

Vaccine envy during the COVID-19 pandemic

Elina Erz¹ and Katrin Rentzsch²

Personality Psychology and Psychological Assessment, Psychologische Hochschule Berlin,
University of Bamberg,

The term *vaccine envy* (i.e., envy experienced when others are given the opportunity to receive a COVID-19 vaccine) was coined during the COVID-19 pandemic and has received media attention. This study is the first to systematically investigate vaccine envy. In two pre-registered online surveys conducted in May 2021 ($N = 1,174$) and October/November 2021 ($N = 535$), we collected data from vaccinated and unvaccinated German participants, including measures of vaccine envy, well-being, personal experiences during the pandemic, and various trait constructs (e.g., justice sensitivity and self-esteem). We found that in May 2021, 47% of participants experienced vaccine envy at least sometimes and that vaccine envy was connected to victim sensitivity, subjective perceptions of being threatened by the pandemic, and an increased willingness to be vaccinated. By November 2021, however, vaccine envy among unvaccinated participants had almost disappeared. Our findings advance the understanding of the psychological impact of the COVID-19 pandemic.

Keywords: Envy; COVID-19; Vaccine; Justice sensitivity; Deservingness.

Disrupting our everyday lives and confronting us with existential fears, the COVID-19 pandemic has had manifold effects on our psyches. The start of the vaccination campaign was eagerly awaited by the public and raised hopes that people's lives might soon return to normal. However, as was true for many countries, COVID-19 vaccines in Germany remained in short supply throughout the first half of 2021 (Robert-Koch Institut, 2022). Due to the shortage, many people, especially the young and healthy, had to wait for months before they could get vaccinated.

The term *vaccine envy* was coined in this first phase of the vaccination campaign. It refers to envy experienced as a reaction to others getting the opportunity to receive a COVID-19 vaccine. At the time of this writing, the German term for vaccine envy (“Impfneid”) generated more than 13,000 search results on Google. However, even though countless media reports during the first months of the vaccination campaign suggested that vaccine envy was widespread, empirical data on vaccine envy remains scarce.

We believe that vaccine envy might have important implications for emotions, well-being, and solidarity during the pandemic. Moreover, as the pandemic is still

ongoing, and inequality regarding the distribution of COVID-19 vaccines continues to exist on a global scale, vaccine envy might still be a common experience for individuals who do not have the opportunity to get vaccinated against COVID-19. This study aims to introduce the concept of vaccine envy to the scientific community by systematically examining its nomological network and correlates as well as changes in vaccine envy over the course of the vaccination campaign.

According to a widely recognised definition, envy is an unpleasant, painful emotion that arises when a person realises that someone else possesses something that the person longs for, strives for, or desires (Parrott & Smith, 1993; Smith & Kim, 2007). This possession does not necessarily have to be an object but can also be, for example, a social position, an attribute (Smith & Kim, 2007), or a certain vaccination status. We thus define vaccine envy as an unpleasant emotion that is experienced when one becomes aware that another person is vaccinated while one is still waiting for the vaccination. Previous research on generic envy has provided important insights that should also be applicable to the new phenomenon of vaccine envy—if vaccine envy is

Correspondence should be addressed to Elina Erz, Personality Psychology and Psychological Assessment, Psychologische Hochschule Berlin, Am Köllnischen Park 2, 10179 Berlin, Germany. (E-mail: e.erk@phb.de)

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actually envy in a true sense (i.e., a painful emotion). However, what is commonly considered vaccine “envy” on the basis of popular media reports does not necessarily have to correspond to the scientific definition of envy. Rather, the phenomenon might reflect a cognitive (i.e., non-emotional) evaluation of the distribution of the vaccine as unjust. To shed light on this question, we derived hypotheses on the nomological network and correlates of vaccine envy on the basis of previous findings on generic (malicious) envy. Our hypotheses should find support if vaccine envy is actually envy in a strict sense.

