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“We have so much information that we can get lost in it”: A Mixed-Methods Study on Parents’ Vaccination Information Seeking, Satisfaction with, and Trust in Medical Providers in Switzerland

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3 1 **“We have so much information that we can get lost in it”: A Mixed-Methods Study on**
4 2 **Parents’ Vaccination Information Seeking, Satisfaction with, and Trust in Medical**
5 3 **Providers in Switzerland**
6 4
7 5
8 6

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19 16
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37 32 Word count: 4648 (without strengths and weaknesses), 4744 (with strengths and weaknesses)
38 33

39 34 **Abbreviations:** Complementary and alternative medicine (CAM); Vaccine hesitancy (VH);
40 35 Parent Attitudes about Childhood Vaccines (PACV).
41 36

42 37 **Keywords**

43 38 Vaccine Hesitancy; Information Sources; Provider; Satisfaction; Trust
44 39

45 40 What is already known on this topic:

46 41 Medical providers, personal networks and the Internet are trusted vaccination information
47 42 sources and have large influences on parents’ vaccination decisions.
48 43

49 44 What this study adds:

50 45 In Switzerland, where complementary and alternative medicine (CAM) is popular, little
51 46 research has examined parents’ vaccination decision-making process. Our findings suggest
52 47 that VH parents seek out a variety of information sources and providers due to dissatisfaction
53 48 with and distrust in previously obtained information. Since doctors are parents’ most trusted
54 49 source of vaccination information, it is important for doctors to create trusting environments
55 50 where parents’ vaccination questions and concerns are taken seriously and can be met with
56 51 satisfaction.

52 **Abstract**

53 Objectives

54 The aim of this study was to better understand parents' information seeking behaviors,
55 information sources, and interactions with their providers regarding childhood vaccines.

56 Setting

57 The study was part of a Swiss national research program investigating vaccine hesitancy and
58 underimmunization.

59 Participants

60 We conducted qualitative interviews with 37 providers and 30 parents and observed 34
61 vaccination consultations. We then conducted quantitative surveys with 130 providers (both
62 CAM- and biomedically oriented) and 1390 parents.

63 Main outcome measures

64 We focused on participants' vaccination information sources used in their decision-making
65 process, as well as parents' trust in and satisfaction with these source and providers.

66 Results

67 Based on the Parent Attitudes about Childhood Vaccines (PACV) scale, we considered 889
68 parents as non-vaccine-hesitant (non-VH) and 501 parents as vaccine-hesitant (VH). Whereas
69 both groups cited providers as the most trusted source of information, non-VH-parents were
70 more likely to cite pediatricians (N=755[85%] vs N=358[71%]) and public health authorities
71 (N=333[37%] vs. N=101[20%]) than VH-parents. VH-parents were more likely to have
72 consulted another provider (N=196[39%] vs. N=173[19%]) than non-VH-parents, to express
73 less satisfaction with both their primary (N=342[82%] vs. N=586[91%]) and other providers
74 (N=82[42%] vs. N=142[82%]), and less trust in their primary (N=368[88%] vs. N=632[98%])
75 and other providers (N=108[55%] vs. N=146[84%]). VH-parents were less likely to be
76 satisfied with their biomedical primary provider than non-VH-parents (100[69%] vs.
77 467[91%]). However, when the primary provider was CAM-oriented, there were similar

78 levels of satisfaction among both groups (237[89%] VH-parents vs. 118[89%] non-VH-
79 parents). All differences were significant ($p<0.05$).

80 Conclusions

81 Pediatricians were parents' most trusted information source. VH-parents were more likely to
82 turn to additional sources and less likely to be satisfied with their providers. (Dis)satisfaction
83 and (dis)trust played significant roles in parents' vaccination decision-making.

84 Registry

85 The local ethics committee (Ethikkommission Nordwest- und Zentralschweiz, EKNZ; project
86 ID number 2017– 00725) approved the study.

87 Strengths and weaknesses of the study

Strengths	Limitations
The mixed-methods study design brought added value to our study, as we could address qualitatively documented phenomena and then systematically analyze them on a larger scale.	The quantitative survey was not administered to a random sample.
Our recruitment strategy explicitly oversampled CAM providers and parents consulting them, which allowed us to compare the patient-provider relationship and patient-provider vaccine perspectives for parents seeing CAM vs. biomedical providers.	Our provider sample was recruited through personal contacts and snowball sampling
We consider the transdisciplinary research to be a distinct advantage [1].	

88

89 1. Introduction

90 The growing body of literature on vaccine hesitancy (VH) points to the multifaceted and
91 complex nature of vaccination decision-making [2, 3]. Most parents – whether vaccine-
92 accepting or VH – obtain their vaccine information primarily from healthcare professionals,
93 with the most commonly cited source being pediatricians, followed by other healthcare
94 professionals, such as midwives, nurses, and other therapists [4, 5, 6]. As healthcare providers
95 are the main source of information for parental decision-making, issues around satisfaction

1
2
3 96 with and trust in the provider are likely to be important. Previous research has shown how
4
5 97 trusting relationships between patients and providers are determinative in parents' vaccination
6
7 98 decision-making, meaning that parents who trust their providers tend to trust their vaccination
8
9 99 recommendations [7, 8, 9]. In Switzerland, *complementary and alternative medicine (CAM)*
10
11
12 100 is widely used and integrated into the healthcare system [10, 11]. Particularly in primary
13
14 101 healthcare for children, CAM is mainly provided by biomedically trained physicians with
15
16
17 102 additional CAM training in the sense of integrative medicine [12]. Researchers have
18
19 103 established associations between VH and CAM use [7, 13, 14], and even suggested that CAM
20
21 104 providers and VH parents have a "symbiotic" relationship, meaning that "VH and CAM exist
22
23
24 105 and function separately, but when combined, provide each other with 'resources' that enable
25
26 106 them to thrive together" [13, p. 111]. Others have shown that VH individuals have lower
27
28 107 levels of trust in biomedicine than in CAM [13, 15].

30 108 In addition to medical providers, sources of vaccination information include parents'
31
32
33 109 social networks, with similar views and norms being shared within networks. Generally,
34
35 110 parents with people in their networks who vaccinate less are also less likely to vaccinate [16,
36
37 111 17]. Social media and the Internet offer platforms for the dissemination of information and
38
39
40 112 thus serve as popular vaccination information sources [18, 19]. Testimonies of (negative)
41
42 113 experiences during and after vaccination or the usage of forums are believed to be particularly
43
44 114 appealing to parents seeking vaccination information [20, 21]. In terms of vaccination
45
46
47 115 information and advice seeking, the Internet, especially social media platforms, has its own
48
49 116 complexities and dynamics that are the subject of intense study and research [22]. In the last
50
51 117 two decades, patient-provider dynamics have partially changed from the former *doctor-*
52
53 118 *provides-patient* to today's *users-provide-users* (i.e., patients no longer obtain their
54
55
56 119 information only from the doctors who treat them, but doctors as well as lay people frequently
57
58 120 disseminate information about health and illness on the Internet, which is available to all other
59
60 121 users), with health-information seeking audiences being potentially far larger, and everyone

1
2
3 122 with Internet access being capable of disseminating information [20, 23]. This context is
4
5 123 further complicated with negative, emotion-focused, and often untrue vaccination information
6
7 124 being difficult to debunk with medical facts [21].
8
9

10 125 A commonly cited explanation for VH, both in scientific and public discourses, is based
11
12 126 on the *knowledge deficit model*, which implies that VH individuals lack the necessary
13
14 127 information to make the “rational choice”, which, from public health and biomedical
15
16 128 perspectives, would be to vaccinate [24]. Some researchers, finding support in the knowledge
17
18 129 deficit model, have turned to considerations of *health literacy*, which “[...] entails people’s
19
20 130 knowledge, motivation and competences to access, understand, appraise, and apply health
21
22 131 information in order to make judgements and take decisions [...]” [25, p. 1473]. Proponents
23
24 132 of this concept point out that greater health literacy generally correlates with better self-
25
26 133 reported health [26, 27]. Other researchers have called into question the presumption that VH
27
28 134 can be explained by the knowledge deficit and health literacy models [28] and therefore the
29
30 135 usefulness of education-only approaches to address VH, but rather suggested to address the
31
32 136 personal and emotional level of the parents and discuss their experiences with vaccinations.
33
34 137 [28, 29].
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40 138 In this mixed-methods study, we studied how non-VH and VH parents seek information
41
42 139 about vaccination and what information sources they rely on. Our results show how the
43
44 140 parental decision-making process is driven by understandings of vaccination information and
45
46 141 by (dis)satisfaction with and (dis)trust in vaccination information sources.
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50

51 142

52 143 **2. Material and methods**

53 144 *2.1. Study design and population*

54 145 This study is part of a national transdisciplinary investigation into vaccination decision-
55
56 146 making in Switzerland [30]. We employed a mixed-methods approach with *sequential*
57
58 147 *exploratory design*, meaning that an initial qualitative component informed the design of a
59
60

1
2
3 148 subsequent quantitative stage [31]. First, we analyzed the qualitative results by identifying
4
5 149 key areas that seemed to be of central importance. We then focused on these when compiling
6
7
8 150 the quantitative questionnaires. The detailed analysis of qualitative and quantitative results
9
10 151 was finally done in parallel by presenting a clustering of similar statements in the qualitative
11
12 152 sector, followed by quantitative results showing similar dynamics on a larger scale. We
13
14 153 interviewed parents throughout German, French and Italian-speaking Switzerland. At the time
15
16
17 154 of the survey, the interviewed parent was ≥ 18 years of age and their child was 0-11 years old.
18
19 155 We asked parents to provide us with a copy of their children's vaccination record.

21 156 *2.2. Patient and public Involvement*

23
24 157 Given the presumably large number of people who are not to be regarded as vaccine
25
26 158 opponents but as vaccine hesitant, we meant to employ a specific focus on the path to
27
28 159 decision-making with all the thought processes, worries and fears contained therein, as well as
29
30 160 the influence of external information. During our qualitative research period, various starting
31
32 161 points emerged that were worth investigating on a larger scale (in the quantitative sector). We
33
34 162 recruited participating parents from a network of 86 biomedical and 44 CAM providers
35
36 163 participating in the project. Participants who indicated they wished to receive the study results
37
38 164 will receive notifications once results are published.

42 165 *2.3. Qualitative data collection and analysis*

44
45 166 We first conducted semi-structured in-depth interviews with parents from September 2017
46
47 167 to February 2018 and with biomedically-only trained doctors and providers (i.e., physicians or
48
49 168 non-physician-providers) with additional CAM training from August 2017 to September
50
51 169 2018. Interviews aimed to better understand parents' vaccination decision-making processes
52
53 170 and their interactions with health care providers. An interview guide was piloted and revisited
54
55 171 iteratively for clarity. We also conducted ethnographic observations of vaccination
56
57 172 consultations. Qualitative interviews were audio-recorded and transcribed verbatim.
58
59
60 173 Interviews allowed us to gather background information about parents and their providers and

1
2
3 174 perspectives on vaccination. Vaccination consultation observations were documented in field
4
5 175 journals and then subsequently written into narrative accounts. Qualitative data were analyzed
6
7
8 176 by AUTHOR2 and AUTHOR4. Analysis of the qualitative interviews and observations were
9
10 177 guided by the Framework Method [32] with support of MAXQDA software.

12 178 2.4. Quantitative data collection and analysis

14 179 For the study's quantitative component, we recruited parents in participating providers'
15
16
17 180 offices. We refer to these providers as the "primary" providers. We administered a
18
19 181 questionnaire to study participants which included the *Parent Attitudes about Childhood*
20
21 182 *Vaccines (PACV)* survey instrument, a validated instrument that was designed by Opel and
22
23 183 colleagues in order to identify VH parents [33, 34, 35]. The 2011 Opel-revised 15-item PACV
24
25 184 [34] results in a score of 0-100 points. If a parent scores ≤ 49 points, they are considered non-
26
27 185 VH; if they score ≥ 50 points, they are considered VH. Based upon the results of a study
28
29 186 validating a 5-item version of the PACV in Switzerland with identical scoring [36], we opted
30
31 187 for the shorter 5-item version for our analyses. The final questionnaire included PACV items,
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33 188 questions gathering sociodemographic information about the parents and the target child, and
34
35 189 additional questions informed by our qualitative research, including questions on the parent-
36
37 190 provider relationship and vaccination information sources. Surveys were conducted by
38
39 191 telephone from January 2019 to April 2020 [30].

41
42 192 A key question posed to parents was "What are your most trusted information sources on
43
44 193 vaccination?" in which we offered a series of pre-established response options (e.g.,
45
46 194 "Internet") and prompted participants to provide additional information through open-answer
47
48 195 responses by asking about certain types of sources (e.g., "What websites?"). The number of
49
50 196 sources mentioned by each participant was analyzed by coding and counting the reported
51
52 197 sources, as well as the free-text answers.

53
54 198 We use descriptive statistics plus Pearson's Chi-squared and Wilcoxon Rank Sum tests to
55
56 199 test whether observed differences between non-VH and VH parent participants are significant

1
2
3 200 at the $p < 0.05$ level. Quantitative data analysis was performed by AUTHOR1 and AUTHOR3
4
5 201 using STATA software version 12.1 (Stata corporation, College Station TX). We personally
6
7 202 read and reviewed the information sources cited by parents and, after consultation within the
8
9 203 team, we decided to consider each source as critical or accepting of the official vaccination
10
11 204 recommendations.

14 205 *2.5. Ethical considerations*

16 206 This study was conducted in compliance with the Swiss Federal Act on Research
17
18 207 Involving Human Beings (Human Research Act) and the Declaration of Helsinki. The local
19
20 208 ethics committee (Ethikkommission Nordwest- und Zentralschweiz, EKNZ; project ID
21
22 209 number 2017– 00725) approved the study. We obtained written informed consent from each
23
24 210 participant after the nature and possible consequences of the study had been fully explained.
25
26 211 Pseudonyms are used for participants throughout. Direct quotes were translated from the
27
28 212 original language of utterance (German, French) into English.
29
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31
32

33 213

35 214 **3. Results**

37 215 *3.1. Study population*

39 216 For the qualitative study component, we conducted ethnographic observations of 34
40
41 217 pediatric vaccination consultations. We also conducted in-depth, face-to-face interviews with
42
43 218 30 parents and 37 providers. Among the provider-interviewees, 20 were biomedically
44
45 219 oriented physicians and 17 were CAM-oriented providers, of which 15 were biomedically
46
47 220 trained physicians with additional training in CAM, and 2 were non-physician CAM
48
49 221 providers.
50

51
52 222 For the quantitative study component, we conducted telephone interviews with 1390
53
54 223 parents as well as 86 biomedically- and 44 CAM-oriented primary providers. 889 (64%)
55
56 224 parents had a PACV score of ≤ 49 , indicating non-VH, and 501 (36%) parents had a PACV
57
58 225 score of ≥ 50 , indicating VH. Parent characteristics are shown in **Table 1**. VH parents were

226 more likely to see a CAM-oriented primary provider than non-VH parents (307 [61%] vs. 183
227 [21%]; $p < 0.001$).

Table 1. Characteristics of the quantitative study population

	All parents (N=1390)		By PACV-score		P value
	N (%)		Non-VH parents (N=889)	VH parents (N=501)	
Female Respondent	1232 (89%)		798 (90)	434 (87)	0.141 ¹
Relationship to child					0.095 ¹
Mother	1228 (88)		797 (90)	431 (86)	
Father	155 (11)		89 (10)	66 (13)	
Other	7 (1)		3 (0)	4 (1)	
Interviewee Age (Mean (SD))	37.1 (6.27)		37 (6.16)	37.2 (6.46)	0.592 ²
Born in Switzerland	981 (71)		608 (68)	373 (74)	0.059 ¹
Parent's highest education					<0.001 ¹
Low ³	272 (20)		188 (21)	84 (17)	
Medium ⁴	321 (23)		209 (24)	112 (22)	
Bachelors ⁵	285 (21)		163 (18)	122 (24)	
Masters	358 (26)		226 (25)	132 (26)	
Doctorate	105 (8)		81 (9)	24 (5)	
Other, missing	49 (4)		22 (2)	27 (5)	
Household income					<0.001 ¹
< 80,000 Swiss Francs (CHF)	319 (23)		174 (20)	145 (29)	
80,000 – 120,000 CHF	384 (28)		225 (25)	159 (32)	
> 120,000 CHF	279 (20)		195 (22)	84 (17)	
Missing, declined to respond	408 (29)		295 (33)	113 (23)	
Type of primary provider					<0.001 ¹
Biomedical	893 (64)		705 (79)	188 (38)	
CAM	490 (35)		183 (21)	307 (61)	
Missing	7 (1)		1 (0)	6 (1)	

Note. ¹Pearson's Chi-squared and ²Wilcoxon Rank Sum tests were used for statistical analysis. ³Secondary school not completed, no completed professional education, completed 9 years of school without further education, apprenticeship, technical school or business school; ⁴College, higher professional school; ⁵Bachelor at University, primary school teacher seminar.

228

229 3.1 Variety of information sources on vaccination

230 During our qualitative interviews and observations of vaccination consultations, parents
231 cited a broad array of vaccination information sources as part of their decision-making
232 process. Many VH parents engaged in what we refer to as *information shopping*, which
233 involves comparing and weighing different information sources in an attempt to reach
234 certainty about the right vaccination decision to make for their children. For example, Mrs.
235 Sandoz, a 35-year-old mother of a 13-month-old unvaccinated son explained her decision not
236 to vaccinate (Pseudonyms are used for participants):

237 “I think it was a mix of discussions with people close to us and with friends. [...]

238 There is my personal feeling about the matter. There is certainly the social influence

1
2
3 239 from my husband. I'll say that the decision surely came more from me than it did from
4
5 240 him. I think I hold the decision closer to my heart than he does. I think it was kind of a
6
7
8 241 vague questioning. There were some things I read on the Internet. I joined Facebook
9
10 242 groups where they talk about it. I read some testimonies. I think when I was pregnant,
11
12 243 I had a discussion with the [CAM] pediatrician in order to know the true risks that we
13
14 244 were taking if we didn't vaccinate. I was looking for the most neutral point of view
15
16
17 245 possible. [...] For now, it's a decision that is in favor of not vaccinating."

18
19 246 Other VH parents explained how having multiple sources of information reassured them
20
21 247 that they were taking the correct course of action for their families. The following example
22
23
24 248 from Mr. and Mrs. Schmied, the parents of a 6-month-old unvaccinated baby demonstrates
25
26 249 this idea (Pseudonyms are used for participants):

27
28 250 *Mrs. Schmied:* We also talked about [vaccination] with a friend who is a doctor. He
29
30 251 gave us – really sweet – a little PowerPoint presentation at home.

