the prerogative of white, privileged parents (e.g., Reich, 2014; Minnotte, 2023). Illustrating how this privilege goes beyond economic issues, Reich demonstrates that applying for a legal exemption to vaccination in the US requires elaborate strategies to collect information and navigate access (2018). Since vaccination is not compulsory in the Netherlands, vaccine-skeptical parents do not need to adopt such an approach. This means that not only do economic factors play a smaller role, but also that non-vaccination in the Dutch context requires less institutional know-how, implying that educational differences are less important.

This does not, of course, mean that (economic and educational) privilege does not play any role in the Netherlands. Some parents, for instance, indicated that they would remove their child from childcare facilities if vaccination were to be made compulsory. However, only those whose joint income was high enough to support the family and enable one parent to stay at home would be able to do so. Additionally, since education is an (increasingly) important indicator of status in the Netherlands (Bovens et al., 2014; De Lange et al., 2015), the focus of Chapter 3 on more-educated parents could also have implications for experiences of stigmatization, which may be stronger among those who are less educated. Research focusing on (Dutch) social groups with varying levels of privilege is thus required to examine whether and how vaccination perspectives among different groups are shaped by this privilege. Moreover, given the complex nature of vaccine skepticism, it is important to distinguish between various forms of privilege, since extant studies suggest that different versions play a different role (e.g., income, education, and race/ethnicity; see Reich, 2014, 2018; Minnotte, 2023).

6.4 Implications for practice

The conclusions drawn in this thesis are a valuable starting point for use in formulating recommendations on vaccination practices. First, the individualist epistemology discussed in Chapter 2 suggests that the central role individuals

adopt when seeking to determine the truth plays a prominent part in their interactions with the healthcare system. This could mean that patients are less willing to just accept information or advice from medical professionals, preferring to look for their own information whether before or after a consultation with a healthcare provider. Instead of these individual judgments remaining unspoken and shaping interactions within the medical field in unknown ways, it would be helpful to explicitly ask patients about their particular evaluations. Irrespective of whether or not these analyses are correct from a medical perspective, they are nevertheless likely to influence how willing someone is to accept any medical intervention, but can only be addressed if healthcare providers are aware of them. Additionally, the research demonstrates that vaccine skeptics are not, by definition, unwilling to listen to medical professionals, but perceptions that they are being judged might have an impact. This is echoed in other studies (e.g., Mills et al., 2005; Reich, 2020b), thus emphasizing the importance of non-stigmatizing interactions in preventing any further erosions of trust.

In line with the finding that different perspectives underlie vaccine skepticism, it would also be valuable to conduct a critical examination of the population-wide measures in regular use by policymakers, including large-scale information campaigns (Dubé et al., 2015). This projected has demonstrated that the assumptions underlying such measures, i.e., that more information means more trust (Sturgis & Allum, 2004), are not necessarily or universally true. Indeed, providing people with more comprehensive and institutional information (Chapter 4) and offering information about the scientific research underlying vaccination (Chapter 5) did not have any effect on most measures of support for the MMR vaccine, and a negative effect in one case. Additionally, a negative effect was more likely in both those with less science-oriented views and those with more anti-institutionalist attitudes. It would thus be worth examining how the type of information provided is (or will be) interpreted by groups with different perspectives. In line with this, several authors have studied the impact of employing different information frames, where the same information is offered but different elements are stressed (e.g., different wording, images, presentation style) in order to help people make better decisions for themselves (Lohiniva et al., 2023). These studies have typically focused on using frames based on psychological

mechanisms that the extant research suggests are relevant to vaccination (e.g., 'social norms' and 'loss' frames), and have had mixed results concerning which specific frames are effective. Nonetheless, overall, they clearly highlight the relevance of adopting different message frameworks in different circumstances and for different groups (Isler et al., 2020; Lohiniva et al., 2023; Zhang et al., 2023). Future research could add to these psychological insights by testing the effects of frames based on *emic* insights into the perspectives underlying vaccine skepticism.

The finding in the thesis that different arguments may be more or less appealing depending on an individual's perspectives on vaccines and health can also be applied to interactions between doctors and patients. Some scholars have suggested that a more individualized approach, tailored to specific needs and views, might help to increase trust in healthcare (e.g., Reich & Gross, 2020). Additionally, more localized and tailored initiatives in which people's personal views and concerns are heard (cf. Cutts et al., 2021) could be an alternative to more universalist approaches. Not only would this enable there to be more tailoring based on different views, but it could also help to limit the rising public skepticism toward the national institutions involved in vaccination.

The declining authority of official institutions in terms of guiding decisions and behavior means it is also important to consider the role of other sources that may be relevant in the contemporary vaccination context, such as social media and peers. In illustrations of the strategies parents use to deal with stigmatization, Chapter 3 briefly touches on the issue of friends and family and social media, which may play a dual role: they may be a source of stigmatization, but parents might nonetheless turn to them in a search for the backing of likeminded communities and supporting information. Alongside their relevance to parents' vaccine-skepticism trajectories, extant research shows that these sources also play a role in both searches for information and attitudes to vaccination. One example is that having more trust in friends and family as a resource relating to childhood vaccines has been found to be related positively to vaccine hesitancy (Nowak et al., 2021). Meanwhile, other research has shown that using social media to obtain information (Jennings et al., 2021) or organize action against vaccination (Wilson & Wiysonge, 2020) is associated with less trust in vaccination generally. A fruitful avenue for further investigation would thus be to examine precisely how peers and social

media play a role. This would help to shape official information on vaccination in ways that address the specific concerns parents have about immunizing their children.

6

R

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A

Appendices

Appendix – Chapter 3

Table S3.1: Overview of the respondents and their individual vaccine-skepticism trajectories

During **Katie's** (female/50/2 children/NVKP) first pregnancy, her sister's two children developed health problems that they attributed to vaccination. In line with previous experiences, and after feeling that her concerns were downplayed by her 'regular' children's health-care centre, she turned to one based on anthroposophical principles and a homeopathic doctor. In line with her nature-centred health views, Katie eventually decided to only administer the DTP vaccine to her children.
Sophie (female/52/2 children/NVKP) encountered people who had different views about vaccination during her training to become a homeopathic doctor. She then started researching the issue herself and expressed doubts to her GP, who she felt was open to her nature-oriented views on health. While her eldest child was fully vaccinated, in consultation with her GP she delayed further vaccination of her partially vaccinated second child.
When she was first pregnant, **Annette** (female/38/1 child/NVKP) began to question the issue of immunisation because her sister-in-law had chosen to not vaccinate her children. Sharing her doubts with the children's health centre, Annette felt she was being 'pushed' to vaccinate her child. Subsequently, she looked for answers in resources aligned with the nature-oriented views she and her husband applied in their agricultural business. Annette initially decided to delay her child's vaccinations before ultimately choosing not to vaccinate at all.
When **Eliza** (female/59/2 children/NVKP) first got pregnant, she and **Mark** (male/58/2 children) read a book that made them question vaccination. After further researching the issue using sources on "alternative health" and "food" (Eliza) that she and her husband were already familiar with and that fit their nature-oriented views on health, they decided not to vaccinate their two children.
After experiencing serious problems during labour with her first child, **Zoe** (female/38/2 children/NVKP) was already very concerned about her daughter's first vaccinations. As her daughter had a cold at the recommended time for her vaccinations, and because Zoe read information at the children's health centre that was unfamiliar to her, she decided not to proceed at that point. Zoe then began to look for more information and consulted several medical experts who, she felt, could not assuage her doubts. Trying to balance the risks of vaccination with those of contracting a disease, based on a science-oriented view on health, she initially chose to delay her child's vaccinations and later only agreed to those against diseases she felt were more dangerous (like polio). At the time of the interview, she was not yet sure what to do about several other vaccines.
During a yoga class attended by **Jennifer** (female/43/1 child/NVKP) shortly after giving birth, the teacher said she thought mothers should research the issue of vaccination before making a decision. This made Jennifer realise that she felt vaccination should be a conscious decision instead of something parents are expected to 'just do.' This led to her researching the issue using resources she had become familiar with in her work as a pharmacist, and that fit her science-oriented approach to health. After this, Jennifer decided to continue vaccinating her son in accordance with the NIP. She also began to organise information sessions at the children's health centre for other (future) parents with doubts.

When **Chris's** (male/58/1 child/NVKP) wife was pregnant with their daughter, their neighbours (who took an anthroposophical approach to health) told them stories that they felt demonstrated the problems of vaccination. This raised questions about the use(fulness) of vaccination for Chris, which he further researched from his perspective as a holistic health-care provider. He and his wife decided to focus on a natural approach during pregnancy, labour, and thereafter, choosing not to administer any vaccinations to their daughter because it was not in line with their nature-centred views on health.
Annie (female/27/2 children/NVKP) was triggered to question vaccination when her youngest son had to be admitted to a hospital urgent care unit after his vaccination. Later, Annie experienced her subsequent contact with her son's doctors as unpleasant and gained the impression that they were not very well-informed. She therefore started looking for information on the risks of vaccination, in line with her science-oriented approach to health. She remained hesitant, had decided to delay further vaccination, and planned to decide on each one at the time recommended in the official programme.
During her pregnancy, **Mabel** (female/41/1 child/NVKP) read something about Hepatitis B that made her question whether young children should be vaccinated against it. Her search for more information caused her to have doubts about vaccination in general, and ultimately made her feel that it had no real benefits and only risks. In this process, Mabel instead chose to rely on health approaches she regarded as more natural (e.g., homeopathic), and which she had experienced positively when dealing with other health issues. Based on her nature-centred view on health, she thus decided not to vaccinate her child.
Babette (female/42/1 child/NVKP) described going to an osteopath regularly before and during her pregnancy, because she was worried about her fertility and very committed to being as healthy as possible. She first started thinking about (non)vaccination when she discovered that a pregnant neighbour, who she felt was very wise and careful, wanted to postpone vaccinating her child. Babette sought out more information from her osteopath, who said vaccination had significant risks. After delving deeper into using biological food and homeopathic treatments as a substitute, following her nature-oriented views on health, Babette decided to forego any vaccination for her daughter.
When **Faye's** (female/53/1 child/online parenting forum) daughter was 12, she was part of the first cohort eligible for the HPV vaccine. Although she had initially not questioned the issue of vaccination, Faye was triggered to reconsider this specific one after seeing a documentary on girls who reported that they had experienced major side-effects. In line with her science-oriented approach to health, she gained more information from acquaintances who worked in the medical industry. Based on this, Faye felt the scientific evidence on the safety of the vaccine was too limited, and she decided not to give it to her daughter.
Kristel (female/28/expecting first child/snowballing) and Toon (male/30/expecting first child/snowballing) had only recently started thinking about vaccination and discovered that people in their environment were against it. Following their science-oriented views, they wanted to make an informed decision based on information they obtained through both the medical professional leading an information session at their children's health centre and other medical institutions (also aided by

