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Anirudh Tagat  
Hansika Kapoor

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# THANK YOU FOR GETTING VACCINATED!

Moral Emotions, Role Models,  
and Trust Predict Vaccine  
Uptake in India

# **Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India**

**Anirudh Tagat**

Department of Economics, Monk Prayogshala, Mumbai, India

**Hansika Kapoor**

Department of Psychology, Monk Prayogshala, Mumbai, India

Neag School of Education, University of Connecticut, Storrs, USA

Address correspondence to Hansika Kapoor at [hk@monkprayogshala.in](mailto:hk@monkprayogshala.in)

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## **Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India**

### **Abstract**

*Rationale:* India experienced a deadly second wave of COVID-19 infections starting May 2021. As of December 2021, only 56% of the adult population was fully vaccinated against COVID-19, with substantial heterogeneity across states. Given the emergence of a new variant as well as ongoing efforts to boost vaccination rates, an examination of the behavioural factors associated with low vaccine uptake is warranted.

*Objectives:* This paper aimed to study the determinants of the willingness to get vaccinated in India and examine the relationship between engagement in preventive behaviours and vaccine uptake.

*Methods:* A large-scale online survey covering aspects of preventive behaviours related to COVID-19, vaccination status, other COVID-19-related behaviours, moral emotions, trust in others, role models, and socio-demographic characteristics was used. A total of  $N = 953$  Indian residents participated in the survey between May and June 2021, of which  $N = 770$  contained valid data on vaccination status.

*Results:* Past preventive health behaviors such as avoiding social gatherings, higher interpersonal trust, and moral emotions, like gratitude and contempt, robustly predicted the willingness to take a COVID-19 vaccine, in both vaccinated (at least one dose) and unvaccinated samples. Results also showed that those who were not vaccinated were less likely to adhere to other preventive health behaviors, such as wearing a mask; past COVID-19 infection status was associated with similar lower adherence to preventive health behaviors.

*Conclusions:* Given the strong associations between positive moral emotions, like gratitude, and vaccine uptake (especially in the unvaccinated subsample), targeted communication interventions can be developed to boost uptake in jurisdictions with low vaccination rates..

*Keywords:* COVID-19, moral emotions, preventive health behaviors, social norms, vaccine hesitancy

## **Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India**

### **1. Introduction**

India has been centre stage of the global fight against the COVID-19 pandemic, with more than 34 million cases and more than 0.47 million deaths as of December 2021. There is also growing concern over emergence of newer mutations and variants of the virus. The pandemic in India triggered a humanitarian crisis among its vulnerable groups such as the poor, migrant workers, and marginalized sections. Having recently suffered through a deadly second wave of cases, and an emerging new variant, the Government of India stepped up vaccination efforts since the second wave (March-June 2021). By October 21 2021, more than 1 billion vaccine doses were administered in India, with recent government data indicating that more than 50% of the eligible population had received at least one dose. However, the fraction of fully vaccinated people (34% as of December 2021) is far behind that of other countries that face a similar burden of COVID-19 cases (Ritchie et al., 2020).

In order to prevent catastrophic effects of a potential third wave related to concerns of a new variant, health experts have argued for the need to extensively scale up vaccination coverage, particularly among densely packed urban populations (Mandal et al., 2020; Pandey et al., 2021). Prior to May 2021, vaccine availability was a significant challenge for achieving this ambitious goal, but since then several new vaccines have received approval in India and have been made available to the adult population. However, attitudes and perceptions related to vaccines, as well as their acceptability have remained uncertain since India's first phase of vaccinations began with frontline workers and doctors in January 2021.

Prior work suggests that preventive health behaviors (PHBs), such as willingness to take the vaccine, not only varies by socio-cultural context (Al-Sanafi & Sallam, 2021), but also by several behavioural (Tagat et al., 2021) and emotional factors (Kapoor & Tagat, 2021). For example, conspiratorial beliefs around COVID-19 and political ideology are associated with COVID-19 risk perception among Indians (Puthillam & Kapoor, 2021), which can thereby impact adherence to preventive behaviours, such as vaccination. COVID-19 behavioral research with Indian samples has also investigated the role played by moral emotions (Ticku et al., 2021) - emotions that are associated with broader societal concerns and whether/how individuals will uphold such moral standards (Haidt, 2003; Tangney et al., 2007). For instance, negative moral emotions (such as contempt towards others or shame towards oneself) for not adhering to PHBs like wearing a mask was associated with measures like social distancing.

In addition, there have been various international studies that look at attitudes and perceptions towards the novel coronavirus (COVID-19), focusing on disease threat, preventive health behaviours, and at-risk populations (e.g., Bavel et al., 2020; Roy et al., 2020; Vacondio et al., 2021). Such studies focus on outcomes such as perceived disease threat and how it might affect future behaviours (particularly preventive behaviours; see for example, Shook et al., 2020). As international scientific efforts progress in developing and delivering effective vaccines to provide immunity against COVID-19, it becomes important to examine the various factors associated with willingness and/or intention to take a COVID-19 vaccine when available. In countries like India, where cultural heterogeneity is along various dimensions, it becomes important to understand underlying attitudes related to the COVID-19 vaccine in order to better frame messaging and communication interventions to encourage vaccine uptake (see also Tagat et al., 2021; Ticku et al., 2021).

### Vaccine Hesitancy in India

There has been relatively little work done on exploring the factors associated with vaccine hesitancy among adults and the COVID-19 vaccine in India. Vaccination rates among the population are not solely a function of demand-side factors, but are also associated with the existing infrastructure to produce and deliver vaccine doses in a timely and efficient manner (Pandey et al., 2021). Although there were already a very high number of vaccination sites administering the COVID-19 vaccine to eligible populations, work by Chowdhury et al. (2021) showed major gaps in vaccine uptake across Indian states. Using large-scale surveys conducted via Facebook, they found that 45% of the eligible national population was willing to get vaccinated. There were wide variations in this figure across states, with Punjab (59% willing) and Tamil Nadu (58% willing) reporting the highest vaccine hesitancy, and Kerala (80%) and Chhattisgarh (77%) reporting lowest levels of vaccine hesitancy. They also found that vaccine hesitancy was negatively correlated with vaccine coverage in the general population as well as specifically with vaccine coverage of health care workers.