31
32
33 252 *Mr. Schmied:* We were there for two hours. [...]

34
35 253 *Mrs. Schmied:* Really nice. He really took his time and explained every single
36
37 254 vaccination to us again: What it is for? What it is not for? [...] What side effects there
38
39
40 255 can be? [...] That was again very helpful [for decision-making]. [...]

41
42 256 *Mr. Schmied:* Then we cancelled [the vaccination appointment] five minutes before.

43
44 257 [...]

45
46 258 *Mrs. Schmied:* Because I realized, "No, we can't really stand behind [the decision of
47
48 259 vaccinating our child]." Then we actually cancelled [the appointment] and haven't
49
50
51 260 made a new one since then.

52
53 261 *Mr. Schmied:* Yes. But at least we now know, what we...

54
55
56 262 *Mrs. Schmied:* What we want.

57
58 263 Qualitative results additionally shed light on parents, often VH parents, having consulted a
59
60 264 multitude of sources that varied in both format and content. Parents described how each piece

1
2
3 265 of information could temporarily solidify their opinion, but also raise further doubts and
4
5 266 uncertainties. Mrs. Sandoz explained (Pseudonyms are used for participants):

7 267 “We have a lot of doubts around the benefits of vaccines. My husband and I are still
8
9 268 reading about it and continue to have discussions and thinking about it in order to be
10
11 269 comfortable. But we’re not sure that the benefits are large enough, compared to what
12
13 270 vaccines contain. [...] For us, in the society we live in, we don’t have the impression
14
15 271 that the risk is sufficient enough, for now, to vaccinate our son. [...] And finding the
16
17 272 right information is difficult, which is probably linked to our information society. We
18
19 273 have so much information that we can get lost in it. [...] Up until now, everything that
20
21 274 I’ve read and the discussions that I’ve had have reinforced our decision to not
22
23 275 vaccinate our son.”

24
25 276 These observations support information seeking as an important characteristic of VH
26
27 277 parents and stand in contrast to the underlying assumptions of the knowledge deficit model
28
29 278 that VH persons make vaccination decisions based on a lack of information. VH parents
30
31 279 described how a multitude of information sources could be both a source of reassurance and
32
33 280 of hesitancy in their quest for neutral information about vaccination. We therefore
34
35 281 investigated the potential association of VH with the number and trustworthiness of parents’
36
37 282 vaccination information sources by including the question “What are your most trusted
38
39 283 information sources on vaccination?” in the quantitative questionnaire.

40
41 284 **Figure 1** illustrates how the number of trusted information sources varies between non-
42
43 285 VH and VH parents. VH parents reported using more sources on average than non-VH
44
45 286 parents (2.98 [SD=2.02] vs. 2.70 [SD=1.83]). While small, the difference was significant
46
47 287 (p=0.012).

48
49 288

50
51 289 **[Figure 1]**

52
53 290

291 3.2 Types of information sources and media

292 Based on our initial qualitative research, we generated a preliminary list of information
 293 source types which we then included in the quantitative questionnaire. Commonly mentioned
 294 information sources included the child's doctor and other providers, family, friends and
 295 acquaintances, official public health recommendations, print media, such as books or
 296 newspaper articles, the Internet, and social media.

297 In **Table 2** we list the trusted vaccination information sources cited most by parents. The
 298 child's doctor was the information source cited most (1113 [80%] parents) by both non-VH
 299 and VH parents, but non-VH parents were more likely to report the child's doctor as the most
 300 trusted source than VH parents (755 [85%] vs. 358 [71%]; $p < 0.001$). Non-VH parents were
 301 also more likely to report public health authorities as a trusted information source than VH
 302 parents (333 [37%] vs. 101 [20%]; $p < 0.001$), as well as information materials that are
 303 consistent with the official vaccination recommendation (74 [8%] vs. 26 [5%]; $p = 0.03$).

304 In contrast, VH parents tended to mention information sources other than the child's
 305 doctor or public health authorities more than non-VH parents, including social networks (215
 306 [43%] vs. 253 [28%]; $p < 0.001$), other health care workers (105 [21%] vs. 119 [13%];
 307 $p < 0.001$) and their personal gut feelings or experiences (16 [3%] vs. 10 [1%]; $p = 0.006$). The
 308 largest difference we identified involved information materials, such as books, online or print
 309 magazines, and websites that are critical of official vaccination recommendations (105 VH
 310 parents [21%] vs. 4 non-VH parents [0%]; $p < 0.001$), and materials of obvious CAM nature
 311 (12 VH parents [2%] vs. 0 non-VH parents [0%]; $p < 0.001$).

Table 2. Types of trusted vaccination information sources.

	<i>All parents</i>		<i>By PACV-score</i>			<i>P value</i>
	<i>(N=1390)</i>		<i>Non-VH parents</i>		<i>VH parents</i>	
			<i>(N=889)</i>		<i>(N=501)</i>	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>		
<i>My child's doctor</i>	1113 (80)	755 (85)	358 (71)		<0.001	
<i>Social networks¹</i>	468 (34)	253 (28)	215 (43)		<0.001	
<i>Public Health Authorities</i>	434 (31)	333 (37)	101 (20)		<0.001	
<i>Other health care workers</i>	224 (16)	119 (13)	105 (21)		<0.001	
<i>Other physician</i>	195 (14)	111 (12)	84 (17)		0.027	
<i>CAM</i>	19 (1)	3 (0)	16 (3)		<0.001	

Homeopathic	12 (1)	2 (0)	10 (2)	0.001
Midwife	13 (1)	4 (0)	9 (2)	0.268
Materials that are critical of public health vaccination recommendation ²	109 (8)	4 (0)	105 (21)	<0.001
“Foundation for consumer protection”	22 (2)	3 (0)	19 (4)	<0.001
Hirte: “Impfen Pro & Contra”	15 (1)	0 (0)	15 (3)	<0.001
Explicitly CAM materials	12 (1)	0 (0)	12 (2)	<0.001
Berthoud: “Qui aime bien vaccine peu”	9 (1)	0 (0)	9 (2)	<0.001
Glöckler/Goebel/Michael: “Kindersprechstunde”	6 (0)	0 (0)	6 (1)	0.001
“www.impfo.ch”	5 (0)	2 (0)	3 (1)	0.264
Materials that are consistent with public health vaccination recommendation ²	100 (7)	74 (8)	26 (5)	0.030
“www.swissmom.ch”	20 (1)	16 (2)	4 (1)	0.132
“Wir Eltern”	8 (1)	7 (1)	1 (0)	0.164
“Beobachter”	6 (0)	2 (0)	4 (1)	0.117
“Puls”	6 (0)	4 (0)	2 (0)	0.890
Google	98 (7)	78 (9)	20 (4)	0.001
Scientific literature ⁴	55 (4)	37 (4)	18 (4)	0.601
No source, missing, don't know, don't want to disclose	49 (4)	26 (3)	23 (5)	0.106
Medical work experience ³	42 (3)	30 (3)	12 (2)	0.306
Nurse	8 (1)	6 (1)	2 (0)	0.514
News	31 (2)	22 (2)	9 (2)	0.411
Personal experience, gut feeling	26 (2)	10 (1)	16 (3)	0.006
Described as neutral	9 (1)	0 (0)	9 (2)	<0.001

Note. ¹Family, friends, and acquaintances; ²Print media, websites, organizations, TV programs, and films that are critical of or consistent with public health vaccination recommendations based on our detailed assessment and on consensus among research team members; ³Medical, biological, or pharmaceutical training or work experience of the interviewee or the other parent of the target child; ⁴As stated by the interviewee. Pearson's Chi-squared tests were used for statistical analysis.

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313 In **Table 3**, we list where parents reported having obtained trusted information about
314 vaccination. We list all information channels reported by at least 5 parents. The Internet was
315 considered the most trustworthy medium by non-VH parents and VH parents in similar
316 proportions (299 [34%] vs. 176 [35%]; $p=0.572$). However, VH parents cited print media as
317 their most trusted medium of vaccination information more frequently than non-VH parents
318 (237 [47%] vs. 176 [20%]; $p<0.001$), including books and brochures (129 [26%] vs. 63 [7%];
319 $p<0.001$). With regards to specific internet sources, non-VH parents were more likely to
320 report Google than VH parents (78 [9%] vs. 20 [4%]; $p=0.001$) as a trusted medium for
321 vaccination information. VH parents were more likely than non-VH parents to cite social
322 media (26 [5%] vs. 21 [2%]; $p=0.005$), although overall few parents in either group cited this
323 as a trusted information source.

Table 3. Types of trusted media for vaccination information

	All parents	By PACV-score
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	(N=1390)	Non-VH parents (N=889)	VH parents (N=501)		
	N (%)	N (%)	N (%)	P value	
324					
325					
6	<i>Internet</i>	475 (34)	299 (34)	176 (35)	0.572
7	<i>Google</i>	98 (7)	78 (9)	20 (4)	0.001
8	326				
9	<i>Social media</i>	47 (3)	21 (2)	26 (5)	0.005
10	<i>Facebook</i>	17 (1)	7 (1)	10 (2)	0.490
11	327				
12	<i>Print media</i>	413 (30)	176 (20)	237 (47)	<0.001
13	<i>Books and brochures</i>	192 (14)	63 (7)	129 (26)	<0.001
14	328				
15	<i>Magazine and newspapers</i>	60 (4)	42 (5)	18 (4)	0.319
16	<i>TV</i>	67 (5)	37 (4)	30 (6)	0.127
17	329				
18	<i>Films</i>	13 (1)	1 (0)	12 (2)	<0.001
19	<i>Conferences</i>	9 (1)	2 (0)	7 (1)	0.150

Note. Pearson's Chi-squared tests were used for statistical analysis.

3.3 Satisfaction with and trust in the primary provider

Our results suggest that more VH parents than non-VH parents consulted providers other than the child's primary provider when making vaccination decisions. We therefore explored whether this information seeking behavior is related to issues of (dis)satisfaction with and (dis)trust in the primary provider.

Figure 2 and **Supplementary Table S1** show how VH parents were more likely to have discussed vaccination with their primary provider than non-VH parents (418 [83%] vs. 645 [73%]; $p < 0.001$). VH parents were less likely to be satisfied with and to trust their primary provider than non-VH parents (satisfaction: 342 [82%] vs. 586 [91%]; trust: 368 [88%] vs. 632 [98%]; $p < 0.001$ for both satisfaction and trust). When their primary provider was biomedically oriented, this difference was even more notable (satisfaction: 100 [69%] vs. 467 [91%]; trust: 120 [83%] vs. 503 [98%]; $p < 0.001$ for both satisfaction and trust). In contrast, when the primary provider was CAM-oriented, there was no significant difference in satisfaction and trust for VH and non-VH parents (satisfaction: 237 [89%] vs. 118 [89%]; trust: 243 [91%] vs. 128 [96%]; $p = 0.395$ and $p = 0.164$, respectively).

To evaluate issues of (dis)satisfaction and (dis)trust, we analyzed parents' responses regarding perceived agreement between their own vaccination view and their primary provider's view. VH parents reported significantly lower agreement between their own

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3 350 vaccination view and their child's doctor perceived view than non-VH parents (271 [65%] vs.
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5 351 567 [88%]; $p < 0.001$). The gap between parent and provider views was larger when the
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7 352 primary provider was biomedically oriented (79 [54%] VH parents vs. 449 [88%] non-VH
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9 353 parents; $p < 0.001$) and smaller when the primary provider was CAM-oriented (188 [70%] VH
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11 354 parents vs. 117 [88%] non-VH parents; $p = 0.001$).
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17 356 **[Figure 2]**
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21 358 *3.4 Seeking multiple provider opinions on vaccination*
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24 359 Given the important role children's doctors play in influencing parents' vaccination
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26 360 decisions, we further explored a phenomenon that our initial qualitative work brought to light –
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28 361 parents consulting with and/or switching from one to another provider, often to one offering
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30 362 CAM services, in response to issues arising during vaccination consultations, a phenomenon
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32 363 we call “provider browsing”. The following conversation with Mrs. Kugler, a 37-year-old
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34 364 mother of one partially vaccinated child, illustrates this behavior (Pseudonyms are used for
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36 365 participants):
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40 366 *Researcher:* Ok. I've already seen in the vaccination booklet, there are two or three
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42 367 different doctors that you consult. Do you prefer to see a biomedical provider?
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44 368 *Mother:* Well, we actually tend to go to the homeopath. [...]. She's always a little, “I
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46 369 told you so,” after every vaccination. But she tolerates it. It takes her two or three
47
48 370 weeks until she gets well enough to be neutral towards us again [laughing]. Because
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50 371 we do vaccinate. And [the homeopath] is the one who treats [our daughter] when she's
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52 372 sick. [...]. And if we needed a diagnosis, for example, if I wasn't sure whether it was
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54 373 otitis media or something like that, I used to go see [the local pediatrician]. [...]. He is
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56 374 a classic [biomedical] Algifor-Dafalgan [commonly prescribed pain killers in
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58 375 Switzerland, containing ibuprofen and paracetamol, respectively] doctor.
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376 *Researcher*: Ok. Purely conventional biomedical?

377 *Mother*: Yes, [...]. At every diagnosis. In winter, [my daughter] was very sick again
 378 with an extremely high temperature. Again, the remedy was Algifor. The doctor
 379 added, ‘We should start vaccinating soon. [...]. It’s a classic fever. We can easily
 380 vaccinate. It’s not too bad at this age.’ [...] I felt we were no longer in good hands and
 381 switched to Dr. Heffelfinger [provider with additional training in anthroposophical
 382 medicine].

383 Qualitative analysis of provider browsing suggested that parents were seeking health care
 384 providers who were willing to listen to and understand parents’ rationales around vaccination
 385 and their adherence to complementary and alternative approaches to medicine.

386 **Table 4** reports quantitative analysis of this phenomenon showing that more VH parents
 387 than non-VH parents reported consulting with a provider other than the primary provider for
 388 vaccination questions (196 [39%] vs. 173 [19%]; $p < 0.001$). We specifically asked questions
 389 about parents’ motivations for consulting with another provider. More VH parents than non-
 390 VH parents cited seeking a second opinion or having a disagreement as the reason for
 391 consulting with another provider (87 [17%] vs. 38 [4%]; $p < 0.001$). Logistical reasons (e.g.,
 392 parents moved, or provider stopped working) were mentioned with similar frequency (43
 393 [9%] among VH parents vs. 68 [8%] among non-VH parents; $p = 0.537$).

394 Interestingly, among parents who had asked another provider about vaccination, about
 395 half as many VH parents as non-VH parents reported satisfaction with and trust in the other
 396 provider (satisfaction: 82 [42%] vs. 142 [82%]; trust: 108 [55%] vs. 146 [84%]; $p < 0.001$ for
 397 both satisfaction and trust).

Table 4. Parents having consulted another doctor about vaccination.

	All parents (N=1390)		By PACV-score		P value
			Non-VH parents (N=889)	VH parents (N=501)	
	N (%)		N (%)	N (%)	
Consulted another doctor					<0.001
No	1012	(73)	712	(80)	300 (60)
Yes	369	(27)	173	(19)	196 (39)

Missing	9 (1)	4 (0)	5 (1)	
<i>Reason for consultation</i>				<0.001
Second opinion or disagreement	125 (9)	38 (4)	87 (17)	
Moved or stopped working	111 (8)	68 (8)	43 (9)	
Other	130 (9)	64 (7)	66 (13)	
Missing	3 (0)	3 (0)	0 (0)	
	<i>Total sample</i>	<i>By PACV-score</i>		
<i>Parents with a biomedical primary doctor</i>	(N=893)	<i>Non-VH parents</i>	<i>VH parents</i>	
		(N=705)	(N=188)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Consulted another doctor</i>				0.002
No	703 (79)	572 (81)	131 (70)	
Yes	183 (20)	129 (18)	54 (29)	
Missing	7 (1)	4 (1)	3 (2)	
<i>Reason for consultation</i>				0.134
Second opinion or disagreement	46 (5)	27 (4)	19 (10)	
Moved or stopped working	71 (8)	55 (8)	16 (9)	
Other	64 (7)	45 (6)	19 (10)	
Missing	2 (0)	2 (0)	0 (0)	
	<i>Total sample</i>	<i>By PACV-score</i>		
<i>Parents with a CAM primary doctor</i>	(N=490)	<i>Non-VH parents</i>	<i>VH parents</i>	
		(N=183)	(N=307)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Consulted another doctor</i>				<0.001
No	308 (63)	140 (77)	168 (55)	
Yes	180 (37)	43 (23)	137 (45)	
Missing	2 (0)	0 (0)	2 (1)	
<i>Reason for consultation</i>				0.014
Second opinion or disagreement	75 (15)	10 (5)	65 (21)	
Moved or stopped working	40 (8)	13 (7)	27 (9)	
Other	64 (13)	19 (10)	45 (15)	
Missing	1 (0)	1 (1)	0 (0)	
	<i>Total sample</i>	<i>By PACV-score</i>		
<i>All parents having consulted another doctor before</i>	(N=369)	<i>Non-VH parents</i>	<i>VH parents</i>	
		(N=173)	(N=196)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied¹ with other doctor</i>	224 (61)	142 (82)	82 (42)	<0.001
<i>Trust³ other doctor</i>	254 (69)	146 (84)	108 (55)	<0.001

Note. ¹Satisfied or very satisfied; ²Somewhat or not at all satisfied; ³Somewhat or completely. Pearson's Chi-squared tests were used for statistical analysis.

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399 Given that VH parents report higher satisfaction and trust in CAM-oriented providers, we
 400 investigated whether provider browsing varied by type of primary provider (i.e., biomedical
 401 or CAM orientation). Among parents with biomedically oriented primary providers, more VH
 402 parents than non-VH parents engaged in provider browsing (54 [29%] vs. 129 [18%];
 403 p=0.002). However, this difference was even starker among parents with CAM-oriented
 404 primary providers (137 [45%] of VH parents vs. 43 [23%] of non-VH parents; p<0.001).

405

406 4. Discussion

407 4.1. Principal findings

408 Our mixed-methods study has three main findings. First, our results confirm previous
409 research showing that children's doctors are parents' most important vaccination information
410 [4, 5, 6, 37]. Similarly, VH participants were more likely to turn to additional information
411 sources, including their social networks, books, and other materials critical of official
412 vaccination recommendations [5, 16, 17]. More VH parents than non-VH parents cited print
413 media as a trusted information source. To our knowledge, this has not been reported on
414 previously.

