

“Following Your Gut” or “Questioning the Scientific Evidence”: Understanding Vaccine Skepticism among More-Educated Dutch Parents

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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 neoromantic one focuses on deriving truth through intuition and following a “natural” path and informs 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 (neoromantic 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.

Keywords

education, reflexivity, risk, vaccination, vaccine skepticism

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 United States 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 such as 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). Because participation in the Dutch National Immunization Program (NIP) is relatively easy and free of charge (Rijksinstituut voor Volksgezondheid en Milieu [Dutch National Institute for Public Health and the Environment, or 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”

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Table 1. The Dutch National Immunization Program.

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.

Source: <https://rijksvaccinatieprogramma.nl/english>.

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, and 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, and Ward 2019; 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 health care field: one neoromantic (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.

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 3, 5, 11, and 14 months and at 4, 9, 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 1 provides an overview of the Dutch NIP.

Traditionally, the vaccination rate in the Netherlands has been relatively high (RIVM 2019c). The 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 2019b), there are still concerns about rising levels of vaccine hesitancy and possible further reductions in the vaccination uptake, particularly

because 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 such as 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 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), but it is also the case that they are more likely to intentionally deviate from or opt out of the NIP (Streefland, Chowdhury, and Ramos-Jimenez 1999). However, how one can understand their vaccine skepticism is unclear, especially given that education is generally found to fuel greater trust in (medical) science and technology (Bak 2001) and increases the capacity to navigate and use health care 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 toward vaccines requires an approach that enables the investigation of nonhegemonic 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 although 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.

DATA AND METHODS

Given the aim of our study, we used qualitative in-depth interviews, which enabled a detailed examination of respondents’ points of view (Charmaz 2014). Because 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, because our focus is on vaccine skepticism, which ranges from strong antivaccination 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 have indicated (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 toward Vaccines,” NVKP), which is an organization for people who are skeptical toward 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 because 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).

Because 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 health care, 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 and the Netherlands Sociological Association, 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 nonjudgmental 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 nonjudgmental 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, 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.

RESULTS

Vaccine Skepticism: A Shared Epistemology

Similar to findings of recent studies on vaccine attitudes (e.g., Attwell et al. 2019; Carrion 2018;

Table 2. Overview of Respondents.

Name	Gender	Age	Education	Number of Children	Notes	Vaccine Uptake	Recruited through
Katie	Female	50	HBO	2		None	NVKP
Sophie	Female	52	HBO	2		Full	NVKP
Annette	Female	38	HBO	1		None	NVKP
Mark	Male	58	HBO	2	Couple interview	None	NVKP
Eliza	Female	59	HBO	2	Couple interview	None	NVKP
Zoe	Female	38	HBO	2		Partial and delayed	NVKP
Jennifer	Female	43	WO	1		Full	NVKP
Chris	Male	58	HBO	1		None	NVKP
Annie	Female	27	HBO	2		Partial	NVKP
Mabel	Female	41	HBO	1		None	NVKP
Babette	Female	42	WO	1		None	NVKP
Faye	Female	53	WO	1		Partial	oudersvannu.nl
Toon	Male	30	WO	Expecting first child	Couple interview	Plan to fully vaccinate	Snowballing
Kristel	Female	28	HBO	child	Couple interview		
Ray	Male	60	HBO	5		None	Snowballing
Elsemieke	Female	60	WO	2		Full	mamaforum.nl
Gwen	Female	39	WO	1		Full + additional vaccines	Facebook Vaccineren: ja of nee
Layla	Female	30	HBO	2		Partial	Facebook Vaccineren: ja of nee
Iris	Female	30	WO	1		Delayed (full)	Snowballing
Vicki	Female	57	HBO	2		Partial	oudersvannu.nl
Crystal	Female	30	WO	1		Full	Snowballing
Michelle	Female	31	HBO	3		Partial	oudersvannu.nl
Robin	Female	39	HBO	2		Eldest full, youngest none	School
Rob	Male	41	WO	2	Couple interview	Partial and delayed	School
Mariëlle	Female	40	WO	2	Couple interview		
Michael	Male	37	HBO	3		Full	School
Tom	Male	34	HBO	2	Couple interview	Full	School
Dunya	Female	34	WO	2	Couple interview	Full	School
Jan	Male	58	HBO	3		Partial	School
Sara	Female	35	HBO	2		None	School
Lilian	Female	51	HBO	4		Eldest 2 full, youngest 2 partial and delayed	School

Note: To protect the identity of the interviewees, we use pseudonyms. HBO stands for Hoger Beroepsopleiding (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 toward Vaccines). 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.