As a comparison-based emotion, envy is experienced as a reaction to an upward social comparison with another person (Alicke & Zell, 2008; White et al., 2006). Accordingly, previous research has shown that people with a pronounced social comparison orientation are more prone to envy (Rentzsch & Gross, 2015). Similarly, self-esteem holds an important position in the nomological network of envy, with a number of studies showing that envy is connected to low self-esteem (Salovey & Rodin, 1991; Smith et al., 1999). Therefore, we expected vaccine envy to be connected to comparison orientation and low self-esteem. Moreover, some people are more prone to envy than others, marking stable interindividual differences in people’s disposition toward envy (Erz & Rentzsch, 2022; Rentzsch & Gross, 2015; Smith et al., 1999). Dispositional envy is a powerful predictor of everyday experiences of envy (Rentzsch & Gross, 2015) and should thus be closely connected to vaccine envy.

Furthermore, as shown in several studies, envy is connected to specific appraisal patterns. For instance, envy can be elicited by perceptions that the envied person’s advantage is undeserved (van de Ven et al., 2012). Moreover, envy is associated with a sense of injustice (Smith et al., 1994). In line with these results, a recent study found that envy was associated with victim justice sensitivity (i.e., a habitual tendency to experience strong negative emotions when confronted with injustice; Hong et al., 2021). Therefore, we expected vaccine envy to be connected to appraisals of injustice and undeservingness and increased victim sensitivity.

During the public debate on vaccine envy in Germany, commentators raised concerns that vaccine envy might undermine social cohesion and solidarity (e.g., Amann, 2021). Indeed, generic envy has been shown to be connected to a vast range of negative social outcomes, such as antisocial behaviour (Behler et al., 2020), hostility (Rentzsch et al., 2015), and social undermining (Duffy et al., 2012). Moreover, previous research has found that dispositional envy is related to neuroticism, mental health problems, and low life satisfaction (Rentzsch & Gross, 2015). At the same time, however, it has been shown that experiencing envy can motivate people to improve themselves (Lange & Crusius, 2015; Van de Ven, 2017). Taken together, these findings suggest that

vaccine envy might have detrimental effects on personal well-being and social cohesion while simultaneously being associated with an increased motivation to get vaccinated.

THE PRESENT STUDY

In this study, we aim to investigate vaccine envy by systematically examining its correlates and nomological network as well as changes in vaccine envy over the course of the vaccination campaign. For this purpose, we conducted two online surveys in May 2021 and October/November 2021. To our knowledge, this is the first study to provide empirical data on vaccine envy.

First, we investigated whether vaccine envy was actually a common phenomenon in our society when the vaccination campaign began and how self-reports of vaccine envy changed as the availability of COVID-19 vaccines increased. When we administered our first survey in May 2021, COVID-19 vaccines were in short supply, and many people who were willing to get vaccinated did not have the opportunity, a situation that provides fertile ground for experiences of envy. On the first day of our survey (7 May 2021), about one third of the German population was vaccinated (Robert-Koch Institut, 2022). This percentage increased to more than two thirds in October/November 2021 when the follow-up survey took place. As the shortage of vaccines was a thing of the past at the end of 2021, we believe that being unvaccinated in October/November 2021 was usually the result of a conscious decision not to get vaccinated and did not entail an upward comparison with another person—a precondition for the experience of envy (Alicke & Zell, 2008; White et al., 2006). We thus hypothesized that vaccine envy among the unvaccinated would be less frequent in October/November 2021 than in May 2021.

Second, in order to determine whether vaccine envy can actually be considered envy in the strict sense (i.e., a painful emotion), we sought to examine the nomological network of vaccine envy. For this purpose, we examined the associations between vaccine envy and specific trait characteristics and appraisal patterns that have been shown to be closely connected to generic envy in previous research. We preregistered the hypotheses that vaccine envy should be positively related to dispositional envy, social comparison orientation, and justice sensitivity and negatively related to self-esteem. Moreover, we expected vaccine envy to be related to appraisals of undeservingness and injustice (see Smith et al., 1994; van de Ven et al., 2012).