415 Second, VH parents expressed lower levels of satisfaction with and trust in their primary
416 provider, particularly biomedically-oriented physicians. This finding is likely associated with
417 our third main finding showing that VH parents engaged more in provider browsing than non-
418 VH parents. Nevertheless, VH parents reported lower levels of satisfaction with and trust in
419 these other providers. VH parents were more also likely to consult with CAM-oriented
420 primary providers and to have higher levels of satisfaction with and trust in CAM than in
421 biomedical providers. Interestingly, the phenomenon of VH parents having consulted with
422 other providers about vaccination occurred more when the primary provider was CAM-
423 oriented.

424 Previous research suggests that the relationship between VH and CAM use is not fully
425 explained by VH individuals' trust in CAM services, but rather by distrust in biomedicine
426 [15]. Accordingly, the VH parents in our sample may have been more likely to be pushed
427 away from biomedicine than pulled toward CAM. While the behavior of information
428 shopping and low trust in medical providers [9, 38] have been documented in previous
429 research as characteristics of VH parents [39], VH parents' consultations with multiple
430 providers about vaccination has, to our knowledge, not extensively been studied.

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3 431 Our results suggest that VH parents' information seeking behaviors are likely an
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5 432 expression of dissatisfaction and distrust. We argue that individuals who are exposed to a
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7 433 variety of information [40], via the Internet [41, 42] or their social networks [17], are
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9 434 likely to harbor concerns or doubts about official vaccination recommendations. Our
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11 435 qualitative data suggest that these doubts may lead VH parents to seek information from
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13 436 additional sources, by consulting a different doctor or reading additional information
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15 437 materials. Reflecting previous findings [38], several parents described how persistent or novel
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17 438 doubts, uncertainty, or dissatisfaction surfaced when they were exposed to new vaccination
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19 439 information.

23 440 *4.2. Strengths and weaknesses in relation to other studies*

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25 441 Our results allow us to question the assumptions of the knowledge deficit and health
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27 442 literacy models [28]. Previous research has already found a link between VH and high levels
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29 443 of health literacy [43], suggesting that informative/educational-only approaches are likely
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31 444 ineffective for addressing VH [44, 45]. Our findings suggest that the knowledge deficit and
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33 445 health literacy models, claiming that VH individuals are hesitant because they lack
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35 446 information, are insufficient to explain VH. Rather, VH participants displayed more
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37 447 information seeking behavior than non-VH parents.

41 448 *4.3. Meaning of the study*

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43 449 Our results suggest potential intervention possibilities for addressing VH. An education-
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45 450 only approach to teaching VH parents about childhood immunizations is likely to be
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47 451 insufficient and perhaps even misguided. In effect, the VH participants in this study did not
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49 452 lack information. Rather, they showed less trust in and usage of public health vaccination
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51 453 recommendations, indicating that public health officials should engage in efforts to earn
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53 454 public trust as a legitimate source of vaccination information. Since doctors are parents' most
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55 455 trusted source of vaccination information, and dissatisfaction and distrust may push parents
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57 456 away from vaccination, it is important for doctors to create trusting environments where

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3 457 parents' vaccination questions and concerns are taken seriously and can be met with
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5 458 satisfaction.

6 7 8 459 *4.4. Unanswered questions and future research*

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10 460 Given that parental distrust and dissatisfaction is a major contributor to their VH, it should
11
12 461 be investigated why VH parents come to distrust doctors.

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15 462

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38 39 473 **Transparency declaration**

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41
42 474 The manuscript is an honest, accurate, and transparent account of the study being reported; no
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44 475 important aspects of the study have been omitted.

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48 49 477 **Contributors**

50
51 478 SE and MD co-drafted the manuscript. SE and KJ focused on the quantitative components
52
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54
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56
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58
59 482 pediatrics in Switzerland. AB was part of the gathering of qualitative data and gave valuable

1
2
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4
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6
7 485 provided important expertise on infectious diseases and internal medicine. All authors read
8
9 486 and approved the final manuscript.
10
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12 487

14 488 **Data sharing**

16 489 Raw data supporting the findings of this study are available from the corresponding author
17
18 (PT) on request.
19
20

21 491

23 492 **COI disclosure statement and competing interests**

25 493 All authors have completed the ICMJE uniform disclosure form at [www.icmje.org/](http://www.icmje.org/coi_disclosure.pdf)
26
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34
35 497 in the submitted work in the previous three years; no other relationships or activities that
36
37 498 could appear to have influenced the submitted work.
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42 500

44 501 **Figure legends**

46 502 Figure 1. Number of trusted vaccination information sources.

48 503 Note. Distribution of the number of trusted vaccination information sources. We divided
49
50 parents into non-VH and VH according to PACV score $<$ or ≥ 50 . The median, mean (standard
51
52 504 deviation) of information sources was; 2, 2.80 (1.90) for the entire study population
53
54 505 (N=1390); 2, 2.70 (1.83) for the non-VH parents (N=889), and; 3, 2.98 (2.02) for the VH
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56 506 parents (N=501). Wilcoxon Rank Sum test was used for statistical analysis.
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1
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3 508 Figure 2. Parental satisfaction with and trust in the child's biomedical or CAM primary
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5 509 provider.

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7 510 Note. ¹Very satisfied or satisfied; ²Completely or somewhat trust; ³Completely or somewhat
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9 511 agree; Percentages refer to the total number of non-VH and VH parent participants; Pearson's
10
11 512 Chi-squared tests were used for statistical analysis.
12
13
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15 513

16 17 514 **References**

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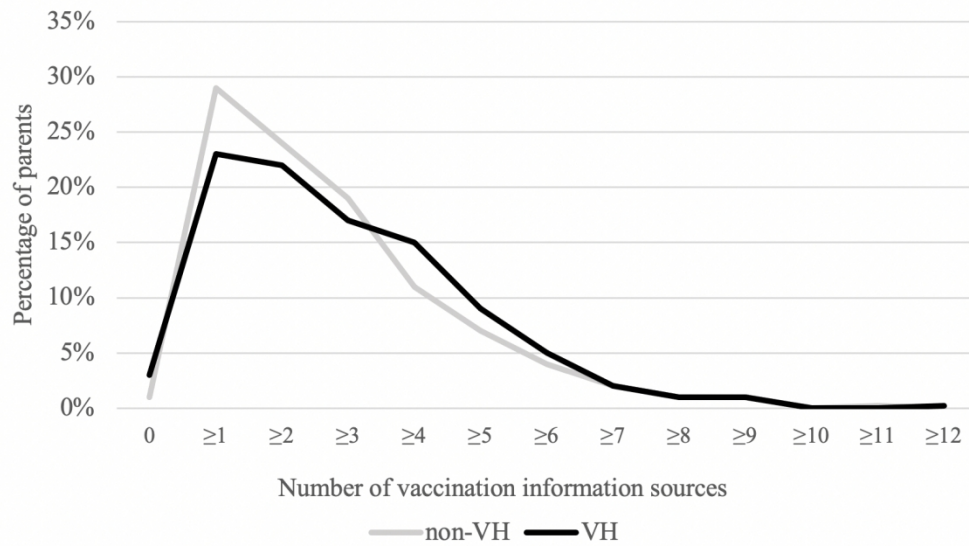
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Figure 1. Number of trusted vaccination information sources.



Note. Distribution of the number of trusted vaccination information sources. We divided parents into non-VH and VH according to PACV score $<$ or ≥ 50 . The median, mean (standard deviation) of information sources was; 2, 2.80 (1.90) for the entire study population (N=1390); 2, 2.70 (1.83) for the non-VH parents (N=889), and; 3, 2.98 (2.02) for the VH parents (N=501). Wilcoxon Rank Sum test was used for statistical analysis.

Figure 1. Number of trusted vaccination information sources.

Figure 2. Parental satisfaction with and trust in the child’s biomedical or CAM primary provider.

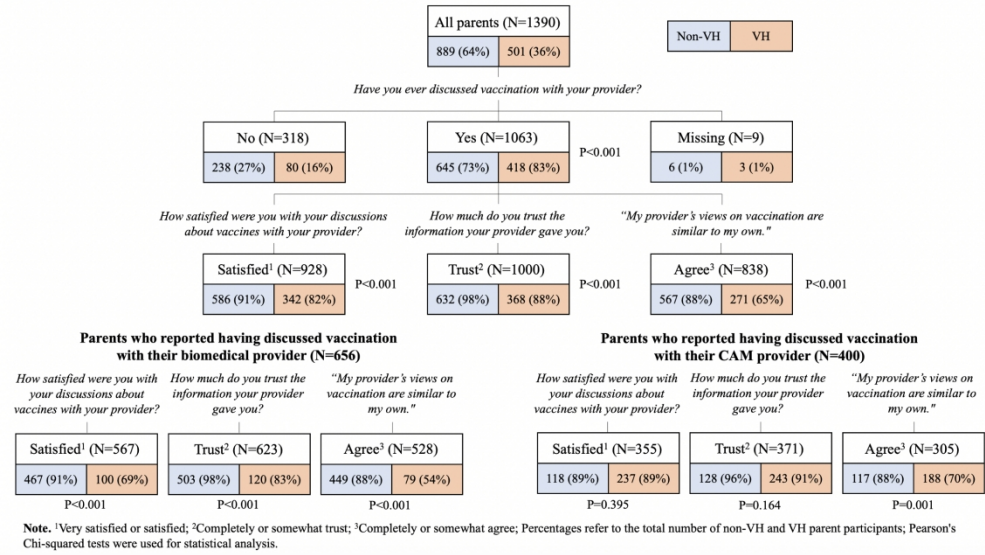


Figure 2. Parental satisfaction with and trust in the child’s biomedical or CAM primary provider.

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60**Supplementary Table S1.** Satisfaction with and trust in primary biomedically- and CAM-oriented providers.

	<i>All parents</i> (N=1390)	<i>By PACV-score</i>		<i>P value</i>
		<i>Non-VH parents</i> (N=889)	<i>VH parents</i> (N=501)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
<i>Type of primary provider</i>				<0.001
<i>Biomedical</i>	893 (64)	705 (79)	188 (38)	
<i>CAM</i>	490 (35)	183 (21)	307 (61)	
<i>Missing</i>	7 (1)	1 (0)	6 (1)	
<i>Discussed vaccines with primary provider</i>				<0.001
<i>No</i>	318 (23)	238 (27)	80 (16)	
<i>Yes</i>	1063 (76)	645 (73)	418 (83)	
<i>Missing</i>	9 (1)	6 (1)	3 (1)	
<i>Parents who reported having discussed vaccination with primary provider</i>	<i>Total sample</i> (N=1063)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=645)	<i>VH parents</i> (N=418)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	928 (87)	586 (91)	342 (82)	<0.001
<i>Trust provider²</i>	1000 (94)	632 (98)	368 (88)	<0.001
<i>Provider's views are similar to parents²</i>	838 (79)	567 (88)	271 (65)	<0.001
<i>Parents who reported having discussed vaccination with biomedical primary provider</i>	<i>Total sample</i> (N=656)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=511)	<i>VH parents</i> (N=145)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	567 (86)	467 (91)	100 (69)	<0.001
<i>Trust provider²</i>	623 (95)	503 (98)	120 (83)	<0.001
<i>Provider's views are similar to parents²</i>	528 (80)	449 (88)	79 (54)	<0.001
<i>Parents who reported having discussed vaccination with CAM primary provider</i>	<i>Total sample</i> (N=400)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=133)	<i>VH parents</i> (N=267)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	355 (89)	118 (89)	237 (89)	0.395
<i>Trust provider²</i>	371 (93)	128 (96)	243 (91)	0.164
<i>Provider's views are similar to parents²</i>	305 (76)	117 (88)	188 (70)	0.001
<i>Parents reporting that primary providers' views are similar to their own²</i>	<i>Total sample</i> (N=838)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=567)	<i>VH parents</i> (N=271)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	774 (92)	522 (92)	252 (93)	0.485
<i>Trust provider²</i>	820 (98)	560 (99)	260 (96)	0.004
<i>Parents reporting that biomedical primary providers' views are similar to their own²</i>	<i>Total sample</i> (N=528)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=449)	<i>VH parents</i> (N=79)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	479 (91)	413 (92)	66 (84)	0.081
<i>Trust provider²</i>	518 (98)	444 (99)	74 (94)	<0.001
<i>Parents reporting that CAM primary providers' views are similar to their own²</i>	<i>Total sample</i> (N=305)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=117)	<i>VH parents</i> (N=188)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	290 (95)	108 (92)	182 (97)	0.141
<i>Trust provider²</i>	297 (97)	115 (98)	182 (97)	0.516

Note. ¹Satisfied/very satisfied; ²Somewhat or completely; Pearson's Chi-squared tests were used for statistical analysis.

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract yes (p. 1-2)	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale yes (p. 3-5)	2	Explain the scientific background and rationale for the investigation being reported
Objectives yes (p. 5)	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design yes (p. 6)	4	Present key elements of study design early in the paper
Setting yes (p. 6)	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants yes (p. 6-7)	6	Give the eligibility criteria, and the sources and methods of selection of participants
Variables yes (p. 6-8)	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement yes (p. 7-8)	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size yes (p. 8-9)	10	Explain how the study size was arrived at
Quantitative variables yes (p. 7)	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods yes (p. 7)	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants yes (p. 8-9)	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data yes (p. 8-9)	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results yes (p. 9-18)	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized

(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results yes (p. 18-19)	18	Summarise key results with reference to study objectives
Limitations yes (p. 3)	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation yes (18-20)	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability yes (p. 3, 19-20)	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding yes (p. 20)	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Parents' Vaccination Information Seeking, Satisfaction with, and Trust in Medical Providers in Switzerland: A Mixed-Methods Study

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1 Parents' Vaccination Information Seeking, Satisfaction with, and Trust in Medical 2 Providers in Switzerland: A Mixed-Methods Study

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3 36 **Word count:** 4621 (without strengths and weaknesses), 4718 (with strengths and weaknesses)

4 37

5 38 **Abbreviations:** Complementary and alternative medicine (CAM); Vaccine hesitancy or
6 39 vaccine hesitant (VH); Parent Attitudes about Childhood Vaccines (PACV).

7 40

8 41 **Keywords**

9 42 Vaccine Hesitancy; Information Sources; Provider; Satisfaction; Trust

10 43

11 44 What is already known on this topic:

12 45 Trust in the medical providers, who are the main source of vaccination information, is crucial
13 46 for facing vaccine hesitancy (VH).

14 47

15 48 What this study adds:

16 49 In Switzerland, where complementary and alternative medicine (CAM) is popular, little
17 50 research has examined parents' vaccination decision-making process. Our findings suggest
18 51 that VH parents seek out a variety of information sources and providers due to dissatisfaction
19 52 with and distrust in previously obtained information. Since doctors are parents' most trusted
20 53 source of vaccination information, it is important for doctors to create trusting environments
21 54 where parents' vaccination questions and concerns are taken seriously and can be met with
22 55 satisfaction.

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58 **Abstract**

59 Objectives

60 The aim of this study was to better understand parental trust in and satisfaction with
61 information sources and medical providers regarding decision-making about childhood
62 vaccines.

63 Setting

64 The study was part of a Swiss national research program investigating vaccine hesitancy and
65 underimmunization.

66 Participants

67 We conducted qualitative interviews with 37 providers and 30 parents, observed 34
68 vaccination consultations, and then conducted quantitative surveys with 130 providers (both
69 CAM- and biomedically oriented) and 1390 parents.

70 Main outcome measures

71 Participants' vaccination information sources used in their decision-making process,
72 parents' trust in and satisfaction with these sources and providers.

73 Results

74 Based on the Parent Attitudes about Childhood Vaccines (PACV) scale, we considered 501
75 parents as vaccine-hesitant (VH) and 889 parents as non-vaccine-hesitant (non-VH). Whereas
76 both groups mentioned providers as the most trusted source of information, VH-parents were
77 less likely to mention pediatricians (N=358[71%] vs. N=755[85%]) and public health
78 authorities (N=101[20%] vs. N=333[37%]) than non-VH-parents. VH-parents were more
79 likely to have consulted another provider (N=196[39%] vs. N=173[19%]) than non-VH-
80 parents, to express less satisfaction with both their primary (N=342[82%] vs. N=586[91%])
81 and other providers (N=82[42%] vs. N=142[82%]), and less trust in their primary
82 (N=368[88%] vs. N=632[98%]) and other providers (N=108[55%] vs. N=146[84%]). VH-
83 parents were less likely to be satisfied with their biomedical primary provider than non-VH-

84 parents (100[69%] vs. 467[91%]). However, when the primary provider was CAM-oriented,
 85 there were similar levels of satisfaction among both groups (237[89%] VH-parents vs.
 86 118[89%] non-VH-parents). All differences were significant ($p<0.05$).

87 Conclusions

88 While the provider remains the main information source, VH parents turn to additional
 89 sources and providers, which is likely related to VH parents being rather dissatisfied with and
 90 distrusting in obtained information and their provider.

91

92 Registry

93 The local ethics committee (Ethikkommission Nordwest- und Zentralschweiz, EKNZ; project
 94 ID number 2017– 00725) approved the study.

95

96 Strengths and weaknesses of the study

Strengths	Limitations
The mixed-methods design brought added value to our study, as this allowed us to address qualitatively documented phenomena and then systematically analyze them on a larger scale.	The quantitative survey was not administered to a random sample.
Our recruitment strategy explicitly oversampled CAM providers and parents consulting them, which allowed us to compare the patient-provider relationship and patient-provider vaccine perspectives for parents seeing CAM vs. biomedical providers.	Our provider sample was recruited through personal contacts and snowball sampling
We consider the transdisciplinary research to be a distinct advantage.	

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98

99 1. Introduction

100 The growing body of literature on vaccine hesitancy (VH) points to the multifaceted and
101 complex nature of vaccination decision-making [1, 2]. Most parents – whether vaccine-
102 accepting or VH – obtain their vaccine information primarily from healthcare professionals,
103 with the most cited source being pediatricians, followed by other healthcare professionals,
104 such as midwives, nurses, and other therapists [3, 4, 5]. As healthcare providers are the main
105 source of information for parental decision-making, issues around satisfaction with and trust
106 in the provider are important to understand. Previous research has shown how trusting
107 relationships between patients and providers are determinative in parents' vaccination
108 decision-making, meaning that parents who trust their providers tend to trust their vaccination
109 recommendations [6, 7, 8]. In Switzerland, *complementary and alternative medicine (CAM)* is
110 widely used and integrated into the healthcare system [9, 10]. Particularly in primary
111 healthcare for children, CAM is mainly provided by biomedically trained physicians with
112 additional CAM training in the sense of integrative medicine [11]. Researchers have
113 established associations between VH and CAM use [6, 12, 13], and suggested that CAM
114 providers and VH parents have a "symbiotic" relationship, meaning that "VH and CAM exist
115 and function separately, but when combined, provide each other with 'resources' that enable
116 them to thrive together" [12, p. 111]. Others have shown that VH individuals have lower
117 levels of trust in biomedicine than in CAM [12, 14].