There has also been ongoing work in vaccine hesitancy in more concentrated settings. Danabal et al. (2021) used community surveys in urban and rural Tamil Nadu and found that vaccine hesitancy was at 40.7%. Importantly, they found that older, more educated individuals were more likely to trust the COVID-19 vaccines, whereas younger people, women, and those residing in rural areas were more likely to favour natural immunity and/or mistrust the vaccine. Larger-scale national surveys (e.g., Bansal et al., 2021; Umakanthan et al., 2021) have found that more wealthier individuals (higher income, residents of urban housing communities, able to maintain social distancing, among others) were in general more favourable toward taking the vaccine in India. Common concerns around the vaccine were similar to the findings from Danabal

et al. (2021), mostly related to adverse side effects. Additionally, Bansal et al. (2021) found that having friends or family who were also vaccinated was strongly associated with vaccine preference.

### **Vaccine Attitudes, Knowledge, and Perceptions**

Prior work on vaccine attitudes in India has focused largely on child vaccination, and a review of adult vaccinations (Dash et al., 2020) finds that low coverage is a concern when it comes to vaccine-preventable diseases. This is particularly the case among medical and paramedical students (i.e., doctors or healthcare workers in training). For example, work by Madhivanan et al. (2009) used focus group discussions to show high acceptability of the human papillomavirus (HPV) vaccine among female medical students in the southern city of Mysore. Another study using students as participants found that having a background in biological sciences was associated positively with willingness to take a vaccine (Rashid et al., 2016).

There is, however, extensive work on applications of various health behaviour models to understanding attitudes and perceptions toward vaccines in general. In a systematic review, Herzog et al. (2013) found that higher awareness among healthcare workers was associated with greater willingness to get vaccinated, whereas more concerns around side effects was associated with a lower willingness to take a vaccine. When it comes to childhood vaccination, such as MMR, review studies (e.g., Brown et al., 2010) indicated that parents that decline vaccines trust media and other sources of information more than hospitals, medical professionals, and the government and also have lower perceived disease threat.

### **The Present Study**

Against the background of existing scholarship on COVID-19 vaccine hesitancy and attitudes, knowledge, and perceptions toward vaccines, this study proposes to examine the



attitudes, behaviours and perceptions related to COVID-19 vaccines using online survey data.

The broad questions guiding this investigation are:

RQ1: What are the determinants of willingness to get vaccinated in India?

RQ2: What is the association between COVID-19 infection/vaccination status and preventive health behaviors?

Findings from this study can help develop targeted communication and health campaigns for the unvaccinated or partially vaccinated in India that are specific to behavioural factors such as moral emotions, role models, and trust.

## Method

### Participants

Data were collected via multiple site-entry methods (Reips, 2002) using an online survey (see Appendix A for questionnaire). Participants could choose to take the survey in either Hindi or English. A total of  $N = 1004$  participated in the study between 28 May and 22 September 2021. A majority of the participants ( $N = 953$ ) participated in the months of May and June, 2021. Of these, data for 770 participants were available on current vaccination status (the chief outcome variable), which forms the sample used for analysis. The study was approved by the Institutional Review Board at Monk Prayogshala (#058-021).

### Measures

#### *COVID-19-related Information*

Participants responded to a series of questions related to COVID-19-related preventive behaviours and outcomes. This included whether participants were ever infected by COVID-19, whether they were ever tested, and if they had received at least one dose of *any* COVID-19 vaccine. On a 10-point scale (0 = *Does not apply at all* to 10 = *Applies very much*), participants provided information on engagement in preventive health behaviours in the past month, including staying at home, avoiding social gatherings, maintaining physical distance with those outside of family, mask-wearing when outdoors, washing hands regularly, and wearing masks around strangers (Fetzer et al., 2020). Participants also responded to a similar scale (0 = *not at all* to 10 = *completely*) on preventive behaviours but in the context of having been vaccinated (for example, if you get vaccinated, how likely are you to... stay at home).

### **COVID-19 Vaccine**

Participants were also asked to rate on a 10-point scale how likely they were to take *any* COVID-19 vaccine (0 = *not at all* to 10 = *extremely*). Then, they provided information on how concerned they were about the serious side effects of vaccines as well as the ingredients in the vaccine, on a 10-point scale (0 = *not at all concerned* to 10 = *extremely concerned*).

### **Role Models**

Participants also responded to the following yes/no question: “If/When X gets vaccinated, only then will I choose to get the vaccine (*select all that apply*),” on a series of stakeholders (X) classified either as *horizontal* or *hierarchical*. Horizontal or immediate role models were those that were in the personal social network of the respondents (immediate family members, neighbours, friends of a similar age, relatives, or co-workers), whereas hierarchical role models were classified as those that were assigned some duties or roles by society, and were perceived to wield power over decisions (family doctors, healthcare workers they knew and trust, boss/work supervisor, the Prime Minister, or the Health Minister). The total number of role models required to convince

participants to get vaccinated was computed, and two variables were derived, representing the ratio of horizontal and hierarchical role models to total role models, respectively.

### ***Trust***

This comprised items along a 10-point scale (0 = *don't trust at all* to 10 = *completely trust*), asking how much participants trusted the following sources: family members, neighbours, people they knew personally, people they interact with on social media, scientists, the medical community (doctors, healthcare workers, nurses), hospitals, and politicians.

### ***Moral Emotions Scale***

These questions are based on the Moral Foundations Theory (Graham et al., 2013) and the EAST framework for designing effective behaviour change strategies by the Behavioural Insights Team, UK (Lunn et al., 2020). Participants responded to a series of questions related to positive and negative moral emotions associated with taking the COVID-19 vaccine. On a scale of 0 = *not at all* to 10 = *extremely*, participants rated the extent to which they felt the following emotions regarding the COVID-19 vaccine. The negative moral emotions were contempt, anger, disgust, shame, embarrassment, and guilt. A sample item was "Contempt towards others who don't get vaccinated." Positive moral emotions included gratitude, awe, compassion, and pride. A sample item was "Compassion towards others who get vaccinated." Moral emotions were included based on preliminary findings indicating that they are reliable predictors of preventive health behaviors in the Indian context (see also Ticku et al., 2021). Separate composite measures were constructed using the positive and negative moral emotions statements, as a total of the individual items. Both measures displayed high internal consistency and reliability ( $\alpha_{\text{positive}} = 0.91$ ;  $\alpha_{\text{negative}} = 0.93$ ).