Third, we examined further correlates and life outcomes associated with vaccine envy. In line with research on benign forms of envy (Lange & Crusius, 2015; Van de Ven, 2017), we preregistered the hypothesis that the motivating effect of envy might express itself in an increased

willingness to get vaccinated. Moreover, we exploratorily examined associations with life satisfaction and depression as well as personal experiences and attitudes related to the pandemic.

METHOD

We collected data using a preregistered online survey with two measurement occasions. All methods, hypotheses and analyses were preregistered on the OSF (Time 1: <https://osf.io/dmj5f/>, Time 2: <https://osf.io/fdsw4/>).

All procedures were in accordance with the ethical standards of the ethics committee of the Psychologische Hochschule Berlin and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all participants included in the study.

Participants and procedure

Participants were recruited via mailing lists and social media and were promised an overview of the study results as an incentive. Participants who did not provide information on their vaccination status, who participated multiple times per measurement occasion, who were below the age of 18, or whose data were defective were not included in the final data set. At the beginning of the vaccination campaign in May 2021 (Time 1), the final sample included 558 vaccinated and 616 unvaccinated German participants ($N = 1,174$) with an average age of 40.9 years ($SD = 13.3$, range: 18–88). Half a year later (October/November 2021, Time 2), we conducted a follow-up survey, including both newly recruited and previous participants. A total of 535 individuals (437 vaccinated and 98 unvaccinated) responded to the invitation ($M_{\text{age}} = 44.0$, $SD_{\text{age}} = 13.2$). For detailed information about the sample, see Table S2_1 in Supporting Information S2 (ESM2).

Measures

The present study included measures of vaccine envy, trait constructs (e.g., victim sensitivity and self-esteem), envy-specific appraisals, and further potential correlates of vaccine envy. We used two measures of vaccine envy: the self-reported frequency of experiences of vaccine envy and the intensity of envy experienced as a reaction to a hypothetical scenario that described a person receiving a COVID-19 vaccine. A detailed overview of all measures, including descriptions of the response scales and example items, can be found in Supporting Information S1 (ESM1). Table 1 presents the internal consistencies of the multi-item scales.

Frequency of vaccine envy

To investigate whether vaccine envy was actually a common phenomenon in our society, we assessed the *frequency of experiences of vaccine envy* via self-reports from unvaccinated participants and the *frequency of experiences of being envied* via self-reports from vaccinated participants at Times 1 and 2. Unvaccinated participants were asked to rate the frequency of experiences of vaccine envy within the last 2 weeks on a 5-point scale ranging from 1 (*never*) to 5 (*very often*) on a one-item measure (“In the last 2 weeks, how often have you experienced more or less intense envy of others who have already received a COVID-19 vaccine?”). Self-reports of vaccine envy were supplemented by reports from vaccinated participants on how often they had been envied by others within the last 2 weeks (“In the last 2 weeks, how often did you have the impression that others were feeling more or less intense envy toward you because you have already received a COVID-19 vaccine?”).

Nomological network of vaccine envy

In order to investigate the nomological network of vaccine envy, at Time 1, we assessed a number of trait characteristics that were connected to envy in previous research: *dispositional envy* (Domain-Specific Envy Scale; Rentzsch & Gross, 2015), *social comparison orientation* (Iowa-Netherlands Comparison Orientation Measure; Gibbons & Buunk, 1999), *victim sensitivity* (Justice Sensitivity Scales-8; Beierlein et al., 2012), and *self-esteem* (Multidimensional Self-Esteem 12-Item Short Scale; Rentzsch et al., 2022).