118 In addition to medical providers, sources of vaccination information include parents'
119 social networks, with similar views and norms being shared within networks. Generally,
120 parents with people in their networks who vaccinate less are also less likely to vaccinate [15,
121 16]. Social media and the Internet offer platforms for disseminating information and thus
122 serve as popular vaccination information sources with its own complexities and dynamics [17,
123 18, 19]. Testimonies of (negative) experiences during and after vaccination or the usage of
124 forums are believed to be particularly appealing to parents seeking vaccination information

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3 125 [20, 21]. In the last two decades, patient-provider dynamics have partially changed from the
4
5 126 former *doctor-provides-patient* to today's *users-provide-users* (i.e., patients no longer obtain
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7 127 their information only from the doctors who treat them, but doctors as well as lay people
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10 128 frequently disseminate information about health and illness on the Internet, which is available
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12 129 to all other users), with health-information seeking audiences being potentially far larger, and
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14 130 everyone with Internet access being capable of disseminating information [20, 22]. This
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17 131 context is further complicated with negative, emotion-focused, and often untrue vaccination
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19 132 information being difficult to debunk with medical facts [21].

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21 133 Research consistently shows how trust in and satisfaction with providers who promote
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23 134 vaccination increases parental vaccine acceptance, while parents being misunderstood,
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25 135 criticized, or alienated when expressing VH in clinical interactions can have a negative impact
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27 136 on vaccination acceptance [8]. Ceasing to consult with a health care provider [23, 24] and,
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29 137 related, the phenomenon of doctor “shopping” (which we refer to as *browsing*) [25], have
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31 138 previously been described as important expressions of patient dissatisfaction. Some of our
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33 139 qualitative data analysis has particularly demonstrated how issues of trust, satisfaction, affect,
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35 140 and choice played determinative roles, not only in parents’ vaccination decisions, but also in
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37 141 the types of vaccination sources and the choices of healthcare practitioners (i.e., biomedical or
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39 142 CAM) with whom they consult for their children’s cares [24]. The nuances of CAM
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41 143 vaccination counselling resulting in higher trust and satisfaction most likely lie within these
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43 144 providers taking time for discussion, incorporating parents into decision-making, and taking
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45 145 parents’ concerns seriously [26].

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47 146 In this mixed-methods study, we examined the extent to which trust in and satisfaction
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49 147 with vaccination information sources, and in particular the health care provider as the main
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51 148 source of information, differs between VH and non-VH parents and how this affects the
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53 149 parental vaccination decision-making.
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151 2. Material and methods

152 2.1. Study design and population

153 This study is part of a national transdisciplinary investigation into vaccination decision-
154 making in Switzerland [27]. We employed a mixed-methods approach with *sequential*
155 *exploratory design*, meaning that an initial qualitative component informed the design of a
156 subsequent quantitative stage [28]. First, we analyzed the qualitative results by identifying
157 key areas that seemed to be of central importance. We then focused on these when compiling
158 the quantitative questionnaires. The detailed analysis of qualitative and quantitative results
159 was finally done in parallel by presenting a clustering of similar statements in the qualitative
160 sector, followed by quantitative results showing similar dynamics on a larger scale. We
161 interviewed parents throughout German, French and Italian-speaking Switzerland. The
162 French-speaking part, with approximately 23% of the Swiss population and about 19% of our
163 parental study sample, was slightly underrepresented, and the Italian part was slightly
164 overrepresented (8% of the Swiss population and 18% of study parents) [29, 30]. At the time
165 of the survey, the interviewed parent was ≥ 18 years of age and their child was 0-11 years old.
166 We asked parents to provide us with a copy of their children's vaccination record.

167 2.2. Patient and public involvement

168 Given the presumably large number of people who are not to be regarded as vaccine
169 opponents but as vaccine hesitant, we meant to employ a specific focus on the path to
170 decision-making with all the thought processes, worries and fears contained therein, as well as
171 the influence of external information. During our qualitative research period, various starting
172 points emerged that were worth investigating on a larger scale (in the quantitative sector). We
173 recruited participating parents from a network of 86 biomedical and 44 CAM providers
174 participating in the project. Participants who indicated they wished to receive the study results
175 will receive notifications once results are published.

176

177 2.3. *Qualitative data collection and analysis*

178 We first conducted semi-structured in-depth interviews with parents from September 2017
179 to February 2018 and with biomedically-only trained doctors and providers (i.e., physicians or
180 non-physician-providers) with additional CAM training from August 2017 to September
181 2018. Interviews aimed to better understand parents' vaccination decision-making processes
182 and their interactions with health care providers. An interview guide was piloted and revisited
183 iteratively for clarity. We also conducted ethnographic observations of vaccination
184 consultations. Qualitative interviews were audio-recorded and transcribed verbatim.
185 **Supplementary Questionnaire S1 and Supplementary Questionnaire S2** contain the
186 interview guides for the qualitative parental and provider interviews, respectively. Interviews
187 allowed us to gather background information about parents and their providers and
188 perspectives on vaccination. Vaccination consultation observations were documented in field
189 journals and then subsequently written into narrative accounts. Qualitative data were analyzed
190 by MD and AB. Analysis of the qualitative interviews and observations were guided by the
191 Framework Method [31] with support of MAXQDA software.

192 2.4. *Quantitative data collection and analysis*

193 For the study's quantitative component, we recruited parents in waiting rooms of
194 participating providers' offices [27]. We refer to these providers as the *primary providers*.
195 The questionnaire, however, was administered during a telephone interview conducted after
196 office hours from January 2019 to April 2020 [27]. The latter included the *Parent Attitudes*
197 *about Childhood Vaccines (PACV)* survey score, a validated instrument that was designed by
198 Opel and colleagues in order to identify VH parents [32, 33, 34]. The 2011 Opel-revised 15-
199 item PACV [33] results in a score of 0-100 points. If a parent scores ≤ 49 points, they are
200 considered non-VH; if they score ≥ 50 points, they are considered VH. Based upon the results
201 of a study validating a 5-item version of the PACV in Switzerland with identical scoring [30],
202 we opted for the shorter 5-item version for our analyses. The final questionnaire included

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3 203 PACV items, questions gathering sociodemographic information about the parents and the
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5 204 target child, and additional questions informed by our previously published qualitative
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7 205 research investigating CAM provider approaches to vaccination consultations [26] ,
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9 206 biomedical provider descriptions of interactions with VH parents and dilemmas faced when
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11 207 addressing vaccine hesitancy and refusal [35], and VH parents' navigation of information
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13 208 sources and consultations with CAM and biomedical providers [24]. These qualitative studies
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15 209 informed the design of several components of the quantitative survey, particularly including
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17 210 questions on the parent-provider relationship and vaccination information sources. The
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19 211 quantitative questionnaire is provided in **Supplementary Questionnaire S3**.

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24 212 A key question posed to parents was "What are your most trusted information sources on
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26 213 vaccination?" to which a series of pre-established response options were made available (e.g.,
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28 214 "Internet".) We invited participants to provide additional information through open-answer
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30 215 responses (e.g., "Which websites?"). The number of sources mentioned by each participant
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32 216 was analyzed by coding and counting the reported sources, as well as the free-text answers.

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35 217 We use descriptive statistics plus Pearson's Chi-squared and Wilcoxon Rank Sum tests to
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37 218 test whether observed differences between non-VH and VH parent participants are significant
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39 219 at the $p < 0.05$ level. Quantitative data analysis was performed by SE and KJ using STATA
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41 220 software version 12.1 (Stata corporation, College Station TX). We personally reviewed the
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43 221 information sources cited by parents and, after consultation within the team, we decided
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45 222 whether to consider each source as critical or accepting of the official vaccination
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47 223 recommendations.

51 224 *2.5. Ethical considerations*

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54 225 This study was conducted in compliance with the Swiss Federal Act on Research
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56 226 Involving Human Beings (Human Research Act) and the Declaration of Helsinki. The local
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58 227 ethics committee (Ethikkommission Nordwest- und Zentralschweiz, EKNZ; project ID
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60 228 number 2017– 00725) approved the study. We obtained written informed consent from each

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229 participant after the nature and possible consequences of the study had been fully explained.

230 Pseudonyms are used for participants throughout. Direct quotes were translated from the

231 original language of utterance (German, French) into English.

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For peer review only

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3 233 **3. Results**
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5 234 *3.1. Study population*
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7 235 For the qualitative study component, we conducted ethnographic observations of 34
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10 236 pediatric vaccination consultations. We also conducted in-depth, face-to-face interviews with
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12 237 30 parents and 37 providers. Among the provider-interviewees, 20 were biomedically
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14 238 oriented physicians and 17 were CAM-oriented providers, of which 15 were biomedically
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16 239 trained physicians with additional training in CAM, and 2 were non-physician CAM
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18 240 providers.
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21 241 For the research program's quantitative component, (i.e., both the childhood vaccines and
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23 242 HPV samples [27]), we completed a full telephone interview with 1,390 parents and 130 (86
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25 243 biomedically- and 44 CAM-oriented) primary providers. 889 (64%) parents had a PACV score
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27 244 of ≤ 49 , indicating non-VH, and 501 (36%) parents had a PACV score of ≥ 50 , indicating VH.
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29 245 Parent characteristics are shown in **Table 1**. VH parents were more likely to see a CAM-
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31 246 oriented primary provider than non-VH parents (307 [61%] vs. 183 [21%]; $p < 0.001$).
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Table 1. Characteristics of the quantitative study population

	All parents (N=1390)		By PACV-score		P value
			Non-VH parents (N=889)	VH parents (N=501)	
	N (%)		N (%)	N (%)	
Female Respondent	1232 (89%)		798 (90)	434 (87)	0.141 ¹
Relationship to child					0.095 ¹
Mother	1228 (88)		797 (90)	431 (86)	
Father	155 (11)		89 (10)	66 (13)	
Other	7 (1)		3 (0)	4 (1)	
Interviewee Age (Mean (SD))	37.1 (6.27)		37 (6.16)	37.2 (6.46)	0.592 ²
Born in Switzerland	981 (71)		608 (68)	373 (74)	0.059 ¹
Parent's highest education					<0.001 ¹
Low ³	272 (20)		188 (21)	84 (17)	
Medium ⁴	321 (23)		209 (24)	112 (22)	
Bachelors ⁵	285 (21)		163 (18)	122 (24)	
Masters	358 (26)		226 (25)	132 (26)	
Doctorate	105 (8)		81 (9)	24 (5)	
Other, missing	49 (4)		22 (2)	27 (5)	
Household income					<0.001 ¹
< 80,000 Swiss Francs (CHF)	319 (23)		174 (20)	145 (29)	
80,000 – 120,000 CHF	384 (28)		225 (25)	159 (32)	
> 120,000 CHF	279 (20)		195 (22)	84 (17)	
Missing, declined to respond	408 (29)		295 (33)	113 (23)	
Type of primary provider					<0.001 ¹
Biomedical	893 (64)		705 (79)	188 (38)	
CAM	490 (35)		183 (21)	307 (61)	
Missing	7 (1)		1 (0)	6 (1)	

Note. ¹Pearson's Chi-squared and ²Wilcoxon Rank Sum tests were used for statistical analysis. ³Secondary school not completed, no completed professional education, completed 9 years of school without further education, apprenticeship, technical school or business school; ⁴College, higher professional school; ⁵Bachelor at University, primary school teacher seminar.

248

249 3.1 Variety of information sources on vaccination

250 During our qualitative interviews and observations of vaccination consultations, parents

251 cited a broad array of vaccination information sources as part of their decision-making

252 process. Many VH parents engaged in what we refer to as *information browsing*, which

253 involves parents comparing and weighing different information sources while striving to

254 reach certainty about the right vaccination decision to make for their children. For example,

255 Mrs. Sandoz, a 35-year-old mother of a 13-month-old unvaccinated son explained her

256 decision not to vaccinate:

257 “I think it was a mix of discussions with people close to us and with friends. [...]

258 There is my personal feeling about the matter. There is certainly the social influence

259 from my husband. I'll say that the decision surely came more from me than it did from

260 him. I think I hold the decision closer to my heart than he does. I think it was kind of a

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3 261 vague questioning. There were some things I read on the Internet. I joined Facebook
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5 262 groups where they talk about it. I read some testimonies. I think when I was pregnant,
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7 263 I had a discussion with the [CAM] pediatrician in order to know the true risks that we
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9 264 were taking if we didn't vaccinate. I was looking for the most neutral point of view
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11 265 possible. [...] For now, it's a decision that is in favor of not vaccinating.”

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14 266 Other VH parents explained how having multiple sources of information reassured them
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16 267 that they were taking the correct course of action for their families.

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19 268 Qualitative results additionally shed light on parents, often VH parents, having consulted a
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21 269 multitude of sources that varied in both format and content. Parents described how each piece
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23 270 of information could temporarily solidify their opinion, but also raise further doubts and
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25 271 uncertainties. Mrs. Sandoz explained:

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28 272 “We have a lot of doubts around the benefits of vaccines. My husband and I are still
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30 273 reading about it and continue to have discussions and thinking about it in order to be
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32 274 comfortable. [...]. We have so much information that we can get lost in it. [...] Up
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34 275 until now, everything that I've read and the discussions that I've had have reinforced
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36 276 our decision to not vaccinate our son.”

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39 277 VH parents described how a multitude of information sources could be both a source of
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41 278 reassurance and of hesitancy in their quest for neutral information about vaccination. We
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43 279 therefore investigated the potential association of VH with the number and trustworthiness of
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45 280 parents' vaccination information sources by including the question “What are your most
46
47 281 trusted information sources on vaccination?” in the quantitative questionnaire.

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50 282 **Figure 1** illustrates how the number of trusted information sources varied between VH
51
52 283 and non-VH parents. VH parents reported using more sources on average than non-VH
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54 284 parents (2.98 [SD=2.02] vs. 2.70 [SD=1.83]). While small, the difference was significant
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56 285 (p=0.012).

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3 **287 [Figure 1]**
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8 *3.2 Types of information sources and media*
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10 290 Based on our initial qualitative research, we generated a preliminary list of information
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12 291 source types which we then included in the quantitative questionnaire. Commonly mentioned
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14 292 information sources included the child's doctor and other providers, family, friends and
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16 293 acquaintances, official public health recommendations, print media, such as books or
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18 294 newspaper articles, the Internet, and social media.
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21 295 In **Table 2** we list the trusted vaccination information sources cited most by parents. The
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23 296 child's doctor was the information source cited most (1113 [80%] parents) by both VH and
24
25 297 non-VH parents, but VH parents were less likely to report the child's doctor as the most
26
27 298 trusted source than non-VH parents (358 [71%] vs. 755 [85%]; $p<0.001$). VH parents were
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29 299 also less likely to report public health authorities as a trusted information source than non-VH
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31 300 parents (101 [20%] vs. 333 [37%]; $p<0.001$), as well as information materials that are
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33 301 consistent with the official vaccination recommendation (26 [5%] vs. 74 [8%]; $p=0.03$).
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37 302 In contrast, VH parents tended to mention information sources other than the child's
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39 303 doctor or public health authorities more than non-VH parents, including social networks (215
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41 304 [43%] vs. 253 [28%]; $p<0.001$), other health care workers (105 [21%] vs. 119 [13%];
42
43 305 $p<0.001$) and their personal gut feelings or experiences (16 [3%] vs. 10 [1%]; $p=0.006$). The
44
45 306 largest difference we identified involved information materials, such as books, online or print
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47 307 magazines, and websites that are critical of official vaccination recommendations (105 VH
48
49 308 parents [21%] vs. 4 non-VH parents [0%]; $p<0.001$), and materials of obvious CAM nature
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51 309 (12 VH parents [2%] vs. 0 non-VH parents [0%]; $p<0.001$).
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Table 2. Types of trusted vaccination information sources.

	All parents (N=1390)		By PACV-score		P value
			Non-VH parents (N=889)	VH parents (N=501)	
	N (%)	N (%)	N (%)		
My child's doctor	1113 (80)	755 (85)	358 (71)	<0.001	
Social networks ¹	468 (34)	253 (28)	215 (43)	<0.001	
Public Health Authorities	434 (31)	333 (37)	101 (20)	<0.001	
Other health care workers	224 (16)	119 (13)	105 (21)	<0.001	
Other physician	195 (14)	111 (12)	84 (17)	0.027	
CAM	19 (1)	3 (0)	16 (3)	<0.001	
Homeopathic	12 (1)	2 (0)	10 (2)	0.001	
Midwife	13 (1)	4 (0)	9 (2)	0.268	
Materials that are critical of public health vaccination recommendation ²	109 (8)	4 (0)	105 (21)	<0.001	
"Foundation for consumer protection"	22 (2)	3 (0)	19 (4)	<0.001	
Hirte: "Impfen Pro & Contra"	15 (1)	0 (0)	15 (3)	<0.001	
Explicitly CAM materials	12 (1)	0 (0)	12 (2)	<0.001	
Berthoud: "Qui aime bien vaccine peu"	9 (1)	0 (0)	9 (2)	<0.001	
Glöckler/Goebel/Michael: "Kindersprechstunde"	6 (0)	0 (0)	6 (1)	0.001	
"www.impfo.ch"	5 (0)	2 (0)	3 (1)	0.264	
Materials that are consistent with public health vaccination recommendation ²	100 (7)	74 (8)	26 (5)	0.030	
"www.swissmom.ch"	20 (1)	16 (2)	4 (1)	0.132	
"Wir Eltern"	8 (1)	7 (1)	1 (0)	0.164	
"Beobachter"	6 (0)	2 (0)	4 (1)	0.117	
"Puls"	6 (0)	4 (0)	2 (0)	0.890	
Google	98 (7)	78 (9)	20 (4)	0.001	
Scientific literature ⁴	55 (4)	37 (4)	18 (4)	0.601	
No source, missing, don't know, don't want to disclose	49 (4)	26 (3)	23 (5)	0.106	
Medical work experience ³	42 (3)	30 (3)	12 (2)	0.306	
Nurse	8 (1)	6 (1)	2 (0)	0.514	
News	31 (2)	22 (2)	9 (2)	0.411	
Personal experience, gut feeling	26 (2)	10 (1)	16 (3)	0.006	
Described as neutral	9 (1)	0 (0)	9 (2)	<0.001	

Note. ¹Family, friends, and acquaintances; ²Print media, websites, organizations, TV programs, and films that are critical of or consistent with public health vaccination recommendations based on our detailed assessment and on consensus among research team members; ³Medical, biological, or pharmaceutical training or work experience of the interviewee or the other parent of the target child; ⁴As stated by the interviewee. Pearson's Chi-squared tests were used for statistical analysis.

