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The effect of moral appeals on influenza vaccination uptake and support for a vaccination mandate among health care workers

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ABSTRACT

Objective: Influenza vaccination uptake among health care workers (HCWs) protects patients and staff. Still, many health institutions' coverage rates are unsatisfactory. We aimed to test the effect of communicating moral appeals in increasing vaccination uptake in a real life setting.

Method: In three field experiments among HCWs, a moral appeal highlighting morally relevant consequences of influenza vaccination was manipulated. The outcome variables were vaccination intention right after exposure to the moral appeal (Study 1; N = 569 US and UK HCWs from various institutions) and vaccination uptake in subsequent weeks for those respondents who consented in sharing this data during the survey (Studies 2 and 3, respectively N = 121 and N = 770 Dutch hospital employees).

Results: Studies 1 and 3 showed that moral appeal enhanced vaccination intention and uptake (vaccination uptake increased by 11%), due to increased awareness that vaccination is a moral decision. In Study 2, moral appeal had no effect, probably because people with more outspoken vaccination attitudes had responded to the call to fill in the survey. Moreover, moral appeal increased support for an influenza vaccination mandate. Furthermore, the results suggest that moral appeal was especially effective among HCWs with no history of influenza vaccination.

Conclusion: These results indicate that moral appeal can be a useful tool for increasing both vaccination uptake and mandate support within health care institutions.

Credit author statement

Laetitia Mulder: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Project administration. Mariëtte Lokate: Methodology, Investigation, Resources.

1. Introduction

Each year, influenza infects millions of people around the world. Of those infected, 2–5 million become severely ill, and 250,000–500,000 die (Cohen and Casken, 2012). Thus, influenza-related hospitalizations pose a heavy burden on health care systems (Palekar et al., 2019). Vaccination helps greatly in countering the harmful effects of influenza. For example, during the 2017–2018 influenza season in the United States, influenza vaccinations prevented about 6.2 million infections, 91,000 hospitalizations, and 5700 deaths (Centers for Disease Control

and Prevention, 2017–2018). Not only does vaccination reduce the possibility of people becoming infected but also the extent to which the virus is able to spread and cause an epidemic.

For these reasons, scholars in medical philosophy argue that influenza vaccination is a moral obligation for health care workers (HCWs) in particular (Giubilini et al., 2018). For example, on an interpersonal level, it has been argued that nurses, when they refuse vaccination, are morally responsible for other people getting infected (Kearns, 2021) and that solidarity (protecting the weakest person) is a moral argument for vaccination among HCW's (Verweij, 2001). On a collective level, the moral arguments are the common interest in preventing an influenza outbreak (Verweij, 2001) and doing one's fair share in contributing to herd immunity (Giubilini et al., 2018). So, by vaccinating, HCWs prevent both patients and colleagues becoming infected, thereby helping to control the hazardous combination of high hospital intakes and large-scale personnel absenteeism.

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Nevertheless, in many health institutions, influenza vaccine uptake among personnel falls short. For example, in 2015, vaccination rates in European countries had a median value of 26% (European Centre for Disease Prevention and Control, 2017). Therefore, it is important to find ways of encouraging vaccination uptake among HCWs by making them aware of their moral obligation. One way to do this, is by means of moral appeals. Moral appeals may increase awareness of the moral aspects of the decision to opt for vaccination among HCWs, encouraging them to get vaccinated and increasing support to make vaccination mandatory within the health institution where they work. In this paper we investigate whether exposure to moral appeals can increase influenza vaccination uptake among HCWs and contribute to support for a vaccination mandate. We designed three field experiments in which HCWs encountered a moral appeal. Our results provide insights into how effective moral appeals can be in real-life settings, specifically in the context of influenza vaccination uptake.

2. Theoretical background

Several literature reviews have found that the reasons for the refusal to get vaccinated against influenza mostly lie in a lack of knowledge or in misperceptions about influenza or vaccination (Cohen and Casken, 2012; Nutman and Yoeli, 2016). In addition, there seems to be a lack of awareness of the social component of vaccination. For example, Meyer and Lum (2017), found that unvaccinated Canadians had an individualized perception of the importance of the influenza vaccination but lacked awareness of its social benefits.

Thus, although there are moral reasons to get the influenza vaccination, moral motives are not always prominent, even among HCWs. This raises the question of whether efforts should be made to increase awareness of the moral aspects of influenza vaccination among HCWs. In classical models of moral decision making (Jones, 1991; Rest, 1986), it is assumed that recognition of the moral components of an issue underlies moral behavior. For a person to behave in moral ways, they need to recognize that the behavior has moral aspects (Bazerman and Sezer, 2016). Moreover, attitudes about the issue more strongly impact behavior when they are rooted in moral considerations (Luttrell et al., 2021).

With regard to communicable diseases, there are reasons to believe that when there is awareness of the moral aspects of vaccination, moral motives *do* contribute to vaccination uptake. Although individual differences in moral values are not related to vaccine hesitancy (Amin et al., 2017; Betsch and Böhm, 2018), more specific moral norms predict vaccination uptake. For example, perceived moral responsibility toward protecting patients' health has been associated with higher vaccination uptake among nurses in Hong Kong (Mo et al., 2019). Also, Oraby, Thampi, & Bauch (2014) argued that high vaccination rates cannot be fully explained by self-interested decision making and that incorporating moral norms into the models increases their ability to predict vaccination uptake. Indeed, Betsch et al. (2018) identified collective responsibility or willingness to protect others to be one of the five major antecedents for vaccination behavior. Also, people report a higher intention to vaccinate against HPV if the vaccination prevented HPV to be transmitted to others than when it did not (Vietri et al., 2012). In the context of influenza vaccination, Shim et al. (2012) found that altruism plays an important role in vaccination decisions which spurred them to suggest that altruism should be included as strategy to increase vaccination uptake.