Duchsherer et al. 2020), our analysis shows that 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 an absence 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 health care 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,” whereas 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 and Beck-Gernsheim 1996:27) and have “no choice but to choose” (Giddens 1991:75). Applying this to the domain of modern medicine and health, other authors have concluded 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 (Reich 2020; Ward et al. 2018). 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. 2019; Carrion 2018), 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 neoromantic repertoire is used where the focus is on deriving truth from individual feelings and intuition 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 health care system is discussed in the following.

Neoromantic Repertoire

Feelings and intuition as the path to the truth. The use of a neoromantic 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,” whereas 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 domains other 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 neoromantic 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.

Positioning in the health care field. Because feelings serve as a way to determine the truth or acquire knowledge in the neoromantic repertoire, they are very important for evaluating health care 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, health care 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 that 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 United States (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” health care, 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 health care, with Jennifer, for instance, saying that she “[has] great faith in the health care system. . . . In *repairing* humans, they’re really good at that” (emphasis added). Preventive 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 preventive (and thus unnatural) measures were also inclined to not participate at all in the government-run NIP.

This neoromantic 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: Although 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 neoromantic 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.

Critical-Reflexive Repertoire

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 neoromantic 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 that she does not like it when sources on vaccination contain “zero arguments” or say “things that are just dumb” and that 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); scientific information on vaccination is not followed blindly but reflected on critically, thus applying a critical and scientific 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, whereas 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,” whereas 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.

Positioning in the health care field. In a critical-reflexive repertoire, evaluations of health care 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 health care 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,” whereas 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 felt 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.” Because our respondents were all highly educated and because 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, and 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 (e.g., vaccines).

The central role of scientific methods was also visible in the strategies used by parents for researching vaccinations and other health care 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, whereas Kristel thought a statement was “more reliable” when she found “different sources” that had “the same answers.” In addition, parents often used (an array of) mainstream medical resources and professionals in their search for the best health care for their child. In contrast to the neoromantic 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 health care professional whose background she considered “absolutely, entirely scientific, medical,” whereas 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,” whereas 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., against polio).

Similar to the neoromantic 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).

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. 2019; Carrion 2018; 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 neoromantic, which focuses on obtaining the truth from feelings and intuition 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 2018). In addition, insight in these repertoires is crucial because 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: While the idea that vaccinating against childhood diseases (like MMR) could interfere with the natural development process was informed by a neoromantic repertoire, uncertainty about the vaccine's scientific basis was brought to the fore in a critical-reflexive repertoire. Our analysis thus shows that although vaccine-skeptical parents may share an individualist epistemology and regularly make the same decisions about vaccinations, they do so for different reasons. That the neoromantic and critical-reflexive repertoires are not drawn on occasionally but inform a wide range of vaccination decisions suggests that respondents' views on issues in other scientific domains, such as pollution or radiation, are also inspired by one of the two repertoires, although future research is required to explore this in depth.

Additionally, whereas 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 neoromantic 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 neoromantic 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, given that 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 neoromantic 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 nonspiritual 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 in 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, "antiscience" phenomenon as often assumed (Carrion 2018), but also 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 on 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 such as vaccine skepticism. Although our more-educated respondents would generally be expected to have a greater affinity with scientific products such as 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 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, and 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 and Achterberg 2017). Individual attributes such as education matter more in individualist societies (Durant et al. 2000; Noy and 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 health care. In more privatized health care systems like that in the United States, 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, and 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 neoromantic 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 multifaceted 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.

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NOTE

1. The critical-reflexive repertoire clearly differs from the neoromantic 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 neoromantically 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 neoromantic 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).