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314 In **Table 3**, we list where parents reported having obtained trusted information about
315 vaccination. We list all information channels reported by at least 5 parents. The Internet was
316 considered the most trustworthy medium by VH parents and non-VH parents in similar
317 proportions (176 [35%] vs. 299 [34%]; p=0.572). However, VH parents cited print media as
318 their most trusted medium of vaccination information more frequently than non-VH parents
319 (237 [47%] vs. 176 [20%]; p<0.001), including books and brochures (129 [26%] vs. 63 [7%];
320 p<0.001). With regards to specific internet sources, VH parents were less likely to report

321 Google than non-VH parents (20 [4%] vs. 78 [9%]; $p=0.001$) as a trusted medium for
 322 vaccination information. VH parents were more likely than non-VH parents to cite social
 323 media (26 [5%] vs. 21 [2%]; $p=0.005$), although overall few parents in either group cited this
 324 as a trusted information source.

325 **Table 3.** Types of trusted media for vaccination information

	All parents (N=1390)		By PACV-score		P value
			Non-VH parents (N=889)	VH parents (N=501)	
	N (%)	N (%)	N (%)	N (%)	
Internet	475 (34)	299 (34)	176 (35)	0.572	
Google	98 (7)	78 (9)	20 (4)	0.001	
Social media	47 (3)	21 (2)	26 (5)	0.005	
Facebook	17 (1)	7 (1)	10 (2)	0.490	
Print media	413 (30)	176 (20)	237 (47)	<0.001	
Books and brochures	192 (14)	63 (7)	129 (26)	<0.001	
Magazine and newspapers	60 (4)	42 (5)	18 (4)	0.319	
TV	67 (5)	37 (4)	30 (6)	0.127	
Films	13 (1)	1 (0)	12 (2)	<0.001	
Conferences	9 (1)	2 (0)	7 (1)	0.150	

328 **Note.** Pearson's Chi-squared tests were used for statistical analysis.

330 3.3 Satisfaction with and trust in the primary provider

331 Our qualitative findings revealed an understudied phenomenon in Switzerland – parents
 332 switching providers for their children's care around the issue of vaccination – and suggested
 333 that this switch was often made from biomedical-oriented physicians to those trained in CAM
 334 [24]. Quantitative results suggest that more VH parents than non-VH parents consulted
 335 providers other than the child's primary provider when making vaccination decisions, as can
 336 be seen below. We therefore explored whether this information seeking behavior is related to
 337 issues of (dis)satisfaction with and (dis)trust in the primary provider.

338 Qualitative evidence particularly showed the saliency of the issue of trust for parents in
 339 their vaccination decision-making process. The following excerpt from an interview with Mrs.
 340 Godet, a 29-year-old mother of a 13-month-old fully vaccinated daughter illustrates how,
 341 despite the mother's media-induced uncertainty about her vaccination decision, trust in the
 342 provider was crucial for her to follow the provider's recommendation:

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3 343 “There are a lot of so-called 'scientific' studies which have come out with
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5 344 consequences that vaccines might have on children's health. [...]. And so it's
6
7
8 345 very hard to know who to believe, actually. [...]. So, we trust, anyway. Well, I
9
10 346 trust my pediatrician. So, if she tells me that I have to vaccinate, I think that's
11
12 347 good. Now, it's true that if you read a little bit of what's on the Internet and
13
14
15 348 everything, you don't really know what to do.”

16
17 349 Providers also discussed how they fostered trust as part of their clinical practice. Dr.
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19 350 Heffelfinger, an anthroposophic physician, explained how he thought his practices differed
20
21 351 from those of a biomedically oriented pediatrician:

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23
24 352 “I try to take much more time and try to make something out of the time. To gain trust,
25
26 353 to create insight to the subject. [...]. To me, the free decision to vaccinate is the top
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28 354 priority. The decision belongs to the human being that decides for himself or herself.”

29
30 355 **Figure 2 and Supplementary Table S1** show how VH parents were more likely to have
31
32 356 discussed vaccination with their primary provider than non-VH parents (418 [83%] vs. 645
33
34 357 [73%]; $p < 0.001$). VH parents were less likely to be satisfied with and to trust their primary
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36 358 provider than non-VH parents (satisfaction: 342 [82%] vs. 586 [91%]; trust: 368 [88%] vs.
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38 359 632 [98%]; $p < 0.001$ for both satisfaction and trust). When their primary provider was
39
40 360 biomedically oriented, this difference was even more notable (satisfaction: 100 [69%] vs. 467
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42 361 [91%]; trust: 120 [83%] vs. 503 [98%]; $p < 0.001$ for both satisfaction and trust). In contrast,
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44 362 when the primary provider was CAM-oriented, there was no significant difference in
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46 363 satisfaction and trust for VH and non-VH parents (satisfaction: 237 [89%] vs. 118 [89%];
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48 364 trust: 243 [91%] vs. 128 [96%]; $p = 0.395$ and $p = 0.164$, respectively).

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50 365 To evaluate issues of (dis)satisfaction and (dis)trust, we analyzed parents' responses
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52 366 regarding perceived agreement between their own vaccination view and their primary
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54 367 provider's view. VH parents reported significantly lower agreement between their own
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56 368 vaccination view and their child's doctor perceived view than non-VH parents (271 [65%] vs.

369 567 [88%]; $p < 0.001$). The gap between parent and provider views was larger when the
370 primary provider was biomedically oriented (79 [54%] VH parents vs. 449 [88%] non-VH
371 parents; $p < 0.001$) and smaller when the primary provider was CAM-oriented (188 [70%] VH
372 parents vs. 117 [88%] non-VH parents; $p = 0.001$).

373

374 **[Figure 2]**

375

376 *3.4 Seeking multiple provider opinions on vaccination*

377 Given the important role children's doctors play in influencing parents' vaccination
378 decisions, we further explored a phenomenon that our initial qualitative work brought to light –
379 parents consulting with and/or switching from one to another provider, often to one offering
380 CAM services, in response to issues arising during vaccination consultations [24], a
381 phenomenon we call *provider browsing*. The following conversation with Mrs. Kugler, a 37-
382 year-old mother of one partially vaccinated child, illustrates this behavior:

383 *Researcher:* Ok. I've already seen in the vaccination booklet, there are two or three
384 different doctors that you consult. Do you prefer to see a biomedical provider?

385 *Mother:* Well, we actually tend to go to the homeopath. [...]. She's always a little, "I
386 told you so," after every vaccination. But she tolerates it. It takes her two or three
387 weeks until she gets well enough to be neutral towards us again [laughing]. Because
388 we do vaccinate. And [the homeopath] is the one who treats [our daughter] when she's
389 sick. [...]. And if we needed a diagnosis, for example, if I wasn't sure whether it was
390 otitis media or something like that, I used to go see [the local pediatrician]. [...]. He is
391 a classic [biomedical] Algifor-Dafalgan [commonly prescribed pain killers in
392 Switzerland, containing ibuprofen and paracetamol, respectively] doctor.

393 *Researcher:* Ok. Purely conventional biomedical?

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3 394 *Mother:* Yes, [...]. At every diagnosis. In winter, [my daughter] was very sick again
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5 395 with an extremely high temperature. Again, the remedy was Algifor. The doctor
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7 396 added, ‘We should start vaccinating soon. [...]. It’s a classic fever. We can easily
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9 397 vaccinate. It’s not too bad at this age.’ [...] I felt we were no longer in good hands and
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11 398 switched to Dr. Heffelfinger.

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13
14 399 Qualitative analysis of provider browsing suggested that parents were seeking health care
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16 400 providers who were willing to listen to and understand parents’ rationales around vaccination
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18 401 and their adherence to complementary and alternative approaches to medicine. Dr.
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20 402 Heffelfinger, an anthroposophical doctor, pointed to the practice of listening to and
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22 403 responding to parents’ questions and concerns. He hypothesized why parents might switch to
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24 404 him after seeing a biomedically oriented physician,

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26 405 “That style of consultation doesn’t suit them. [...]. The parents don’t feel like they are
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28 406 being taken seriously, or they have many more questions than what they were able to
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30 407 discuss.”

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33 408 When asked if parents followed this provider’s vaccination recommendations, he responded
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35 409 affirmatively, noting that parents did not often return to their previous pediatrician,

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37 410 “People don’t consult that pediatrician again because the pediatrician was vaccinating
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39 411 insanely. [With me], parents do almost exactly the same vaccines as they would have
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41 412 done with their previous pediatrician. But we talked about them.”

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44 413 **Table 4** reports quantitative analysis of this phenomenon showing that more VH parents
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46 414 than non-VH parents reported consulting with a provider other than the primary provider for
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48 415 vaccination questions (196 [39%] vs. 173 [19%]; $p < 0.001$). We specifically asked questions
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50 416 about parents’ motivations for consulting with another provider. More VH parents than non-
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52 417 VH parents cited seeking a second opinion or having a disagreement as the reason for
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54 418 consulting with another provider (87 [17%] vs. 38 [4%]; $p < 0.001$). Logistical reasons (e.g.,
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3 419 parents moved, or provider stopped working) were mentioned with similar frequency (43
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5 420 [9%] among VH parents vs. 68 [8%] among non-VH parents; $p=0.537$).

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8 421 Interestingly, among parents who had asked another provider about vaccination, about
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10 422 half as many VH parents as non-VH parents reported satisfaction with and trust in the other
11
12 423 provider (satisfaction: 82 [42%] vs. 142 [82%]; trust: 108 [55%] vs. 146 [84%]; $p<0.001$ for
13
14 424 both satisfaction and trust).

16
17 425 Since VH parents report higher satisfaction and trust in CAM-oriented providers, we
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19 426 investigated whether provider browsing varied by type of primary provider (i.e., biomedical
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21 427 or CAM orientation). Among parents with biomedically oriented primary providers, more VH
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23 428 parents than non-VH parents engaged in provider browsing (54 [29%] vs. 129 [18%];
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25 429 $p=0.002$). However, this difference was even starker among parents with CAM-oriented
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28 430 primary providers (137 [45%] of VH parents vs. 43 [23%] of non-VH parents; $p<0.001$).

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Table 4. Parents having consulted another doctor about vaccination.

	<i>All parents</i> (N=1390)	<i>By PACV-score</i>		<i>P value</i>
		<i>Non-VH parents</i> (N=889)	<i>VH parents</i> (N=501)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
<i>Consulted another doctor</i>				<i><0.001</i>
No	1012 (73)	712 (80)	300 (60)	
Yes	369 (27)	173 (19)	196 (39)	
Missing	9 (1)	4 (0)	5 (1)	
<i>Reason for consultation</i>				<i><0.001</i>
Second opinion or disagreement	125 (9)	38 (4)	87 (17)	
Moved or stopped working	111 (8)	68 (8)	43 (9)	
Other	130 (9)	64 (7)	66 (13)	
Missing	3 (0)	3 (0)	0 (0)	
	<i>Total sample</i> (N=893)	<i>By PACV-score</i>		
<i>Parents with a biomedical primary doctor</i>		<i>Non-VH parents</i> (N=705)	<i>VH parents</i> (N=188)	<i>P value</i>
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
<i>Consulted another doctor</i>				<i>0.002</i>
No	703 (79)	572 (81)	131 (70)	
Yes	183 (20)	129 (18)	54 (29)	
Missing	7 (1)	4 (1)	3 (2)	
<i>Reason for consultation</i>				<i>0.134</i>
Second opinion or disagreement	46 (5)	27 (4)	19 (10)	
Moved or stopped working	71 (8)	55 (8)	16 (9)	
Other	64 (7)	45 (6)	19 (10)	
Missing	2 (0)	2 (0)	0 (0)	
	<i>Total sample</i> (N=490)	<i>By PACV-score</i>		
<i>Parents with a CAM primary doctor</i>		<i>Non-VH parents</i> (N=183)	<i>VH parents</i> (N=307)	<i>P value</i>
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
<i>Consulted another doctor</i>				<i><0.001</i>
No	308 (63)	140 (77)	168 (55)	
Yes	180 (37)	43 (23)	137 (45)	
Missing	2 (0)	0 (0)	2 (1)	
<i>Reason for consultation</i>				<i>0.014</i>
Second opinion or disagreement	75 (15)	10 (5)	65 (21)	
Moved or stopped working	40 (8)	13 (7)	27 (9)	
Other	64 (13)	19 (10)	45 (15)	
Missing	1 (0)	1 (1)	0 (0)	
	<i>Total sample</i> (N=369)	<i>By PACV-score</i>		
<i>All parents having consulted another doctor before</i>		<i>Non-VH parents</i> (N=173)	<i>VH parents</i> (N=196)	<i>P value</i>
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
<i>Satisfied¹ with other doctor</i>	224 (61)	142 (82)	82 (42)	<i><0.001</i>
<i>Trust³ other doctor</i>	254 (69)	146 (84)	108 (55)	<i><0.001</i>

Note. ¹Satisfied or very satisfied; ²Somewhat or not at all satisfied; ³Somewhat or completely. Pearson's Chi-squared tests were used for statistical analysis.

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436 4. Discussion

437 4.1. Principal findings

438 Our mixed-methods study has several main findings. First, our results confirm previous
439 research showing that children's doctors are parents' most important vaccination information
440 [3, 4, 5, 36]. Similarly, VH participants were more likely to turn to additional information
441 sources, including their social networks, books, and other materials critical of official
442 vaccination recommendations [4, 15, 16]. More VH parents than non-VH parents cited print
443 media as a trusted information source. To our knowledge, this has not been reported on
444 previously.

445 Second, VH parents expressed lower levels of satisfaction with and trust in their primary
446 provider, particularly biomedically oriented physicians. This finding is likely associated with
447 our third main finding showing that VH parents engaged more in provider browsing than non-
448 VH parents. Nevertheless, VH parents reported lower levels of satisfaction with and trust in
449 these other providers. VH parents were more likely to consult with CAM-oriented primary
450 providers and to have higher levels of satisfaction with and trust in CAM than in biomedical
451 providers. Interestingly, the phenomenon of VH parents having consulted with other
452 providers about vaccination occurred more when the primary provider was CAM-oriented.

453 Previous research suggests that the relationship between VH and CAM use is not fully
454 explained by VH individuals' trust in CAM services, but rather by distrust in biomedicine
455 [14]. Accordingly, we argue that the VH parents in our sample may have been more likely to
456 be pushed away from biomedicine than pulled toward CAM, as VH parents seemed to switch
457 providers when they were no longer satisfied with or no longer fully trusted their provider,
458 therefore substantiating not primarily the attractiveness of the second provider, but rather a
459 form of dissatisfaction with the initial provider. Whereas low trust in medical providers has
460 been documented in previous research as characteristics of VH parents [8, 37, 38], VH

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3 461 parents' consultations with multiple providers about vaccination has, to our knowledge, not
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5 462 extensively been studied.

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7 463 Our results further imply that VH parents' information browsing behaviors are, similarly
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9 464 to provider browsing, an expression of dissatisfaction and distrust. We argue that individuals
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11 465 who are exposed to a variety of information [39], via the Internet [40, 41] or their social
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13 466 networks [16], are likely to harbor concerns or doubts about official vaccination
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15 467 recommendations. Our qualitative data suggest that these doubts may lead VH parents to seek
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17 468 information from additional sources, by consulting a different doctor or reading additional
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19 469 information materials. Reflecting previous findings [37], several parents described how
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21 470 persistent or novel doubts, uncertainty, or dissatisfaction surfaced when they were exposed to
22
23 471 new vaccination information.

24 472 *4.2. Strengths and weaknesses in relation to other studies*

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26 473 Building upon existing literature, our study provides evidence demonstrating how VH
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28 474 parents can be characterized by their lower levels of satisfaction and trust, and that this may
29
30 475 be an important basis for a *vicious circle* of information seeking, dissatisfaction, distrust, and
31
32 476 VH, as previous studies have shown the importance of trust when it comes to addressing VH
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34 477 [8, 42, 43]. Furthermore, there is a need to examine decision-making on childhood
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36 478 vaccinations and under-immunization among VH parents in countries where little research
37
38 479 has been conducted [1]. It is therefore important that research provides context-specific
39
40 480 insights on Switzerland, due particularly to its high CAM use [10] and high rates of VH [27].
41
42 481 The focus on Switzerland, the large-scale data on the questions of VH, and the study's mixed-
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44 482 methods approach speak to the novelty of this research.

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46 483 That said, this is not a representative, population-based sample and it provides cross-
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48 484 sectional data.

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50 485 Future studies could investigate how trust and satisfaction are maintained, gained, or lost
51
52 486 over time in consultations between parents and HCPs over time.

487 4.3. *Meaning of the study*

488 Our results suggest potential intervention possibilities for addressing VH. Since providers
489 remain the number one source of both VH and non-VH parents, we argue that providers can
490 undergo vaccine consultation and communication training to engage more effectively in
491 dialogue about vaccination with patients. Parents, especially VH parents, do not always lack
492 facts but also may lack certainty, trust, and satisfaction toward the information they obtain as
493 well as in their medical provider. Previous literature shows that parents showing reluctance
494 towards childhood vaccination are not necessarily poised to reject vaccination. Such
495 reluctance is rather a result of uncertainty and doubt acquired through conflicting information
496 [26]. It is important that the provider does not hastily label or even exclude those patients, but
497 rather views them as patients with doubts or concerns and with potential for productive
498 dialogue. If hesitant parents' questions are not adequately addressed and concerns are not met
499 with understanding, distrust and dissatisfaction can arise. In these instances, parents may
500 engage in provider browsing, information browsing, and engage in behaviors that might
501 increase their VH.

502 4.4. *Unanswered questions and future research*

503 Given the current sociocultural tension surrounding the Covid-19 pandemic, a thorough
504 analysis of the underlying factors and potential intervention measures of widespread VH
505 about the SARS-CoV-2 vaccine is needed. It will also be important for researchers to examine
506 how issues of trust and satisfaction around Covid-19 vaccination services might be associated
507 with routine childhood vaccinations and the influenza vaccination.

508

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517

518 **Transparency declaration**

519 The manuscript is an honest, accurate, and transparent account of the study being reported; no
520 important aspects of the study have been omitted.