Kristel's background as a nurse). At the time of the interview, they planned to fully vaccinate their future child.
After switching to a biological approach in his agricultural business, **Ray** (male/60/5 children/snowballing) decided to follow homeopathic education, which triggered him to question vaccination. Since he found it difficult to find additional information at that time, he used his acquired homeopathic knowledge to make a decision. He and his wife ultimately decided not to vaccinate their children, preferring homeopathic remedies that they felt better fit their nature-centred health views instead.
When she was younger, **Elsemieke's** (female/60/2 children/online parenting forum) daughter experienced some difficulties with learning at school, for which she received help from a tutor. When this tutor voiced her opinion that these issues were due to the heavy metals in vaccines, Elsemieke began a science-oriented search for information on governmental and medical-institution websites and through her GP. This, as well as her own (positive) experiences with vaccinations for her many travels, made her eventually decide to fully vaccinate both her children.
After giving birth to her son, **Gwen** (female/39/1 child/general Facebook group on vaccination) was asked by a close friend whether she intended to vaccinate him, which was something her friend regarded as very dangerous. After looking at the resources provided by this friend, Gwen began to have serious doubts about vaccination. Since she was oriented towards science and scientific resources, she turned to her GP and the medical specialist who had administered her fertility treatment. Their answers and information from other medical resources re-established Gwen's trust in vaccination. She therefore chose to not only give her son the NIP vaccinations, but also several additional vaccines like the one against varicella (chickenpox).
When **Layla** (female/30/2 children/general Facebook group on vaccination) read that children often get a fever after being vaccinated, she questioned whether it was potentially harmful (linking it to her own negative experience of a high fever). She attended a special question-and-answer session at the children's health centre, where she received additional information that fit her science-oriented approach to health. Ultimately, Layla and her husband decided to vaccinate their children based on a modified programme they created by working with the children's health centre.
Iris (female/30/1 child/snowballing) started reading about vaccination during her pregnancy, after learning from the media about people who did not vaccinate their children. Relying on her familiarity with scientific articles and her affinity with science from her time as a student, she found it difficult to find evidence that reassured her about the risk of side-effects. Iris reluctantly agreed to follow the NIP, but was particularly worried about combination vaccines. At the time of the interview, she was still unsure about the vaccinations her daughter was due to receive at a later age.
Vicki's (female/57/2 children/online parenting forum) daughter had several health issues in the first three years of her life. Vicki did not think that these concerns were properly addressed by her GP, and she also felt that she was blamed for these problems by the employees at the children's health centre. After a referral to a homeopathic doctor, Vicki had a completely different (positive) experience, feeling that she was taken seriously and that his approach better fit her nature-oriented health views. This doctor suggested that vaccines were the root cause of her daughter's health issues,

which prompted Vicki to look for more information about vaccination. Ultimately, she and her husband decided to vaccinate their two children based on a (partially) modified (partial) schedule.
After reading about the economic interests of the pharmaceutical industry, which added to the concerns that **Crystal** (female/30/1 child/snowballing) had cultivated during her studies and work as a scientific researcher, she wanted to find out more about vaccination. Adopting a science-oriented approach, she felt the benefits outweighed the risks, which is why she decided to vaccinate her son and planned to continue in accordance with the NIP in the end.
Michelle (female/31/3 children/online parenting forum) was triggered to have doubts about vaccination when she had to go to the emergency care unit after her daughter had difficulty breathing following her first vaccination. Wondering what could have caused it, she started looking for information on the substances present in vaccines, and their potential risks, in line with a science-centred approach to health issues. She eventually decided to delay the first vaccinations of her two youngest children, and to opt for individual instead of combination vaccines when possible.
Robin (female/39/2 children/school) only started to think critically about not vaccinating her children when her daughter was around 4 years old and had already received the recommended vaccinations for her age. As her daughter had frequent health problems, Robin was given information about food by her sister after they had a discussion about these issues. This inspired her to investigate matters further on the internet. There, Robin encountered material that made her question vaccines and aligned with her nature-centred views on health and preference for natural remedies. After re-interpreting the whole process of vaccination and her children's health, she decided to no longer vaccinate them and to use homeopathic methods to try to counter what she saw as the negative effects of vaccination on her daughter.
After reading a leaflet at their health centre, where they had a GP who operated based on anthroposophical principles, **Rob** (male/41/2 children/school) and **Mariëlle** (female/40/2 children/school) discussed the potential risks of vaccination with this GP and others in their environment who they knew were critical. In a science-oriented way weighing the perceived pros and cons, they decided that they did not want to vaccinate their children as early as recommended. As well as delaying the process, they chose to reject some vaccines that they felt were unnecessary, e.g., the one against pertussis.
With his children attending a school based on anthroposophical principles, **Michael** (male/37/3 children/school) said criticism of vaccination was more common in this environment, which made him also think about the potential dangers. In line with his science-centred views, he used academic articles to research possible alternatives. This led Michael to realise that there are none that he considers to be viable. He therefore decided to vaccinate his children in accordance with the NIP after all.
During **Dunya's** (female/34/2 children/school) first pregnancy, she and her partner **Tom** (male/34/2 children/school) started to read up on various issues, including vaccination. As a result of what they found and subsequent discussions with friends, the couple developed concerns about the young age at which children are expected to be vaccinated. They said that they were also worried about the time-period between the different vaccinations, which they initially wanted to extend. After

researching this particular issue in a way that fit their science-oriented perspective (with a focus on scientific research and potential risks), they decided to keep to the recommended schedule after all.
When **Jan's** (male/58/3 children/school) wife was pregnant with their first child, their anthroposophical doctor suggested that they should delay the first vaccinations. As a result, Jan and his wife started to think about vaccination more generally and looked for more information using their resources in the anthroposophical milieu, which aligned with his nature-centred health views. They eventually decided to delay vaccination until their children were aged at least 1, and to not administer vaccination against so-called 'childhood diseases' like the measles.
After reading something during her first pregnancy, **Sara** (female/35/2 children/school) described being very worried about vaccination and so wanted to research the issue. She initially decided to delay vaccinating her children, but then felt more confident about not vaccinating them at all after discussing the issue at the anthroposophical children's health centre and with their homeopathic doctor. Instead, she chose to use methods that she felt were more natural to support her children's health, which she also felt better fit her nature-oriented views on health.
Lilian (female/51/4 children/school) first started questioning the issue of vaccination after she talked about it with other parents at her children's school, which provided an education based on anthroposophical principles. After getting more information from her homeopathic doctor and at their anthroposophical health-care centre, Lilian decided to delay the first vaccines and use homeopathic remedies intended to counter potential side-effects. In this way, she made a decision that she felt was in line with her natural approach to health.

Appendix – Chapter 4

Figure S4.1: Treatment texts

Text with basic information (control condition):

Mumps, measles and rubella are diseases that are especially prevalent among children. In the Netherlands, the MMR vaccine is available to vaccinate against these diseases:

- Children of 14 months can receive the MMR vaccine at the well-baby clinic.
- The vaccine is administered from the age of 14 months because it is not effective until that age. Before then, children have antibodies from their mother.
- To increase its effectiveness, a second dose of the vaccine is administered at the age of nine.

Mumps

Children who contract mumps usually do not experience any serious problems. The mumps virus can, however, sometimes cause complications like meningitis, or inflammation of the pancreas, testicles or ovaries.

Measles

Infected children almost always become ill after one to two weeks. Children mostly recover from the measles without any further problems. Sometimes, complications do arise, such as a serious case of meningitis. The measles virus temporarily weakens the immune system, which makes you more vulnerable to other serious infectious diseases like pneumonia. These complications can cause disabilities among children or even death.

Rubella

Infected children usually present with symptoms of general illness. A temporary shortage of platelets, meningitis or joint inflammation are rare complications. If pregnant women contract the virus, they are at risk of miscarrying and the unborn child is at risk of deafness, blindness and impaired mental development.

Texts with extra information on the MMR vaccine:

The MMR-vaccine

The active component in the MMR vaccine is made up out of weakened mumps, measles and rubella viruses. These weakened viruses do not cause you to become ill, but help you develop immunity against the disease. The weakened viruses multiply inside the body and activate the immune system. The vaccine viruses are not contagious, and you cannot transfer them to other people. Once you are in contact with mumps, measles or rubella viruses, your body will recognize them and your immune system will destroy the viruses, preventing you from becoming ill. After two doses of the MMR vaccine, more than 99% of the children are protected against the diseases causes by these viruses.

Side-effects

If side-effects occur, they mostly occur between 5 days and 3 weeks after vaccination. The most frequent side-effects of the MMR vaccine are a fever, listlessness and/or a rash. The skin may also appear red or be painful at the spot of vaccination. On rare occasions serious side-effects may occur, like a febrile seizure, a temporary shortage of platelets, or temporary joint aches. These side-effects are rare and mostly disappear by themselves.

Text with information about scientific research:

Scientific research

To find out how safe and effective the MMR vaccine is, scientists have been conducting research about it for years. This is done in what scientists call ‘clinical studies’ (also called: ‘randomized controlled trials’), in which they perform experiments. This means that one group of people is administered an injection that contains the MMR vaccine, while another group is given an injection that does not contain the vaccine (also called a ‘placebo’). After this, the scientific researchers monitor whether people who were given the MMR vaccine experience more side-effects than those who were not, and how well protected they are against mumps, measles and rubella.

Text with brief explanation about RIVM including official logo:

Rijksinstituut voor Volksgezondheid
en Milieu
Ministerie van Volksgezondheid,
Welzijn en Sport

The 'Rijksinstituut voor Volksgezondheid en Milieu' (RIVM) is a governmental institute that plays a central role in preventing and controlling infectious diseases. The RIVM was granted the responsibility to organize the National Immunisation Programme by the Ministry of Public Health, Wellbeing and Sports. The minister of Public Health, Wellbeing and Sports determines which vaccines children are offered.