Moreover, we examined the association between vaccine envy and envy-specific appraisal patterns of perceived injustice and undeservingness at Time 1. Perceived *injustice* was measured via a one-item measure (“I find it unfair that I haven’t been vaccinated so far”). To investigate *deservingness*, unvaccinated participants were randomly assigned to one of three hypothetical scenarios that described a person receiving a COVID-19 vaccine. In these scenarios, the deservingness of the fictitious person (Elisabeth M.) was systematically manipulated by varying their age and job (low vs. high deservingness vs. no deservingness information). For example, the vignette for the low-deservingness scenario read: “You’re chatting with a friend. They tell you about an acquaintance who has just been vaccinated. Elisabeth M. is 36 years old and works mainly from home. She was able to get an early vaccination appointment because she has good connections with her family physician even though she does not belong to a risk group.” As a manipulation check, participants were asked to rate the person’s deservingness. Feelings of envy were measured with three items: “I feel a bit envious of Elisabeth M.”; “I envy Elisabeth M.”; and

“I feel envy.” For further analyses, a mean score was computed for the three items.

The *intensity of envy experienced as a reaction to the hypothetical scenario* in the low deservingness condition ($n = 198$) was used as a second indicator of vaccine envy (correlation between the two indicators of vaccine envy: $r = .79, p < .001$).

Further correlates and life outcomes of vaccine envy

To investigate the correlates and life outcomes of vaccine envy, we assessed *demographic variables* (age and gender), life satisfaction, depressivity, vaccination willingness, and attitudes and experiences related to the pandemic. *Life satisfaction* was measured via the General Life Satisfaction Short Scale (Beierlein et al., 2015). *Depressivity* (“Since last week, to what extent have you felt sad, depressed, or uninterested in life?”) and *vaccination willingness* (“Would you get the vaccine against COVID-19 if you had the opportunity?”) were assessed via one-item measures. Assessments of *attitudes and experiences related to the COVID-19 pandemic* included participants’ perceived infection risk, feeling threatened or feeling restricted in one’s everyday life, worries about one’s own health, worries about others, the number of COVID-19 infections in one’s social environment, financial issues due to the pandemic, and the endorsement of privileges for the vaccinated (see [ESM1](#) for example items and the response scales). In this context, we also assessed participants’ political orientation on an 11-point scale adapted from the German Socio-Economic Panel (SOEP; see Kroh, 2007).

Analytic strategy

All analyses were preregistered. As preregistered, we used $p < .05$ for non-directional hypotheses/exploratory analyses and $p < .10$ for directional hypotheses. All analyses were computed in R version 3.6.1.

Differences in the *frequency of experiences of vaccine envy* between Times 1 and 2 in unvaccinated participants were examined via t tests. In line with the preregistered protocol, we used independent-samples t tests because the covariance coverage between measurement occasions was low (<10%) due to attrition and changes in vaccination status. Differences in the *frequency of experiences of being envied* among vaccinated participants were also investigated via independent-samples t tests.

To investigate the *nomological network* of vaccine envy, we computed the Pearson correlations between vaccine envy and trait characteristics (i.e., dispositional envy, social comparison orientation, victim sensitivity, and self-esteem) as well as perceived injustice. To test the hypothesis on the relationship between vaccine envy

and deservingness, we used a one-way ANOVA with three groups (low vs. high deservingness vs. no information) and envy intensity as the dependent variable (for the manipulation check, perceived deservingness was used as the DV). Further *correlates and life outcomes* of vaccine envy were investigated via Pearson correlation coefficients.

The anonymized data and R scripts are available on the OSF (<https://osf.io/vz2sk/>).