521

522 **Contributors**

523 SE and MD co-drafted the manuscript. SE and KJ focused on the quantitative components
524 and MD and AB focused on the qualitative components. SM provided valuable feedback
525 during the writing process. BH, BW and DK gave rich insight into CAM in Switzerland. BH
526 and BW helped establishing the network of CAM providers and gave and insight into
527 pediatrics in Switzerland. AB was part of the gathering of qualitative data and gave valuable
528 feedback during the writing process. RE, JP and JH gathered qualitative data. PT was the head
529 of the entire project. He directed and supervised all operations from start to finish. He also
530 provided important expertise on infectious diseases and internal medicine. All authors read
531 and approved the final manuscript.

532

533 **Data sharing**

534 Raw data supporting the findings of this study are available from the corresponding author
535 (PT) on request.

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538

539 **Competing Interest Statement**

540 All authors have completed the ICMJE uniform disclosure form at [www.icmje.org/](http://www.icmje.org/doi_disclosure.pdf)
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546 could appear to have influenced the submitted work.

547

548 **Figure legends**

549 Figure 1. Number of trusted vaccination information sources.

550 Note. Distribution of the number of trusted vaccination information sources. We divided
551 parents into non-VH and VH according to PACV score $<$ or ≥ 50 . The median, mean (standard
552 deviation) of information sources was; 2, 2.80 (1.90) for the entire study population
553 (N=1390); 2, 2.70 (1.83) for the non-VH parents (N=889), and; 3, 2.98 (2.02) for the VH
554 parents (N=501). Wilcoxon Rank Sum test was used for statistical analysis.

555 Figure 2. Parental satisfaction with and trust in the child's biomedical or CAM primary
556 provider.

557 Note. ¹Very satisfied or satisfied; ²Completely or somewhat trust; ³Completely or somewhat
558 agree; Percentages refer to the total number of non-VH and VH parent participants; Pearson's
559 Chi-squared tests were used for statistical analysis.

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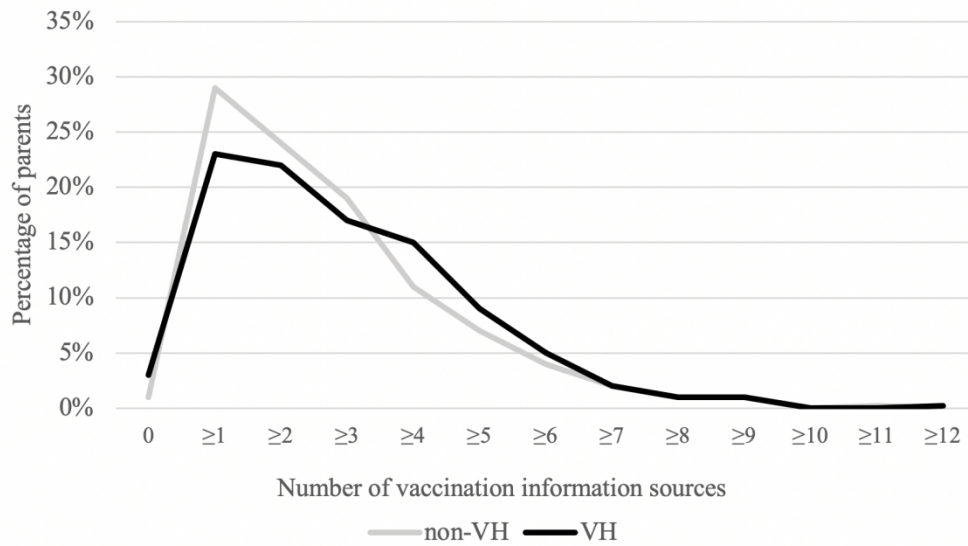
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Figure 1. Number of trusted vaccination information sources.



Note. Distribution of the number of trusted vaccination information sources. We divided parents into non-VH and VH according to PACV score $<$ or ≥ 50 . The median, mean (standard deviation) of information sources was; 2, 2.80 (1.90) for the entire study population (N=1390); 2, 2.70 (1.83) for the non-VH parents (N=889), and; 3, 2.98 (2.02) for the VH parents (N=501). Wilcoxon Rank Sum test was used for statistical analysis.

Figure 1. Number of trusted vaccination information sources.

Figure 2. Parental satisfaction with and trust in the child’s biomedical or CAM primary provider.

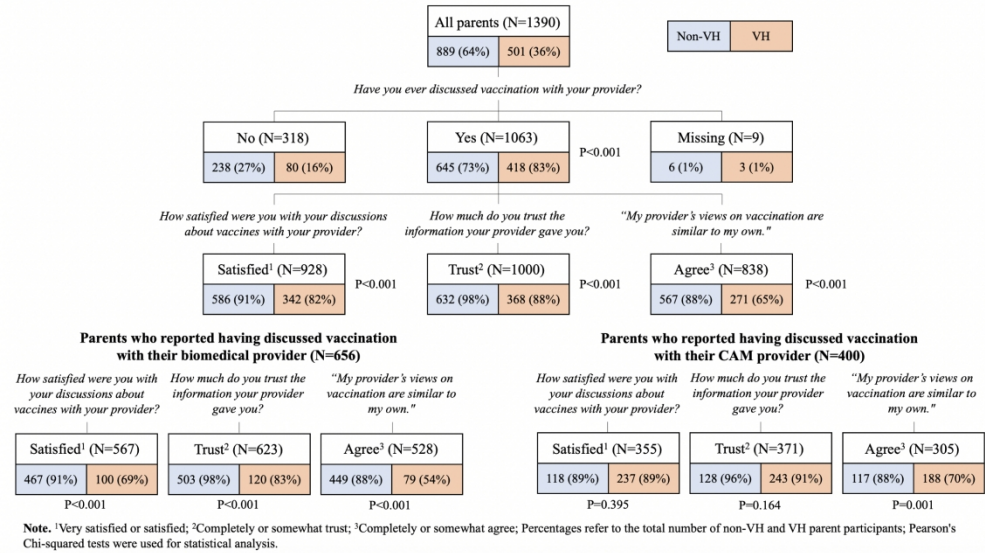


Figure 2. Parental satisfaction with and trust in the child’s biomedical or CAM primary provider.

Qualitative interview guideline for parents

Background about the children and parents

- 1) How many children do you have? How old are they? Are they boys or girls?
- 2) What type of school do your children attend (probe: public, private, daycare)?
- 3) What is your civil status (married/divorced/widowed/single/etc.)? Is your child's/children's other parent(s) present?
- 4) How old are you? How old is your partner (spouse, other child's parent)?
- 5) Where were you born and raised? And your partner (spouse, child's other parent)? What is your nationality? And your partner's (spouse, child's other parent)?
 - a. For participants not originally from Switzerland:
 - i. How long have you been in Switzerland?
 - ii. How long has your partner (spouse, child's other parent) been in Switzerland?
- 6) Where in Switzerland do you live?
- 7) What is the highest level of education that you have attained? What is the highest level of education that your partner (spouse, other child's parent) has attained?
 - i. no completed school or professional education
 - iii. mandatory school (9 years in Switzerland)
 - iv. finished apprenticeship
 - v. bachelors degree
 - vi. higher professional education
 - vii. higher technical or commercial school
 - viii. university
 - ix. other
- 8) What is your current occupation? What is your rate of occupation (i.e. 25, 50, 75, or 100%) What is your partner's (spouse, other child's parent) current occupation? What is your partner's rate of occupation (i.e. 25, 50, 75, or 100%)
- 9) Could you talk about the parents' roles in the family? Who works? Who takes care of the children? Who makes the children's healthcare decisions? Who made the decision regarding the children's vaccinations?
- 10) Do your children attend daycare? Does one parent stay home with the children while the other parent works? How do you manage childcare?

Questions about the children, their health, and their healthcare

- 11) What kind of health are your children in? (prompt: any chronic illnesses? birth defects? healthy?)
- 12) For your children's health, do you consult traditional biomedical doctors? CAM providers? Both?
- 13) **When you consult biomedical providers:** For what issues do you seek biomedical doctors' input for your children? Why? How often? Can you think of an example?
- 14) **When you consult CAM providers:** For what issues do you seek CAM providers' input for your children? Why? How often? Can you think of an example?
- 15) How would you describe your family's lifestyle? (Probe: What kinds of foods does your family eat (healthy/organic/avoid toxins)? What kind of physical activities do you do? Would you consider your family as making healthy choices? Why or why not?)

Questions about vaccine practices and beliefs

- 16) **Childhood vaccinations:** I had a look at your child's/children's vaccine certificate, and I noticed... (i.e. differences between the children, missing or delayed vaccinations, all vaccinations were administered according to the OFSP/BAG recommendations, etc.*During this part of the interview, Julia and/or Mike will have the vaccination booklet in order to look it over with the parents. We decided to consider the two youngest children and to ask if there have been any

Qualitative interview guideline for parents

major vaccination changes between the two youngest and the other children in the family. If there have been major vaccination changes, ask about this).

- a. Do you think your child/children had all the recommended vaccinations?
- b. What were the reasons and/or your motivations for your children to receive the vaccinations that they did receive?
- c. If your child/children haven't received some of the recommended vaccinations, why not?
- d. Have all your children received the same vaccinations? Why or why not? Has something changed the way that you think about vaccinations between your children? (Prompt: learned new information about vaccinations, vaccination experience with the first child, differences between children (e.g. each child's perceived immunity/potential of getting sick, particular childhood ailments, allergies, sensitivities, etc.))
- e. Do you have any regrets about vaccinating or not vaccinating your child/children for childhood vaccinations? Why or why not?
- f. How do you feel about childhood vaccinations? Why? Probe:
 - Are you for them? Are you against them?
 - Worldviews: Do your religious convictions influence views on vaccines? Do your political convictions influence views on vaccines?
 - Work and family set-up: How do you prevent your children from becoming sick? How do you manage when your children are sick? Can you stay home with them? Can you take them to see a doctor?
 - Can you give examples?
- g. What are the benefits of childhood vaccinations? What are the risks of childhood vaccinations?
- h. Do you think there are differences between different types of vaccinations? Are some more beneficial than others? If yes, which ones? Why? Are some more risky than others? If yes, which ones? Why?

17) HPV: I had a look at your child's/children's vaccine certificate and I noticed... (i.e. differences between the children, missing or delayed vaccinations, etc.)

- a. Are your children aged 11 to 14 boys or girls? Did you consider the HPV vaccine for both boys and girls? Why or why not?
- b. Do you think your child has received all the recommended doses of the HPV vaccine?
- c. Why did they receive them or why did they not receive them?
- d. Were all your children vaccinated against HPV? Why or why not? What changed your mind? Prompt:
 - boys vs. girls getting the vaccination
 - learned new information about vaccination
 - vaccination experience with the first child
 - differences between children (e.g. each child's perceived immunity/potential of getting sick, particular childhood ailments, allergies, sensitivities, etc.)
 - it is a relatively new vaccine
- e. What did you consider when deciding on the HPV vaccine for your children? Probe:
 - What does the vaccine protect against?
 - How new the vaccine is?
 - Not knowing the side effects or long-term effects?
 - Did you consider the preventative aspects for sexually transmitted infections? Does receiving the vaccine encourage earlier sexual relationships? Does its ability to protect against certain STI's influence your decision? Why or why not?
- f. What are the benefits of HPV vaccinations? What are the risks of HPV vaccinations?
- g. Do you have regrets about vaccinating or not vaccinating your child/children against HPV? Why or why not?

Qualitative interview guideline for parents

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2 18) Have your children ever had any side effects or complications from any vaccinations? If yes,
3 what were they? And from what vaccinations? Did you expect these side effects or
4 complications? Why or why not?
5 19) How was the actual experience of vaccinating your child/children? (prompts: stressful, child
6 crying, painful for child, feeling helpless, agreeable/not stressful). Who vaccinated your
7 child/children? (prompts: pediatrician, school health service, etc.)
8 20) What do you think about alternative vaccination schedules, which allow parents to decide at what
9 moment the vaccination should be administered, even if this does not strictly follow BAG/OFSP
10 guidelines?
11 21) Do you think vaccinations should be an individual choice for families? Why or why not? Is this
12 how you viewed it when making your decisions? Did you consider public and community health
13 consequences when deciding whether to vaccinate your children or not? (Probe: For example, did
14 you consider how your child being vaccinated or not might affect other people (e.g. children
15 infecting other children)? Why or why not?
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Questions about the decision-making process regarding vaccines

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21 22) How did you decide if you were going to vaccinate your children or not? Why?
22 23) With whom did you discuss vaccines for your children? (Probe: spouse/child's other parent?
23 Parents? Friends? Family? Doctors? School doctors/nurses/medical staff? Teachers/daycare
24 providers?) Do you trust these people and how they make healthcare decisions? Why or why not?
25 What specifically did you discuss with these people? Did you trust what they said? Why or why
26 not? Who was the most influential person in determining whether or not you would vaccinate
27 your children? Why?
28 24) Did you look for information about childhood/HPV vaccines? If so, where did you look? (probe:
29 Internet websites, forums, magazine articles, books, etc.)? Were you comfortable with the
30 information that these sources provided? Why or why not? Which source was the most
31 influential for you?
32 25) Did your child's school (or school health services) offer to provide vaccinations for your
33 children? If so, which ones? What kind of information did they provide? Did you have the
34 opportunity to discuss vaccinations with someone from the school/school health service? How
35 was authorization requested? What do you think about this process (probe: Were you satisfied
36 with the process? Why or why not?)?
37 26) Have you ever felt pressured to vaccinate or not vaccinate your children outside of a medical
38 setting? By whom? (Probe: spouse/child's other parent? Parents? Friends? Family? Authorities?
39 Teachers/daycare providers (perhaps may have excluded children from being allowed to come to
40 daycare?)) How specifically did they pressure you? Did they influence your decision?
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Questions about the decision-making process during the patient-provider interaction

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47 27) When discussing the vaccination decision with your provider(s), what were your questions
48 regarding vaccines? Were you comfortable raising these questions or concerns? How did the
49 provider(s) react to your questions or concerns? (probe: Was the provider receptive? Were you
50 criticized, belittled, or patronized for your questions/concerns? Were you taken seriously?) Were
51 your questions sufficiently addressed by the medical provider(s) (**biomedical and/or CAM**)?
52 Why or why not?
53 28) Did you discuss the vaccination decision for your children with your medical provider(s)? With a
54 biomedical provider? A CAM provider? Or both?
55 **a. For parents seeking vaccine advice from CAM providers, probe further:** Why did you
56 choose to seek vaccine-related information from a CAM medical provider? Do you trust this
57 information? Why or why not? How did the discussion go? Were your questions sufficiently
58 addressed by the CAM provider? Why or why not?
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Qualitative interview guideline for parents

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- b. For parents seeking vaccine advice from biomedical providers, probe further:** Why did you choose to seek vaccine-related information from a biomedical provider? Do you trust this information? Why or why not? How did the discussion go? Were your questions sufficient addressed by the biomedical provider? Why or why not?
- c. For parents seeking vaccine advice from both, probe further:** Why did you choose to seek vaccine-related information from both CAM and biomedical providers?
- 29) Have you ever felt pressured to vaccinate or not vaccinate your children by any of your providers? And in other medical settings (i.e. urgent care centers)? How specifically did the provider pressure you? How did it happen in other medical settings? Did this influence your decision to vaccinate or not vaccinate your children? How so?
- 30) Have you ever been criticized or excluded from a practitioner's office because of your views towards vaccinations? In what circumstances? Did this influence your decision to vaccinate or not vaccinate your children?
- 31) About how much time did you spend discussing vaccinations with your provider(s)? Do you think the medical provider(s) (**biomedical and/or CAM**) spent enough time addressing your vaccine-related concerns? Would you have liked to spend more time discussing vaccinations with your provider? Why or why not?
- 32) How clearly did your medical provider(s) explain vaccinations to you? Did you understand the information provided to you? Would you have liked to receive more/other information from your medical provider(s)? If so, about what specifically?

Concluding Questions

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- 33) In conclusion, what is the most important factor influencing your decision towards vaccinations?
- 34) Is there anything that you could recommend to improve upon how vaccines are currently administered in Switzerland? If so, what would you recommend?
- 35) Would you like to make any clarifications about anything we discussed? Would you like to add anything that we did not discuss? Do you have any questions?

Questions for providers

Introduction - Establishing background information about the provider

- 1) Can you talk a bit about yourself and briefly present your job title? How would you introduce yourself to other colleagues?
- 2) What type of provider are you (probe: pediatrician, generalist, biomedical, CAM, etc.)?
- 3) How long have you been practicing medicine? In what year was your final exam? How long have you been practicing in your current position?
- 4) Do you follow any specific approaches to medicine and medical treatment?
- 5) What types of patients do you see and treat?

Questions about patient-provider interactions

- 6) Do you recommend vaccinations to your patients? If so, which ones? Why do you recommend them?
- 7) If you do not recommend vaccinations to your patients, why not? Which ones do you not recommend? Why?
- 8) **Childhood vaccines:** Can you describe a typical vaccine consultation which involves young children's (less than 11 years old) vaccination-related decisions? Who is present? How do you inform parents/children about vaccinations? What is discussed? Who makes the decisions (probe: mother, father, child, provider decides for the parent, etc.)?
- 9) **HPV:** Can you describe a typical vaccine consultation, which involves adolescent patients' (between 11 and 14 years old) vaccination-related decisions for HPV? Who is present? How do you inform parents/adolescents about vaccinations? Do you broach sexuality? What is discussed (probe: sexuality, genital warts, cervical cancer, ear nose and throat cancers, anal/penis cancer)? Is there any difference when discussing HPV-vaccinations with a female or male adolescent? Who makes the decisions (probe: mother, father, adolescent, provider, school physician/authorities)?
- 10) In general, when it comes to vaccination-related decisions, who tends to make the decisions? (probe: mother, father, both, child/adolescent, provider, school physician/authorities)?
- 11) What are typical questions parents (mothers/fathers) have concerning vaccines for their children? (Probe: What kinds of questions do they have about childhood vaccinations? What kinds of questions do they have about the HPV vaccine? Anxieties/concerns?)
- 12) How do you discuss the consequences of vaccinating or not vaccinating children with parents? Can you give examples?
 - a. How do you discuss vaccinations with parents who wish to vaccinate their children? Do you have any examples? What are the key reasons for parents that come to you to vaccinate their children?
 - b. How do you discuss vaccinations with parents who are hesitant to vaccinate their children? Do you have any examples? What are the key reasons for parents that come to you not to vaccinate their children?
- 13) Do you try to influence parents' decisions regarding vaccination for their children? If so, how do you try to convince parents to follow your recommendations? What advice do you give? Do you have any strategies to influence parents' decisions?
- 14) Do parents generally follow your advice and recommendations regarding vaccination? Why or why not?
- 15) Have you ever excluded a patient from your practice/clinic due to his/her perspectives on vaccination? Can you provide an example? What happened during this consultation?
- 16) How much time do you usually have for the discussions with parents regarding vaccination? Do you feel that this amount of time is sufficient? How much time do you need? (Probe: would you like more or less time spent on the topic?)
- 17) Do you feel like you have been properly trained to discuss vaccinations with parents and children/adolescent? Would you like extra training? What should this extra training cover?