Table S4.2: The effect among respondents who correctly answered the manipulation-check question of providing comprehensive information and institutional information on scientific research on: a) support for the MMR vaccine; b) likelihood of recommending the vaccine to other parents; and c) support for compulsory vaccination, and the role of anti-institutionalism (rows continue next page)

	Model 1			Model 2			Model 3			Model 4		
	a	b	c	a	b	c	a	b	c	a	b	c
Independents												
Constant	6.62***	6.43***	4.94***	6.59***	6.34***	4.79***	6.99***	6.95***	5.11***	7.02***	6.96***	5.32***
	(0.03)	(0.04)	(0.06)	(0.03)	(0.04)	(0.06)	(0.06)	(0.08)	(0.15)	(0.06)	(0.08)	(0.14)
Information treatment												
Comprehensive info (ref. = basic)	-0.03	-0.08	-0.15				0.03	0.01	0.21			
	(0.04)	(0.05)	(0.09)				(0.08)	(0.11)	(0.20)			
Institutional info (ref. = comprehensive)				-0.03	-0.02	0.01				-0.03	-0.05	-0.09
				(0.04)	(0.05)	(0.09)				(0.09)	(0.11)	(0.19)
Anti-institutionalism							-0.12***	-0.17***	-0.06	-0.14***	-0.19***	-0.17***
							(0.02)	(0.02)	(0.04)	(0.02)	(0.02)	(0.04)
Interaction terms												
Information treatments * anti-institutionalism												
Comprehensive info							-0.02	-0.02	-0.11			
							(0.02)	(0.03)	(0.06)			

Table S4.2 Continued

Institutional info										-0.00	0.00	0.03
										(0.02)	(0.03)	(0.05)
R^2 (adjusted)	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.01	0.07	0.08	0.02
n	1,658	1,658	1,658	1,664	1,664	1,664	1,583	1,583	1,583	1,604	1,604	1,604

Method: Ordinary Least Squares (OLS) regression. Dependent variables: a) dependent variable 'support for MMR vaccine'; b) dependent variable 'likelihood of recommending the vaccine to others'; c) dependent variable 'support for compulsory vaccination'.

* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$

Appendix – Chapter 5

Table S5.1: The effect among the respondents who correctly answered the manipulation check question of providing information about scientific research on: a) support for the MMR-vaccine, b) likelihood to recommend the vaccine to other parents, and c) support for compulsory vaccination, and the roles of nature and science-oriented worldviews (rows continue on next page

	Model 1			Model 2			Model 3		
	a	b	c	a	b	c	a	b	c
Independents									
Constant	6.61***	6.43***	4.85***	6.58***	6.53***	5.19***	5.96***	5.26***	3.30***
	(0.03)	(0.05)	(0.06)	(0.18)	(0.23)	(0.41)	(0.11)	(0.14)	(0.27)
Information treatment									
Treatment scientific	-0.02	-0.09*	-0.07	0.10	-0.10	0.48	-0.35*	-0.30	-0.19
	(0.04)	(0.04)	(0.09)	(0.25)	(0.32)	(0.58)	(0.16)	(0.20)	(0.37)
Nature-oriented worldview				0.00	-0.02	-0.06			
				(0.03)	(0.04)	(0.07)			
Science-oriented worldview							0.13***	0.23***	0.31***
							(0.02)	(0.03)	(0.05)
Interaction terms									
Information treatments * nature-oriented worldview									
Information scientific research				-0.02	0.00	-0.10			
				(0.04)	(0.06)	(0.10)			

Table S5.1 Continued

Information treatments * science-oriented worldview									
Information scientific research							0.07*	0.05	0.03
							(0.03)	(0.04)	(0.07)
R^2 (adjusted)	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09	0.04
n	1,677	1,677	1,677	1,673	1,673	1,673	1,673	1,673	1,673

Method: Ordinary Least Squares (OLS) regression. Dependent variables: a) dependent variable 'support for MMR vaccine'; b) dependent variable 'likelihood to recommend'; c) dependent variable 'support for compulsory vaccination'.

* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$

Table S5.2: The roles of nature and science-oriented worldviews in the effect of providing information about scientific research on: a) support for the MMR-vaccine, b) likelihood to recommend the vaccine to other parents, and c) support for compulsory vaccination; controlled for gender, age, income, education, religiosity and migration background (rows continue on next two pages)

	Model 2			Model 3		
	a	b	c	a	b	c
Independents						
Constant	6.02***	5.86***	4.59***	5.74***	5.14***	3.10***
	(0.26)	(0.32)	(0.56)	(0.22)	(0.26)	(0.47)
Information treatment						
Treatment scientific	-0.40	-0.49	0.41	-0.54**	-0.52*	-0.49
	(0.27)	(0.34)	(0.59)	(0.18)	(0.21)	(0.39)
Nature-oriented worldview	0.02	0.01	-0.08			
	(0.03)	(0.04)	(0.11)			
Science-oriented worldview				0.10***	0.20***	0.28***
				(0.02)	(0.03)	(0.05)
Interaction terms						
Information treatments * nature-oriented worldview						
Information scientific research	0.06	0.07	-0.08			
	(0.05)	(0.06)	(0.11)			
Information treatments * science-oriented worldview						
Information scientific research				0.10**	0.09*	0.09
				(0.03)	(0.04)	(0.08)

Table S5.2 Continued

Control variables						
Gender (female)	0.08	0.04	-0.27**	0.11*	0.08	-0.22*
	(0.05)	(0.06)	(0.10)	(0.04)	(0.05)	(0.10)
Age	0.00*	0.00*	0.01***	0.00	0.00	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Net income	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Education						
Vmbo	0.18	0.16	0.42	0.15	0.13	0.35
	(0.15)	(0.18)	(0.33)	(0.15)	(0.18)	(0.32)
Havo/vwo	0.16	0.19	-0.03	0.13	0.15	-0.14
	(0.16)	(0.20)	(0.35)	(0.16)	(0.19)	(0.35)
MBO	0.14	0.06	0.14	0.13	0.06	0.10
	(0.15)	(0.18)	(0.32)	(0.14)	(0.18)	(0.32)
HBO	0.26	0.29	0.15	0.24	0.25	0.05
	(0.15)	(0.19)	(0.33)	(0.15)	(0.18)	(0.32)
WO	0.45**	0.47*	0.21	0.36*	0.33	-0.01
	(0.16)	(0.19)	(0.34)	(0.15)	(0.18)	(0.33)
Different	0.31	0.17	0.72	0.29	0.17	0.69
	(0.25)	(0.31)	(0.54)	(0.24)	(0.30)	(0.53)
No education	0.68	0.89	0.64	0.65	0.82	0.39
	(0.49)	(0.61)	(1.08)	(0.48)	(0.59)	(1.05)
Primary school (ref)						

Table S5.2 Continued

Migration background						
First generation, Western background	-0.15	-0.14	0.26	-0.15	-0.15	0.22
	(0.11)	(0.13)	(0.24)	(0.11)	(0.13)	(0.23)
First generation, non-Western background	-0.27*	-0.32*	0.26	-0.26*	-0.31*	0.19
	(0.11)	(0.13)	(0.23)	(0.10)	(0.12)	(0.22)
Second generation, Western background	-0.05	-0.06	0.05	-0.04	-0.05	0.05
	(0.09)	(0.11)	(0.19)	(0.08)	(0.10)	(0.18)
Second generation, non-Western background	-0.50***	-0.70***	-0.57*	-0.51***	-0.72***	-0.57*
	(0.12)	(0.15)	(0.27)	(0.12)	(0.15)	(0.26)
No migration background (ref)						
Religiosity (not religious)	0.00	0.01	0.16	-0.03	-0.05	0.07
	(0.05)	(0.06)	(0.11)	(0.05)	(0.06)	(0.10)
R^2 (adjusted)	0.04	0.04	0.02	0.08	0.11	0.07
n	1,503	1,503	1,503	1,503	1,503	1,503

Method: Ordinary Least Squares (OLS) regression. Dependent variables: a) dependent variable 'support for MMR vaccine'; b) dependent variable 'likelihood to recommend'; c) dependent variable 'support for compulsory vaccination'.

* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$

Table S5.3: Characteristics of sample and Dutch population (rows continue on next page)

	Sample (treatment and control group)				Dutch adult population (sources: Statline, 2022)
	M	S	Range	*n*	M
Gender					
Female	0.52	0.50	0 – 1	1,647	0.50 (ns)
Male	0.48	0.50	0 – 1	1,647	0.50 (ns)
Age	58.00	17.08	18 – 95	1,647	49.61***
Net monthly income (Euros)	1864.35	1153.17	0 - 10000	1,570	2172.00***
Education					
Primary education	0.06	0.23	0 – 1	1,643	0.09***
Vmbo	0.19	0.40	0 – 1	1,643	0.19 (ns)
Havo/vwo	0.11	0.31	0 – 1	1,643	0.10 (ns)
Mbo	0.25	0.43	0 – 1	1,643	0.26 (ns)
Hbo/wo	0.39	0.44	0 – 1	1,643	0.35**
Religiosity					
Yes	0.27	0.44	0 – 1	1,619	0.43***
No	0.73	0.44	0 – 1	1,619	0.57***

Table S5.3 Continued

Migration background					
Dutch	0.81	0.39	0 – 1	1,610	0.75***
First generation foreign, Western	0.04	0.20	0 – 1	1,610	0.06***
First generation foreign, non-western	0.05	0.21	0 – 1	1,610	0.09***
Second generation foreign, Western	0.06	0.25	0 – 1	1,610	0.05*
Second generation foreign, non-western	0.04	0.18	0 – 1	1,610	0.04 (ns)

* : $p < 0.001$, ** : $p < 0.01$, ***: $p < 0.05$ (one-sample t-test; asterixis show whether mean score found in sample differs significantly from mean score listed in final column)

A

Nederlandse samenvatting

Vaccinatiescepsis begrijpen: Een cultuursociologische multi-methode studie van perspectieven op het Rijksvaccinatieprogramma

Er zijn toenemende zorgen over het dalende aandeel kinderen dat gevaccineerd is binnen overheidsprogramma's, vooral in Westerse landen als de Verenigde Staten en Europese landen. Deze ontwikkeling wakkert publiek debat aan over vaccinatieweigeraars en maatregelen zoals een vaccinatieplicht. Ook in Nederland, waar de deelname aan het Rijksvaccinatieprogramma (RVP) relatief hoog is, maken officiële instanties zoals het Rijksinstituut voor Volksgezondheid en Milieu (RIVM) zich zorgen. Hoewel de daling die rond 2015 werd ingezet leek te stabiliseren vlak voor de coronapandemie ook Nederland trof, gaf het RIVM in een recente publicatie aan dat de werkelijke vaccinatiegraad onder zuigelingen en kleuters in 2024 iets lager lijkt dan in het jaar ervoor.

Het Nederlandse RVP wordt, naast de hierboven genoemde dalende deelname, gekenmerkt door een relatief grote toegankelijkheid: deelname is gratis voor alle kinderen. Daarnaast speelt religie in Nederland een relatief kleine rol in vaccinatiekeuze, en neemt de vaccinatiebereidheid toe in gebieden waar religie gemiddeld genomen een grotere rol speelt (de zogenoemde 'Bible Belt'). Dit betekent dat een gebrek aan toegang tot vaccinaties en religieuze motivaties de waargenomen daling in de deelname aan het RVP waarschijnlijk niet kunnen verklaren. Dit proefschrift, dat zich richt op het begrijpen van vaccinatiescepsis in Nederland, onderzoekt daarom andere factoren dan toegang en religie.