REFERENCES

- Achterberg, Peter, Willem de Koster, and Jeroen van der Waal. 2017. “A Science Confidence Gap: Education, Trust in Scientific Methods, and Trust in Scientific Institutions in the United States, 2014.” *Public Understanding of Science* 26(6):704–20.
- Attwell, Katie, Julie Leask, Samantha Meyer, Philippa Rokkas, and Paul Ward. 2017. “Vaccine Rejecting Parents’ Engagement with Expert Systems That Inform Vaccination Programs.” *Bioethical Inquiry* 14(1):65–76.
- Attwell, Katie, David Smith, and Paul Ward. 2019. “‘If Your Child’s Vaccinated, Why Do You Care about Mine?’ Rhetoric, Responsibility, Power and Vaccine Rejection.” *Journal of Sociology*. <https://doi.org/10.1177/1440783319893468>.
- Attwell, Katie, Paul Ward, Samantha Meyer, Philippa Rokkas, and Julie Leask. 2018. “‘Do-It-Yourself’: Vaccine Rejection and Complementary and Alternative Medicine (CAM).” *Social Science & Medicine* 196(1):106–14.
- Bak, Hee-Je. 2001. “Education and Public Attitudes toward Science: Implications for the ‘Deficit Model’ of Education and Support for Science and Technology.” *Social Science Quarterly* 82(4):779–95.
- Beck, Ulrich. 1992. *Risk Society: Towards a New Modernity*. London: Sage.
- Beck, Ulrich, and Elisabeth Beck-Gernsheim. 1996. “Individualization and ‘Precarious Freedoms’: Perspectives and Controversies of a Subject-Oriented Sociology.” Pp. 23–48 in *Detraditionalization: Critical Reflections on Authority and Identity*, edited by P. Heelas, S. Lash, and P. Morris. Oxford: Blackwell.
- Becker, Howard. 1998. *Tricks of the Trade: How to Think about Your Research while You’re Doing It*. Chicago: University of Chicago Press.
- Bobel, Chris. 2002. *The Paradox of Natural Mothering*. Philadelphia, PA: Temple University Press.
- Bolsen, Toby, James Druckman, and Fay Cook. 2014. “The Influence of Partisan Motivated Reasoning on Public Opinion.” *Political Behavior* 36(2):235–62.
- Byström, Emma, Ann Lindstrand, Nathalie Likhite, Robb Butler, and Maria Emmelin. 2014. “Parental Attitudes and Decision-Making Regarding MMR Vaccination in an Anthroposophic Community in Sweden.” *Vaccine* 32(50):6752–57.
- Campbell, Colin. 2007. *The Easternization of the West. A Thematic Account of Cultural Change in the Modern Era*. Boulder, CO: Paradigm Publishers.
- Carrion, Melissa. 2018. “‘You Need to Do Your Research’: Vaccines, Contestable Science, and Maternal Epistemology.” *Public Understanding of Science* 27(3):310–24.
- Charmaz, Kathy. 2014. *Constructing Grounded Theory*. 2nd ed. Los Angeles: SAGE.
- CLO. 2019. *Hoogopgeleiden, 2018 (indicator 2100, versie 10, 5 juni 2019)*. Den Haag/Heerlen: CBS; Den Haag: PBL; Bilthoven: RIVM; Wageningen: Wageningen University and Research. <https://clo.nl/indicatoren/nl2100-opleidingsniveau-bevolking>.
- Dubé, Eve, Dominique Gagnon, Emily Nickels, Stanely Jeram, and Melanie Schuster. 2014. “Mapping Vaccine Hesitancy—Country-Specific Characteristics of a Global Phenomenon.” *Vaccine* 32(49):6649–54.
- Dubé, Eve, Maryline Vivion, Chantal Sauvageau, Arnaud Gagneur, Raymonde Gagnon, and Maryse Guay. 2015. “‘Nature Does Things Well, Why Should We Interfere?’: Vaccine Hesitancy among Mothers.” *Qualitative Health Research* 26(3):411–25.
- Duchsherer, Amy, Jason Mal, Carrie Anne Platt, and Zoltan Majdik. 2020. “Immunized against Science: Narrative Community Building among Vaccine Refusing/Hesitant Parents.” *Public Understanding of Science* 29(4):419–35.
- Durant, John, Martin Bauer, George Gaskell, Cees Midden, Miltos Liakopoulos, and Liesbeth Scholten. 2000. “Two Cultures of Public Understanding of Science and Technology in Europe.” Pp. 131–56 in *Between Understanding and Trust: The Public, Science and Technology*, edited by M. Dierkes and C. V. Grote. London: Routledge.
- Erola, Jani, Sanni Jalonen, and Hannu Lehti. 2016. “Parental Education, Class and Income over Early Life Course and Children’s Achievement.” *Research in Social Stratification and Mobility* 44(1):33–43.
- Gauchat, Gordon. 2015. “The Political Context of Science in the United States: Public Acceptance of Evidence-Based Policy and Science Funding.” *Social Forces* 94(2):723–46.
- Gauchat, Gordon, and Kenneth Andrews. 2018. “The Cultural-Cognitive Mapping of Scientific Professions.” *American Sociological Review* 83(3):567–95.
- Geertz, Clifford. 1983. *Local Knowledge: Further Essays in Interpretive Anthropology*. New York: Basic Books.
- Giambi, Cristina, Massimo Fabiani, Fortunato D’Ancona, Lorenza Ferrara, Daniel Fiacchini, Tolinda Gallo, Domenico Martinelli, Maria Grazia Pascucci, Rosa Prato, Antonietta Filia, Antonino Bella, Martina Del Manso, Caterina Rizzo, and Maria Cristina Rota.