Questions for providers

Information about vaccination beliefs, practices, and recommendations to patients

- 18) How do you feel about vaccinations?
- 19) Where do you obtain your information regarding vaccinations (probe: colleagues, Swiss/BAG recommendations, specific approach to medicine, Internet, medical textbooks, etc.)?
- 20) For you, is there a difference between immunity that has been acquired “naturally” (i.e. having been infected with a disease and surviving) and immunity acquired through the use of vaccines? What is the difference for you? Is one way better than the other? Why or why not?
- 21) What do you think about waiting to vaccinate children when they are older, (prompt: immune systems more mature, body integrity, causing injury, vulnerability, protected by mother antibodies)?
- 22) How do you feel about individualized vaccine schedules?
- 23) Do you think vaccinations should be an individual choice for families? Why or why not? Should considerations of community/public health (i.e. herd immunity) also play a role in vaccine decisions? Why or why not? (If needed, explain herd immunity: When a critical portion of a community is immunized against a contagious disease, most members of the community are protected against that disease because there is little opportunity for an outbreak.)
- 24) In your opinion, are people in Switzerland vaccinated sufficiently? Should there be a specific vaccination rate? (probe: higher rates, lower rates, fine as is, etc.)
- 25) Do you think vaccinations can have any benefits? What kind of benefits? Where do you get the information related to benefits? Do you trust these sources? Why or why not?
- 26) Do you think vaccinations can have any risks? What kind of risks? Where do you get the information related to risks? Do you trust these sources? Why or why not?
- 27) Do you think there are differences between different types of vaccinations? Are some more beneficial than others? If yes, which ones? Are some more risky than others? If yes, which ones?
 - a. **Recommended childhood vaccinations:** (Probe: recommended childhood vaccines in Switzerland: DTP-HIB-IPV; Diphtheria, Tetanus, Pertussis, Haemophilus influenzae (meningitis), Polio; MMR: mumps, measles, rubella).
 - b. **Adolescent Vaccines: for HPV:** What do you consider when discussing HPV with your patients? (probe: Do you have different advice for males and females? What does the vaccine protect against? How new the vaccine is? Not knowing the side effects or long-term effects? Did you consider the preventative aspects for sexually transmitted infections? earlier onset of sexual activity, more partners, more unprotected sex because the vaccine “protects”, etc. Does that influence your advice? Why or why not?)
- 28) Is there anything that could prompt you to change your beliefs about vaccinations for your patients?

Concluding Questions

- 29) To conclude, what are the most important considerations regarding vaccines?
- 30) Is there anything that you could recommend to improve upon how vaccines are currently administered in Switzerland? If so, what would you recommend?
- 31) Would you like to make any clarifications about anything we discussed? Would you like to add anything that we did not discuss? Do you have any questions?

Quantitative questionnaire

Select the questionnaire

Childhood vaccination

HPV parent

HPV adolescent

Provider

Select the language

English

Français

Deutsch

Italiano

Date of the interview

Date

ID of interviewer

Identifying number

ID of questionnaire

Identifying number

ID of provider

Identifying number

Name of provider

Write-in response with provider's name

Name of respondent

Write-in response with respondent's name

Name of the target child

Write-in response with target child's/youth's name

Birthday of the target child

Date of birth of target child/youth

Is a copy of the vaccination card available to the study team?

Yes

Not yet available, but participant agreed to send it during recruitment

Card not available: do not vaccinate

Card not available: lost vaccination card

Card not available: child too young

Card not available: other reason

Participant does not want to share the card

No answer

Consent form available

Yes

No

Is the relevant person available?

Yes, target person is already on the phone and ready for interview

Another situation...

Please describe why the person is not available and what are the next steps

Write-in response with why the person is not available and what are the next steps

What is the sex of [child's name]?

Boy

Girl

Intersex

Doesn't want to disclose

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6 Is Dr. [primary providers's name] [child's name]'s doctor?

7 Yes

8 No

9 Unclear

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11 Right person identified, interview can start

12 Interview started

13 Language problems

14 Person refused

15 Interviewee incapacitated

16 Other

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18
19 The interview cannot take place as not all identification or selection criteria are met. I would like to
20 thank you very much for your time.

21 In order to obtain more background about you and your practices, could you please tell me if you are a
22 licensed medical doctor in Switzerland?

23 Yes

24 No

25 Missing

26
27 Have you undertaken any additional specialist training in any discipline of complementary and/or
28 alternative medicine?

29 Yes

30 No

31 Missing

32
33 Which ones?

34 Anthroposophic medicine

35 Traditional Chinese Medicine / Acupuncture

36 Homeopathic medicine

37 Phytotherapy (i.e. plant-based/herbal remedies)

38 Other(s)

39 No answer

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42 Ok. Thank you. Do you provide any complementary or alternative medicines to your patients?

43 No

44 Yes

45 Missing

46
47 Which ones?

48 Anthroposophic medicine

49 Traditional Chinese Medicine / Acupuncture

50 Homeopathic medicine

51 Phytotherapy (i.e. plant-based/herbal remedies)

52 Other(s)

53 No answer

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56 Anthroposophic medicine

57 No

58 Yes

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60 Traditional Chinese Medicine / Acupuncture

No

Yes

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3 Homeopathic medicine

4 No

5 Yes

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7 Phytotherapy (i.e. plant-based/herbal remedies)

8 No

9 Yes

10 Other(s)

11 No

12 Yes

13 No answer

14 No

15 Yes

16 You live in a household with X people. How would you describe the household you live in. Is it...

17 Household of a couple with 1 or more children

18 Household of a single parent with 1 or more
19 children

20 Household of people who are not related at all

21 Household where some of the people are
22 related

23 Household of people who are all related

24 Doesn't want to disclose

25 Doesn't know

26 Missing

27 Could you please tell me about the people who live in your home, yourself included?

28 First yourself [person 1], what is your age?

29 Age

30 Person 1, sex

31 Male

32 Female

33 Other/not disclosed

34 Missing

35 How are you related to [child's name]?

36 Mother

37 Step-mother

38 Mother/father's partner

39 Sister or half-sister

40 Step-sister

41 Grand-mother

42 Aunt, cousin

43 Other relative

44 Not a relative

45 Doesn't want to disclose

46 Doesn't know

47 Missing

48 How are you related to [child's name]?

49 Father

50 Step-father

51 Mother/father's partner

52 Brother or half-brother

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Step-brother

Grand-father

Uncle, cousin

Other relative

Not a relative

Doesn't want to disclose

Doesn't know

Missing

Besides you and [child's name], who else lives in your household?

Indicates that another person lives in household

Indicates that NO other person lives in household

Doesn't want to say

Missing

Person 2, age

[Same as above]

Person 2, sex

[Same as above]

How is she related to [child's name]?

[Same as above]

How is he related to [child's name]?

[Same as above]

Does someone else live in your household?

[Same as above]

Person 3, age

[Same as above]

Person 3, sex

[Same as above]

How is she related to [child's name]?

[Same as above]

How is he related to [child's name]?

[Same as above]

Do you have children?

Yes

No

Doesn't want to disclose

Doesn't know

Missing

How many?

Number of children

Do you have any children who do not live at home?

Yes

No

Doesn't want to disclose

Doesn't know

Missing

How many?

Number of children

How would you describe the household you live in. Is it...

- 1
2
3 Household of couple without children
4 Household of a couple with 1 or more children
5 Household of a single parent with 1 or more
6 children
7
8 Household of people who are not related at all
9 Household where some of the people are
10 related
11 Household of people who are all related
12
13 doesn't want to disclose
14 doesn't know
15 missing

16 Have you ever delayed [child's name]'s vaccination for reasons other than illness or allergy?

- 17 Yes
18 No
19 Doesn't want to disclose
20 Doesn't know
21 Missing

22 Have you ever refused [child's name]'s vaccination for reasons other than illness or allergy?

- 23 Yes
24 No
25 Doesn't want to disclose
26 Doesn't know
27 Missing

28 On a scale from 0 to 10, with 0 being not sure at all and 10 being completely sure, How sure are you
29 that following the recommended vaccine schedule is a good idea for [child's name]?

30 0 - 10

31 I will rephrase the question: On a scale from 0 to 10, with 0 being not sure at all and 10 being
32 completely sure, how sure are you that it is a good idea to vaccinate [child's name] with the vaccines
33 recommended by the Federal Office of Public Health?

34 0 - 10

35 Do you agree or disagree with the following statements:

36 It is my role as a parent to question shots.

- 37 Strongly agree
38 Sgree
39 Not sure
40 Disagree
41 Strongly disagree
42 Doesn't want to disclose
43 Missing

44 I believe that many of the illnesses that vaccines prevent are severe.

- 45 Strongly agree
46 Sgree
47 Not sure
48 Disagree
49 Strongly disagree
50 Doesn't want to disclose
51 Missing

1
2
3 It is better for [child's name] to develop immunity by getting sick than to get a vaccine.
4

5 Strongly agree

6 Agree

7 Not sure

8 Disagree

9 Strongly disagree

10 Doesn't want to disclose

11 Missing

12
13
14 It's better for [child's name] to get fewer vaccines at the same time.

15 Strongly agree

16 Agree

17 Not sure

18 Disagree

19 Strongly disagree

20 Doesn't want to disclose

21 Missing

22
23
24
25 How concerned are you that [child's name] might have a serious side effect from a vaccine?

26 Not at all concerned

27 Not too concerned

28 Not sure

29 Somewhat concerned

30 Very concerned

31 Doesn't want to disclose

32 Missing

33
34
35 How concerned are you that one of the vaccines might not be safe?

36 Not at all concerned

37 Not too concerned

38 Not sure

39 Somewhat concerned

40 Very concerned

41 Doesn't want to disclose

42 Missing

43
44
45
46 How concerned are you that vaccines might not prevent disease?

47 Not at all concerned

48 Not too concerned

49 Not sure

50 Somewhat concerned

51 Very concerned

52 Doesn't want to disclose

53 Missing

54
55
56
57 If you had another child today, would you want him/her to get all the recommended vaccines?

58 Yes

59 No

60 Doesn't want to disclose

1
2
3 Doesn't know

4 Missing

5
6 Overall, how hesitant about vaccinations would you consider yourself to be?

7 Not at all hesitant

8 Not too hesitant

9 Not sure

10 Somewhat hesitant

11 Very hesitant

12 doesn't want to disclose

13 missing

14 Do you agree or disagree with the following statements:

15 I educate parents of children in my practice about the importance of immunizations.

16 Strongly agree

17 Sgree

18 Not sure

19 Disagree

20 Strongly disagree

21 Doesn't want to disclose

22 Missing

23 I monitor whether or not children I see are up to date on their immunizations.

24 Strongly agree

25 Sgree

26 Not sure

27 Disagree

28 Strongly disagree

29 Doesn't want to disclose

30 Missing

31 I trust the information I receive about vaccinations .

32 Strongly agree

33 Sgree

34 Not sure

35 Disagree

36 Strongly disagree

37 Doesn't want to disclose

38 Missing

39 I am able to openly discuss my concerns about vaccines with my child's doctor.

40 Strongly agree

41 Sgree

42 Not sure

43 Disagree

44 Strongly disagree

45 Doesn't want to disclose

46 Missing

47 All things considered, how much do you trust your child's doctor, on a scale from 0 to 10, with 0
48 being not at all and 10 being completely?
49
50

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- 0 - 10
- Have you ever discussed [child's name]'s vaccination with [provider's name]?
- Yes
 - No
 - Doesn't want to disclose
 - Doesn't know
 - Missing
- How strongly does [provider's name] recommend vaccinating [child's name] with all the recommended vaccines?
- Supports all recommended vaccines
 - Supports most recommended vaccines
 - Supports some recommended vaccines
 - Doesn't support any recommended vaccines
 - Doesn't want to disclose
 - Doesn't know
 - Missing
- How important is following the recommended vaccination schedule for [provider's name]?
- Very important
 - Somewhat important
 - Not very important
 - Not important at all
 - Doesn't want to disclose
 - Doesn't know
 - Missing
- How much do you trust the information [provider's name] gave you?
- Completely trust
 - Somewhat trust
 - Neither trust nor distrust
 - Somewhat distrust
 - Don't trust at all
 - Doesn't want to disclose
 - Doesn't know
 - Missing
- How satisfied were you with your discussions about vaccines with [provider's name]?
- Not at all satisfied
 - Somewhat satisfied
 - Neither satisfied nor unsatisfied
 - Satisfied
 - Very satisfied
 - Doesn't want to disclose
 - Doesn't know
 - Missing
- Please indicate how much you agree with the following statements:
- I am able to ask [provider's name] questions about vaccination.
- Completely agree

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Somewhat agree

Neither agree nor disagree

Somewhat disagree

Completely disagree

Doesn't want to disclose

Doesn't know

Missing

[Provider's name] takes the time needed to discuss my concerns about vaccination with me.

Completely agree

Somewhat agree

Neither agree nor disagree

Somewhat disagree

Completely disagree

Doesn't want to disclose

Doesn't know

Missing

[Provider's name] takes my concerns about vaccination seriously.

Completely agree

Somewhat agree

Neither agree nor disagree

Somewhat disagree

Completely disagree

Doesn't want to disclose

Doesn't know

Missing

[Provider's name]'s views on vaccination are similar to my own.

Completely agree

Somewhat agree

Neither agree nor disagree

Somewhat disagree

Completely disagree

Doesn't want to disclose

Doesn't know

Missing

Have you discussed vaccination for [child's name] with any other doctor?

Yes

No

Doesn't want to disclose

Doesn't know

Missing

What led you to consult another doctor?

Second opinion

Moved

Former provider stopped working

1
2
3 Disagreement with provider

4 Other: _____

5 Doesn't want to disclose

6 Doesn't know

7 Missing

8
9
10 How satisfied were you with your discussions about [child's name]'s vaccines with that doctor?

11 Not at all satisfied

12 Somewhat satisfied

13 Neither satisfied nor unsatisfied

14 Satisfied

15 Very satisfied

16 Doesn't want to disclose

17 Doesn't know

18 Missing

19
20
21
22 How much do you trust the information that doctor gave you about vaccines?

23 Completely trust

24 Somewhat trust

25 Neither trust nor distrust

26 Somewhat distrust

27 Don't trust at all

28 Doesn't want to disclose

29 Doesn't know

30 Missing

31
32
33
34 What are your most trusted information sources on vaccination?

35 No information/no source

36 Family

37 My child's doctor

38 Other doctor

39 Friends and acquaintances

40 Public health authorities

41 TV

42 Internet

43 Social media (such as Facebook, Instagram and
44 Twitter)

45 Print media (such as books, magazines and
46 newspapers)

47 Other: _____

48 Doesn't want to disclose

49 Doesn't know

50 Missing

51 Which TV programs?

52 Write-in response

53 Which websites?

54 Write-in response

55 What social media?

56 Write-in response

57 What print media?

1
2
3 Write-in response
4 What other sources?
5 Write-in response
6 Did you apply the information you received when making decisions about vaccination for your
7 child?

8 Yes

9 No

10 Doesn't want to disclose

11 Doesn't know

12 Missing

13
14
15 Please indicate how much you agree with the following statements:

16 I can always prevent my child from being infected with vaccine-preventable diseases by other
17 means than vaccination.

18 Completely agree

19 Somewhat agree

20 Neither agree nor disagree

21 Somewhat disagree

22 Completely disagree

23 Doesn't want to disclose

24 Doesn't know

25 Missing

26
27
28
29 Vaccine-preventable diseases can be easily cured in Switzerland.

30 Completely agree

31 Somewhat agree

32 Neither agree nor disagree

33 Somewhat disagree

34 Completely disagree

35 Doesn't want to disclose

36 Doesn't know

37 Missing

38
39
40
41 Vaccines can cause serious long-term harm to health.

42 Completely agree

43 Somewhat agree

44 Neither agree nor disagree

45 Somewhat disagree

46 Completely disagree

47 Doesn't want to disclose

48 Doesn't know

49 Missing

50
51
52
53 Vaccination is unnatural, so it is best to vaccinate as little as possible.

54 Completely agree

55 Somewhat agree

56 Neither agree nor disagree

57 Somewhat disagree

58 Completely disagree

59 Doesn't want to disclose

1
2
3
4 Doesn't know

5 Missing

6 How likely do you think it is that your child will be exposed to vaccine-preventable diseases
7 in your home?

8 Very likely

9 Somewhat likely

10 Not sure

11 Somewhat unlikely

12 Very unlikely

13 Doesn't want to disclose

14 Doesn't know

15 Missing

16 How likely do you think it is that your child will be exposed to vaccine-preventable diseases in
17 your community?

18 Very likely

19 Somewhat likely

20 Not sure

21 Somewhat unlikely

22 Very unlikely

23 Doesn't want to disclose

24 Doesn't know

25 Missing

26 About how many of your family members with children do you think have vaccinated their children?

27 Almost all

28 About three-quarters

29 About half

30 About a quarter

31 Almost none

32 Doesn't want to disclose

33 Doesn't know

34 Missing

35 About how many of your friends with children do you think have vaccinated their children?

36 Almost all

37 About three-quarters

38 About half

39 About a quarter

40 Almost none

41 Doesn't want to disclose

42 Doesn't know

43 Missing

44 About how many of the children in your community do you think are vaccinated?

45 Almost all

46 About three-quarters

47 About half

48 About a quarter

1
2
3 Almost none

4 Doesn't want to disclose

5 Doesn't know

6 Missing

7
8
9 Now I would like to ask you some questions about health more generally.

10 How is your child's health, in general?

11 Very good

12 Good

13 OK

14 Bad

15 Very bad

16 Doesn't want to disclose

17 Doesn't know

18 Missing

19
20
21
22 Do you agree or disagree with the following statements:

23 It is my responsibility as a parent to actively research health decisions for my child

24 Strongly agree

25 Agree

26 Neither agree nor disagree

27 Disagree

28 Strongly disagree

29 Doesn't want to disclose

30 Doesn't know

31 Missing

32
33
34
35 I took an active role in choosing my child's doctor.

36 Strongly agree

37 Agree

38 Neither agree nor disagree

39 Disagree

40 Strongly disagree

41 Doesn't want to disclose

42 Doesn't know

43 Missing

44
45
46
47 I chose a doctor for my child who shares my views on health.