Bestaand onderzoek naar vaccinatiescepsis is geworteld in verschillende wetenschappelijke velden, variërend van medisch onderzoek tot psychologische studies, en meer recent ook sociologische benaderingen. Psychologisch onderzoek richt zich hierbij voornamelijk op de invloed van cognitieve en affectieve processen, die bijvoorbeeld verklaren waarom misinformatie mensen kan aanspreken. Daarnaast wordt onderzoek gedaan naar zogeheten vooroordelen, zoals de 'confirmation bias' (bevestigingsvooroordeel), die vaccinatiescepsis in de hand kunnen werken. Epidemiologisch onderzoek daarentegen heeft vaak een bredere focus, en richt zich op het in kaart brengen van de (geografische en sociale) verdeling van vaccinatie. In sociologische studies is een recente verschuiving te zien van een focus op economische en geografische barrières tot vaccinatie, naar het

verklaren van het toenemend aantal ouders dat er bewust voor kiest hun kinderen niet te laten vaccineren, terwijl vaccinatie door veel wetenschappers, beleidsmakers, en tot voor kort het overgrote deel van de bevolking als vanzelfsprekend wordt gezien.

Om de keuze voor niet-vaccineren te verklaren, wordt vaak gewezen op twee factoren. Ten eerste vindt bestaand onderzoek een verband tussen orthodoxe religie en vaccinatiescepsis. Zo blijkt uit Nederlands onderzoek dat orthodoxe Protestantse ouders minder bereid zijn hun kinderen te vaccineren dan niet-religieuze ouders. Religieuze motivaties kunnen echter de recente daling in deelname aan het RVP niet verklaren, gezien de toegenomen vaccinatiebereidheid onder Protestantse gemeenschappen en de relatief kleine rol van religie in Nederland.

Andere studies richten zich op anti-wetenschappelijke of anti-institutionele houdingen om vaccinatiescepsis te verklaren. Een voorbeeld is het *information-deficit* model, dat stelt dat meer wetenschappelijke kennis leidt tot meer steun voor de wetenschap. Omgekeerd zou een gebrek aan kennis leiden tot minder steun, omdat dit irrationele angsten en geloof in zogenaamde complottheorieën zou stimuleren. Daarnaast wordt een anti-institutionele houding gerelateerd aan vaccinatiescepsis. De veronderstelling is dat wantrouwen in instituties doorwerkt in opvattingen over de maatregelen die zij aanbieden (zoals het Rijksvaccinatieprogramma).

Wat deze verklaringen met elkaar gemeen hebben is de veronderstelling dat het kernidee van vaccinaties (de wetenschappelijke consensus over hoe ze werken) wordt gedeeld door het brede publiek, en dat afwijken van het Rijksvaccinatieprogramma geweten kan worden aan het bestaan van ‘misverstanden’ die gecorrigeerd kunnen (en zouden moeten) worden. Hierbij bestaan in de wetenschap verschillende ideeën over waarom sceptische mensen vaccinaties niet ‘begrijpen’ (religieuze redenen, gebrek aan wetenschappelijke kennis, wantrouwen in instituties). Een dergelijke benadering van vaccinatiescepsis besteedt geen aandacht aan de manier waarop vaccinatiesceptici zelf vaccinaties zien. Deze benadering houdt bovendien onvoldoende rekening met de mogelijkheid dat ouders die sceptisch zijn over het vaccineren van hun kinderen breed gedragen

(wetenschappelijke) kennis over vaccins niet delen, maar in plaats daarvan een heel ander beeld hebben van vaccinaties.

Daarom richt recent onderzoek zich steeds meer op het begrijpen van de onderliggende motivaties van vaccinatiescepsis vanuit het perspectief van ouders zelf. Deze, vaak kwalitatieve, studies richten zich in mindere mate op het bieden van een universele verklaring, en houden zich in plaats daarvan bezig met het onderzoeken van verschillende zienswijzen op vaccinaties (vaak onder verschillende sociale groepen). Zo laten verschillende onderzoeken zien dat sommige ouders hun vaccinatiebeslissingen baseren op een voorkeur voor natuurlijke benaderingen van gezondheid, in plaats van een aanpak die zij als onnatuurlijk zien (zoals vaccinaties). Deze bevinding laat zien dat vaccinatiescepsis kan voortkomen uit perspectieven op vaccinaties die verschillen van zienswijzen die dominant zijn in officieel beleid en in de wetenschap.

Hiernaast zijn er aanwijzingen dat vaccinatiescepsis niet slechts geworteld is zienswijzen die vaak worden gezien als 'antiwetenschappelijk' (zoals een voorkeur voor het natuurlijke) of als kenmerkend voor een gebrek aan affiniteit met wetenschap. Zo zijn er bijvoorbeeld auteurs die laten zien dat vaccinatiescepsis vooral groeit onder groepen die relatief goed bekend zijn met het dominante wetenschappelijk discours en die goed hun weg weten te vinden in officiële instituties. Dit suggereert dat, naast een voorkeur voor een natuurlijke levensstijl, meer perspectieven een rol spelen in scepsis ten opzichte van kindervaccinaties.

Om perspectieven die ten grondslag liggen aan vaccinatiescepsis in Nederland te ontginnen, hanteert dit proefschrift een cultuursociologische aanpak. Een dergelijke aanpak wordt aangemoedigd door andere wetenschappers die zich bezighouden met vaccinatiescepsis. Zo geven zij aan dat traditionele aannames dat sceptische ouders simpelweg niet over voldoende kennis beschikken in het beste geval slechts een incompleet beeld van vaccinatiescepsis kunnen schetsen. Ook vinden onderzoekers aanwijzingen dat de mening van mensen over informatie die verstrekt wordt over bijvoorbeeld vaccinaties gevormd wordt door andere factoren. Een voorbeeld hiervan is onderzoek naar gemotiveerd redeneren ('motivated reasoning'), waaruit blijkt dat mensen gemotiveerd kunnen zijn om informatie te interpreteren op een manier die hun eigen wereldbeeld bevestigt, waardoor de manier waarop zij de informatie verwerken beïnvloed wordt. Geïnspireerd door

deze meer psychologische onderzoekslijn, richten sommige sociologische onderzoekers zich op de rol van gedeelde waarden in risicopercepties (van bijvoorbeeld vaccinaties). Op deze manier worden ook culturele factoren bestudeerd, al worden deze voornamelijk gemeten in grootschalige vragenlijsten opgesteld op basis van de ideeën van onderzoekers. Dit betekent dat de zienswijzen van ouders zelf een blinde vlek blijven in dergelijk onderzoek.

Dit proefschrift richt zich daarom op het ontginnen van perspectieven die ten grondslag liggen aan vaccinatiescepsis. Hierbij wordt een cultuursociologische aanpak gehanteerd: de zienswijzen van sceptische ouders staat centraal in het onderzoek. Dit betekent dan ook dat het onderzoek het blikveld van de mensen zelf als startpunt neemt, en daarmee een 'emic' begrip (een begrip gebaseerd op de ervaring van mensen zelf) biedt van vaccinatiescepsis. Op deze manier worden niet de ideeën van onderzoekers, maar die van de mensen die onderzocht worden, centraal gesteld in het onderzoek.

Het is belangrijk om hierbij op te merken dat het niet de bedoeling is om de zienswijzen van mensen die sceptisch zijn over vaccinaties toe te juichen of te veroordelen. Het vormen van een waardeoordeel over sceptici zou het ontwikkelen van een verklaring van hun zienswijzen niet ten goede komen. Deze benadering is geïnspireerd door werk van socioloog Howard Becker, die zich in zijn onderzoek naar mensen die worden gezien als 'deviant' (oftewel: afwijkend) vooral richtte op hun eigen ervaringen en perspectieven, in plaats van die van degenen die hen als deviant zagen. Zijn onderzoek laat zien dat een focus op de ervaringen van mensen zelf cruciaal is om hun handelen te begrijpen.

Naast het ontginnen van perspectieven die ten grondslag liggen aan vaccinatiescepsis in Nederland, onderzoekt dit proefschrift ook hoe dit soort perspectieven een rol spelen in een bredere vaccinatiecontext. Op deze manier gaat dit proefschrift ook in op aanwijzingen dat houdingen ten opzichte van vaccinaties complex en veranderlijk zijn, en op externe factoren waar ouders mee te maken krijgen, zoals informatievoorziening over vaccinaties. Het bestuderen van de rol van onderliggende perspectieven in de ontwikkeling van houdingen en reacties op informatie is extra belangrijk vanwege het sterk gedetraditionaliseerde karakter van de Nederlandse context: de legitimiteit van officiële instanties wordt steeds

meer in twijfel getrokken. Dit kan grote gevolgen kan hebben voor publieke reacties op bijvoorbeeld informatievoorziening.

De cultuursociologische aanpak die centraal staat in dit proefschrift bestaat dus uit twee stappen. Ten eerste worden perspectieven ontgonnen die ten grondslag liggen aan scepsis ten opzichte van het Rijksvaccinatieprogramma door de zienswijzen van ouders centraal te stellen. Hiermee kan dit proefschrift een toevoeging bieden aan recent onderzoek dat laat zien dat een natuurgericht perspectief een rol speelt in vaccinatiescepsis. Ten tweede wordt de rol van onderliggende perspectieven bestudeerd in de ontwikkeling van houdingen ten opzichte van vaccinaties en reacties op informatievoorziening. Met deze tweede stap geeft dit proefschrift niet alleen inzicht in onderliggende perspectieven zelf en wat deze inhouden, maar wordt ook de bredere relevantie hiervan bestudeerd. Dit mondt uit in de volgende onderzoeksvraag: *Welke perspectieven liggen ten grondslag aan scepsis ten opzichte van kindervaccinatie in Nederland, en hoe vormen deze de ontwikkeling van vaccinatieattitudes en reacties op informatievoorziening over vaccinatie?*

In de eerste studie van dit proefschrift, gepresenteerd in **Hoofdstuk 2**, worden perspectieven die ten grondslag liggen aan vaccinatiescepsis ontgonnen. Hierbij is de strategische keuze gemaakt om een groep te onderzoeken die door beleidsmakers en onderzoekers vaak als opvallend wordt bestempeld: theoretisch opgeleide ouders die sceptisch zijn ten opzichte van vaccinaties. Hun scepsis is opvallend omdat zij relatief vaak niet-religieus zijn en gemiddeld genomen een grote affiniteit hebben met de wetenschap en moderne instituties. Om inzicht te verkrijgen in hun sceptische houding ten opzichte van kindervaccinaties, zijn interviews gehouden met 31 theoretisch opgeleide Nederlandse ouders. Om zowel ouders te spreken die uitgesproken tegen (alle) vaccinaties waren als ouders die twijfelden over (sommige) vaccins, is contact gezocht met ouders via netwerken die specifiek opgericht zijn voor (en door) mensen die wantrouwig zijn tegenover vaccinaties zoals de Nederlandse Vereniging Kritisch Prikken (NVKP) en via algemenere kanalen zoals scholen en kinderopvangcentra. Om onderliggende perspectieven van ouders te achterhalen, hadden de interviews de vorm van een open gesprek waarin de zienswijzen van ouders zelf centraal stonden. De interviews zijn gehouden tussen maart 2019 en februari 2020, wat betekent dat de interviews

afgerond waren voor de uitbraak van COVID-19 in Nederland. Meningen over COVID-19 en COVID-maatregelen hebben dus geen rol gespeeld in de interviews.