The above discussion suggests that increasing the awareness of HCWs about the moral aspects of vaccination could result in increased rates of vaccination within this group. One straightforward method of raising this awareness is to communicate a moral appeal. Moral appeals have been defined in various ways, such as the invocation of moral obligations (Schmitt, 1964), reminding people of the moral implications of a specific behavior (Akeley Spear and Miller, 2012), or as messages that contain a moral argument (Dal Bó and Dal Bó, 2014). Moral appeals

can be duty-based in the sense that they refer to moral duties or values to behave in a certain way (e.g. "be a loyal employee") (Dal Bó and Dal Bó, 2014). Alternatively, they can also be more consequentialist in the sense that they communicate rational arguments for why a certain behavior is moral (namely by explaining the consequences of a behavior that bear moral relevance) (Bos et al., 2020; Dal Bó and Dal Bó, 2014; Luttrell et al., 2019).

The effects of moral appeals have been studied within various settings. Studies conducted in field settings have demonstrated that moral appeals help to reduce tax evasion (Bott et al., 2017) as well as to encourage energy conservation (Ito et al., 2018), compliance with COVID-19 restrictions (Bos et al., 2020), repayment of debts (Bursztyrn et al., 2019), and re-use of towels (Gössling et al., 2019). However, some studies found that moral appeals failed to induce individuals to pay for their TV licenses (Fellner et al., 2009), pay their taxes (Blumenthal and Christian, 2001; Torgler, 2004, 2013), make honor box payments (Schlüter and Volland, 2015), or discourage students from cheating (Tittle and Rowe, 1973). Some studies even suggest that moral appeals can have counterproductive effects as they may pose a psychological threat to individuals (Täuber et al., 2015). Recently it was found that, when unvaccinated people experience moral reproach (i.e. they expect vaccinated people to perceive them to be immoral), this predicted COVID vaccination refusal (Rosenfeld and Tomiyama, 2022). As moral appeals may unintentionally communicate moral reproach toward unvaccinated people, they could reduce intentions to vaccinate.

In sum, research on moral appeals applied within various domains has yielded mixed results. Therefore, moral appeal is not a self-evident tool that can be applied straightforwardly to steer people in a desired direction. In the context of vaccinations, there is some indirect indication that moral appeals may work. Heine and Wolters (2021) tested whether language expressing moral values in brochures about children's vaccination affected vaccination uptake. They found that certain types of morally-laden terminology increased vaccination uptake, while other types did not. Although these findings are insightful, it was not a direct test of the effects of a moral appeal because using terminology related to moral values may not necessarily entail an actual moral appeal. For example, the sentence "Vaccines are not allowed to be used until it is clear that the vaccine works and is safe" contains the word "safe" (terminology for the moral value of care) but aims to reduce fear for vaccination side effects rather than to appeal to parents to care for their children by vaccinating them. Vice versa, a moral appeal may not necessarily contain moral values terminology. For example, the sentence "This booster shot will prevent your child from infecting others" does not contain morally laden terminology, but it does contain a (consequentialist) moral argument to vaccinate.

Studies that have directly tested the effects of an actual moral appeal to vaccinate are scarce, and it's not up to recently that empirical research has started to focus on the effects of triggering moral motives (Cucciniello et al., 2021). The few studies that have been performed in this area (Betsch et al., 2013; Betsch et al., 2017; Cucciniello et al., 2021) indicated positive effects. For example, Betsch et al. (2013) found that the message communicating the social benefit "if you get vaccinated, you protect others who are not vaccinated" increased intentions to get vaccinated when vaccination costs were also low. Cucciniello et al. (2021) found that a message conveying how vaccination affects the wellbeing of vulnerable groups increased vaccination intentions in presence of a vulnerable other. Rieger (2020) found that a text explaining that vaccination against COVID-19 would reduce the risk for vulnerable people, increased young-people's intentions to get vaccinated.

However, to date, research has not tested the effect of moral appeals on actual vaccination behavior in a real-life setting. Most research has focused on self-reported vaccination intentions rather than actual behavior (Betsch et al., 2013, 2017; Rieger, 2020). Sometimes the context of a fictitious disease is used in which people are presented with information about a fictitious disease, such as its contagiousness,

symptoms, and the vaccine, after which they indicate their hypothetical choices (Betsch et al., 2013, 2017). Also, some used a laboratory setting in which participants play a “vaccination game” with monetary rewards resembling the pay-off structure of a real decision regarding vaccination uptake (Böhm et al., 2016; Cucciniello et al., 2021). Although such studies can provide useful insights into the motives and rational decision-making process behind vaccination, their findings may not apply automatically to vaccination-related decisions in real-life situations in which individuals need to decide whether to actually vaccinate or not for an existing disease. In such situations, they already have certain perceptions or emotions regarding the disease and vaccination, and may make decisions in less rational, and less socially desirable ways. Therefore, field experiments in actual vaccination settings are needed. These will also yield insights into the size of the effect in real-life situations where a multitude of variables influences vaccination and will provide valuable inputs for developing policies that aim to increase vaccination uptake.

Therefore, the present study aimed to test the extent to which a moral appeal increases influenza vaccination uptake among HWCs in a field setting. Given the finding of the positive effects of moral appeals in hypothetical vaccination contexts, we expected that moral appeals would increase influenza vaccination uptake. Furthermore, we investigated whether the effect of moral appeals could be explained by moral awareness (i.e., the extent to which individuals perceive vaccination to be a moral decision). Accordingly, we developed the following hypotheses:

Hypothesis 1. Moral appeal increases influenza vaccination uptake.

Hypothesis 2. The effect of moral appeal on influenza vaccination uptake is mediated by moral awareness.

The type of moral appeal that we explored in our study was intended to inform participants of the moral aspects of influenza vaccination by explaining how vaccination helps reduce infecting others and prevent an epidemic from occurring. Thus, the message communicated was largely consequentialist in nature. Also, it refrained from using accusatory language directed at non-vaccinators and avoided the use of the word “moral”. In this way, we aimed to reduce the risk of prompting a perception of moral reproach or moral self-threat for those who had not vaccinated before.