RESULTS

Frequency of vaccine envy

One of our main goals was to examine whether vaccine envy was actually a common phenomenon in our society. Results showed that at Time 1, 21% of unvaccinated participants reported experiencing vaccine envy often or very often in the last 2 weeks and 26% reported sometimes experiencing vaccine envy (for more details, see [Figure S2_1](#) in [ESM2](#)). Among vaccinated participants, 30% reported being envied by others at least sometimes. At Time 2, 97% of unvaccinated participants reported never or rarely experiencing vaccine envy in the previous 2 weeks (see also [Figure S2_2](#) in [ESM2](#)). Unvaccinated participants thus reported experiencing vaccine envy significantly less frequently by the end of 2021 ($M = 1.2, SD = 0.6$) than in the initial survey in May 2021 ($M = 2.4, SD = 1.3$), $t(266.3) = 16.3, p < .001$, with a large effect (Cohen’s $d = 1.07$). Vaccinated participants’ reports of being envied also were significantly less frequent in October/November 2021 ($M = 1.1, SD = 0.4$) than in May 2021 ($M = 2.0, SD = 1.0$), $t(757.0) = 18.3, p < .001, d = 1.10$.

Nomological network of vaccine envy

When investigating vaccine envy’s nomological network, we found that unvaccinated participants high in victim sensitivity ($r = .41$), social comparison orientation ($r = .35$), and dispositional envy ($r = .28$) as well as individuals with low self-esteem ($r = -.16$) reported experiencing vaccine envy more frequently, all $ps < .001$ (for detailed information on the means, standard deviations and intercorrelations of the trait measures, see [Table 1](#)). The correlations with the intensity of envy experienced as a reaction to the hypothetical scenario in the low deservingness condition yielded similar results (see [Table 1](#)). With regard to envy-specific appraisal patterns, we found a strong and significant positive association between perceived injustice and the frequency of vaccine envy ($r = .64, p < .001$). This result means that participants who found it unfair that they had not already been vaccinated had a stronger tendency to feel vaccine envy. Results were in line with the preregistration.

TABLE 1
Nomological network of vaccine envy: Intercorrelations with envy-related traits and perceived injustice at Time 1 (unvaccinated participants)

	<i>N</i>	<i>M</i>	<i>SD</i>	α	1.	2.	3.	4.	5.	6.	7.
1. Vaccine envy frequency ^a	593	2.44	1.26	-	1						
2. Vaccine envy after scenario ^{1, b}	167	3.08	2.07	.97	.79**	1					
3. Dispositional envy (DSES) ^b	493	2.29	0.95	.90	.28**	.35**	1				
4. Social comparison orientation (INCOM) ^d	477	2.92	0.72	.83	.35**	.34**	.58**	1			
5. Victim sensitivity (USS-8) ^c	461	3.11	1.34	.80	.41**	.45**	.56**	.45**	1		
6. Self-esteem (MSES-12) ^b	469	4.84	1.48	.79	-.16**	-.22*	-.48**	-.44**	-.37**	1	
7. Perceived injustice ^b	593	2.75	1.94	-	.64**	.53**	.13**	.18**	.28**	-.10*	1

Note: DSES = Domain-Specific Envy Scale. INCOM = Iowa-Netherlands Comparison Orientation Measure; USS-8 = Justice Sensitivity Scales-8, victim sensitivity subscale; MSES-12: Multidimensional Self-Esteem 12-Item Short Scale, global self-esteem subscale. α = Cronbach's alpha. Correlations: *N* = 155–593 due to missing data. ¹Intensity of envy experienced as a reaction to the hypothetical scenario in the low deservingness condition. ^aScale ranging from 1 to 5. ^bScale ranging from 1 to 7. ^cScale ranging from 1 to 6. **p* < .05. ***p* < .001.