Vanwege de gevoelige aard van het onderwerp van de interviews, werd aan het begin van elk gesprek tijd genomen om uitleg te geven over het onderzoek, de doelen ervan, en de institutionele inbedding. Ook was er alle ruimte voor het stellen van vragen, zodat deelnemers zich op hun gemak voelden en in vertrouwen hun verhaal konden vertellen. De waardering van ouders voor deze aanpak is te zien aan de duur van de interviews (gemiddeld 1 uur en 45 minuten, waarbij het kortste interview iets langer duurde dan een uur en het langste ruim zes uur) en verschillende uitnodigingen voor lunch of diner.

Uit de interviews bleek dat alle deelnemers een individualistische epistemologie hadden: zij zagen het individu als cruciaal in het verkrijgen van kennis en in het bepalen van wat waar is. In lijn hiermee vonden alle geïnterviewde ouders het onverstandig om blind te varen op advies van instanties zoals het RIVM, omdat zij een sterke persoonlijke verantwoordelijkheid voelden voor de gezondheid van hun kinderen en het daarom ook belangrijk vonden om zelf te beoordelen of informatie betrouwbaar was en beslissingen te nemen over vaccinaties. Deze individualistische epistemologie werd echter niet door alle ouders op dezelfde manier vertaald in scepsis ten opzichte van vaccinaties. Onder de geïnterviewde ouders speelden twee perspectieven een rol in hun houding ten opzichte van vaccinaties. Sommige ouders hadden een natuurgericht perspectief, waarin intuïtie centraal stond als manier om de waarheid te achterhalen en de meest natuurlijke aanpak de voorkeur had. Andere ouders waren gericht op de wetenschap en zagen moderne wetenschappelijke methoden als cruciaal voor het bepalen van wat waar is. Zij gebruikten hun affiniteit met wetenschappelijke methoden echter ook om wat wordt gezien als wetenschappelijke consensus kritisch te bevragen. Voor deze tweede groep waren vaccinatiebeslissingen geworteld in risicocalculaties, oftewel een rationalistische inschatting van welke keuze het kleinste risico met zich meedraagt. Ouders met een natuurgericht perspectief, daarentegen, maakten hun beslissingen op basis van een risicotypologie, waarbij natuurlijke risico's (zoals de kans op het krijgen van een ziekte waartegen gevaccineerd kan worden) werden onderscheiden van, en de voorkeur hadden boven, onnatuurlijke risico's

(bijvoorbeeld risico's die zij koppelden aan wat zij zagen als onnatuurlijke middelen zoals vaccins).

Door twee perspectieven te ontginnen onder theoretisch opgeleide Nederlandse ouders (een natuurgericht en een wetenschapsgericht perspectief), biedt Hoofdstuk 2 inzicht in de inhoud van perspectieven die een sceptische houding ten opzichte van kindervaccinaties inspireren. Verschillende studies tonen echter aan dat vaccinatiehoudingen niet statisch zijn, maar zeer complex en veranderlijk. Ook bestaan er aanwijzingen dat gezondheidsgerelateerde gebeurtenissen, zoals het ervaren van bijwerkingen na een behandeling of (negatieve) interactie met een zorgmedewerker, invloed kunnen hebben op (veranderingen in) vertrouwen in gezondheidszorg en de blik op vaccinaties. Bevindingen uit onderzoek naar bijvoorbeeld politieke attitudes laat daarnaast zien dat interpretaties van, en reacties op, verschillende soorten fenomenen gevormd worden door culturele frames. Gezien de bevinding dat natuur- en wetenschapsgerichte perspectieven een rol spelen in vaccinatiescepsis, lijkt het aannemelijk dat deze perspectieven vormen hoe ouders omgaan met gezondheidsgerelateerde gebeurtenissen en hoe hun vaccinatiescepsistrajecten vervolgens vorm krijgen. **Hoofdstuk 3** onderzoekt daarom hoe gezondheidsgerelateerde gebeurtenissen een rol spelen in vaccinatiescepsistrajecten van theoretisch opgeleide Nederlandse ouders, en hoe deze trajecten gevormd worden door de perspectieven van ouders.

Voor het beantwoorden van deze vraag zijn dezelfde interviews geanalyseerd als in Hoofdstuk 2. In deze interviews zijn ook vragen gesteld over potentiële veranderingen in de houding van ouders ten opzichte van vaccinaties. Analyse van dit biografische element van de verzamelde data liet zien dat verschillende soorten gezondheidsgerelateerde gebeurtenissen ouders kunnen aanzetten tot het stellen van (kritische) vragen over kindervaccinaties. Deze gebeurtenissen konden ervaringen zijn die direct gerelateerd waren aan de gezondheid van ouders of kinderen zelf, maar ook ervaringen die niet direct te maken hadden met de eigen gezondheid of die van eigen kinderen, zoals gesprekken met anderen over vaccinaties. Bovendien bleek uit de interviews dat hoe ouders deze gebeurtenissen ervoeren en hoe de daaropvolgende fases in hun vaccinatiescepsistraject precies vorm kregen afhankelijk was van hun eerder

bestaande perspectieven op gezondheid. Daarbij kregen ouders met een natuurgericht perspectief twijfels over de fundamentele principes van vaccinaties en richtten zij zich in toenemende mate op bronnen en praktijken die gezien worden als alternatief. Daarentegen ontwikkelden ouders met een wetenschapsgericht perspectief twijfels over potentiële risico's van vaccinaties en zochten zij informatie die (in hun ogen) zo wetenschappelijk mogelijk was.

Na inzicht te hebben geboden in onderliggende perspectieven van vaccinatiescepsis in Hoofdstuk 2, liet dit proefschrift in Hoofdstuk 3 zien dat onderliggende perspectieven ook vormen hoe houdingen ten opzichte van vaccinaties zich ontwikkelen. Deze twee eerste hoofstukken demonstreren dat het belangrijk is om de perspectieven van mensen zelf mee te nemen in onderzoek naar hun houding ten opzichte van vaccinaties, hoe zij beslissingen maken en hoe hun houdingen zich ontwikkelen. De volgende twee hoofdstukken bouwen voort op dit inzicht door zich te richten op een ander kenmerk van de hedendaagse vaccinatiecontext, namelijk informatievoorziening over vaccinaties. Deze hoofdstukken bestuderen de bredere relevantie van onderliggende perspectieven door te onderzoeken hoe reacties op informatievoorziening gevormd worden door een perspectief waarvan het belang is aangetoond in bestaand onderzoek, anti-institutionalisme (Hoofdstuk 4), en door de perspectieven die ontgonnen zijn in dit proefschrift, een natuur- en een wetenschapsgericht perspectief (Hoofdstuk 5).

Verschillende studies naar de effecten van informatievoorziening suggereren dat de effectiviteit van informatiecampagnes kan worden vergroot door uitgebreidere informatie te bieden. Op deze manier zou de kans op een niet-kloppende ideeën over vaccinaties en wijdverspreide misverstanden verkleind worden. Een andere suggestie om effectiviteit te vergroten is het bieden van informatie over de instantie die de bron is van de informatie, omdat dit de informatie betrouwbaarder zou maken in de ogen van het publiek.

Gezien de huidige context, is het is echter de vraag of deze suggesties daadwerkelijk het gewenste effect hebben. In gedetraditionaliseerde landen zoals Nederland worden officiële instanties namelijk steeds meer in twijfel getrokken, en daarmee ook de informatie die zij bieden. Daarnaast laat ander onderzoek, waaronder de eerste twee studies van dit proefschrift, zien dat onderliggende perspectieven van mensen een rol kunnen spelen in hun meningen over vaccinaties

en hoe deze veranderen. Het is daarom aannemelijk dat bestaande perspectieven ook vormen hoe mensen reageren op informatievoorziening over vaccinaties. Omdat een anti-institutionele houding een belangrijke rol speelt in bestaand onderzoek, richtte het volgende hoofdstuk van dit proefschrift zich op het bestuderen van de rol van anti-institutionalisme. Samengevat onderzocht **Hoofdstuk 4** de effecten van het bieden van uitgebreidere informatie over vaccinaties en informatie over de institutionele bron van de informatie op steun voor vaccinatie, en of deze elementen een minder sterk effect hebben onder mensen met een sterkere anti-institutionele houding. Hierbij lag de focus op informatie over, en steun voor, het BMR-vaccin, omdat in Nederland sterke zorgen bestaan over de dalende vaccinatiegraad tegen de bof, mazelen, en rodehond.

Hiervoor een survey-experiment gehouden onder een steekproef die representatief was voor de Nederlandse bevolking. Hierbij werden de respondenten ingedeeld in vier groepen, waarvan er drie gebruikt werden voor dit hoofdstuk: Groep 1 kreeg basisinformatie over de bof, mazelen, rodehond en het BMR-vaccin; Groep 2 ontving dezelfde basisinformatie en uitgebreide informatie over het vaccin, de effectiviteit, mogelijke bijwerkingen en onderliggend wetenschappelijk onderzoek; en Groep 3 kreeg dezelfde basisinformatie en uitgebreide informatie als groep 1 en 2, en extra informatie over de instantie die verantwoordelijk is voor het Rijksvaccinatie programma, het RIVM, met daarbij het officiële RIVM-logo. Daarna werden alle respondenten gevraagd naar hun persoonlijke steun voor het BMR-vaccin, de kans dat ze het vaccin zouden aanraden aan andere ouders, en hun steun voor een hypothetische verplichting om het BMR-vaccin te nemen. Ook werd de mate waarin zij wantrouwend waren ten opzichte van instituties gemeten (anti-institutionalisme).

Uit analyse van de verzamelde gegevens bleek dat er geen positief effect bestond van het bieden van uitgebreide informatie of van informatie over het RIVM. Daarnaast lieten de analyses zien dat het geven van uitgebreide informatie *geen effect* had op steun voor een hypothetische vaccinatieplicht onder individuen die weinig wantrouwen hadden richting instituties (lagere scores op anti-institutionalisme), maar een *negatief effect* op steun voor verplichting onder individuen die meer wantrouwend waren ten opzichte van instituties (hogere scores op anti-institutionalisme). Deze bevindingen wijzen op het belang van een

voorzichtige aanpak bij het opzetten van grootschalige informatiecampagnes, omdat deze kunnen leiden tot minder vertrouwen onder groepen die vaak juist het doel zijn. Hierbij kan worden opgemerkt dat de dataverzameling voor Hoofdstuk 4 (en 5) plaatsvond na de aanvang van de COVID-19 pandemie, waarna instanties zoals het RIVM het onderwerp waren van veel negatieve aandacht. Dit zou ervoor kunnen zorgen dat het bieden van informatie over instanties zoals het RIVM niet bijdraagt aan een perceptie van betrouwbaarheid en daarmee niet het gewenste positieve effect teweegbrengt.