The (morally relevant) consequences of (non)vaccination that we referred to in the appeal were drawn from two principles. The first relates to the inter-personal reasons stemming from medical philosophy for why vaccination is considered to be a moral issue, namely the “do no harm” or “care” principle. This is a foundational principle for health care (Smith, 2005) and, more broadly, for morality (Graham and Haidt, 2011; Zakharin and Bates, 2021). The second principle relates to collective reasons to vaccinate, namely collective benefit. This is premised on the idea that vaccination requires mutual cooperation (i.e., vaccination) to achieve the best outcomes for the entire collective (i.e., preventing the occurrence of an epidemic) (Attari et al., 2014; Böhm et al., 2016; Oraby et al., 2014). In Study 1, we explored the effects of these two types of moral appeal separately.

Furthermore, we tested the influence of moral appeals on support for an influenza vaccination mandate. In the context of the current COVID-19 crisis, but also before its onset, there have been calls for mandatory vaccination within health institutions. Several such institutions already engage in mandatory influenza vaccinations, and there is ample evidence that this policy increases vaccination rates (Pitts et al., 2014). Nevertheless, policy makers are often hesitant to mandate influenza vaccinations, as they fear resistance and counterproductive effects. Moral appeals may reduce such negative reactions if they succeed in raising awareness of the moral aspects of vaccination. As such, moral appeals may help to increase support for vaccination mandates among HWCs. Therefore, we formulated the following hypothesis:

Hypothesis 3. Moral appeal increases support for an influenza

vaccination mandate.

To test our hypotheses, we performed three studies among HWCs in which we manipulated their exposure to a moral appeal and tested HWCs’ subsequent vaccination intention (Study 1) or actual vaccination (Studies 2 and 3). All studies aimed to test Hypotheses 1 and 2. Studies 2 and 3 also aimed to test Hypothesis 3. The data for all of the studies and the supplementary material are publicly available at https://osf.io/qyw5b/?view_only=b2d24aa0debb45228db45f48a8d016bb. In all studies, respondents were required to answer all focal measures, so there were no missing values. In each study, there was a small percentage of respondents (<5%) who quit the survey before the focal measures were filled in and can be assumed to be not missing at random. We considered these low percentages as unproblematic and refrained from using imputation methods (Scheffer, 2002).

3. Study 1

Practical circumstances in Study 1 prevented us from manipulating moral appeals *before* influenza vaccines were administered, which made it impossible to consider actual vaccination behavior as an outcome variable. Therefore, vaccination intention was the outcome variable and we measured whether respondents had received the influenza vaccination for that season.

4. Method

4.1. Participants and study design

In November 2018, we recruited individuals who worked in health care through two online platforms: Amazon Mechanical Turk ($n = 260$, using the filter “employment industry: health care”) and Academic Prolific ($n = 309$, using the filter “industry: health care and social assistance”). The total of 569 participants (127 male; $M_{age} = 36.7$, $SD_{age} = 10.49$; 315 US citizens, 205 UK citizens, 47 from other countries; 190 nurses, 52 doctors, 131 allied health professionals, 196 “other”) gave us a power of 0.56 and 1.00 for detecting a small effect ($f = 0.10$) and medium effect ($f = 0.25$) respectively, F-test for omnibus ANOVA, $\alpha = 0.05$, two-tailed. Of the respondents, 333 had already received an influenza vaccination that season and 236 had not. Respondents were randomly assigned to either the no moral appeal (no MA), “do no harm” moral appeal (MA-DNH), or “collective benefit” moral appeal (MA-CB) condition.

4.1.1. Procedure

First, respondents were asked questions about their demographic characteristics and beliefs regarding influenza vaccination. One of these questions was whether or not they had received the influenza vaccination that season. Moral appeal was then manipulated, and influenza vaccination intention and moral awareness were subsequently measured along with some exploratory measures (importance of vaccination for the professional group, personal norms about vaccination, inclination to socially confront non-vaccinators, medical or religious reasons (not) to get vaccinated, and general attitudes about vaccination).

4.1.2. Manipulation

The moral appeal conditions provided respondents with a text explaining the effects of influenza vaccination (i.e. “By vaccinating against the flu health care professionals decrease the chance to get infected and to infect others.”). The MA-DNH condition highlighted that having the influenza vaccination contributed to patients’ safety, using arguments such as that vaccination reduced the possibility of infecting patients with influenza along with attendant risks of complications, a longer hospital intake, or death. The MA-CB condition highlighted that the influenza vaccination benefited the collective by presenting arguments that included the reduced possibility of infecting patients and other health care professionals, which leads to increased hospital intakes

and personnel absenteeism (see Supplementary material for complete texts). For the no moral appeal condition neither of these texts were shown to participants.

4.1.3. Measures

The question measuring vaccination intention varied according to respondents' vaccination status. Respondents who had not received the influenza vaccination for that season were asked: "Do you intend to get the flu vaccination this season?" Respondents who had already received the influenza vaccination for that season, were asked: "Do you intend to get the flu vaccination each year in future?" Responses were scored on a 4-point Likert scale (1 = *definitely not*, 2 = *probably not*, 3 = *probably yes*, 4 = *definitely yes*).

Moral awareness was measured using five items, starting with "Getting the flu vaccination ..." and continuing with (1) "... is something you do for others," (2) "... is something you do for the community or common good," (3) "... is in accordance with the norms of my professional group," (4) "... Is mainly a moral decision," and (5) "... is mainly a social decision." These items were answered using a 7-point Likert scale (1 = *completely disagree*, 7 = *completely agree*) and combined into one scale ($\alpha = 0.79$).