### ***Socio-demographic Characteristics***

At the end of the survey, respondents provided details on a range of individual and household characteristics. These include their sex, age, educational qualification, occupation, religion, caste, and annual household income.

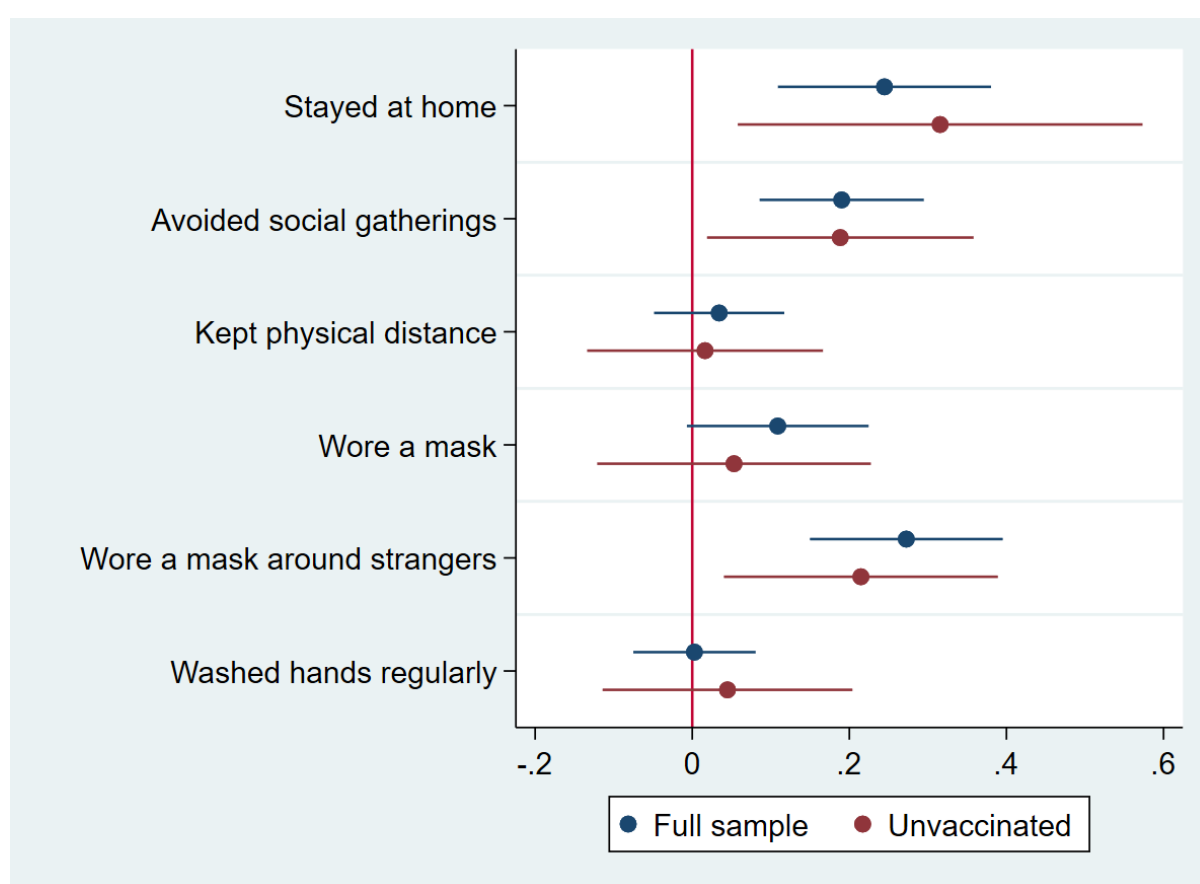
### **Analysis**

Three separate models were derived to empirically investigate RQ1, where the dependent variable is willingness to take the vaccine, and the independent variables in Model 1 were preventive behaviours, in Model 2 were role models as well as trust in various stakeholders, and Model 3 addressed positive and negative moral emotions. Each model was also run separately for the unvaccinated and full (partially or fully vaccinated and unvaccinated) sample. To address RQ2, additional regression models were run where the extent to which participants engaged in preventive health behaviours in the past month was the dependent variable. The key independent variable of interest was whether or not individuals had received at least one dose of *any* COVID-19 vaccine at the time of the survey. All regressions were run using ordinary least squares in Stata 16.2, using robust standard errors and smoothed daily vaccinations and cases per million as on the date the respondent participated in the survey. Results are presented in the form of coefficient plots of key explanatory variables.

### **Results**

With respect to RQ1, engaging in preventive health behaviours was broadly associated with greater willingness to take a vaccine, in both the full ( $N = 662$ ) as well as unvaccinated sample ( $N = 250$ ). The results are presented in the coefficient plot in Figure 1. A unit increase in respondents staying at home (on the 10-point scale) was associated with a 0.3 percentage point increase ( $p < 0.05$ ) in the willingness to take the vaccine among the unvaccinated sample. Similarly,

avoiding social gatherings in the past one month was associated with greater vaccine uptake intent ( $B_{\text{unvaccinated}} = 0.19, p < 0.05$ ). Wearing a mask when interacting with strangers was also positively associated with willingness to take the vaccine, with a unit increase in the scale corresponding to 0.21 percentage point increase in willingness to take the vaccine ( $p < 0.05$ ). The results in the full sample are similar to that of the unvaccinated sample, except that they are significant at the 1% level.