Naast het bestuderen van een perspectief dat in ander onderzoek naar voren komt als relevant voor vaccinatiehoudingen (anti-institutionalisme), bestudeerde de laatste studie van dit proefschrift de rol van de natuur- en wetenschapsgerichte perspectieven die naar voren kwamen in Hoofdstuk 2. Naar aanleiding van studies waarin wordt verwacht dat het bieden van informatie over wetenschappelijk onderzoek dat ten grondslag ligt aan vaccinatie effectiever is dan basisinformatie over vaccinatie, werden in **Hoofdstuk 5** de effecten van dergelijke informatie bestudeerd op persoonlijke steun voor het BMR-vaccin, de kans dat men het vaccin zou aanraden aan andere ouders, en steun voor een hypothetische plicht op vaccinatie met het BMR-vaccin. Daarnaast werd geanalyseerd of deze effecten beïnvloed werden door natuur- en wetenschapsgerichte perspectieven.

Hiervoor werd dezelfde steekproef gebruikt als voor Hoofdstuk 4. Van de in totaal 4 groepen respondenten werden er twee gebruikt in dit hoofdstuk. De eerste groep kreeg basisinformatie over de bof, mazelen, rodehond en het BMR-vaccin. De tweede groep ontving dezelfde basisinformatie en daarnaast informatie over onderliggend wetenschappelijk onderzoek naar het vaccin. Hierna beantwoordden alle respondenten vragen over hun steun voor het BMR-vaccin, de kans dat ze het vaccin zouden aanraden aan andere ouders, en hun steun voor een hypothetische verplichting om het BMR-vaccin te nemen. Daarnaast bevatte de dataset gegevens over de mate waarin respondenten waarde hechtten de natuur (een natuurgericht perspectief) en de mate waarin zij de wetenschap en wetenschappelijke methoden centraal stelden (een wetenschapsgericht perspectief).

Analyse van deze gegevens liet zien dat het ontvangen van extra informatie over wetenschappelijk onderzoek geen positief effect had op de drie metingen van steun voor het BMR-vaccin. In het geval van steun voor verplichting van vaccinatie

met het BMR-vaccin werd een *negatief* effect gevonden, terwijl bij de andere twee metingen van steun geen effect werd gevonden. Bovendien bleek informatie over wetenschappelijk onderzoek een negatief effect te hebben op persoonlijke steun voor het BMR-vaccin onder degenen met een minder wetenschapsgericht perspectief. Deze bevinding is opvallend aangezien deze groep juist vaak de doelgroep is van informatiecampagnes omdat zij gemiddeld minder steun hebben voor vaccinatie.

De implicaties van de bevindingen zijn besproken in **Hoofdstuk 6** van dit proefschrift. De bevinding van een individualistische epistemologie onder theoretisch opgeleide, vaccinatiesceptische ouders past binnen sociologische literatuur over moderniseringsprocessen. Individualisering, oftewel een verschuiving van collectivistische naar individualistische waarden, wordt over het algemeen beschouwd als een belangrijk aspect hiervan. Op basis van dit proefschrift lijkt het aannemelijk dat deze verschuiving ook van toepassing is op vaccinatiehoudingen en -beslissingen. Uit de interviews bleek echter dat de keuze om wel of niet te vaccineren voor de geïnterviewde ouders niet alleen te maken had met individuele voordelen van niet-vaccineren (zoals het profiteren van het vaccineren door anderen, zogenaamd *freerider* gedrag). Dit wordt ook gesuggereerd door ander onderzoek naar vaccinatiescepsis, waaruit blijkt dat ouders tegenwoordig een groeiende verantwoordelijkheid voelen voor de gezondheid van hun kinderen en deze zien als in grote mate afhankelijk van hun keuzes als ouders. De ouders in dit onderzoek gaven allen aan dat hun beslissing samenging met grote angst en zorgen over de gezondheid van hun kinderen. Dit biedt een andere blik op vaccinatiescepsis dan studies waarin wordt vaccinatiekeuzes worden omschreven als een afweging tussen individuele vrijheid en sociale verantwoordelijkheid. Daarmee biedt dit proefschrift een toevoeging aan bestaande literatuur door een *emic* inzicht (geworteld in de ervaring van mensen zelf) te bieden in vaccinatiescepsis, gebaseerd op diepgaand onderzoek naar de zienswijzen van sceptische individuen.

Wat betreft de generaliseerbaarheid van de bevindingen, lijkt een individualistische epistemologie van toepassing in een bredere context waar individualistische waarden dominant zijn. Gezien het wijdverspreide karakter van individualistische waarden in Westerse landen, speelt een individualistische

benadering van waarheidsvinding waarschijnlijk ook een rol in beslissingen over andere (gezondheids)kwesties en onder andere sociale groepen dan theoretische opgeleiden. Onderzoek in landen waar collectivistische waarden dominant zijn zou wellicht wel andere resultaten opleveren wat betreft het belang van een individualistische epistemologie.

De bevinding van een natuurgericht perspectief is niet verrassend wanneer men ander kwalitatief onderzoek naar vaccinatiescepsis raadpleegt. Verschillende studies bevestigen dat een voorkeur voor het natuurlijke een rol speelt in vaccinatiescepsis onder verschillende sociale groepen en in verschillende landen. Kwantitatief onderzoek op dit gebied is zeldzamer, en is voornamelijk gebaseerd op specifieke metingen die direct gerelateerd zijn aan vaccinaties. Zoals aanbevolen door andere auteurs, biedt dit proefschrift inzicht in de rol van een voorkeur voor het natuurlijke als op zichzelf staand perspectief dat niet alleen van toepassing is op vaccinaties. Hoofdstuk 5, dat een dergelijke meting bevatte, liet echter geen verband zien tussen een natuurgericht perspectief en het effect van wetenschappelijke informatie. Om deze bevinding beter te begrijpen zou toekomstig onderzoek kunnen bestuderen of het omgekeerde wel plaatsvindt: een positiever effect van informatie waarin natuurlijkheid (in plaats van een wetenschappelijk karakter) benadrukt wordt onder degenen met een meer natuurgericht perspectief. Dit is vooral interessant in het licht van andere maatschappelijke trends waarin aandacht voor het natuurlijke een grote rol speelt, zoals toenemende aandacht voor natuurlijk bevallen en natuurlijk ouderschap.

Naast een natuurgericht perspectief speelde ook een wetenschapsgericht perspectief een rol in vaccinatiescepsis onder theoretisch opgeleide Nederlandse ouders. Deze bevinding is wellicht onverwachter, omdat vaak verondersteld wordt dat een grotere affiniteit met wetenschap leidt tot een groter vertrouwen in wetenschap en maatregelen die eruit voortkomen (zoals vaccinaties). Dit proefschrift laat zien dat een dergelijke affiniteit met wetenschap en wetenschappelijke methoden zich niet automatisch vertaalt in een groter vertrouwen: voor sommige mensen resulteert dit juist in grotere scepsis. Ouders die geïnterviewd zijn voor dit onderzoek gebruikten hun bekendheid met, en waardering voor, wetenschappelijke methodes en principes om de kwaliteit van wetenschappelijk onderzoek kritisch te bevragen en in twijfel te trekken. Opvallend

is dat een dergelijke kritische houding wordt gezien als de kern van onderwijs dat gegeven wordt aan wetenschappelijke instituten zoals universiteiten. Toekomstig onderzoek zou kunnen bestuderen voor wie, en onder welke omstandigheden, affiniteit met de wetenschap samengaat met het in twijfel trekken van de wetenschappelijke consensus.

Voortbouwend op literatuur die stelt dat culturele frames vormen hoe mensen reageren op publieke informatievoorziening, bestudeerde dit proefschrift ook hoe onderliggende perspectieven invloed hebben op de ontwikkeling van vaccinatiescepsistrajecten, en op de effecten van informatievoorziening over vaccinaties. Uit Hoofdstuk 3 bleek dat vaccinatiescepsistrajecten van ouders met een natuurgericht perspectief verschillen van die van ouders met een wetenschapsgericht perspectief. Inzicht in de rol die perspectieven spelen kan bovendien helpen om te begrijpen waarom sommige ouders die twijfels krijgen over vaccinaties uiteindelijk besluiten om geen vaccinaties toe te dienen, terwijl anderen kiezen voor gedeeltelijke vaccinatie en weer anderen het volledige programma volgen. Hoewel het verwerven van onderliggende perspectieven niet centraal stond in Hoofdstuk 3, geven de interviews aanwijzingen dat zowel socialisatie in de vroege jeugd als in latere levensjaren een rol kunnen spelen.

Uit Hoofdstuk 4 en 5, waarin de rol van onderliggende perspectieven in de effecten van informatievoorziening over vaccinaties werd bestudeerd, bleek dat alleen een anti-institutionele houding en een wetenschapsgericht perspectief een rol spelen. De bevinding dat effecten van informatievoorziening verschillend zijn onder groepen met verschillende denkbeelden sluit aan bij literatuur waarin het traditionele ‘informatie-deficit’ model bekritiseerd wordt vanwege de aanname dat informatie-effecten universeel zijn. Om informatie-effecten beter te begrijpen, is het belangrijk om onderliggende perspectieven (of ‘culturele frames’) van mensen mee te nemen.

De studies uitgevoerd voor dit proefschrift lieten zien dat een natuurgericht perspectief geen rol speelden in de effecten van informatievoorziening over vaccinaties. Het zou kunnen dat er geografische verschillen bestaan in hoe belangrijk een natuurgericht perspectief is voor hoe informatie ontvangen wordt. Zo sluit een natuurgericht perspectief nauw aan bij antroposofische overtuigingen, die in Nederland geconcentreerd zijn in bepaalde gebieden (in en rondom Zutphen,

Zeist, en Den Haag). Vergelijkend onderzoek zou hierin meer inzicht kunnen bieden. Daarnaast zou in onderzoek naar de effecten van informatie-voorziening de rol van andere zienswijzen, zoals religieuze overtuigingen, bestudeerd kunnen worden.

