



RESEARCH ARTICLE

Covid-19 vaccinations, self-reported health, and worldviews – A representative survey from Germany

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ABSTRACT

The novel mRNA vaccinations against Covid-19 were hailed as an immense progress, but indications for severe side effects were noted. We wanted to know to what extent people report having had diseases during the last two years that are associated with Covid-19 vaccinations, and whether there is a difference between those vaccinated and those without vaccinations. We also wanted to know whether the willingness to be vaccinated is associated with particular worldviews.

We therefore conducted a representative internet survey, organized by Debaro GmbH, Munich, a professional survey company. The final sample was prepared to yield an approximately representative sample of the German population. Altogether 1051 responses were analyzed. Vaccinated persons reported significantly more events that required the visit of a doctor (42% versus 30%, $p = 0.0024$), more Covid-19 infections (30% vs. 23%, $p = 0.0535$) and more musculoskeletal problems (21% vs. 15%, $p = 0.059$). Vaccinated respondents reported significantly more diseases overall (mean 1.6 ± 1.6 vs. 1.3 ± 1.4 ; $p = 0.0023$). We analyzed the likelihood to be vaccinated by a logistic regression model. The vaccinated were more likely to be older, have German nationality, to have higher income, to live alone, to have been taking more medications and to know someone who died of Covid-19 but no one who might have died after Covid-19 vaccination. Further, a materialist worldview was positively associated with the probability of getting vaccinated, while the belief that there are other realms of reality more important than everyday reality and that these realms are beyond any scientific explanation was negatively related. In addition, the belief that mRNA vaccinations help humankind was a highly significant predictor of the probability to be vaccinated. Finally, a propensity score analysis accounting for sociodemographic variables and pre-vaccination health status confirmed that Covid-19 occurred more frequently in vaccinated individuals (31% vs. 23%, $p=0.103$). Again, the belief that mRNA-based vaccines are beneficial to humanity was significantly more present among the propensity-score matched vaccinated compared to the unvaccinated group (agreed/disagreed/uncertain: 34.6%/30.8%/34.6% versus 22.9%/45.2%/31.9%, $p=0.0075$). This self-report survey supports the view that the Covid-19 vaccinations have produced some side-effects that need to be further investigated, preferably by hard data from insurance companies or similar organizations.

0 Background

Covid-19 vaccines have been hailed as the solution to the SARS-CoV-2 pandemic, and many people, as well as the executives in most countries, awaited them eagerly. Critics raised concerns at the outset, due to various issues, among them the accelerated regulation process, the lack of safety data which should normally be available in the conventional regulation procedure before human phase 3 studies are embarked on, and the novel biological principle of genetic processes to generate antigens by the body itself.¹

The large phase-3-trials to test the efficacy and safety were hampered right from the start and compromised quickly, as they were neither large enough to detect serious side-effects, nor long enough to discover putative late side-effects. In addition, they had been unblinded early.²⁻⁴ This led to the situation that no methodologically solid insight into long-term safety could be gleaned from them. Hence, researchers had been forced to use secondary analyses with more uncertain data such as from adverse events reporting systems (e.g. VAERS).⁵⁻⁸

Safety signals have indeed been detected, but, due to the political situation, have rarely been acted upon.⁹⁻¹¹ For instance, the German pharmacovigilance database of the Paul-Ehrlich-Institute

(https://www.pei.de/SharedDocs/Downloads/DE/newsroom/dossiers/rohdaten-sicherheitsberichte/download-xls-uaw-daten-2020-12-27-bis-2023-12-31.html?nn=169638&cms_dlConfirm=true; accessed 3rd

December 2024) reports 1460 cases of death associated with Covid-19 vaccinations from 2021 until 2023, compared to 60 cases of death associated with all other vaccinations together during the same period. In the case of Covid-19 vaccines, this would be approximately one death per 100,000 vaccinations.¹² In our original assessment of the risk-benefit ratio of Covid-19 vaccines we estimated 4 deaths per 100,000 vaccinations reported, using the Dutch pharmacovigilance data. The German pharmacovigilance data reported 18 times fewer safety problems at the time,⁸ and we can assume that the reporting standard has not been improved since then. Hence, the estimate of one death per 100,000 vaccinations is likely an underestimation of the true figure.