5. Results

A one-way ANOVA with contrasts was performed to test differences among the three conditions for vaccination intention. We did this separately for people who had not vaccinated that season and for those who had, due to the different vaccination intentions measures. This reduced the power for the non-vaccinated group ($n = 236$) to 0.26 and 0.94 for a small and medium effect respectively, and for the vaccinated group ($n = 333$) to 0.35 and 0.99 respectively. For non-vaccinated people, the overall effect was significant ($F[2, 211] = 4.81, p = .009, \eta^2 = 0.04$), and there was a significant contrast between the no moral appeal condition ($M = 1.99, LLCI = 1.75, HLCI = 2.22, SD = 1.00$) and both the MA-DNH condition ($M = 2.46, LLCI = 2.21, HLCI = 2.70, SD = 1.01, t[211] = 2.79, p = .006, d = 0.47$) and MA-CB condition ($M = 2.41, LLCI = 2.19, HLCI = 2.63, SD = 0.96, t[211] = 2.58, p = .01, d = 0.43$). For vaccinated people, the overall effect was not significant ($F[2, 291] = 0.33, p = .72, \eta^2 = 0.00$), without significant contrast effects (all p 's > 0.44). The results are plotted in Fig. 1. We also collapsed the two measures of vaccination intentions for both respondent groups into one DV to run an univariate ANOVA to test vaccination history as a moderator. This showed a moral appeal \times existing vaccination status interaction ($F[2, 502] = 4.30, p = .01, \eta^2 = 0.02$). Overall, the results of these analyses support Hypothesis 1 but only for those individuals who had not already been vaccinated.

Next, a one-way ANOVA with contrasts was performed for moral

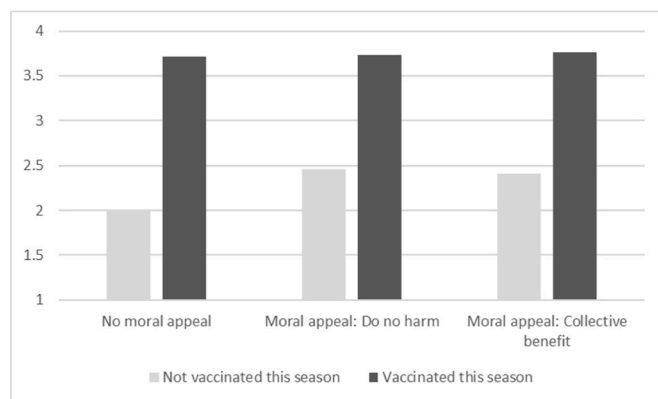


Fig. 1. Vaccination intentions as a function of moral appeal and existing vaccination status, Study 1.

awareness. This showed a significant overall effect ($F[2, 507] = 4.57, p = .01, \eta^2 = 0.02$) and two significant contrasts. Compared with the no moral appeal condition ($M = 4.85, LLCI = 4.66, HLCI = 5.04, SD = 1.24$), moral awareness was higher in the MA-DNH condition ($M = 5.18, LLCI = 5.03, HLCI = 5.33, SD = 1.00, t[505] = 2.80, p = .005, d = 0.29$) and in the MA-CB condition ($M = 5.13, LLCI = 4.98, HLCI = 5.29, SD = 1.02, t[505] = 2.37, p = .02, d = 0.25$). To assess how vaccination status influenced this effect, a 3 (MA conditions) \times 2 (existing vaccination status) univariate ANOVA was performed with moral awareness as dependent variable. This showed a main effect of moral appeal ($F[2, 502] = 7.28, p = .001, \eta^2 = 0.03$), a main effect of vaccination status ($F[1, 502] = 102.73, p < .001, \eta^2 = 0.17$), but a non-significant interaction ($F[2, 502] = 2.28, p = .10, \eta^2 = 0.01$).

Finally, we tested Hypothesis 2 about moral awareness mediating the effect of moral appeal on vaccination intention, using the PROCESS procedure version 3.4 (Hayes, 2018). As we had found that moral appeal only affected non-vaccinated respondents' vaccination intentions, we confined our mediation analysis to this group. Also, as the two different MA conditions were similar with regard to vaccination intention and moral awareness, we collapsed them into one moral appeal condition. The results showed that moral appeal predicted vaccination intention without moral awareness in the model ($\beta = 0.22, p = .002$) but this effect disappeared when moral awareness was included ($\beta = 0.08, p = .17$), with moral awareness predicting vaccination intentions ($\beta = 0.49, p < .0001$). The indirect effect of moral appeal on vaccination intentions through moral awareness was significant ($\beta = 0.14, LLCI = 0.0541, HLCI = 0.2278$). These findings support Hypothesis 2 that the effect of moral appeal on vaccination is mediated by moral awareness.

6. Discussion

The results of the first study suggest that a moral appeal can motivate HCWs to get the influenza vaccination. Reading text conveying a moral appeal increased awareness that the decision to have the influenza vaccination is a moral one. Moreover, those who had not felt the need to get vaccinated earlier were more inclined to get the influenza vaccination after reading the moral appeal. Those who had already received the influenza vaccination were not further motivated by a moral appeal, possibly because of a ceiling effect as they were already motivated to get the influenza vaccination.

It is noteworthy that, considering the timing of the survey, respondents were likely to have already been exposed to calls to get vaccinated and to have acted on those calls. Therefore, the finding that moral appeals increased the intentions of the non-vaccinated to get the influenza vaccination during the same season is important. It shows that individuals who are not intrinsically inclined to get vaccinated can be encouraged to do so through moral appeals. The type of moral appeal did not matter. Referring to interpersonal or collective consequences of vaccination, was equally effective. A limitation of this study is that it did not measure actual vaccination behavior. Our subsequent studies included data on actual vaccination behavior following exposure to a moral appeal.

6.1. Study 2

Next to testing Hypotheses 1 and 2, Study 2 also aimed to test Hypothesis 3, which posits that moral appeal increases support for vaccination mandates. Considering that a moral appeal can induce a perception of vaccination to be a moral choice among individuals, they are also likely to contribute to the idea that vaccination is an obligation for all health practitioners and that it is legitimate for authorities to enforce vaccination. Therefore, we also measured support for a vaccination mandate. As Study 1 showed that the effect of moral appeal depended on respondents' vaccination status, we continued to investigate the effect of moral appeal in combination with respondents' influenza vaccination histories.