2018. "Parental Vaccine Hesitancy in Italy—Results From a National Survey." *Vaccine* 36(6):779–87.
- Giddens, Anthony. 1991. *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Stanford, CA: Stanford University Press.
- Glaser, Barney, and Anselm Strauss. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine.
- Gottlieb, Samantha. 2016. "Vaccine Resistances Reconsidered: Vaccine Skeptics and the Jenny McCarthy Effect." *BioSocieties* 11(2):152–74.
- Gross, Karin, Karin Hartmann, Elisabeth Zemp, and Sonja Merten. 2015. "I Know It Has Worked for Millions of Years': The Role of the 'Natural' in Parental Reasoning against Child Immunization in a Qualitative Study in Switzerland." *BMC Public Health* 15(1):373–80.
- Hak, Eelko, Yvonne Schönbeck, Hester de Melker, Gerrit van Essen, and Elisabeth Sanders. 2005. "Negative Attitudes of Highly Educated Parents and Health Care Workers towards Future Vaccinations in the Dutch Childhood Vaccination Program." *Vaccine* 23(24):3103–3107.
- Inglehart, Ronald. 1997. *Modernization and Post-modernization: Cultural, Economic and Political Change in 43 Societies*. Princeton, NJ: Princeton University Press.
- Lareau, Annette. 2015. "Cultural Knowledge and Social Inequality." *American Sociological Review* 80(1):1–27.
- Makarovs, Kirils, and Peter Achterberg. 2017. "Contextualizing Educational Differences in 'Vaccination Uptake': A Thirty Nation Survey." *Social Science & Medicine* 188(1):1–10.
- McNutt, Louise-Anne, Cristina Desemone, Erica DeNicole, Hassan El Chebib, Jessica Nadeau, Robert Bednarczyk, and Jana Shaw. 2016. "Affluence as a Predictor of Vaccine Refusal and Underimmunization in California Private Kindergartens." *Vaccine* 34(14):1733–38.
- Motta, Matthew, Timothy Callaghan, and Steven Sylvester. 2018. "Knowing Less but Presuming More: Dunning-Kruger Effects and the Endorsement of Anti-vaccine Policy Attitudes." *Social Science & Medicine* 211(1):274–81.
- Noy, Shiri, and Timothy O'Brien. 2019. "Science for Good? The Effects of Education and National Context on Perceptions of Science." *Public Understanding of Science* 28(8):897–916.
- Peretti-Watel, Patrick, Heidi Larson, Jeremy Ward, William Schulz, and Pierre Verger. 2015. "Vaccine Hesitancy: Clarifying a Theoretical Framework for an Ambiguous Notions." *PLoS Currents* 7. <https://dx.doi.org/10.1371%2Fcurrents.outbreaks.6844c80f9f5b273f34c91f71b7fc289>.
- Peretti-Watel, Patrick, Jeremy Ward, Chantal Vergelys, Aurélie Bocquier, Jocelyn Raude, and Pierre Verger. 2019. "'I Think I Made the Right Decision. . . I Hope I'm Not Wrong': Vaccine Hesitancy, Commitment and Trust among Parents of Young Children." *Sociology of Health and Illness* 41(6):1192–206.
- Reich, Jennifer. 2016. "Of Natural Bodies and Antibodies: Parents' Vaccine Refusal and the Dichotomies of Natural and Artificial." *Social Science & Medicine* 157(2016):103–10.
- Reich, Jennifer. 2018. *Calling the Shots. Why Parents Reject Vaccines*. New York: New York University Press.
- Reich, Jennifer. 2020. "Vaccine Refusal and Pharmaceutical Acquiescence: Parental Control and Ambivalence in Managing Children's Health." *American Sociological Review* 85(1):106–27.
- Rijksinstituut voor Volksgezondheid en Milieu. 2015. *Vaccinatiegraad Rijksvaccinatieprogramma Nederland. Verslagjaar 2015*. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu. <https://www.rivm.nl/bibliotheek/rapporten/2015-0067.pdf>.
- Rijksinstituut voor Volksgezondheid en Milieu. 2017. *Vaccinatiegraad en jaarverslag Rijksvaccinatieprogramma Nederland 2016*. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu. <https://www.rivm.nl/bibliotheek/rapporten/2017-0010.pdf>.
- Rijksinstituut voor Volksgezondheid en Milieu. 2018. *Vaccinatiegraad en jaarverslag Rijksvaccinatieprogramma Nederland 2017*. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu. <https://www.rivm.nl/bibliotheek/rapporten/2018-0008.pdf>.
- Rijksinstituut voor Volksgezondheid en Milieu. 2019a. *Over het Rijksvaccinatieprogramma*. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu. <https://rijksvaccinatieprogramma.nl/over-het-programma>.
- Rijksinstituut voor Volksgezondheid en Milieu. 2019b. *Vaccinatiegraad en jaarverslag Rijksvaccinatieprogramma Nederland 2018*. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu. <https://www.rivm.nl/bibliotheek/rapporten/2019-0015.pdf>.
- Rijksinstituut voor Volksgezondheid en Milieu. 2019c. *Volledige deelname vaccinaties verslagjaar 2019*. Bilthoven: Rijksinstituut voor Volksgezondheid en Milieu. <https://www.volksgezondheidszorg.info/onderwerp/vaccinaties/regionaal-internationaal\zuigelingen/node-volledige-deelname-gemeente>.
- Ruijs, Wilhelmina, Jeannine Hautvast, Wilke van Ansem, Reinier Akkermans, Kees van 't Spijker, Marlies Hulscher, and Koos van der Velden. 2012. "Measuring Vaccination Coverage in a Hard to Reach Minority." *European Journal of Public Health* 22(3):359–64.
- Sobo, Elisa. 2015. "Social Cultivation of Vaccine Refusal and Delay among Waldorf (Steiner) School Parents." *Medical Anthropology Quarterly* 29(3):381–99.
- Sobo, Elisa. 2019. "Theorizing (Vaccine) Refusal: Through the Looking Glass." *Cultural Anthropology* 31(3):342–50.
- Spaan, Henri, Wilhelmina Ruijs, Jeannine Hautvast, and Alma Tostmann. 2017. "Increase in Vaccination Coverage between Subsequent Generations of Orthodox Protestants in the Netherlands." *European Journal of Public Health* 27(3):524–30.