Various problems of these vaccines have been reported since, among them myocarditis in children and adults,^{10,11,13-16} but also other problems, including excess mortality.¹⁷⁻²¹ Unfortunately, there were no systematic population-wide prospective monitoring studies set up, which might have helped to gauge the effect of benefits against potential side effects. Hence, this study was meant to add to the knowledge by using a representative population survey in Germany to gather at least subjective experience data about potential vaccination side effects.

Some critics raised their voice by stipulating that it is a particular mind-set or ideology that was a main driving factor for the Covid-19 vaccination campaign, and possibly also for the willingness of a large part of Western populations to accept these novel substances without critique.²²

These two questions were studied jointly in a representative survey study. In addition to asking about diseases that might be indicative of side-effects, we developed a questionnaire that measures a transhumanist worldview and used the data so see, whether willingness to be vaccinated is associated with such a worldview.

1 Materials and Methods

We initiated a representative online-survey. The survey was administered by Debaro GmbH, Munich, as in a previous study.²³ This company uses an already extant online-panel of some 20,000 members. It consists of voluntary respondents who have signed up to answering questions on various issues related to consumer marketing, health and politics. They were notified by the company about this new survey. The company sampled as many answers until they had a complete quorum with no missing data that could be prepared to yield a quasi-representative sample of the German population. The company has sophisticated checking routines implemented to make sure that every respondent answers only once and also to check, whether a survey was clicked through in a hurry or answered properly.

The questionnaire asked about Covid-19 vaccination history and potential health issues after the vaccination. Additional questions tapped into the worldview of respondents. Part of the questions consisted of the German version of an already published worldview questionnaire²⁴, and in addition nine new items were added that asked about a transhumanist worldview. These items were pretested in an extra sample of 200 ad-hoc respondents and psychometrically analyzed. The scale proved to be psychometrically sound and will be reported in a separate publication. The survey was offered to the panel as a “survey on health issues and worldviews”.

QUESTIONNAIRE

The questionnaire asked about sociodemographic data, specific health problems in the last two years and worldviews; in order not to bias the answers, questions regarding Covid-19 vaccinations were asked at the very end. We refrained from asking about specific vaccines, because in Germany, many people received a mix of different vaccines and we thought it unlikely that reliable data about vaccination types could be gleaned retrospectively. The method was described in a protocol that was deposited ahead of the study and is available at the Open Science Foundation (<https://osf.io/98s4f/>). It also contains the questions of the questionnaire. Specifically, we asked about the following health issues, which have been reported as potential Adverse Events of Special Interest.³

Have you *yourself* newly experienced any of the following symptoms or diseases described below during the *last two years*? (more than one option can be marked)

- Any condition that required seeing a doctor for treatment
- Any condition that needed treatment in hospital
- Long-standing conditions that necessitated rehabilitation
- Severe, long-standing fatigue

- Repeated infections
- Covid-19
- Pain in the heart region
- Diagnosed heart conditions such as myocarditis, myocardial infarction
- Thrombotic events
- Shingles
- Problems with memory, concentration and other mental activities
- Pain and problems with the musculo-skeletal system
- Lung problems, pneumonia, and similar
- Diagnosis of an autoimmune disease
- Cancer
- Other, namely.....

The Worldview-Questionnaire is a psychometric instrument that comprises the 10 items of the original worldview-scale of Timmermann et al.²⁴ in their German translation, all items forming the “non-physicalist belief scale” plus the “idealism item” no 4; the three last items were dropped here for reasons of parsimony. The translation of the items was performed by us, retranslated by a native English speaker and differences were resolved by discussion. In addition, 9 more items tapping into transhumanist mind-sets were added. The items and their wording are presented in the protocol (<https://osf.io/98s4f/>) and will not be discussed in detail in this paper, as we will report the scales and their properties in a separate publication. All items of the worldview scales were answered as “agree”, “undecided”, “don’t agree”.