As the two types of moral appeal in Study 1 yielded similar results, we only compared a no moral appeal condition with a moral appeal condition in which the interpersonal and collective consequences of vaccination were combined. We administered a survey in which we asked employees for their permission to access their vaccination data afterward.

7. Method

7.1. Participants, study design, and procedure

In the fall of 2019, approximately one week before the influenza vaccination was offered to employees, a survey was sent out to head nurses of a Dutch hospital with the request to distribute it among their colleagues. The invitation stated that the aim of the survey was to acquire insights into the reasons for (not) getting the influenza vaccination. A total of 539 respondents filled in the survey at least up to the focal measures (81% nurses, 88.5% women). There was an even distribution of respondents across different age categories (18–25 years: 16%; 26–35 years: 23%; 36–45 years: 21%; 46–55 years: 22%; 56–65 years: 16%; and >65 years: 1%). Respondents were randomly assigned to either the no moral appeal or the moral appeal condition. The procedure was similar to Study 1. At the end of the survey, we requested permission from the respondents to access their vaccination data afterward, which was granted by 201 respondents (38.7%).

7.1.1. Manipulation and measures

The moral appeal manipulation was similar to Study 1, with the arguments used in the two MA conditions in Study 1 combined, some of the wording differing slightly (see Supplementary material for the complete text). Respondents who gave permission to access their vaccination data provided their names and personnel numbers. These details were matched with the vaccination data two months later, adding the variable “vaccinated” (0 = no, 1 = yes) to the dataset. Confidentiality was guaranteed by the fact that (1) the matching was done by a researcher outside of the hospital and (2) after being matched, personal data were removed from the dataset.

The measure of moral awareness was similar to Study 1. Support for an influenza vaccination mandate was measured with two questions, starting with “To what extent are you in favor or against ...” followed by (1) “... making the flu shot mandatory for health care staff nationwide?” and (2) “... the hospital making the flu shot mandatory for its health care staff?” These items were answered using a 7-point Likert scale (1 = *strongly against*, 7 = *strongly in favor*) and combined into one measure ($\alpha = 0.98$).

Despite our main interest in actual vaccination, we also measured intentions to vaccinate with the question “In the period November 18–29 you can get the flu vaccination at the [name hospital]. Will you get the flu vaccination during this period?”.

We measured their vaccination history with the item, “In previous years, did you receive the flu vaccination?” Responses were obtained using a 5-point scale (1 = *no, never*, 2 = *mostly not*, 3 = *sometimes yes, sometimes not*, 4 = *most of the time*, 5 = *yes, always*). We also asked respondents if they had already got vaccinated that season. As it only made sense to assess the vaccination choices of individuals who had not already received the influenza vaccination for that season, respondents who answered “yes” were excluded when testing the effect of moral appeal on vaccination.

8. Results

Of the 201 respondents who gave us permission to access their vaccination data, 80 were already vaccinated. Therefore, the effect of moral appeal on vaccination was assessed for the remaining 121 respondents. This gave us a power of .20 or 0.91 for detecting a small effect ($w = 0.10$) or medium effect ($w = 0.30$) respectively, χ^2 goodness-

of-fit test, $\alpha = 0.05$, two-tailed. We standardized vaccination histories, centralized the condition variable, calculated the interaction term between them, and entered these terms in a logistic regression to predict vaccination behavior. This step rendered a positive main effect of vaccination history ($B = 1.34$, $\text{Exp}(B) = 3.82$, $LLCI = 2.38$, $HLCI = 6.13$, $p < .001$). The percentage of vaccinated respondents did not differ between the moral appeal condition (75%) and the no moral appeal condition (78%, $B = -0.09$, $\text{Exp}(B) = 0.91$, $LLCI = 0.59$, $HLCI = 1.41$, $p = .68$). Therefore, [Hypothesis 1](#) was not supported. Also, the interaction term was not significant ($B = 0.01$, $\text{Exp}(B) = 1.02$, $LLCI = 0.63$, $HLCI = 1.64$, $p = .94$).

A similar (but OLS) regression was performed on vaccination intention. Although vaccination intentions were on average higher in the moral appeal condition ($M = 2.62$, $SD = 1.21$) than in the no moral appeal condition ($M = 2.49$, $SD = 1.24$), this effect was not significant, $B = 0.05$, $LLCI = -0.28$, $HLCI = 0.13$, $p = .20$, $f^2 = 0.002$. Again, there was a main effect of vaccination history ($B = 0.85$, $LLCI = 0.77$, $HLCI = 0.93$, $p < .001$, $f^2 = 0.88$), but no interaction ($B = 0.02$, $LLCI = -0.07$, $HLCI = 0.10$, $p = .71$, $f^2 = 0.0001$).

Next, we performed a similar regression for moral awareness. Despite a higher level of moral awareness in the moral appeal condition ($M = 4.66$, $SD = 1.38$) than in the no moral appeal condition ($M = 4.45$, $SD = 1.27$), the main effect of moral appeal did not reach the conventional level of statistical significance ($B = 0.09$, $LLCI = -0.01$, $HLCI = 0.19$, $p = .08$, $f^2 = 0.005$). There was a significant positive main effect of vaccination history ($B = 0.62$, $LLCI = 0.52$, $HLCI = 0.71$, $p < .001$, $f^2 = 0.28$) and no interaction ($B = 0.07$, $LLCI = -0.03$, $HLCI = 0.17$, $p = .18$, $f^2 = 0.003$). Due to the lack of an effect of moral appeal on vaccination uptake, we did not test the mediating effect predicted in [Hypothesis 2](#).