**Figure 1: Preventive health behaviours and vaccine uptake**

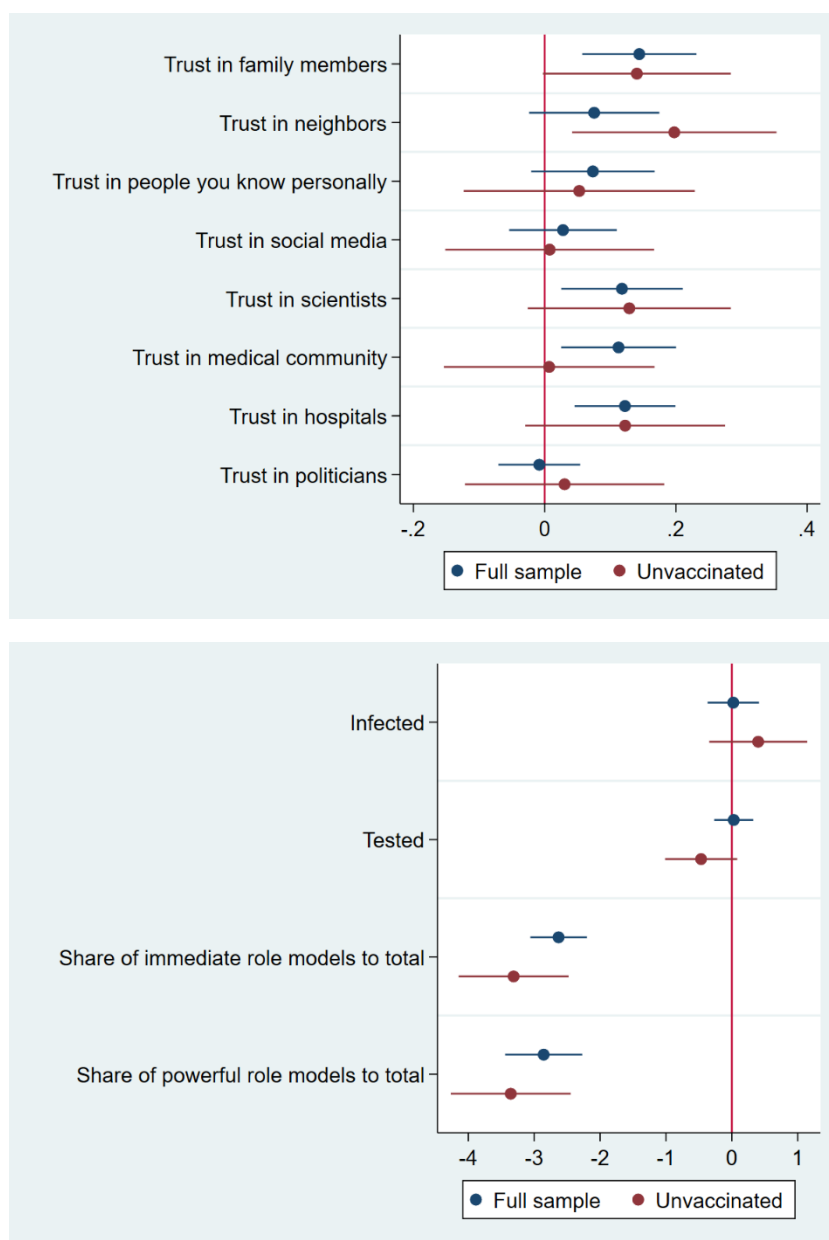
*Note:* Plot depicts point estimates of coefficients and 95% confidence intervals from two ordinary least squares regressions of vaccine uptake on preventive behaviours, moral emotions, trust, and other factors. Both regression specifications contain additional covariates on age (in years), sex, occupation, educational qualification, income group, caste grouping, religion, whether previously infected, whether previously tested, natural log of daily vaccinations per million persons, and natural log of new cases per million persons on the day of survey response.

Figure 2 contains the results of the regression of vaccine uptake on role models and trust. In general, reliance on role models (or requiring others to have taken the vaccine in order for respondents to get vaccinated) was negatively associated with willingness to take the vaccine. In the unvaccinated sample, an increase in the fraction of immediate role models to all role models was associated with a 3.3 point decrease in the willingness to get vaccinated ( $p < 0.01$ ), whereas the corresponding coefficient for hierarchical role models was slightly larger at 3.35 ( $p < 0.01$ ). These coefficients and significance also appear in the full sample, albeit with slightly smaller negative coefficients.

In terms of interpersonal trust, the results find that trust in family members ( $B = 0.144$ ,  $p < 0.01$ ), scientists ( $B = 0.118$ ,  $p < 0.05$ ), the medical community ( $B = 0.113$ ,  $p < 0.05$ ) and hospitals ( $B = 0.122$ ,  $p < 0.01$ ) in the full sample was associated with a greater willingness to take the vaccine. In contrast, in the unvaccinated sample, only greater trust in neighbours was positively associated with willingness to get vaccinated ( $B_{\text{unvaccinated}} = 0.198$ ,  $p < 0.05$ ).