STATISTICS

The single items were analyzed descriptively using mean, standard deviation, median and range for continuous variables and frequencies for categorical and dichotomous variables. Differences between the two groups of vaccinated and unvaccinated individuals were assessed using the Wilcoxon rank sum test and χ^2 test for continuous and categorical variables, respectively. Diseases were also tabulated according to vaccination status and compared using χ^2 tests. As some categories were only mentioned by very few respondents, all diseases mentioned by a single respondent were added up to form a continuous variable “number of diseases mentioned” which was compared between both groups.

We also constructed logistic regression models to predict vaccination status. Each model was built on one of four sets of variables corresponding to different combinations of variable categories:

1. The full set of sociodemographic variables together with the number of diseases;
2. The full set of sociodemographic variables, the number of diseases and the worldview questionnaire variables;
3. The full set of sociodemographic variables, the number of diseases and the transhumanism questionnaire variables;
4. The full set of sociodemographic variables, the number of diseases, the worldview and transhumanism questionnaire variables.

One logistic regression model was built on each of these four variable sets in the following way: first, we selected the most important predictors out of all variables comprising one set with the least absolute shrinkage and selection operator (LASSO) method.²⁵ The LASSO method shrinks regression coefficients of less important variables to 0 and typically yields lower estimation variance than stepwise selection methods. The optimal penalty parameter λ was determined based on 10-fold cross validation and used for determining the most important predictor variables. Because the outcome of cross validation depends on the random splitting of training and testing sets, we built a total of 100 cross-validated LASSO models, each time constraining the maximum number of variables with non-zero regression coefficients to 11 in order to avoid overfitting. The final logistic regression model was then built by using only those variables which had been selected into at least 60 out of the 100 LASSO models. In this way, four different models were built on the above four variable sets which we could then compare using the bias-corrected Akaike Information Criterion (AICc). The model with the minimum AICc value was deemed as the best-fitting model.

Finally, in order to see whether vaccination would be causally linked to any diseases or worldview beliefs, we used propensity score matching²⁶ to construct a new data set in which each unvaccinated individual was matched to a vaccinated individual with similar sociodemographic characteristics.

We did not adjust p-values for multiple testing, but used a more stringent threshold of $p < 0.01$ to define statistical significance.²⁷ All analyses were performed with the software R version 4.4.1 with the glmnet package for LASSO modeling and the MatchIt package for propensity score matching.

ETHICS

The protocol was submitted to the ethical review board of the German Association of Psychologists (DGPs) and approved (WalachHarald2024-08-08WV).

2 Results

We received 1051 complete datasets. A total of 863 (82.1%) respondents had received at least one Covid-19 vaccination; these were defined as the “vaccinated” subgroup. Among the vaccinated, 607 respondents (70.3%) had received the vaccination voluntarily, while 256 (29.7%) felt more or less forced to receive a vaccination. Those who were voluntarily vaccinated had received a mean and median number of 3.1 ± 0.9 and 3 (range 1-5) vaccinations, respectively, while those feeling more or less forced had received a mean and median number of 2.4 ± 0.9 and 2 (range 1-5) vaccinations; this difference was statistically highly significant ($p < 0.00001$).

The sociodemographic characteristics of the complete sample and the two subgroups of the vaccinated and unvaccinated are described in Table 1. It can be seen that, except for gender and education, the vaccinated and unvaccinated subgroup differed significantly in all sociodemographic variables: People who had received at least one vaccination were older, had a higher body

mass and BMI, were less likely of non-German nationality, were more financially independent with a higher monthly income, were more likely to live alone and had been

taking medications more frequently compared to the unvaccinated subgroup.