- Streefland, Pieter, Mushtaque Chowdhury, and Pilar Ramos-Jimenez. 1999. "Patterns of Vaccination Acceptance." *Social Science & Medicine* 49(12):1705–16.
- Van Zoonen, Liesbet. 2012. "I-Pistemology: Changing Truth Claims in Popular and Political Culture." *European Journal of Communication* 27(1): 56–67.
- Ward, Paul, Katie Attwell, Samantha Meyer, Philippa Rokkas, and Julie Leask. 2017. "Understanding the Perceived Logic of Care by Vaccine-Hesitant and Vaccine-Refusing Parents: A Qualitative Study in Australia." *PLoS ONE* 12(10):e0185955.
- Ward, Paul, Katie Attwell, Samantha Meyer, Philippa Rokkas, and Julie Leask. 2018. "Risk, Responsibility and Negative Responses: A Qualitative Study of Parental Trust in Childhood Vaccinations." *Journal of Risk Research* 21(9):111–30.
- Wiley, Kerrie, Julie Leask, Katie Attwell, Catherine Helps, Chris Degeling, Paul Ward, and Stacy Carter. 2020. "Parenting and the Vaccine Refusal Process: A New Explanation of the Relationship between Lifestyle and Vaccination Trajectories." *Social Science & Medicine* 263(1):113259–69.
- WHO. 2008. "Vaccination Greatly Reduces Disease, Disability, Death and Inequity Worldwide." *Bulletin of the World Health Organization* 86(2):81–160.

WHO. 2019. "Ten Threats to Global Health in 2019." <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019>.

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