We performed a similar regression for mandate support. A main effect of moral appeal was found ($B = 0.17$, $LLCI = 0.03$, $HLCI = 0.32$, $p = .02$, $f^2 = 0.007$). Supporting [Hypothesis 3](#), respondents exposed to moral appeal were more likely to support making influenza vaccination mandatory ($M = 3.26$, $SD = 2.15$) than those who were not ($M = 2.87$, $SD = 1.95$). There was also a positive significant main effect of vaccination history ($B = 1.02$, $LLCI = 0.88$, $HLCI = 1.17$, $p < .001$, $f^2 = 0.34$) but no interaction ($B = 0.04$, $LLCI = -0.11$, $HLCI = 0.18$, $p = .63$, $f^2 = 0.0003$).

9. Discussion

In Study 2, there was no effect of moral appeal on vaccination behavior, and the effect of moral appeal on moral awareness did not reach the conventional level of statistical significance. The failure of moral appeal could be attributed to several factors. First, the number of respondents available for testing the effect was low ($n = 121$), resulting in a low power to detect a small effect. Second, the sample in this study was more specific than that in the first study. In Study 1 individuals with different functions within health care participated, whereas in Study 2 mainly nurses participated. Possibly, nurses are a specific group that is less likely to be influenced by moral messages regarding vaccination. Third, a certain type of respondent may have been motivated to complete the survey in the first place. As the respondents were informed that the survey was about influenza vaccination, those with outspoken (negative or positive) opinions about this topic may have been especially motivated to participate. Outspoken negative opinions may make people less susceptible for a moral appeal, while people with outspoken positive opinions may already be convinced about the moral aspects of vaccination.

9.1. Study 3

Study 3 aimed for a larger and more diverse sample to re-test the effect of moral appeal on vaccination behavior and support for a vaccination mandate. At the same hospital of Study 2, we recruited respondents across all categories of employees in the fall of 2020. This was also the first year of the COVID-19 pandemic, but our study preceded the

launch of COVID-19 vaccinations. Because the hospital aimed to study HCWs experiences with COVID-19, the survey also included questions about this. The recruitment invitation only referred to the COVID-19 part of the survey. Therefore, invited employees were unaware that the (other) topic of the survey was influenza vaccination, making it unlikely to attract a disproportionate share of people with strong opinions about influenza vaccination.

10. Method

10.1. Survey participants, design, and procedure

In 2020, a week before the start of the influenza vaccination campaign, the hospital's weekly personnel newsletter included an invitation to complete an online survey about COVID-19. This prompted 1597 respondents (76% women) to complete the survey at least up to the focal measures (1,574). Respondents were fairly equally distributed across different age categories (18–25 years: 9%; 26–35 years: 21%; 36–45 years: 20%; 46–55 years: 24%; 56–65 years: 24%; >65 years: 2%). Thirteen percent described themselves as nurses, 9% as doctors, 19% as “health professionals with patient contact,” 11% as “health professionals without patient contact,” 18% as having an administrative or policy-related function, 14% as having a research-related function, 6% as operators in the areas of ICT or facility services, 3% as teaching staff, and 7% as “other”.

The procedure was similar to those in Studies 1 and 2. A total of 770 respondents (48%) gave their consent to access their vaccination data afterward, which gave us a power of 0.79 for detecting a small effect ($w = 0.10$) and a power of 1.00 for detecting a medium effect ($w = 0.30$), χ^2 goodness-of-fit test, $\alpha = 0.05$, two-tailed.

10.2. Manipulation and measures

The moral appeal manipulation was similar to that in Study 2 (see Supplementary material for complete text). All measures were similar to those in Study 2, except that one item of the moral awareness measure (“Getting the flu vaccination is something you do for the community or common good”) used in previous surveys was not included due to an oversight of the authors when shortening the survey. The reliability of the four remaining items was sufficient ($\alpha = 0.77$).

11. Results

None of the respondents had already been vaccinated for that season, so those who gave permission to share their vaccination data were all included in the analysis. Of these individuals, 67% in the moral appeal condition got vaccinated compared with 60% in the no moral appeal condition. Vaccinated behavior was regressed (in a logistics regression) on vaccination history (standardized), moral appeal (centered), and the interaction between them. Significant main effects were found for moral appeal ($B = 0.16$, $p = .04$, $\text{Exp}[B] = 1.18$, $LLCI = 1.001$, $HLCI = 1.38$) and for vaccination history ($B = 0.76$, $p < .001$, $\text{Exp}[B] = 2.14$, $LLCI = 1.81$, $HLCI = 2.51$). Thus, [Hypothesis 1](#) was supported. The interaction was not significant ($B = -0.11$, $p = .20$, $\text{Exp}[B] = 0.90$, $LLCI = 0.76$, $HLCI = 1.06$). Contrast analyses showed that the effect of moral appeal was only statistically significant among people who had seldom ($p = .04$, odds = 3.15) or sometimes ($p = .01$, odds = 4.01) received the influenza vaccination.

To test the effects of moral appeal and vaccination history on vaccination intentions, vaccination intentions were regressed on moral appeal (centralized), vaccination history (standardized), and the interaction term. This rendered a main effect of vaccination history ($B = 0.65$, $p < .001$, $LLCI = 0.61$, $HLCI = 0.68$, $f^2 = 0.72$), a main effect of moral appeal that did not reach the conventional level of statistical significance ($B = 0.03$, $LLCI = -0.004$, $HLCI = 0.08$, $p = .08$, $f^2 = 0.001$), and a significant interaction effect ($B = -0.04$, $LLCI = -0.08$, $HLCI =$

-0.001 , $p = .04$, $f^2 = 0.002$), indicating that the effect of moral appeal was stronger for people with a weaker vaccination history. The largest contrast effects were among people who had never ($d = 0.17$) or seldom ($d = 0.26$) received the influenza vaccination, albeit they did not reach the conventional level of statistical significance ($p = .06$ and $.10$, respectively).