Table 1: Characteristics of the Sample: n = 1051; mean ± standard deviation, median (range) and frequencies (percentage). We explicitly had asked for medication intake prior to the year 2021

Variable	Complete sample (n=1051)	Vaccinated (n=863)	Unvaccinated (n=188)	Difference (p-value)
Age [years]	46.9±17.0 47 (15-95)	48.4±16.9 49 (15-95)	40.2±15.8 40 (15-83)	<0.0001
Body mass [kg]	78.9±19.9 78 (38-185)	79.6±19.4 78 (38-170)	75.8±22.1 71.5 (40-185)	0.00093
BMI [kg/m ²]	26.2±5.8 25.2 (13.8-67.9)	26.4±5.7 25.5 (13.8-67.9)	25.0±5.9 24.0 (15.6-56.5)	<0.0001
Gender	Male: 535 (50.9%) Female: 516 (49.1%)	Male: 418 (48.4%) Female: 445 (51.6%)	Male: 98 (52.1%) Female: 90 (47.9%)	0.403
German Nationality	Yes: 972 (92.5%) No: 79 (7.5%) None: 42 (4.0%)	Yes: 816 (94.6%) No: 47 (5.4%) None: 30 (3.5%)	Yes: 156 (83%) No: 32 (17%) None: 12 (6.4%)	<0.0001
Highest Education	Basic: 270 (25.7%) GCSE: 325 (30.9%) A-level: 211 (20.1%) Bachelor: 80 (7.6%) Master: 116 (11.0%) PhD: 7 (0.7%)	Basic: 216 (25.0%) GCSE: 271 (31.4%) A-level: 164 (19.0%) Bachelor: 72 (8.3%) Master: 105 (12.2%) PhD: 5 (0.6%)	Basic: 54 (28.7%) GCSE: 54 (28.7%) A-level: 47 (25.0%) Bachelor: 8 (4.3%) Master: 11 (5.8%) PhD: 2 (1.1%)	0.0104
Monthly Net Income	<1300€: 142 (13.5%) <2000€: 167 (13.9%) <2600€: 166 (15.8%) <3600€: 200 (19.0%) <5000€: 174 (16.6%) >5000€: 202 (19.2%)	<1300€: 98 (11.3%) <2000€: 131 (15.2%) <2600€: 132 (15.3%) <3600€: 171 (19.8%) <5000€: 153 (17.7%) >5000€: 178 (20.6%)	<1300€: 44 (23.4%) <2000€: 36 (19.1%) <2600€: 34 (18.1%) <3600€: 29 (15.4%) <5000€: 21 (11.2%) >5000€: 24 (12.8%)	<0.0001
Financial Independence	Yes, me: 596 (56.7%) Yes, more persons: 289 (27.5%) No: 166 (15.8%) Yes: 751 (71.5%)	Yes, me: 493 (57.1%) Yes, more persons: 248 (28.7%) No: 122 (14.1%) Yes: 632 (73.2%)	Yes, me: 103 (54.8%) Yes, more persons: 41 (21.8%) No: 44 (23.4%) Yes: 119 (63.3%)	0.00363
Living with others Regular	No: 300 (28.5%) Yes: 450 (42.8%)	No: 231 (26.8%) Yes: 402 (46.6%)	No: 69 (36.7%) Yes: 48 (25.5%)	0.0082
Medication Intake ^a	No: 553 (52.6%) Not sure: 48 (4.6%)	No: 420 (48.7%) Not sure: 41 (4.8%)	No: 133 (70.7%) Not sure: 7 (3.7%)	<0.0001
Number of medications ^a	1.3±2.2 0 (0-22)	1.4±2.3 0 (0-22)	0.6±1.3 0 (0-8)	<0.0001

Next, we tabulated the single disease categories according to vaccination status and calculated univariate

χ^2 -tests (if necessary, with Yates correction). The result is presented in Table 2.