To investigate whether people experience more vaccine envy when the vaccination seems undeserved, we examined the effect of three hypothetical scenarios describing a person who received a COVID-19 vaccine in which deservingness was systematically manipulated. As expected, the manipulation check showed that the high deservingness scenario resulted in significantly higher ratings of deservingness ($M = 6.2$, $SD = 1.6$) than the scenarios with low deservingness ($M = 3.3$, $SD = 2.0$) or no deservingness information ($M = 4.6$, $SD = 1.9$), $F(2, 501) = 106.98$, $p < .001$, $\eta^2 = .30$ (post hoc tests: all $ps < .001$). Moreover, as preregistered, we found a significant effect of deservingness on vaccine envy, $F(2, 499) = 35.62$, $p < .001$, $\eta^2 = .13$. Post hoc comparisons revealed that vaccine envy was significantly higher for the low deservingness condition ($M = 3.1$, $SD = 2.1$) than for the conditions with high deservingness ($M = 1.6$, $SD = 1.2$) or no deservingness information ($M = 2.6$, $SD = 1.7$), with $p < .001$ and $p = .046$, respectively (see also Figure 1). This means that participants reported more intense envy when informed about the vaccination of a person who seemed undeserving of the vaccine due to their young age and option to work from home when compared with a scenario with an older person working in the health sector or with no further information.

Further correlates and life outcomes of vaccine envy

Our investigation of the correlates of vaccine envy showed that women reported significantly more vaccine envy than men ($r = .16$, $p < .001$) and that reports of vaccine envy decreased with age ($r = -.25$, $p < .001$). Concerning the association between vaccine envy and well-being, we found that participants who reported more vaccine envy showed significantly higher depressivity ($r = .19$, $p < .001$) and lower life satisfaction ($r = -.09$, $p = .047$). As pre-registered and in line with previous research on the motivational effect of envy, vaccine envy was associated

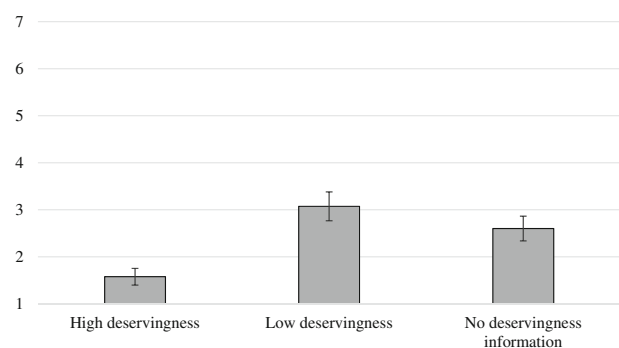


Figure 1. Vaccine envy after the presentation of a scenario with high versus low deservingness versus no deservingness information. *N* = 502 (unvaccinated participants). Error bars represent 95% confidence intervals.

with an increased willingness to get vaccinated ($r = .45$, $p < .001$). For detailed information about the means and standard deviations of the correlates of vaccine envy, see Table S2_2 in ESM2.

When investigating attitudes and experiences related to the COVID-19 pandemic, we found that vaccine envy was reported more frequently by participants who felt threatened by the virus ($r = .36$), had a strong sense that their daily lives were affected by anti-COVID measures ($r = .27$), worried more about their own health or the safety of their loved ones ($r = .35/.32$), and judged their own risk of being infected as particularly high ($r = .22$), all $ps < .001$. However, objective criteria, such as the number of COVID-19 infections in one's social environment ($r = 0$, $p = .952$) or one's own financial losses due to the pandemic ($r = -.05$, $p = .192$), did not play a role in the experience of vaccine envy. Moreover, participants who reported more frequent vaccine envy did not differ significantly in their political orientation ($r = .02$, $p = .577$) and were not more sceptical about privileges for the vaccinated ($r = .03$, $p = .482$). The correlations with the intensity of envy experienced as a reaction to the hypothetical scenario in the low deservingness

condition yielded mostly similar results (see Table S2_2, ESM2).

DISCUSSION

The goal of this study was to empirically investigate the phenomenon of vaccine envy that emerged during the COVID-19 pandemic. In line with the many media reports from the beginning of the vaccination campaign, we found that vaccine envy was indeed a common experience at the time. In May 2021, half of unvaccinated participants reported experiencing vaccine envy at least sometimes, and one third of vaccinated participants said that they had been envied due to their vaccination status.