A similar regression was performed on moral awareness as DV. The results indicated a main effect of moral appeal ($B = 0.10$, $LLCI = 0.04$, $HLCI = 0.13$, $p < .001$, $f^2 = 0.007$), a main effect of vaccination history ($B = 0.48$, $LLCI = 0.44$, $HLCI = 0.52$, $p < .001$, $f^2 = 0.30$), and an interaction between them ($B = -0.07$, $LLCI = -0.10$, $HLCI = -0.01$, $p = .01$, $f^2 = 0.003$) showing that moral appeal more strongly influenced moral awareness for respondents with a shorter influenza vaccination history. The differences between the two conditions for each level of vaccination history are plotted in [Fig. 2](#). Moral appeal significantly increased moral awareness for individuals who had never had the influenza vaccination ($t[510] = 3.37$, $p < .001$, Cohen's $d = 0.30$) and weakly (not reaching the conventional level of statistical significance) for those who had seldom received it ($t[152] = 1.73$, $p = .09$, Cohen's $d = 0.28$). For others, it had no effect (all p -values $> .30$).

As in Study 2, we tested [Hypothesis 2](#) with a PROCESS procedure. The results showed that moral appeal significantly predicted vaccination intention without moral awareness in the model ($B = 0.17$, $p = .02$). When moral awareness was included, moral appeal no longer predicted vaccination intention ($B = 0.21$, $p = .17$), whereas moral awareness did predict vaccination intention ($B = 0.52$, $p < .0001$). The indirect effect of moral appeal on vaccination intention was significant ($\beta = 0.08$, $LLCI = 0.0125$, $HLCI = 0.1692$), supporting [Hypothesis 2](#), which posited that the effect of moral appeal on vaccination behavior is mediated by moral awareness.

Next, we regressed mandate support on moral appeal and vaccination history. The result showed a main effect of moral appeal ($\beta = 0.07$, $LLCI = 0.02$, $HLCI = 0.11$, $p = .003$, $f^2 = 0.005$), thus supporting [Hypothesis 3](#). It also showed a main effect of vaccination history ($\beta = 0.43$, $LLCI = 0.39$, $HLCI = 0.47$, $p < .001$, $f^2 = 0.21$) and an interaction between moral appeal and vaccination history ($\beta = -0.05$, $LLCI = -0.10$, $HLCI = -0.003$, $p = .03$, $f^2 = 0.003$), depicted in [Fig. 3](#). Contrast analyses showed that only among those who had never been vaccinated, moral appeal affected mandate support ($t[511] = 3.76$, $p < .001$, Cohen's $d = 0.33$). For the others, moral appeal had no effect (all p -values $> .38$).

12. Discussion

Study 3 shows that a moral appeal can increase influenza vaccination uptake. This was irrespective of vaccination history, although a moral appeal did exert a stronger effect on vaccination intentions and moral awareness among those with a weaker vaccination history. Furthermore,

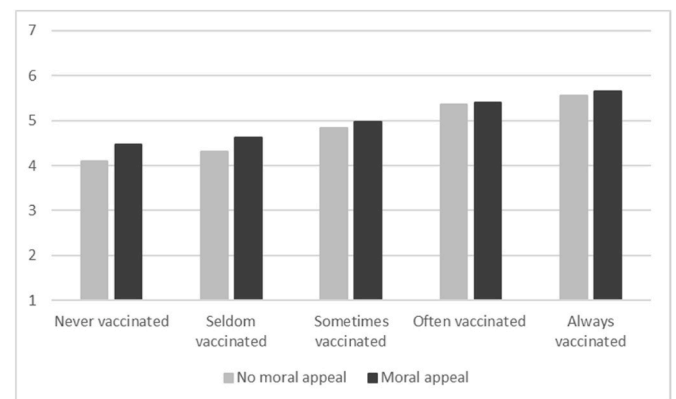


Fig. 2. Moral awareness as a function of vaccination history and moral appeal, Study 3.

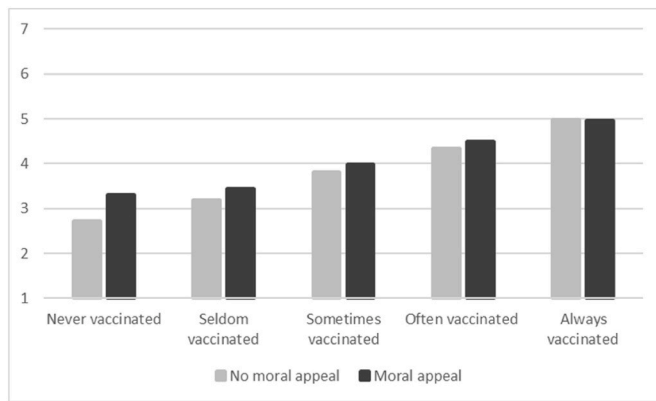


Fig. 3. Mandate support as a function of vaccination history and moral appeal, Study 3.

we again found that exposure to a moral appeal enhanced support for a vaccination mandate, particularly among those who had not previously been vaccinated.

13. General discussion

In this paper we set out to investigate the effect of communicating a moral appeal in a real life vaccination setting. Studies 1 and 3 suggest that a moral appeal can increase influenza vaccination. The effect sizes (e.g. effect sizes for moral awareness in Study 1 of a Cohen's d between 0.20 and 0.30; odds ratio for actual vaccination in Study 3 of 1.18) suggest that the overall effect is small and perhaps even irrelevant. Nevertheless, in Study 3, it practically meant that moral appeal exposure increased vaccination uptake from 60% to 67% (an increase of 11%), which may be regarded as a meaningful increase. Moreover, albeit the overall effects of moral appeal may seem of little relevance, the effects for people with low vaccination histories, were relevant (e.g., Study 1 Cohen's d 's between 0.40 and 0.50 for intentions and Study 3 odds ratios around 3–4 for vaccination uptake among people who had seldom/sometimes vaccinated). Also, the size of the effect could be an underestimation of the effects that could be attained when moral appeals are conveyed more elaborately. In our study, we presented the moral appeal only once, but one could also communicate it repeatedly in multiple contexts (e.g., also in personal communications of managers, information brochures, etc.) which will be more effective than a single communication. Nevertheless, considering the relative small effect found, if substantial increases in vaccination uptake are required, policy makers should not rely solely on moral appeals. Instead, they should combine them with other interventions, such as providing information about the safety of vaccination or removing practical barriers.