Table 2: Diseases experienced during the last 2 years according to vaccination status (frequencies, percent), knowledge of someone who died of Covid and knowledge of someone who died after vaccination

Did you experience one of the following diseases during the last 2 years...	Vaccinated (n=863)	Unvaccinated (n=188)	χ^2 (DF = 1/2); p-value
A disease that required the assistance of a doctor	363 (42.1%)	56 (29.8%)	9.2; p = 0.0024
A disease that required hospital treatment	125 (14.5%)	25 (13.3%)	30.09; p = 0.759
A disease that required rehabilitation	67 (7.8%)	12 (6.4%)	0.25; p = 0.619
Severe fatigue	78 (9.0%)	16 (8.5%)	0.008; p = 0.929
Recurrent infections	52 (6.0%)	12 (6.4%)	0.0003; p = 0.986
Covid19 infections	261 (30.2%)	43 (22.9%)	3.73; p = 0.0535
Heart pain	47 (5.4%)	16 (8.5%)	2.06; p = 0.15
Cardiological diseases	27 (3.1%)	5 (2.7%)	0.011; p = 0.916
Thrombotic events	18 (2.1%)	4 (2.1%)	<0.001; p = 1
Shingles	27 (3.1%)	3 (1.6%)	0.81; p = 0.367
Memory. difficulties concentrating	62 (7.2%)	8 (4.3%)	1.69; p = 0.19
Musculo-skeletal problems	184 (21.3%)	28 (14.9%)	3.57; p = 0.059
Autoimmune diseases	36 (4.2%)	7 (3.7%)	0.006; p = 0.938
Cancer	27 (3.1%)	5 (2.7%)	0.01; p = 0.916

Did you experience one of the following diseases during the last 2 years...	Vaccinated (n=863)	Unvaccinated (n=188)	χ^2 (DF = 1/2); p-value
Other diseases	42 (4.8%)	5 (2.7%)	1.28; p = 0.258
Knew someone who died of Covid-19			20.8; p = 0.00003
Yes	269 (31.2%)	43 (22.9%)	
No	567 (65.7%)	126 (67.0%)	
Uncertain	27 (3.1%)	19 (10.1%)	
Knew someone who died after vaccination			26.5; p <0.00001
Yes	67 (7.8%)	32 (17.0%)	
No	750 (86.9%)	135 (71.8%)	
Uncertain	46 (5.3%)	21 (11.2%)	

Many disease categories were mentioned only by few respondents. Nevertheless, it can be seen that the tendency is uniform: A higher percentage of vaccinated respondents affirms problems compared to the unvaccinated. This is confirmed by the sum of all diseases, a variable in which all positive mentions per person are added up and compared: The mean number of diseases in the vaccinated subgroup was 1.6 ± 1.6 (median: 1,

range: 0-9) compared to 1.3 ± 1.4 (median: 1, range: 0-7) in the unvaccinated subgroup ($p=0.00233$).

Finally, we tried to explore which variables are related to vaccination status and calculated a logistic regression model. We used the AICc to decide between rivaling models. The result is presented in Table 3.

Table 3: Logistic regression models predicting the probability of being vaccinated