Daarnaast zou de timing van de verschillende momenten waarop data verzameld zijn invloed kunnen hebben gehad op de resultaten gepresenteerd in dit proefschrift. Zo zijn de interviews (voor Hoofdstuk 2 en 3) gehouden voor de uitbraak van COVID-19 in Nederland, terwijl de data voor de studies gepresenteerd in Hoofdstuk 4 en 5 daarna verzameld zijn. De pandemie zou ervoor kunnen hebben gezorgd dat anti-institutionele en wetenschapsgerichte perspectieven een prominentere rol zijn gaan spelen in het publieke debat, waardoor zij van groter belang zijn voor hoe informatie ontvangen wordt. Tot slot zou een focus op een ander vaccin (dan het BMR-vaccin) tot een andere uitkomst kunnen leiden: vaccins gebaseerd op nieuwe technologie, zoals het mRNA-vaccin tegen COVID-19, zouden sterkere associaties kunnen oproepen met technologie en kunstmatigheid, die vooral voor mensen met een natuurgericht perspectief belangrijk zouden kunnen zijn.

Op basis van de bevindingen van dit proefschrift kunnen ook conclusies worden getrokken over de waarde van de gehanteerde cultuursociologische benadering. Eén van de centrale doelstellingen van dit proefschrift was het centraal stellen van de zienswijzen van vaccinatiesceptische mensen zelf, om op deze manier diepgravend inzicht te kunnen bieden in hun perspectieven en hoe deze verbonden zijn met hun sceptische houding ten opzichte van vaccinaties. Dit heeft ertoe geleid dat er naast een natuurgericht perspectief, dat aansluit bij ander onderzoek, ook een wetenschapsgericht perspectief is ontgonnen. Op basis van literatuur die veronderstelt dat een affiniteit met wetenschap leidt tot meer vertrouwen, is de rol die een wetenschapsgericht perspectief speelt onverwacht. Dit proefschrift biedt daarmee een belangrijke toevoeging aan bestaande kennis over vaccinatiescepsis.

Daarnaast had de cultuursociologische benadering in dit proefschrift als doel om de rol van onderliggende perspectieven in een bredere vaccinatieomgeving te onderzoeken. Door aan te tonen dat dergelijke perspectieven een belangrijke rol spelen in hoe vaccinatieattituden zich ontwikkelen en in hoe mensen reageren op informatievoorziening over vaccinaties, laat dit proefschrift de waarde zien van een

bredere cultuursociologische aanpak die verdergaat dan het ontginnen van perspectieven. Concluderend biedt de gehanteerde aanpak dus conclusies die geworteld zijn in de ervaringen van vaccinatiesceptische individuen zelf, waarmee een relevante bijdrage kan worden geboden aan wetenschappelijk en maatschappelijk debat over vaccinatiescepsis.

Tot slot biedt dit proefschrift ook aanbevelingen voor de praktijk van vaccinaties en gezondheid(szorg). Ten eerste lijkt het vruchtbaar om rekening te houden met de individualistische houding die hedendaagse ouders hebben ten opzichte van kennis- en waarheidsvinding. Omdat mensen in Westerse contexten het individu zo belangrijk vinden, zou het bijvoorbeeld waardevol zijn om individuele beoordelingen van informatie en advies expliciet te bevragen in interacties tussen patiënten en zorgprofessionals. Daarnaast laat dit proefschrift zien dat mensen die sceptisch zijn ten opzichte van vaccinaties niet per definitie afwijzend staan tegenover advies van medici, maar dat het gevoel veroordeeld te worden op basis van hun zienswijzen hier een belangrijke rol in speelt. Hiermee sluit dit proefschrift aan bij andere onderzoeken die aangeven dat een niet-veroordelende houding belangrijk is om te voorkomen dat wantrouwen verder wordt aangewakkerd.

De bevinding dat onderliggende perspectieven een rol spelen in hoe mensen omgaan met informatie heeft ook implicaties voor de praktijk. Zo is het voor beleidsmakers belangrijk om de effecten van grootschalige informatiecampagnes kritisch te doordenken, omdat deze ook averechts kunnen werken onder bepaalde groepen. Bestaand onderzoek naar het gebruik van ‘frames’ in informatievoorziening laat zien dat het anders brengen van informatie zonder de boodschap te veranderen nuttig kan zijn. Verder onderzoek naar frames die gebaseerd zijn op de perspectieven van mensen zelf kan meer inzicht bieden in welke informatieframes ten goede kunnen komen aan het maken van een geïnformeerde keuze over vaccinaties. Daarnaast kan een meer geïndividualiseerde aanpak in de gezondheidszorg helpen om rekening te houden met de verschillende perspectieven van mensen. Recente studies laten bijvoorbeeld zien dat lokale initiatieven, die dichter bij de mensen zelf staan, behulpzaam zijn bij het achterhalen van verschillende zienswijzen en vragen die mensen hebben, en in het meenemen hiervan in maatregelen. Dergelijke benaderingen hebben als bijkomend

voordeel dat deze minder leunen op grote, landelijke instituties die in de huidige context te maken hebben met dalend vertrouwen, en waar individuen tegenwoordig minder bereid zijn om informatie van aan te nemen. Tot slot zou toekomstig onderzoek zich kunnen richten op de rol die andere bronnen van informatie zouden kunnen spelen. Zo blijkt uit dit proefschrift (en uit ander onderzoek) dat vrienden, familie, en sociale media belangrijke bronnen van sociale steun, informatie, maar ook van stigmatisering kunnen zijn. Gezien de verschillende rollen die deze bronnen kunnen vervullen, is verder onderzoek nodig om inzicht te verkrijgen in hoe ze kunnen bijdragen aan het omgaan met zorgen die ouders hebben over het vaccineren van hun kinderen.

Dankwoord

Dankwoord

Het schrijven van een proefschrift gaat denk ik niemand in de koude kleren zitten, en ik ben hierop geen uitzondering. Zonder hulp had ik dit proefschrift niet kunnen schrijven, laat staan afmaken. Mijn eerste woord van dank gaat uit naar de respondenten die hebben meegewerkt aan dit onderzoek. Zonder hen had ik dit onderzoek niet kunnen uitvoeren. Ik waardeer hun openheid, vertrouwen, en bereidheid om persoonlijke ervaringen te delen enorm – dat kan niet makkelijk geweest zijn in een tijd waarin oordelen over elkaars gedrag breed worden uitgemeten in het publieke debat.

Dankbaar ben ik ook voor de academische omgeving waarin ik dit proefschrift heb mogen schrijven. Allereerst voor Willem en Jeroen, mijn begeleiders. Bedankt voor al jullie steun, feedback en aanmoediging. Ik denk dat ik (en de anderen die jullie begeleid(d)en) een apart hoofdstuk zouden kunnen schrijven over jullie rol als begeleiders. Dat ga ik natuurlijk niet doen, maar wel wil ik graag kwijt dat ik me altijd gelukkig geprijsd heb met begeleiders als jullie. Niet alleen allebei ontzettend intelligent en altijd (eigenlijk onvermoeibaar) scherp, maar bovendien zeer betrokken. Nooit ging het menselijke element verloren in onze vele afspraken. Of dit nu de vorm aannam van allerlei grapjes over onderzoek, mij, of jullie zelf (dat waren de leukste), serieuze gesprekken over het leven of eten bij de Chinees, altijd was er tijd en aandacht voor hoe het ging op persoonlijk vlak. Ontzettend bedankt!

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helpen met inhoudelijke en administratieve vragen. Ook was er gelukkig zo nu en dan tijd voor borrels en andere uitjes. De redactie van Sociologie Magazine heeft mij geholpen om mijn blik te verbreden, en om een brug te slaan naar de wereld buiten de academie. Een extra bedankje gaat naar José, die ik leerde kennen tijdens mijn masterstudie. Niet alleen ben je ontzettend intelligent en kun je scherpe feedback geven (en gek genoeg erg bescheiden blijven), je was er ook altijd om te vragen naar hoe het met me ging. Bedankt!

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inmiddels samen nog iets veel groters meegemaakt: de geboorte van ons kleine meisje. Onze dochter Fleur is een nog grotere inspiratiebron dan al mijn werk in de wetenschap ooit geweest is. Ik hou van jullie!

Doctoral portfolio

Articles published during PhD

Ten Kate, J., De Koster, W. & Van der Waal, J. (2025). What is the effect of providing information about the science behind vaccination? A population-based survey-experiment on support for the MMR vaccine. *European Societies (Early access)*: 1-29

Ten Kate, J., De Koster, W. & Van der Waal, J. (2022). Becoming skeptical towards vaccines: How health views shape the trajectories following health-related events. Social Science & Medicine, 293(1), 114668-114672.

Ten Kate, J., De Koster, W. & Van der Waal, J. (2021). "Following your gut" or "questioning the scientific evidence": Understanding vaccine skepticism among more-educated Dutch parents. Journal of Health and Social Behavior, 62(1): 85-99.

Articles published before PhD

Ten Kate, J., De Koster, W. & Van der Waal, J. (2018). 'Gelovig en gelukkig? De relatie tussen religiositeit en levenstevredenheid in Nederland'. Mens en Maatschappij, 93(1), 77-92. doi: https://doi.org/10.5117/MEM2018.1.INDE

Ten Kate, J., De Koster, W. & Van der Waal, J. (2017). 'Why are depressive symptoms more prevalent among the less educated? The relevance of low cultural capital and cultural entitlement.' Sociological Spectrum, 37(2), 63-76. doi: 10.1080/02732173.2016.1274248

Ten Kate, J., De Koster, W. & Van der Waal, J. (2017). 'The effect of religiosity on life satisfaction in a secularised context: Assessing the relevance of believing and belonging.' Review of Religious Research, 59(2), 135-155. doi: 10.1007/s13644-016-0282-1

Other professional publications

Ten Kate, J., De Koster, W., Van der Waal, (2021). 'Waarom hoger opgeleide ouders sceptisch zijn over vaccinaties'. Friesch Dagblad, 25 februari, 2021 (herdruk van artikel Sociale Vraagstukken).