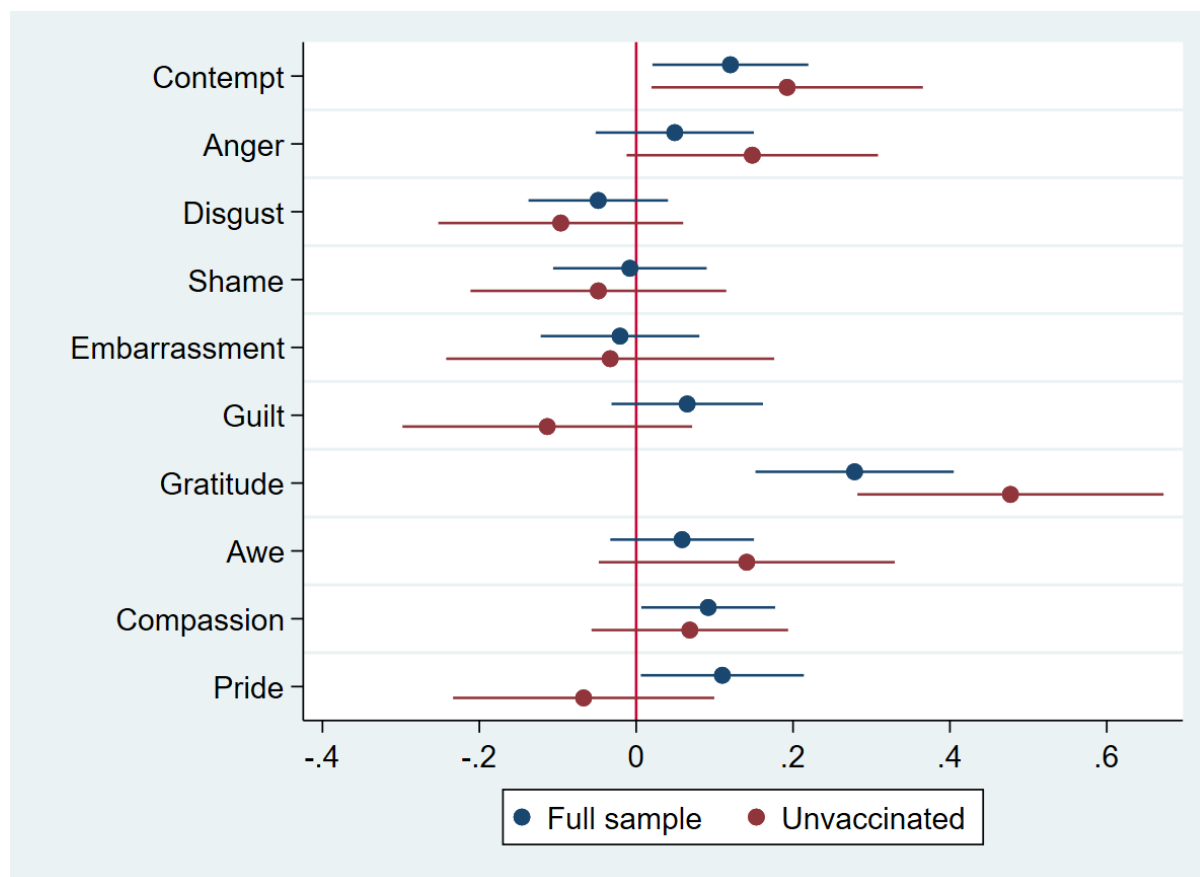
Finally, Figure 3 presents the estimates for moral emotions. Positive moral emotions were strongly associated with increase in willingness to take the vaccine in the full as well as unvaccinated sample. A large part of this is driven by gratitude towards those who have been vaccinated ( $B_{\text{full}} = 0.28$ ,  $B_{\text{unvaccinated}} = 0.48$ ; both  $p < 0.01$ ). There are smaller positive coefficients for compassion towards others who have been vaccinated ( $B = 0.09$ ,  $p < 0.05$ ) and pride associated with getting vaccinated ( $B = 0.11$ ,  $p < 0.05$ ), but only in the full sample. In terms of the composite variable of positive moral emotions, a unit increase in the score was associated with a 0.13 unit increase in the willingness to get vaccinated ( $p < 0.01$ ) in the unvaccinated sample. The composite variable for negative moral emotions were also significantly associated with greater willingness to take the vaccine ( $B_{\text{full}} = 0.022$ ,  $p < 0.01$ ), but not in the unvaccinated sample. However, in the unvaccinated sample, greater contempt towards those not vaccinated was positively associated

with vaccine uptake ( $B_{\text{unvaccinated}} = 0.193, p < 0.05$ ). No other statistically significant results were obtained for negative moral emotions.



**Figure 2: Role models, trust, and vaccine uptake**

*Note:* Plot depicts point estimates of coefficients and 95% confidence intervals from two ordinary least squares regressions of vaccine uptake on preventive behaviours, moral emotions, trust, and other factors. Both regression specifications contain additional covariates on age (in years), sex, occupation, educational qualification, income group, caste grouping, religion, whether previously infected, whether previously tested, natural log of daily vaccinations per million persons, and natural log of new cases per million persons on the day of survey response.



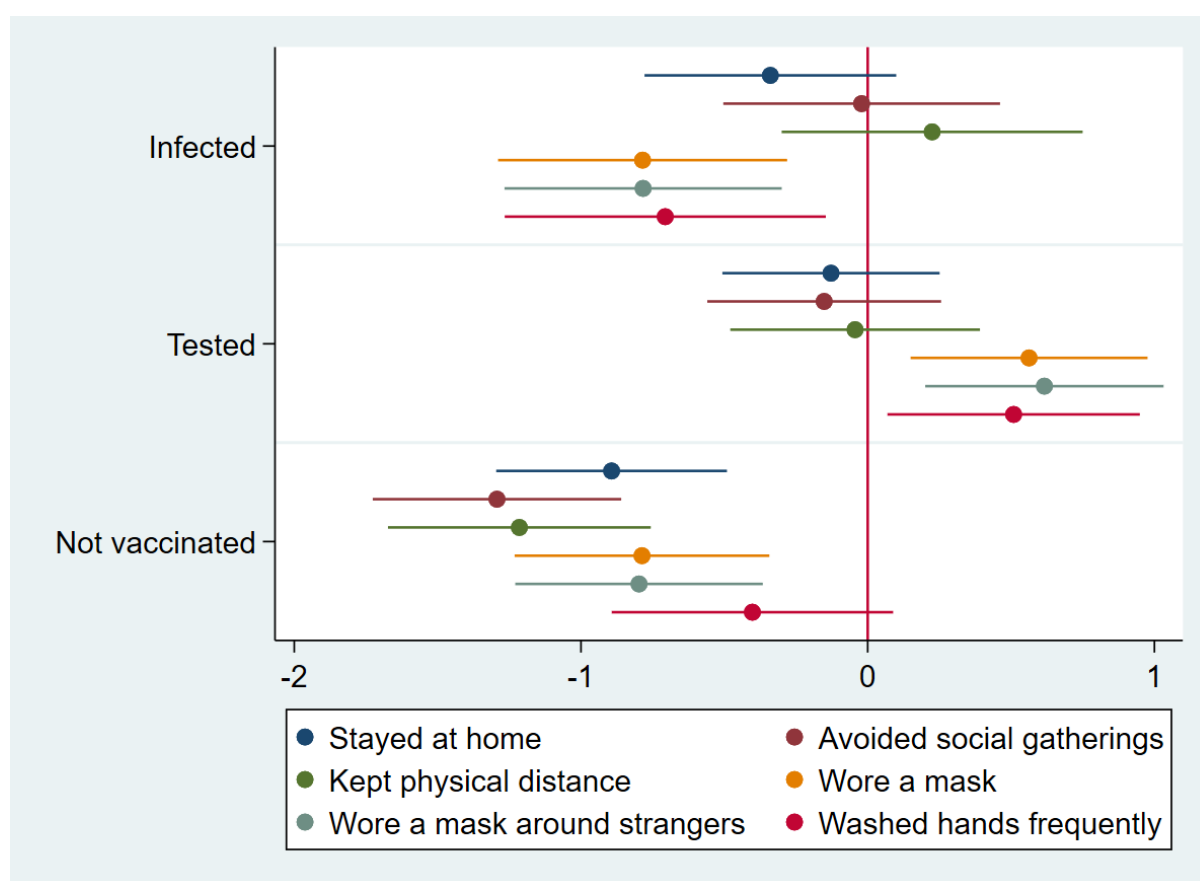
**Figure 3: Moral emotions and vaccine uptake**

*Note:* Plot depicts point estimates of coefficients and 95% confidence intervals from two ordinary least squares regressions of vaccine uptake on preventive behaviours, moral emotions, trust, and other factors. Both regression specifications contain additional covariates on age (in years), sex, occupation, educational qualification, income group, caste grouping, religion, whether previously infected, whether previously tested, natural log of daily vaccinations per million persons, and natural log of new cases per million persons on the day of survey response.