Variable	Model 1		Model 2		Model 3		Model 4	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Age [years]	1.02 (1.00-1.03)	0.011	1.02 (1.01-1.03)	0.0029	1.02 (1.01-1.03)	0.0036	1.02 (1.01-1.03)	0.0013
BMI [kg/m ²]	1.02 (0.99-1.05)	0.312	—	—	—	—	—	—
German nationality: yes	2.17 (1.28-3.66)	0.0040	2.29 (1.34-3.86)	0.0020	2.26 (1.33-3.83)	0.0024	2.21 (1.29-3.73)	0.0033
Income > 3.600 Financial responsibility for more than oneself: yes	1.47 (0.99-2.20)	0.060	1.46 (0.98-2.20)	0.069	1.43 (0.96-2.16)	0.084	1.45 (0.98-2.19)	0.067
Living alone: yes	1.28 (0.83-1.96)	0.261	1.30 (0.83-1.99)	0.240	1.28 (0.82-1.96)	0.240	—	—
Regular medication intake: No/not sure	1.44 (1.00-2.08)	0.051	1.51 (1.04-2.18)	0.029	1.45 (1.00-2.09)	0.050	1.44 (0.99-2.08)	0.057
Number of medications	0.90 (0.51-1.60)	0.710	0.87 (0.49-1.56)	0.647	0.86 (0.49-1.53)	0.607	0.86 (0.49-1.52)	0.594
Sum of diseases	1.21 (1.02-1.49)	0.059	1.21 (1.02-1.49)	0.054	1.18 (1.01-1.45)	0.074	1.19 (1.01-1.46)	0.067
Belief in WV5	1.02 (0.90-1.16)	0.754	1.37 (1.11-1.70)	0.0041	—	—	—	—
Belief in WV6	—	—	—	—	—	—	0.81 (0.66-1.00)	0.052
Belief in WV7	—	—	0.77 (0.62-0.95)	0.017	—	—	0.79 (0.64-0.98)	0.036
Belief in TH5	—	—	—	—	1.57 (1.28-1.94)	<0.0001	1.65 (1.33-2.05)	<0.0001
Knew someone who died of Covid-19: yes	2.25 (1.49-3.50)	0.00019	2.31 (1.62-3.59)	0.00013	2.15 (1.42-3.34)	0.00045	2.30 (1.51-3.58)	0.00016

Variable	Model 1		Model 2		Model 3		Model 4	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Knew someone who died after vaccination: yes	0.30 (0.18-0.51)	<0.0001	0.27 (0.16-0.47)	<0.0001	0.29 (0.17-0.50)	<0.0001	0.31 (0.18-0.53)	<0.0001
AICc	907.0		897.1		889.7		883.0	

The variables included in each model had been determined by variable selection with the LASSO method (see Materials and Methods section). CI: Confidence interval; OR: Odds ratio; TH: transhumanism; TH5: The mRNA-Covid vaccinations have shown that one can bring foreign genes into the human body to help humankind; WV: Worldview; WV5: There is only one primary reality: The spirit or consciousness are only physical properties of the brain and have a purely material explanation; WV6: There are other realms of reality that are more important than the everyday reality WV7: The universe obeys a unitary principle beyond any material or scientific explanation.

It can be inferred from Table 3 that models incorporating the individual variables from the worldview and transhumanism questionnaire were superior to models without considering these predictors. However, variables belonging to the sociodemographic category were the most frequently selected predictors. The best-fitting model was model 4, which incorporated variables from the sociodemographic, transhumanism and worldview categories. This model is highly significant (Likelihood Ratio $\chi^2 = 128.6$; $df = 12$; $p < 0.00001$) and explains roughly 25.7% of the variation according to the pseudo- R^2 measure proposed by McKelvey and Zavoina.²⁸

According to the logistic regression models (Table 3), the vaccinated are more likely to be older, have German nationality, to be financially better off, to live alone, to have been taking more medications and to know someone who died of Covid-19 but no one who might have died after Covid-19 vaccination. It is also interesting that a materialist worldview ("The spirit, or consciousness are only physical properties of the brain and have a purely material explanation") was positively associated with the probability of getting vaccinated, while the belief that there are other realms of reality that are more important than the everyday reality and that the universe obeys a unitary principle which is beyond any material or scientific explanation were associated with a higher probability of not getting vaccinated. In addition, the belief that the mRNA-Covid vaccinations have shown that one can bring foreign genes into the human body to help humankind was a highly significant predictor of the probability to being vaccinated.