According to our data, vaccine envy decreased dramatically over the course of the vaccination campaign. By the end of 2021, vaccine envy among unvaccinated participants had almost disappeared. The decrease in vaccine envy was to be expected considering the increase in the availability of COVID-19 vaccines.

Is vaccine envy really envy?

Even though our data showed that many participants could relate to the new phenomenon, this does not necessarily mean that vaccine envy is really envy in a strict sense (i.e., a painful emotion). In order to shed some light on this question, we investigated vaccine envy's nomological network, which yielded mixed results. On the one hand, the associations with dispositional envy, justice sensitivity, social comparison orientation, and low self-esteem were in line with previous empirical studies on generic envy (e.g., Rentzsch & Gross, 2015) and with the preregistration. Moreover, vaccine envy was associated with envy-specific appraisals of injustice and undeservingness (Smith et al., 1994; van de Ven et al., 2012). On the other hand, the association between vaccine envy and dispositional envy was weaker than expected, and victim sensitivity and social comparison orientation emerged as the most important correlates of vaccine envy. These results raise doubts about whether vaccine envy can be considered envy in a strict sense or whether it reflects merely a cognitive appraisal of the situation as unjust (see also distinction between envy and "resentment proper" as proposed by Smith & Kim, 2007).

Still, it is important to bear in mind that victim sensitivity and envy have a common core that goes beyond injustice appraisals. The two constructs have similar nomological networks: Like envy, victim sensitivity is related to antisocial tendencies, a proclivity to engage in social comparison, and low life satisfaction (Baumert et al., 2014; Schmitt et al., 2005). Moreover, justice sensitivity has a strong emotional component (Mohiyeddini & Schmitt, 1997), which is reflected by the wording of the

victim sensitivity items (e.g., "It makes me angry when others are undeservingly better off than me"). Similar to anger, vaccination envy might thus be an emotion that individuals high in victim sensitivity tend to experience in situations that are perceived as unjust.

All things considered, we believe that "vaccine envy" might be a mixture of justice-related concerns and envy in the true sense (i.e., a painful emotion). An exploratory review of the answers to an open-ended question in the present study supports this notion. In this question, participants were asked to describe a situation in which they had experienced vaccine envy. Whereas some participants reported experiencing "abstract vaccine envy" and general perceptions of unfairness regarding the distribution of vaccines, others described painful emotional states (for a compilation of the answers to the open-ended question, see Supporting Information S3 [ESM3]).

Implications of vaccine envy for enviers and society

In line with previous envy literature (van de Ven et al., 2012), we found that the experiences of vaccine envy were associated with perceptions of deservingness. Vaccine envy is thus primarily directed toward people who are judged to be undeserving of a COVID vaccine, for instance, because they are young or can work from home. This finding highlights the relevancy of deservingness appraisals for the process of envy generation and might simultaneously point out the importance of adequately justifying decisions about the distribution of vaccines to prevent vaccine envy.

Such justifications might be particularly important for societal groups that report more vaccine envy than others. In our data, we found that women and younger people experienced vaccine envy more often. These findings are in line with previous literature that showed that women and younger people are more prone to envy (e.g., Erz & Rentzsch, 2022; Henniger & Harris, 2015). Moreover, the age effect we found might be a consequence of political decisions about the distribution of vaccines. In Germany, citizens were assigned to priority groups to ensure an efficient and fair distribution of the available vaccines. Younger people had to wait longer than others for their vaccination, and this wait may have resulted in more frequent experiences of vaccine envy.

However alarming vaccine envy might have appeared in the media, it is important to keep in mind that there might also be some positive side effects. In line with previous research on the motivational effect of envy (Lange & Crusius, 2015; Van de Ven, 2017), we found that vaccine envy was associated with an increased willingness to be vaccinated against COVID-19. Vaccine envy might thus be an expression of positive attitudes and hope associated with the vaccination campaign. Similarly, we did

not find any evidence that individuals who frequently experienced vaccine envy were more critical of privileges for the vaccinated. This might suggest that even though some people had a strong emotional response to others being vaccinated, they did not feel ill will toward all vaccinated people and might still have approved of the political agenda regarding the vaccination campaign. Vaccine envy might thus represent a benign form of envy which lacks the hostile character of malicious envy (see Dual Envy Theory; Lange & Crusius, 2015). The concern that vaccine envy might lead to an erosion of solidarity in our society thus seems to be unfounded.