In terms of RQ2, the results suggest that not being vaccinated is negatively associated with engaging in preventive health behaviours. Figure 4 presents the coefficient plots, separately for each preventive behaviour. Except for regular handwashing, not being vaccinated (relative to those vaccinated with at least one dose) has a negative coefficient on all preventive health behaviours. The largest negative coefficient was observed for avoiding social gatherings ( $B = -1.29$ ,  $p < 0.01$ ), followed by the coefficient for maintaining physical distance ( $B = -1.21$ ,  $p < 0.01$ ). There are similar negative associations between not being vaccinated and staying at home ( $B = -0.89$ ,  $p <$



0.01), mask-wearing when outdoors ( $B = -0.79, p < 0.01$ ), and wearing a mask when interacting with strangers ( $B = -0.8, p < 0.01$ ). In each model, having been previously infected with COVID-19 was also negatively associated with engaging in preventive behaviours recently ( $B_{\text{woremask}} = -0.78$ ;  $B_{\text{maskstranger}} = -0.78$ , both  $p < 0.01$ ;  $B_{\text{washedhands}} = -0.71, p < 0.05$ ). In contrast, having been tested for COVID-19 infection was positively associated with engaging in these same preventive behaviours ( $B_{\text{woremask}} = 0.56$ ;  $B_{\text{maskstranger}} = 0.61$ , both  $p < 0.01$ ), and to a lesser extent, frequent handwashing ( $B = 0.51, p < 0.05$ ).



**Figure 4: Vaccination status and preventive health behaviours**

Note: Plot depicts point estimates of coefficients and 95% confidence intervals from six ordinary least squares regressions of preventive behaviours on vaccination status. Both regression specifications contain additional covariates on age (in years), sex, occupation, educational qualification, income group, caste grouping, religion, whether previously infected, whether previously tested, natural log of daily vaccinations per million persons, and natural log of new cases per million persons on the day of survey response.

In supplementary analysis (Appendix B), the full-sample analysis was run separately for males and females to identify if there were any gender differences. For RQ1, the positive association between two preventive behaviours (avoiding social gatherings and mask-wearing) was statistically significant only in the male sample ( $B_{\text{avoidsocgathering}} = 0.211, p < 0.01$ ;  $B_{\text{mask}} = 0.162, p < 0.05$ ), whereas other behaviours were consistent with full sample results reported above. Furthermore, the results on trust were also driven by the male sample, with trust in family members positive and significant for men but not women. Note that there were no major differences in significance in terms of the hierarchical and horizontal role models between men and women. Interestingly, the positive association between trust in scientists and the medical community in the full sample was stronger among women in our sample, as the coefficients were not statistically significant for men (although the results for trust in hospitals was driven by men). The gender-disaggregated results on moral emotions and their associations with vaccine uptake suggest that the positive emotions (compassion and pride) as well as the negative emotion of disgust was significantly associated with vaccine uptake but only for men in the full sample. Indeed, the results on combined moral emotions indicates that the significant association between negative moral emotions and vaccine uptake in the full sample is driven by men. For RQ2, there appears to be minor differences in coefficients between men and women, with the exception of previous COVID-19 infection being associated with men less likely to stay at home and women more likely to stay at home. The remainder of the results consistent with the full sample appear to be stronger in the male sample than in the female sample.

## Discussion

The purpose of the present study was to examine the determinants of willingness to get vaccinated in India, as well as to examine changes in preventive health behaviors as a function of vaccination status. Results indicated that past preventive health behaviors like avoiding social gatherings, interpersonal trust, and moral emotions robustly predicted the willingness to take a COVID-19 vaccine, in both vaccinated (at least one dose) and unvaccinated samples. Results also showed that those who were not vaccinated were less likely to adhere to other preventive health behaviors, such as wearing a mask; COVID-19 infection status was associated with similar lower adherence to preventive health behaviors, but having been tested was related to more frequent engagement in behaviors like handwashing.

Getting vaccinated is the epitome of engaging in preventive health behavior. Thus, individuals who had received at least one dose as well as those who were unvaccinated were more willing to take a COVID-19 vaccine if they had also stayed at home, avoided social gatherings, and worn masks when interacting with strangers in the past month. Past research has similarly found grouping of engagement in preventive health behaviors, including willingness to protect oneself and others by taking a COVID-19 vaccine (Latkin et al., 2021).

This was one of the first studies to examine the impact of role models on vaccine uptake. Given that vaccination against COVID-19 is a global public health concern, and that role models have been shown to increase vaccine coverage (Vet et al., 2011), this was an important variable in the current study. Findings indicated that the more participants relied on role models to have taken the vaccine, the less willing they were to get vaccinated themselves; this was true for both horizontal (e.g., coworkers) and hierarchical (e.g., doctors) role models. In other words, vaccine hesitant individuals need more social proof that others have been vaccinated for them to be willing to get vaccinated themselves. This can be juxtaposed with recent work that shows greater vaccine hesitancy among supporters of former American President, Donald Trump, given his anti-vaccine

stance (Hornsey et al., 2020). Highlighting numbers of frontline workers and public health officials along with social norm metrics of local vaccinated populations may be an effective communication strategy to persuade those who are on the fence about getting vaccinated (Santos et al., 2021). Similarly, interpersonal trust in neighbors and that in family mattered the most for the willingness to get vaccinated among those who had not yet and those who had received at least one dose, respectively. On the other hand, trust in hierarchical institutions like hospitals and scientists contributed to higher willingness to get vaccinated. Both sets of results on role models and trust indicate the necessity of focusing on hyperlocal communities and norms when framing effective health messaging for vaccine uptake in India, which has been suggested elsewhere (Wrigley-Field et al., 2021).