48 Strongly agree

49 Agree

50 Neither agree nor disagree

51 Disagree

52 Strongly disagree

53 Doesn't want to disclose

54 Doesn't know

55 Missing

56
57
58
59 If I disagree or am uncertain about the advice of a nurse or a doctor, I am comfortable saying so.

60 Strongly agree

- 1
2
3 Agree
4 Neither agree nor disagree
5 Disagree
6 Strongly disagree
7 Doesn't want to disclose
8 Doesn't know
9 Missing

10 How many of the recommended well-child visits from birth until now has your child completed?

- 11 All recommended visits
12 Some but maybe not all recommended visits
13 None of them
14 Doesn't want to disclose
15 Doesn't know
16 Missing

17 When [child's name] was an infant (0-2 years old), which of the following childcare options did you use? Please indicate all that apply.

- 18 I (or my partner) stayed home with him/her.
19 Other family cared for him/her.
20 A nanny cared for him/her in my home.
21 He/she attended a small, home-based day care.
22 He/she attended private day care.
23 He/she attended public day care.
24 Other
25 Doesn't want to disclose
26 Doesn't know
27 Missing

28 And how old was he/she when he/she started day care?

29 Age

30 I will now list some activities. Please indicate which of these descriptions applies to what you did when [child's name] was an infant (0-2 years old)? Please indicate all that apply

- 31 In paid work
32 In education (even if on vacation)
33 Unemployed and actively looking for a job
34 Unemployed, wished to work but didn't actively look for a job
35 Permanently sick or disabled
36 Retired
37 In community or military service
38 Doing housework, looking after children or other persons
39 Other
40 Doesn't want to disclose
41 Doesn't know
42 Missing

43 What were your total 'basic' or contracted hours each week (in your main job), excluding any paid and unpaid overtime?

44 Hours

1
2
3 How is your health in general? Is it...

4
5 Very good

6 Good

7 OK

8 Bad

9 Very bad

10 Doesn't want to disclose

11 Doesn't know

12 Missing

13
14
15 How important is health for you? Here are three options, please tell us which one is closest to
16 your own opinion.

17 I live without worrying too much about consequences for my
18 health.

19 My lifestyle is influenced by considerations about maintaining my
20 health.

21 Considerations about my health have a large impact on how I
22 live.

23 Doesn't want to disclose

24 Doesn't know

25 Missing

26
27 In the last 12 months, that is since [month, year], which of the following treatments have you used
28 for your own health? Please indicate yes or no for each.

29 Acupressure

30 Acupuncture

31 Anthroposophical medicine

32 Chinese medicine

33 Chiropractics

34 Herbal treatment

35 Homeopathy

36 Hypnotherapy

37 Massage therapy

38 Osteopathy

39 Physiotherapy

40 Reflexology

41 Spiritual Healing

42 Other: _____

43 None of these

44 Don't know

45
46
47
48
49
50 *The following questions have been posed to your patients who participated in this study. We would
51 now like to pose the same questions to you. This will help us to better understand the factors that
52 play a role when patients choose their providers.*

53 Now I would like to ask you some questions about other topics to get a sense of your core worldview
54 and political and religious sentiments.

55 Do you consider yourself as belonging to any particular religion or denomination?

56 Yes

57 No

58 Doesn't want to disclose

59 Doesn't know
60

1
2
3
4 Missing

5 Which one?

6 Christian: _____

7 Jewish: _____

8 Islamic: _____

9 Eastern religions: _____

10 Other non-Christian religions: _____

11 Doesn't want to disclose

12 Doesn't know

13 Missing

14 Please specify which exactly:

15 Write-in response

16 Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays?

17 Every day

18 More than once a week

19 Once a week

20 At least once a month

21 Only on special holy days

22 Less often

23 Never

24 Doesn't want to disclose

25 Doesn't know

26 Missing

27 Regardless of whether you belong to a particular religion, how religious would you say you are?

28 Not at all religious

29 Somewhat religious

30 Religious

31 Very religious

32 Doesn't want to disclose

33 Doesn't know

34 Missing

35 How important do you consider spiritual experiences to be in your everyday life?

36 Very important

37 Somewhat important

38 Not very important

39 Not important at all

40 Not sure

41 Doesn't want to disclose

42 Doesn't know

43 Missing

44 How interested would you say you are in politics? Are you...

45 Very interested

46 Quite interested

47 Hardly interested

1
2
3 Or, not at all interested?

4 Doesn't want to disclose

5 Doesn't know

6 Missing

7
8
9 Is there a particular political party that you feel closer to than all the other political parties?

10 Yes

11 No

12 Doesn't want to disclose

13 Doesn't know

14 Missing

15
16
17 Which one?

18 Write-in response

19 In politics, people sometimes talk of "left" and "right". Where would you place yourself? Would
20 you consider yourself...

21 Left

22 Center left

23 Center

24 Center right

25 Right

26 Doesn't want to disclose

27 Doesn't know

28 Missing

29
30
31 How often do you participate in activities with a society, a club, a political party, a cultural
32 association, or other groups, including religious groups?

33 Almost every day

34 About once a week

35 About 1-3 times a month

36 A few times a year

37 More rarely

38 Never

39 Doesn't want to disclose

40 Doesn't know

41 Missing

42
43
44
45 We would now like to pose some questions regarding the values that generally guide people in
46 their everyday life. The questions don't directly relate to vaccinations.

47
48 When you decide whether something is right or wrong, to what extent are the following
49 considerations relevant to your thinking?

50 Whether or not someone suffered emotionally. Is it not at all relevant, not very relevant, slightly
51 relevant, somewhat relevant, very relevant or extremely relevant?

52 Not at all relevant

53 Not very relevant

54 Slightly relevant

55 Somewhat relevant

56 Very relevant

57 Extremely relevant

58 Doesn't want to disclose

59 Doesn't know

1
2
3
4 Missing

5 Whether or not someone was treated differently than others.

6 Not at all relevant

7 Not very relevant

8 Slightly relevant

9 Somewhat relevant

10 Very relevant

11 Extremely relevant

12 Doesn't want to disclose

13 Doesn't know

14 Missing

15 Whether or not someone's actions showed love for his or her country.

16 Not at all relevant

17 Not very relevant

18 Slightly relevant

19 Somewhat relevant

20 Very relevant

21 Extremely relevant

22 Doesn't want to disclose

23 Doesn't know

24 Missing

25 Whether or not someone's actions showed a lack of respect for authority.

26 Not at all relevant

27 Not very relevant

28 Slightly relevant

29 Somewhat relevant

30 Very relevant

31 Extremely relevant

32 Doesn't want to disclose

33 Doesn't know

34 Missing

35 Whether or not someone violated standards of purity and decency.

36 Not at all relevant

37 Not very relevant

38 Slightly relevant

39 Somewhat relevant

40 Very relevant

41 Extremely relevant

42 Doesn't want to disclose

43 Doesn't know

44 Missing

45 Whether or not someone was good at math.

46 Not at all relevant

47 Not very relevant

- 1
- 2
- 3
- 4 Slightly relevant
- 5 Somewhat relevant
- 6 Very relevant
- 7 Extremely relevant
- 8 Doesn't want to disclose
- 9 Doesn't know
- 10 Missing
- 11
- 12

13 Whether or not someone cared for someone weak or vulnerable.

- 14 Not at all relevant
- 15 Not very relevant
- 16 Slightly relevant
- 17 Somewhat relevant
- 18 Very relevant
- 19 Extremely relevant
- 20 Doesn't want to disclose
- 21 Doesn't know
- 22 Missing
- 23
- 24
- 25

26 Whether or not someone acted unfairly.

- 27 Not at all relevant
- 28 Not very relevant
- 29 Slightly relevant
- 30 Somewhat relevant
- 31 Very relevant
- 32 Extremely relevant
- 33 Doesn't want to disclose
- 34 Doesn't know
- 35 Missing
- 36
- 37
- 38

39 Whether or not someone did something to betray his or her group.

- 40 Not at all relevant
- 41 Not very relevant
- 42 Slightly relevant
- 43 Somewhat relevant
- 44 Very relevant
- 45 Extremely relevant
- 46 Doesn't want to disclose
- 47 Doesn't know
- 48 Missing
- 49
- 50
- 51
- 52

53 Whether or not someone conformed to the traditions of society.

- 54 Not at all relevant
- 55 Not very relevant
- 56 Slightly relevant
- 57 Somewhat relevant
- 58 Very relevant
- 59 Extremely relevant
- 60

1
2
3 Doesn't want to disclose

4 Doesn't know

5 Missing

6
7 Whether or not someone did something disgusting.

8 Not at all relevant

9 Not very relevant

10 Slightly relevant

11 Somewhat relevant

12 Very relevant

13 Extremely relevant

14 Doesn't want to disclose

15 Doesn't know

16 Missing

17
18 Please listen to the following statements and indicate whether you strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree or strongly agree

19
20 Compassion for those who are suffering is the most crucial virtue.

21 Strongly disagree

22 Moderately disagree

23 Slightly disagree

24 Slightly agree

25 Moderately agree

26 Strongly agree

27 Doesn't want to disclose

28 Doesn't know

29 Missing

30
31 When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.

32 Strongly disagree

33 Moderately disagree

34 Slightly disagree

35 Slightly agree

36 Moderately agree

37 Strongly agree

38 Doesn't want to disclose

39 Doesn't know

40 Missing

41
42 I am proud of my country's history.

43 Strongly disagree

44 Moderately disagree

45 Slightly disagree

46 Slightly agree

47 Moderately agree

48 Strongly agree

49 Doesn't want to disclose

50 Doesn't know

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Missing

Respect for authority is something all children need to learn.

Strongly disagree

Moderately disagree

Slightly disagree

Slightly agree

Moderately agree

Strongly agree

Doesn't want to disclose

Doesn't know

Missing

People should not do things that are disgusting even if no one is harmed.

Strongly disagree

Moderately disagree

Slightly disagree

Slightly agree

Moderately agree

Strongly agree

Doesn't want to disclose

Doesn't know

Missing

It is better to do good than to do bad.

Strongly disagree

Moderately disagree

Slightly disagree

Slightly agree

Moderately agree

Strongly agree

Doesn't want to disclose

Doesn't know

Missing

One of the worst things a person could do is hurt a defenseless animal.

Strongly disagree

Moderately disagree

Slightly disagree

Slightly agree

Moderately agree

Strongly agree

Doesn't want to disclose

Doesn't know

Missing

Justice is the most important requirement for a society.

Strongly disagree

Moderately disagree

1
2
3 Slightly disagree
4 Slightly agree
5 Moderately agree
6 Strongly agree
7 Doesn't want to disclose
8 Doesn't know
9 Missing
10
11
12

13 People should be loyal to their family members even when they have done something wrong.

14 Strongly disagree
15 Moderately disagree
16 Slightly disagree
17 Slightly agree
18 Moderately agree
19 Strongly agree
20 Doesn't want to disclose
21 Doesn't know
22 Missing
23
24
25

26 Men and women should each have different roles to play in society.

27 Strongly disagree
28 Moderately disagree
29 Slightly disagree
30 Slightly agree
31 Moderately agree
32 Strongly agree
33 Doesn't want to disclose
34 Doesn't know
35 Missing
36
37
38

39 I would call some acts wrong on the grounds that they are unnatural.

40 Strongly disagree
41 Moderately disagree
42 Slightly disagree
43 Slightly agree
44 Moderately agree
45 Strongly agree
46 Doesn't want to disclose
47 Doesn't know
48 Missing
49
50
51
52

53 I just have a few more questions to finish up.

54 First I would like to ask some questions about you and [child's name]'s other parent's education.
55 What is the highest level of education you have successfully completed?

56 Secondary school not completed, no completed
57 Professional education
58 Completed 9 years of school, no further
59 education
60 Technical school or business school

1
2
3 Completed apprenticeship
4 College
5 Primary school teacher seminar
6 Higher professional school
7 Bachelor at University or applied university
8 Master at University or applied university
9 Doctorate at University or applied university
10 Other
11 Doesn't want to disclose
12 Doesn't know
13 Missing

14 And what about [child's name]'s father/mother? What is the highest level of education s/he has
15 successfully completed?

16 Secondary school not completed, no completed
17 Professional education
18 Completed 9 years of school, no further
19 education
20 Technical school or business school
21 Completed apprenticeship
22 College
23 Primary school teacher seminar
24 Higher professional school
25 Bachelor at University or applied university
26 Master at University or applied university
27 Doctorate at University or applied university
28 Other
29 Doesn't want to disclose
30 Doesn't know
31 Missing

32 Which of these descriptions apply to what you have been doing for the last seven days?

33 In paid work or away temporarily
34 In education (even if on vacation)
35 Unemployed and actively looking for a job
36 Unemployed, wishes to work but doesn't actively look for a
37 job
38 Permanently sick or disabled
39 Retired
40 In community or military service
41 Doing housework, looking after children or other
42 persons
43 Other
44 Doesn't want to disclose
45 Doesn't know
46 Missing

47 Regardless of your basic or contracted hours, how many hours per week do you normally work,
48 including any paid or unpaid overtime?

49 Hours

50 What is your current occupation?

- 1
2
3 Write-in response
4 And what about [child's name]'s father/mother? Which describes his/her situation in the last seven days?
5 In paid work or away temporarily
6 In education (even if on vacation)
7 Unemployed and actively looking for a job
8 Unemployed, wishes to work but doesn't actively look for a
9 job
10 Permanently sick or disabled
11 Retired
12 In community or military service
13 Doing housework, looking after children or other
14 persons
15 Other
16 Doesn't want to disclose
17 Doesn't know
18 Missing
19
20 How many hours does s/he normally work, including any paid or unpaid overtime?
21 Hours
22 What is his/her current occupation?
23 Write-in response
24 In what range is your current annual household income?
25 <20'000
26 <40'000
27 <60'000
28 <80'000
29 <100'000
30 <120'000
31 <150'000
32 Min. 150'000
33 Refuses answer
34 Doesn't know
35 Missing
36
37 Are you a citizen of Switzerland?
38 Yes
39 No
40 Doesn't want to disclose
41 Doesn't know
42 Missing
43
44 What citizenship do you hold?
45 Write-in response
46 Were you born in Switzerland?
47 Yes
48 No
49 Doesn't want to disclose
50 Doesn't know
51 Missing
52
53 In which country were you born?
54 Write-in response
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What year did you first come to live in Switzerland?

Year

What languages do you speak most often at home?

Write-in response

Second language:

Write-in response

What language do you speak most often with your doctor?

Write-in response

What is your postcode?

Write-in response

Do you have comments you would like to make?

Write-in response

For peer review only

Supplementary Table S1. Satisfaction with and trust in primary biomedically- and CAM-oriented providers.

	<i>All parents</i> (N=1390)	<i>By PACV-score</i>		<i>P value</i>
		<i>Non-VH parents</i> (N=889)	<i>VH parents</i> (N=501)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
<i>Type of primary provider</i>				<0.001
<i>Biomedical</i>	893 (64)	705 (79)	188 (38)	
<i>CAM</i>	490 (35)	183 (21)	307 (61)	
<i>Missing</i>	7 (1)	1 (0)	6 (1)	
<i>Discussed vaccines with primary provider</i>				<0.001
<i>No</i>	318 (23)	238 (27)	80 (16)	
<i>Yes</i>	1063 (76)	645 (73)	418 (83)	
<i>Missing</i>	9 (1)	6 (1)	3 (1)	
<i>Parents who reported having discussed vaccination with primary provider</i>	<i>Total sample</i> (N=1063)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=645)	<i>VH parents</i> (N=418)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	928 (87)	586 (91)	342 (82)	<0.001
<i>Trust provider²</i>	1000 (94)	632 (98)	368 (88)	<0.001
<i>Provider's views are similar to parents²</i>	838 (79)	567 (88)	271 (65)	<0.001
<i>Parents who reported having discussed vaccination with biomedical primary provider</i>	<i>Total sample</i> (N=656)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=511)	<i>VH parents</i> (N=145)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	567 (86)	467 (91)	100 (69)	<0.001
<i>Trust provider²</i>	623 (95)	503 (98)	120 (83)	<0.001
<i>Provider's views are similar to parents²</i>	528 (80)	449 (88)	79 (54)	<0.001
<i>Parents who reported having discussed vaccination with CAM primary provider</i>	<i>Total sample</i> (N=400)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=133)	<i>VH parents</i> (N=267)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	355 (89)	118 (89)	237 (89)	0.395
<i>Trust provider²</i>	371 (93)	128 (96)	243 (91)	0.164
<i>Provider's views are similar to parents²</i>	305 (76)	117 (88)	188 (70)	0.001
<i>Parents reporting that primary providers' views are similar to their own²</i>	<i>Total sample</i> (N=838)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=567)	<i>VH parents</i> (N=271)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	774 (92)	522 (92)	252 (93)	0.485
<i>Trust provider²</i>	820 (98)	560 (99)	260 (96)	0.004
<i>Parents reporting that biomedical primary providers' views are similar to their own²</i>	<i>Total sample</i> (N=528)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=449)	<i>VH parents</i> (N=79)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	479 (91)	413 (92)	66 (84)	0.081
<i>Trust provider²</i>	518 (98)	444 (99)	74 (94)	<0.001
<i>Parents reporting that CAM primary providers' views are similar to their own²</i>	<i>Total sample</i> (N=305)	<i>By PACV-score</i>		
		<i>Non-VH parents</i> (N=117)	<i>VH parents</i> (N=188)	
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>P value</i>
<i>Satisfied with provider¹</i>	290 (95)	108 (92)	182 (97)	0.141
<i>Trust provider²</i>	297 (97)	115 (98)	182 (97)	0.516

Note. ¹Satisfied/very satisfied; ²Somewhat or completely; Pearson's Chi-squared tests were used for statistical analysis.

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60STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract yes (p. 1-2)	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale yes (p. 3-5)	2	Explain the scientific background and rationale for the investigation being reported
Objectives yes (p. 5)	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design yes (p. 6)	4	Present key elements of study design early in the paper
Setting yes (p. 6)	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants yes (p. 6-7)	6	Give the eligibility criteria, and the sources and methods of selection of participants
Variables yes (p. 6-8)	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement yes (p. 7-8)	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size yes (p. 8-9)	10	Explain how the study size was arrived at
Quantitative variables yes (p. 7)	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods yes (p. 7)	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants yes (p. 8-9)	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data yes (p. 8-9)	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results yes (p. 9-18)	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized

(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results yes (p. 18-19)	18	Summarise key results with reference to study objectives
Limitations yes (p. 3)	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation yes (18-20)	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability yes (p. 3, 19-20)	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding yes (p. 20)	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.