Concerning COVID-related attitudes and experiences, we did not find a relationship between vaccine envy and “hard” indicators, such as financial losses due to the pandemic and the number of infections in one’s social environment. What seemed to be more relevant were subjective indicators, such as perceived threat and infection risk and worries about one’s own health or others’ health. Vaccine envy thus seems to thrive in an atmosphere of subjective fear and might be reduced by effective and trust-building communication.

Moreover, we found evidence that vaccine envy was connected to depressivity and low life satisfaction. These findings are in line with previous literature that showed that people who are more prone to envy tend to suffer from mental health problems and low life satisfaction (Rentzsch & Gross, 2015). Even though the present data do not allow conclusions about a causal relationship between envy and well-being, the decline in subjective well-being that has been observed during the pandemic (Zacher & Rudolph, 2021) might be connected to the emergence of vaccine envy. Policies or interventions that aim at preserving well-being and mental health might thus also help reduce vaccine envy.

While vaccine envy was a novel phenomenon that arose during the most severe public health crisis of the last decades, we believe that our results may not be restricted to the COVID-19 pandemic. Similar cases of widespread health-related envy might occur in the future, if there is a health emergency which is perceived as threatening by many people, and there is a shortage of a medicinal product (e.g., vaccines), which is perceived as highly desirable by many.

Strengths, limitations, and directions for future research

Strengths of the present research include the preregistration and the novel research questions. Moreover, we used two different indicators of vaccine envy (i.e., self-reported frequency within the last 2 weeks and state envy after the presentation of a hypothetical scenario).

However, there are some limitations worth mentioning. Whereas the age range of our sample was quite

broad with a mean age resembling that of the German population, women and highly educated participants were overrepresented. The study thus allows only limited conclusions about the prevalence of vaccine envy in the general population. Future research should validate our findings using representative samples, for instance, in countries where access to COVID-19 vaccines remains limited or in the context of future vaccination campaigns against COVID-19 or other infectious diseases.

Moreover, our study mostly relied on self-reports, which might have been subject to bias due to socially desirable responding. Even though a definition of vaccine envy was provided in the instructions, participants’ concepts of vaccine envy might have been influenced by media reports on vaccine envy, some of which focused more on a societal imbalance in the distribution of vaccines than on personal feelings of envy. Future research should thus include measures of vaccine envy that are less susceptible to bias, such as other reports or behavioural observations. Moreover, as the measures of vaccine envy used in the present study focused mainly on the experience of a painful feeling, future research might want to use measures that also include other aspects of envy such as aggression and improvement motivation (Lange et al., 2018).

Regarding the motivational effect of vaccine envy, it might be interesting to investigate whether the increase in vaccination willingness found in this study translates into tangible changes in people’s behaviour, such as procuring a timely vaccination appointment.

Conclusion

The present study presents initial empiric evidence of vaccine envy as an important phenomenon that occurred during the pandemic. We believe that our research advances the knowledge about envy during the COVID-19 pandemic and thus makes an important contribution to understanding the implications of the pandemic on emotions and well-being.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Supporting Information S1. Overview of selected measures.
Supporting Information S2. Additional tables and figures.
Table S2_1. Sample size and demographics.
Table S2_2. Further correlates and life outcomes of vaccine envy (unvaccinated participants, Time 1).
Figure S2_1. Frequency of vaccine envy in unvaccinated participants at Times 1 and 2.
Figure S2_2. Frequency of perceived vaccine envy in vaccinated participants at Times 1 and 2.
Supporting Information S3. Answers to open-ended question.

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