In Study 2, moral appeal exerted no effect. Although this may have been partly due to low power to detect a small effect in Study 2, it could also have resulted from the sample type. The sample differed from that in Study 3 in three main ways. First, it consisted mainly of nurses. To assess whether the failure of moral appeal in Study 2 had something to do with this, we tested whether moral appeal in Study 3 was less effective for nurses. It was not. On the contrary, moral appeal increased vaccination uptake among nurses (from 65% to 84%, $\chi^2 [1] = 3.91, p = .048$), more strongly than among other employees (from 60% to 65%, ($\chi^2 [1] = 1.62, p = .21$)). Second, Study 2 was conducted before the COVID-19 pandemic began, which possibly made respondents in Study 2 less aware of the social aspects of a pandemic, and hence, less receptive to moral appeals. However, the results of Study 1, also conducted before the pandemic, also found a positive effect of moral appeal. This contradicts the explanation that the Study 3 results were driven by changed attitudes about vaccination due to the COVID-19 pandemic. Third, recruitment for Study 2 explicitly mentioned influenza vaccination, possibly

attracting a disproportionate sample of employees with outspoken opinions than in Study 3 (where the recruitment message did not mention influenza vaccination as study topic). Employees with an outspoken opinion (either negative or positive) may be less affected by moral appeals, explaining the failure of the moral appeal in Study 2. Indeed, with regard to outspoken positive opinions, it is striking that the overall vaccination uptake was higher in Study 2 (76.6%) than in Study 3 (63.3%). Hence, many people in Study 2 may already be inclined to vaccinate and could not be motivated any further than they already were. With regard to outspoken negative opinions, additional analyses showed that conspiracy beliefs were stronger among respondents in Study 2 ($M = 2.69, SD = 1.23$) than among respondents in Study 3 ($M = 2.30, SD = 1.08$), $t(2075) = 7.08, p < .001$. This makes it plausible that the findings in Study 2 are due to the sample composition, with a relatively large number of HCWs who had outspoken opinions about vaccines to begin with.

Our studies contribute to the literature on moral appeals in that they advance the understanding of whether and to what extent moral appeals increase vaccination uptake in a real life setting. They also contribute to the understanding of how they do so. The results indicate an increase in moral awareness due to moral appeals, which subsequently resulted in an increased vaccination intention (Study 1) or behavior (Study 3). So moral appeals work through increasing the awareness that vaccination is morally desirable. Nevertheless, we cannot rule out that processes other than moral awareness may help to explain the effect of moral appeal. For example, moral appeal could contribute to social norms (Cucciniello et al., 2021). Future studies may shed light on this issue.

Another important finding was that moral appeals increase support for a vaccination mandate. This implies that rationales that include moral arguments should be used to legitimize such mandates when they are introduced. When individuals are convinced that mandates are introduced for ethical reasons, they are more likely to accept them and comply with them. In addition, our results suggest that such rationales are even more important for respondents without an influenza vaccination history.

13.1. Limitations

This study had some limitations. First, the results of the three studies are not entirely consistent. The failure of moral appeals in Study 2 has already been discussed, but the results also differed in whether the effects of moral appeal were moderated by vaccination history. This was often the case, but not for all variables or in all three studies. The inconsistent effects of vaccination history might be due to ceiling effects: in some cases, people who have vaccinated before may be encouraged even more to vaccinate by a moral appeal, and in some cases this is simply not needed anymore. In any case, insofar as the effect of moral appeal depends on someone's vaccination history, it has more positive effects among HWCs who do not have a history of prior influenza vaccination (despite the prevalence of vaccine conspiracy beliefs within this group: see supplementary materials). This finding is encouraging, as persuading non-vaccinators is critically important.

We used a specific type of moral appeal in our studies. The word "moral" was avoided, as well as the argument that not being vaccinated was immoral. This was done in order to prevent potential rebound effects. When moral appeals are interpreted as moral accusations towards those whose behavior is counter-normative, they may be experienced as psychologically threatening to these individuals, prompting defensive reactions rather than behavioral changes (Täuber et al., 2015). Therefore, our message merely conveyed to respondents the morally relevant consequences of vaccination, one being interpersonal (preventing others to become infected) and the other collective (preventing an epidemic to occur). As such, the argument was not explicitly judgmental of those who did not get vaccinated. Whether or not other types of moral appeal that are more explicit or duty-based exert similar or opposite effects on vaccination behavior is a topic of further research. With regard to the

type of consequences used in our moral appeal, Study 1 suggests that focusing on interpersonal or collective consequences is equally effective. Maybe this was because the appeal describing collective consequences also included some level of description of interpersonal consequences (the argument of vaccination reducing contagion was needed to describe how it prevented an epidemic to occur). More research in another domain than vaccination could disentangle these two consequences and shed more light on the effectiveness of each of them.

14. Conclusion

From the experimental field studies reported in this paper, we draw several conclusions. First, communicating a moral appeal that focuses on the morally relevant consequences of influenza vaccination can increase influenza vaccination uptake by making HWCs aware of the moral aspects of influenza vaccination. Second, a moral appeal provides support for the introduction of an influenza vaccination mandate. Third, the positive effect of moral appeals is particularly strong among individuals without a previous history of influenza vaccination. Together, these results contribute to an understanding of the effects of moral appeals, especially in relation to vaccination in real-life settings.

Declaration of competing interest

We have no competing interests to declare.

Data availability

We have shared our data in OSF, and the link is shared in the paper

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2022.115357>.

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