Finally, we matched a subset of 188 vaccinated individuals to the 188 unvaccinated individuals using nearest neighbor matching to the propensity score; the latter was determined by logistic regression on the following sociodemographic variables: Age, BMI, German nationality, income, financial responsibility, living alone, regular medication intake and total number of medications used prior to 2021. After matching, there were no significant differences between any of the sociodemographic variables listed in Table 1. However, vaccinated individuals tended to know someone who had died of Covid-19 (χ^2 test, $p=0.029$), while they reported knowing someone who died after a Covid-19 vaccination significantly less frequently ($p=0.0085$). There was no significant difference between the matched groups with respect to any of the diseases, the greatest difference being a higher proportion of Covid-19 reported by the vaccinated (30.9%) compared to the unvaccinated group (22.9%, $p=0.103$). Among the

transhumanism questionnaire items, the belief that mRNA-based vaccines are beneficial to humanity was significantly more present among the vaccinated compared to the unvaccinated group (agreed/disagreed/uncertain: 34.6%/30.8%/34.6% versus 22.9%/45.2%/31.9%, $p=0.0075$). Vaccinated individuals also held materialist and nonordinal worldviews more frequently, although the difference was not statistically significant ($p=0.079$ and 0.075 , respectively).

3 Discussion

To our knowledge this is the first representative survey on potential side effects of Covid-19 vaccinations in Germany. Some findings stand out in this representative population sample: The diseases which have been associated with Covid-19 and the mod-RNA or vector vaccines given to prevent the disease, as well as some other disease categories are mentioned more frequently by those that have been vaccinated, except heart pain which is reported more by the unvaccinated. Some diseases, namely those requiring a visit to the doctor, musculoskeletal diseases and Covid-19 infections were significantly more frequent in the vaccinated. The sum of all diseases was significantly higher in the vaccinated group. The logistic regression predicting vaccination status was meaningful. The vaccinated are older, are more likely to be materially better off and to be of German nationality. Their health was worse at the outset, indicated by more medications taken prior to 2021, and their belief in some kind of non-ordinary reality was less, while their belief in the benefit of genetic interventions was higher. They knew someone who died of Covid-19 more frequently than someone who might have died of the vaccination. These findings, overall, support the view that the vaccinated have suffered more from diseases that are known or supposed to be associated with Covid-19 vaccinations, and that the decision to receive those vaccinations are associated with worldviews and with one's own perceived health.

Specifically, we found that diseases requiring a visit to the doctor are clearly more frequent in the group that was vaccinated (42%) than in the unvaccinated (30%, $p=0.0024$). Also, Covid-19 is more frequently reported by the vaccinated group (30.2% versus 22.9%, $p=0.0535$). This is supported by unsystematic clinical experience but not widely accepted. It seems that the specificity of the antibody generation induced by the mod-RNA and vector vaccinations is counterproductive in the long run, either because the immune system eschews

new variants or because the immune response is itself skewed.^{29,30}

In a propensity score analysis, we eliminated many of the confounding factors that could be partly responsible for the observed differences in disease frequencies between both groups. The result of this analysis suggests that the generally higher frequency of diseases reported by the vaccinated is less pronounced when taking sociodemographic variables, in particular medication intake prior to 2021, into account. This finding is consistent with logistic regression modelling which yielded no statistically significant effect of the number of diseases in predicting vaccination status after controlling for sociodemographic and other variables that we queried. However, even after propensity score matching, Covid-19 occurred more frequently in vaccinated individuals (31% vs. 23%, $p=0.103$).

Logistic regression also indicated that world views play a role in the decision of receiving vaccination or not. In particular, four worldview items emerged as important predictors. The probability of being vaccinated was positively associated with the belief that there is only one primary reality and that the spirit or consciousness are only physical properties of the brain and have a purely material explanation as well as the transhumanist belief that mRNA-Covid vaccinations have shown that one can bring foreign genes into the human body in order to help humankind. In contrast, the probability of being vaccinated was negatively associated with the beliefs that there are other realms of reality that are more important than everyday reality, and that the universe obeys a unitary principle beyond any material or scientific explanation (Table 3). These results complement, and partly confirm, our findings from an earlier representative survey, where we found that the best predictors of the probability to be vaccinated were a higher income, less use of alternative media and – most importantly – a stronger belief in the orthodox Covid-19 narrative which included that assumption that fast vaccine development had been a good thing.²³