Ten Kate, J., De Koster, W., Van der Waal, (2021). 'Waarom hoger opgeleide ouders sceptisch zijn over vaccinaties'. Sociale Vraagstukken, 11 februari 2021.

https://www.socialevraagstukken.nl/waarom-hoger-opgeleide-ouders-sceptisch-zijn-over-vaccinaties/

Datasets and data collection

Ten Kate, J., De Koster, W. & Van der Waal, J. (2022). 'Uw mening over gezondheid'. Information provision survey-experiment. *Tilburg: Centerdata*. (n=3,448)

Ten Kate, J., De Koster, W. & Van der Waal, J. (2022). 'Discrete Choice Experiment'. *Tilburg: Centerdata*. (n=3,714)

Ten Kate, J., De Koster, W. & Van der Waal, J. (2018). Meanings and trajectories of vaccine skepticism: in-depth interviews. Self-collected (n=31)

Courses taught during PhD

Lecturer in Premaster course 'Research Project'. Giving lectures and supervising students' research projects. *Erasmus University Rotterdam*

Head lecturer and designing of Premaster course 'Basis Kwantitatief Onderzoek. Designing new course and overall coordination. *Erasmus University Rotterdam*

Head lecturer Bachelor-2 course 'Hoofdvragen van de Sociologie'. Designing new course and overall coordination. *Erasmus University Rotterdam*

Thesis supervisor, Master of Sociology [supervised a total of 6 theses and second reader to a total of 7 other theses], *Erasmus University Rotterdam*

Thesis supervisor, Bachelor of Sociology [supervised a total of 8 theses and second reader to a total of 11 other theses], *Erasmus University Rotterdam*

Workgroup lecturer Bachelor course 'SPSS Practicum', *Erasmus University Rotterdam*

Workgroup lecturer Master course 'The Social Bases of Politics', *Erasmus University Rotterdam*

Workgroup lecturer Bachelor course 'SPSS Practicum', *Erasmus University Rotterdam*

Workgroup lecturer Master course 'The Social Bases of Politics', *Erasmus University Rotterdam*

Junior lecturer Bachelor course 'Political Science', *Erasmus University Rotterdam*

Courses taught before PhD

Thesis supervisor, Master of Sociology [supervised a total of 5 theses and second reader to a total of 5 other theses], *Erasmus University Rotterdam*

Thesis supervisor, Bachelor of Sociology [supervised a total of 5 theses and second reader to a total of 6 other theses], *Erasmus University Rotterdam*

Junior lecturer and student research supervisor 'Kwalitatief leeronderzoek', *Erasmus University Rotterdam*

Workgroup lecturer Bachelor course 'Statistics 2', *Erasmus University Rotterdam*

Workgroup lecturer Bachelor course 'Beleidssociologie', *Erasmus University Rotterdam*

Workgroup lecturer Bachelor course 'Kwantitatieve Methoden', *Erasmus University Rotterdam*

Workgroup lecturer Master course 'Herverdelen, participeren en zorgen', *Erasmus University Rotterdam*

Workgroup lecturer Master course 'Organiseren', *Erasmus University Rotterdam*

Junior lecturer and student research supervisor 'Kwalitatieve Methoden en Leeronderzoek', *Erasmus University Rotterdam*

Doctoral training

Bounce back: mental challenges of doing a PhD, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Open Science Framework (OSF), *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Making your research count: Impact in times of information overload, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Maximize your visibility as a researcher, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

MATLAB data skills & tools for the social sciences, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Philosophy of the humanities and social sciences, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Mixed method research: How to combine diverse quantitative and qualitative methods, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Visual exploration of scientific literature with VOSviewer, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Multilevel modelling II: SEM, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Multilevel modelling I: An introduction, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Communicating your research: Lessons from Bitescience, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Data analysis with R, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Responsible research data management, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Qualitative comparative analysis (QCA), *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Professionalism & integrity, *Erasmus Graduate School of Social Sciences and the Humanities, Erasmus University Rotterdam*

Conference presentations

Ten Kate, J., De Koster, W., Van der Waal, J. (2021). 'How do more-educated Dutch parents become vaccine skeptics? How health views shape the trajectories following triggering events.' Presentation at European Sociological Association Conference, 2nd September 2021.

Ten Kate, J., De Koster, W., Van der Waal, J. (2021). 'Vaccinatiescepticisme-trajecten van hoger opgeleide Nederlandse ouders. De rol van gezondheidsgebeurtenissen en -overtuigingen.' Presentation at 'Dag van de Sociologie' organized by the Dutch Sociological Association (NSV), 10th June 2021.

Ten Kate, J., De Koster, W., Van der Waal, J. (2020). 'Becoming a vaccine skeptic: How pathways to vaccine skepticism are shaped by the interplay between health-related events and worldviews.' Presentation at the annual PhD Day of the Department of Public Administration and Sociology (Erasmus University Rotterdam), 17th December 2020.

Ten Kate, J., De Koster, W., Van der Waal, J. (2020). 'Becoming a vaccine skeptic: How pathways to vaccine skepticism are shaped by the interplay between health-related events and worldviews.' Presentation at the Cultural Sociology Lowlands Conference, 6th November 2020.

Ten Kate, J., De Koster, W., Van der Waal, J. (2020). '"Your really have to make your own choice": Understanding vaccine skepticism among more-educated Dutch parents.' Presentation at American Sociological Association Annual Conference, 30th June 2020.

Ten Kate, J., De Koster, W., Van der Waal, J. (2019). 'Attitudes towards vaccination among more-educated parents in the Netherlands.' Presentation at the annual PhD Day of the Department of Public Administration and Sociology (Erasmus University Rotterdam), 17th December 2019

Ten Kate, J., De Koster, W. & Van der Waal, J. (2018). 'The role of status-oriented culture in the educational gradient in mental well-being in European countries.' Presented at the European Society for Health and Medical Sociology in 2018, Lisbon, Portugal.

Ten Kate, J., De Koster, W. & Van der Waal, J. (2017). 'Country variations in educational inequality in well-being.' Presented at the Annual meeting of the Dutch and Flemish Sociological Association in 2017 ('Dag van de Sociologie'), Brussels, Belgium.

Ten Kate, J., De Koster, W. & Van der Waal, J. (2016). 'The effect of religiosity on life satisfaction in a secularized context: Assessing the relevance of believing and belonging.' Presented at the Annual meeting of the Dutch and Flemish Sociological Association in 2016 ('Dag van de Sociologie'), Tilburg, the Netherlands.

Ten Kate, J., De Koster, W. & Van der Waal, J. (2016). 'Collectivism, marriage, and well-being. How and why the extent to which marriage leads to greater subjective well-being depends on national collectivism'. Presented at the

Annual meeting of the Dutch Demographic Association in 2016 ('Demografiedag'), Utrecht, the Netherlands.

Ten Kate, J., De Koster, W. & Van der Waal, J. (2015). 'Why are depressive symptoms more prevalent among the less educated? Testing economic, cultural, and social explanations in the United States, 2014'. Presented at the Annual meeting of the Dutch and Flemish Sociological Association in 2015 ('Dag van de Sociologie'), Amsterdam, the Netherlands.

Invited lectures

Ten Kate, J., De Koster, W., Van der Waal, J. (2022). 'Hoe verschillende wereldbeelden vaccinatie attitudes vormen'. Invited lecture at the Fall Conference of the 'Vlaamse Vereniging voor Kindergeneeskunde' (forthcoming, November 2022), Gent University.

Ten Kate, J., De Koster, W., Van der Waal, J. (2022). 'Hoe kunnen we vaccinatiescepsis in Nederland begrijpen?' Invited lecture at the 'Landelijke Docentendag Maatschappijleer' (16-06-2022) organized by the Dutch Association for Civics Teachers (NLVM), ProDemos (Den Haag).

Ten Kate, J., De Koster, W., Van der Waal, J. (2022). 'Hoe kunnen we vaccinatiescepsis onder hogeropgeleide Nederlandse ouders begrijpen?' Invited lecture at the 'Landelijke Leraren-in-Opleiding Dag Maatschappijleer' (28-03-2022), Universiteit van Amsterdam.

Ten Kate, J., De Koster, W., Van der Waal, J. (2021). '"Je gevoel volgen" of "het wetenschappelijke bewijs bevragen". Hoe kunnen we vaccinatiescepsis onder hoger opgeleide Nederlandse ouders begrijpen?' Gastspreker bij Symposium 'De prijs van uw pil' (16 september 2021), Amsterdam UMC.

Ten Kate, J., (2017). 'Sociale ongelijkheid in mentaal welzijn.' Invited lecture at the National Institute for Public Health and the Environment (RIVM) (26-06-2017), Bilthoven, the Netherlands.

Ten Kate, J. (2017). 'The effect of religiosity on life satisfaction in a secularized context: Assessing the relevance of believing and belonging.' Invited lecture at the EHERO Seminar (10-03-2017), Erasmus University Rotterdam, the Netherlands.

Media exposure

NRC (2021). 'Telkens weer misvattingen over vaccins en vruchtbaarheid'. NRC, 8 december 2021. https://www.nrc.nl/nieuws/2021/12/08/misvattingen-over-vaccins-en-vruchtbaarheid-zijn-onuitroeibaar-a4068372

BN De Stem (2021). 'Wel of niet vaccineren? De wens van het kind telt: 'Ik ben haar ouder, niet de baas over haar lijf''. BN De Stem, 14 augustus 2021. https://www.bndestem.nl/roosendaal/wel-of-niet-vaccineren-de-wens-van-het-kind-telt-ik-ben-haar-ouder-niet-de-baas-over-haar-lijf~a88a3aa5/?referrer=https%3A%2F%2Fwww.google.com%2F

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Erasmus Magazine (2021). 'Coronawetenchap: Deze onderzoeker wil begrijpen waarom mensen vaccinaties wantrouwen'. Erasmus Magazine, Erasmus Universiteit Rotterdam, 9 maart 2021. https://www.erasmusmagazine.nl/2021/03/09/coronawetenschap-deze-onderzoeker-wil-begrijpen-waarom-mensen-vaccinaties-wantrouwen/

Studio Erasmus (2021). 'Waar komt de angst voor vaccinaties vandaan?' Studio Erasmus, 1 februari 2021. https://www.youtube.com/watch?v=tXYpg17UKcE&list=PLy8Iye-CVycVjyfWc1ZorNZEm_6A8l8FY&index=8

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Nederlands Dagblad (2021). 'Roep om beter informeren over vaccinatie. 'Erken twijfels en zorgen coronaprik''. Nederlands Dagblad, 6 januari 2021. https://www.nd.nl/nieuws/nederland/1011747/erken-twijfels-en-zorgen-coronaprik

Radio Rijnmond (2020). 'Socioloog over het coronavaccin: Mensen hebben het idee dat het schort aan de kwaliteit van de controleprocedure.' Interview Radio

Rijnmond, 18 november 2020. https://www.rijnmond.nl/nieuws/201245/Socioloog-over-coronavaccin-Mensen-hebben-het-idee-dat-het-schort-aan-de-kwaliteit-van-de-controleprocedure

5 Uur Show (2020). 'Wantrouwen in vaccinatie'. SBS6, 3 december 2020. https://www.youtube.com/watch?v=mANyXhrldpo

Nederlands Dagblad (2021). 'Erken twijfels en zorgen coronaprik.' Nederlands Dagblad, https://www.nd.nl/nieuws/nederland/1011747/erken-twijfels-en-zorgen-coronaprik

Knowledge utilization

Advisor to the 'Underserved groups' project of the Pandemic and Disasters Preparedness Center (PDPC) (2022-present).

Expert contribution to 'Zienswijze over de humanisering van gezelschapsdieren' (2020) by the Raad voor Dierenaangelegenheden (RDA). Advice to the Minister van Landbouw, Natuur en Voedselkwaliteit on vaccination trends.

Expert participation in 'World Cafe Vaccination' (2021) organized by 'Hieroo' in collaboration with the GGD Rotterdam-Rijnmond.