The weakness of our study is obvious: Although we sought to get a representative sample, it still is a self-report study, where recall bias and perception bias might be high. This is specifically obvious in the two questions asking whether respondents knew someone who died of Covid-19 disease, or after Covid-19 vaccinations, respectively. The mentions of the first category is implausibly high (31% and 22%, respectively), given that the infection fatality rate was similar to that of influenza.³¹ The same goes for the second question, which was answered in the positive by 8% of the vaccinated and 17% of the unvaccinated. Another potential bias is the question about medication intake prior to the year 2021. While this variable was meant to reflect pre-existing diseases which could in turn be causally connected to the diseases diagnosed during the past two years, it is also prone to recall bias and the possibility exists that respondents reported medication use prescribed for a disease which occurred during the last two years.

Another weakness is a lack of power: The group of the unvaccinated was small, so our propensity-matched

sample is comparatively small as well. Hence, our inability to uncover any meaningful differences in that sub-sample of matched individuals is not necessarily due to the fact that there are none, but more likely due to the fact that these differences are small, but still important, and hence not visible in such a small sample. The same is true for the full sample: While the sample of 1051 is enough to approach representativity, it is not enough to document differences for small but important disease categories.

Another shortcoming is the fact that we cannot make distinctions regarding vaccines. A post-hoc analysis of the Paul-Ehrlich-Institute adverse reaction database has shown that the Comirnaty vaccine (Pfizer) produces a rate of 2.8 severe side-effect per 10,000 vaccinations, Spikevax (Moderna) 2.4 per 10,000, Vaxzevria (Astra-Zeneca) 6.0 per 10,000, Jcovden (Janssen) 4.6 per 10,000, and Nuvaxovid (Novavax) 10.1 severe side-effects per 10,000 vaccinations.¹² We can assume that in our sample the majority of respondents will either have received the Comirnaty product, or Spikevax, or a mix. Since our objective was a very coarse-grained picture, and our method retrospective, we thought it not useful to attempt a distinction that would be difficult to gather reliably.

Concerning diseases, we deliberately sought to be conservative: We asked for diseases that have been diagnosed over the last two years, accepting a recall bias. We asked about the vaccination history last in our survey in order to not bias the responses. It would of course be mandatory for a diligent documentation of side effects of any intervention to do this prospectively in a well-defined cohort and not retrospectively in a survey, such as in our study. Safety signals have now been reported also by prospective documentation studies^{11,14,16,20,32,33}. However, none of these have been initiated right at the beginning and would have isolated safety signals in time to stop the roll-out of the vaccines.

The problems of this type of vaccine can, and should be extrapolated to modified RNA as a generic platform for vaccinations. There might be the rash conclusion that now, as Covid-19 vaccines have received market authorization quickly due to the pandemic situation, we now might move forward to use this platform for other vaccines and pathogens. We think that our and other researchers' data caution against this approach, as side effects are more numerous than one should accept for safe products. Authorities should insist on diligent prospective safety data, before new products are authorized onto the market.

4 Conclusions

In summary, our data support the notion that in Germany, people who decided to get vaccinated against Covid-19, held particular worldviews, were comparatively older and had a higher intake of medication, which we assume indicates higher comorbidity, than those who decided against vaccination. This might have placed them at greater risk for the subsequent emergence of new diseases. Our data also show that the very disease that was supposed to be prevented by the vaccination program, namely Covid-19, was reported more

frequently by those having been vaccinated compared to the unvaccinated, even after controlling for some important confounding effects of sociodemographic variables by propensity score analysis. Other side-effects were more numerous, too. These findings show that the promises made by those aggressively promoting the large vaccination campaign were untrue, as is likely the case too for the theoretical models inferring a significant health benefit from the worldwide vaccination programs.³⁴ Our data should stimulate institutions that hold more valid data than this survey to confirm or refute our findings.

Conflicts of Interest Statement

The authors have no conflicts of interest to declare.

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