Moral emotions, both positive and negative, were robust predictors of the willingness to get vaccinated (see also Ticku et al., 2021). Within the broader social context, moral emotions related to vaccine uptake establish a moral norm that is expected to be followed by oneself and imposed on others. In the event that others do not adhere to this norm, moral emotions aid in sanctioning transgressions, thereby establishing the normative behavior of getting vaccinated. High gratitude and compassion towards others, pride towards oneself, but high contempt towards others who did not get vaccinated predicted vaccine uptake. These findings can be applied in health communication campaigns to establish sociomoral norms, especially highlighting how others may view one who chooses/does not choose to get vaccinated (with gratitude or contempt).

Preventive health behaviors were found to be an interesting behavioral marker that differentiated those who were infected, tested, or unvaccinated. This is in line with Kreps et al. (2021), who used a sample from the United States and found that vaccinated individuals were more likely to support continued mask-wearing post-vaccination. Those not yet vaccinated were

also less likely to engage in several preventive behaviors, thereby providing further evidence for a clustering of vaccine uptake with engaging or not engaging in behaviors that could protect against COVID-19. Although the analysis did not control for the date of vaccination, being vaccinated at the time of the survey was associated with greater willingness to take part in preventive health behaviours such as mask-wearing and social distancing. This is seemingly at odds with any risk compensating behaviour suggested in the medical literature (e.g., Trogen & Caplan, 2021). Being tested was associated with greater tendencies to engage in preventive health behaviors, both being markers of increased threat perception translating into behavior. Last, having been infected with COVID-19 was associated with lower likelihood of partaking in preventive behaviors, the converse marker of lower disease threat perception.

### **Concluding Remarks**

The current study examined behavioral factors associated with COVID-19 vaccine uptake in India, where as of December 2021, little more than 50% of the adult population is fully vaccinated. In the subsample yet to be vaccinated, engagement in preventive behaviors such as mask-wearing and avoiding social gatherings were positively associated with greater vaccine uptake. Requiring more immediate role models to be vaccinated was associated with a lower willingness to take the vaccine, but positive moral emotions such as gratitude towards those who are vaccinated were strongly associated with greater vaccine uptake. These results point toward potential health communication strategies for boosting vaccine uptake in the Indian context. For example, governments could use social proof of thanking those who have been fully vaccinated in targeted campaigns aimed at districts or jurisdictions where vaccine uptake remains low. Although data on vaccination rates is publicly available, leveraging these to inform well-designed behavioural

interventions is key to driving down vaccine hesitancy and achieving universal adult vaccination against COVID-19 in India.

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Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
Predict Vaccine Uptake in India

Appendix A: Survey Questionnaire

1. Please select the language in which you would like to take part in the survey.

English (2)

हिंदी (3)

Q2 Have you ever been:

	Response	
	Yes (1)	No (2)
Infected with COVID-19? (1)	<input type="radio"/>	<input type="radio"/>
Tested for COVID-19? (2)	<input type="radio"/>	<input type="radio"/>
Vaccinated against COVID-19? (at least one dose) (3)	<input type="radio"/>	<input type="radio"/>

Q3 To what extent do the following statements describe your behavior for the past month?

	Does not apply at all		Applies very much								
	0	1	2	3	4	5	6	7	8	9	10
I stayed at home. ()											
I did not attend social gatherings (i.e. gatherings of more than 6 people outside the family). ()											
I kept a distance of at least two meters to people outside the family. ()											
If I went outside, I wore a face covering or mask continuously. ()											
If I was interacting with strangers, I wore a face covering or mask. ()											
I washed my hands more frequently than the month before. ()											

Q4 How likely do you think you are to contract COVID-19?

	Not at all likely		Extremely likely								
	0	1	2	3	4	5	6	7	8	9	10
Likelihood ()											

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
Predict Vaccine Uptake in India

Q5 How likely do you think your friends are to contract COVID-19?

Not at all likely

Extremely likely

0 1 2 3 4 5 6 7 8 9 10



Q29

In the last month, has your access to any healthcare services (doctors, hospitals, nursing homes, etc.) been disrupted due to COVID-19?

Not at all

Extremely

0 1 2 3 4 5 6 7 8 9 10



Q6 I believe I am immune to COVID-19.

Not at all

Extremely

0 1 2 3 4 5 6 7 8 9 10



Q7 How much do you think others believe that they are immune to COVID-19?

Not at all

Extremely

0 1 2 3 4 5 6 7 8 9 10



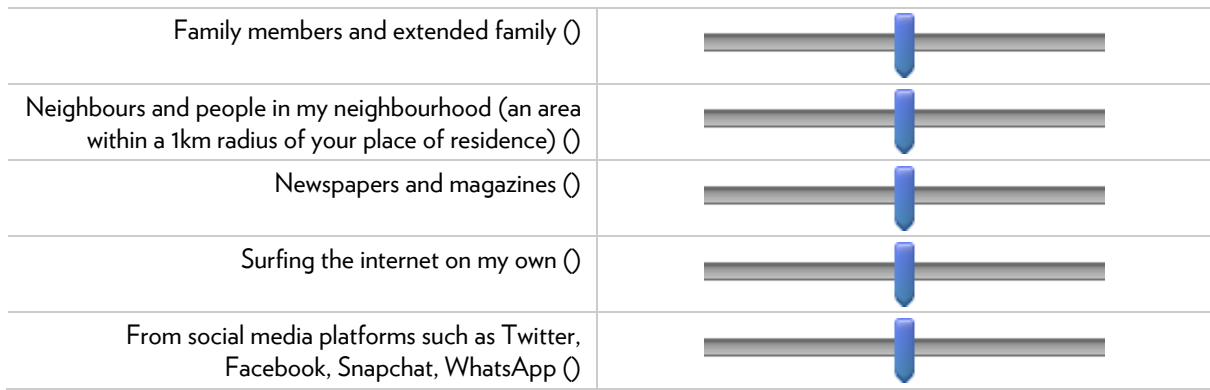
Q8 To what extent do you get your information about COVID-19 from:

Not at all

Completely

0 1 2 3 4 5 6 7 8 9 10

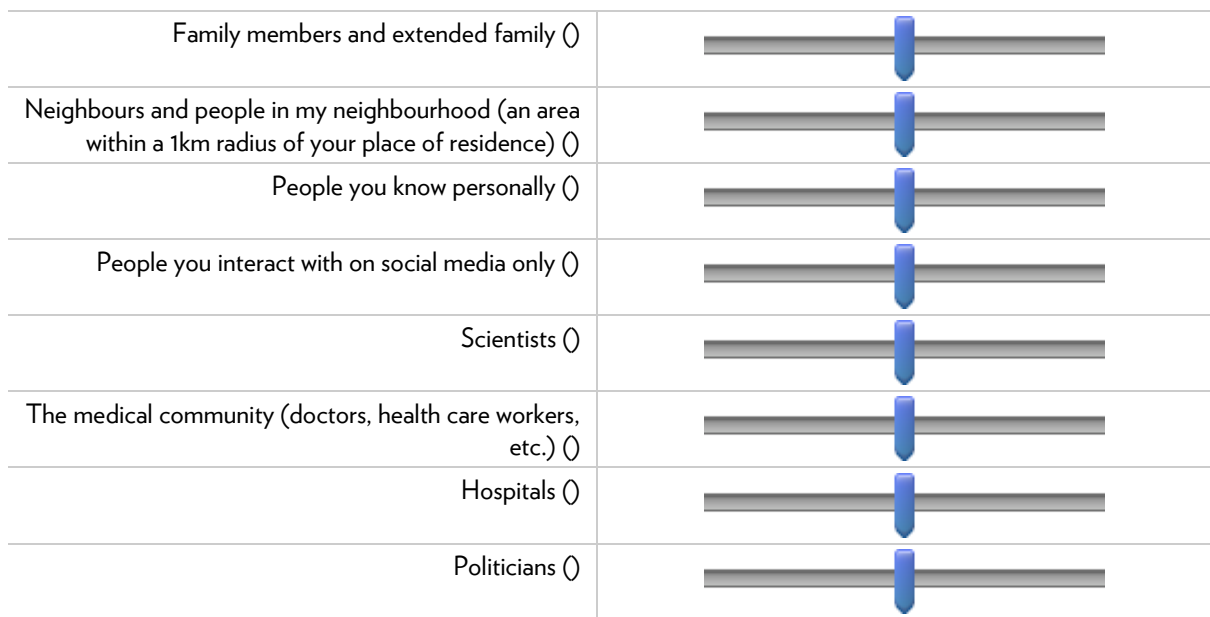
Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
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Q10 For each of the following, how much do you trust people from this group?

Don't trust at all Completely trust

0 1 2 3 4 5 6 7 8 9 10



Q33 How likely are you to take any COVID-19 vaccine?

Not at all Extremely

0 1 2 3 4 5 6 7 8 9 10



Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
Predict Vaccine Uptake in India

Display This Question:

If How likely are you to take any COVID-19 vaccine? [ Likelihood ] >= 1

And How likely are you to take any COVID-19 vaccine? [ Likelihood ] <= 9

Q11 If/When X gets vaccinated, only then will I choose to get the vaccine (select all that apply).

- Immediate family member(s) (1)
- Extended family member(s) (2)
- Neighbour(s) (3)
- Friend of similar age (4)
- Work colleague(s) (8)
- Family doctor (5)
- Health care worker I know and trust (6)
- Boss/work supervisor(s) (7)
- Prime Minister (9)
- Health Minister (10)

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Q12 I will convince X to take the vaccine.

	Yes (1)	No (2)
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Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
 Predict Vaccine Uptake in India

Immediate family member(s) (1)	<input type="radio"/>	<input type="radio"/>
Extended family member(s) (2)	<input type="radio"/>	<input type="radio"/>
Neighbour(s) (3)	<input type="radio"/>	<input type="radio"/>
Friend of similar age (4)	<input type="radio"/>	<input type="radio"/>
Work colleague(s) (6)	<input type="radio"/>	<input type="radio"/>

Q13 I am concerned about serious side effects of vaccines.

Not at all concerned      Extremely concerned  
 0 1 2 3 4 5 6 7 8 9 10



Q14 I am concerned about the ingredients inside the vaccine.

Not at all concerned      Extremely concerned  
 0 1 2 3 4 5 6 7 8 9 10

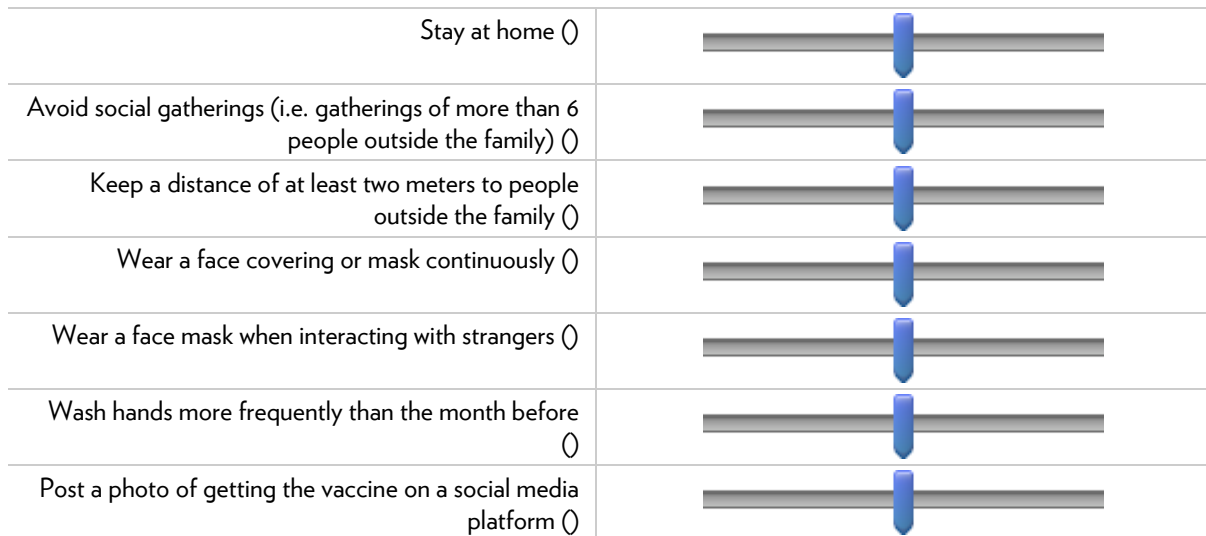


Q15 If you get vaccinated, how likely are you to

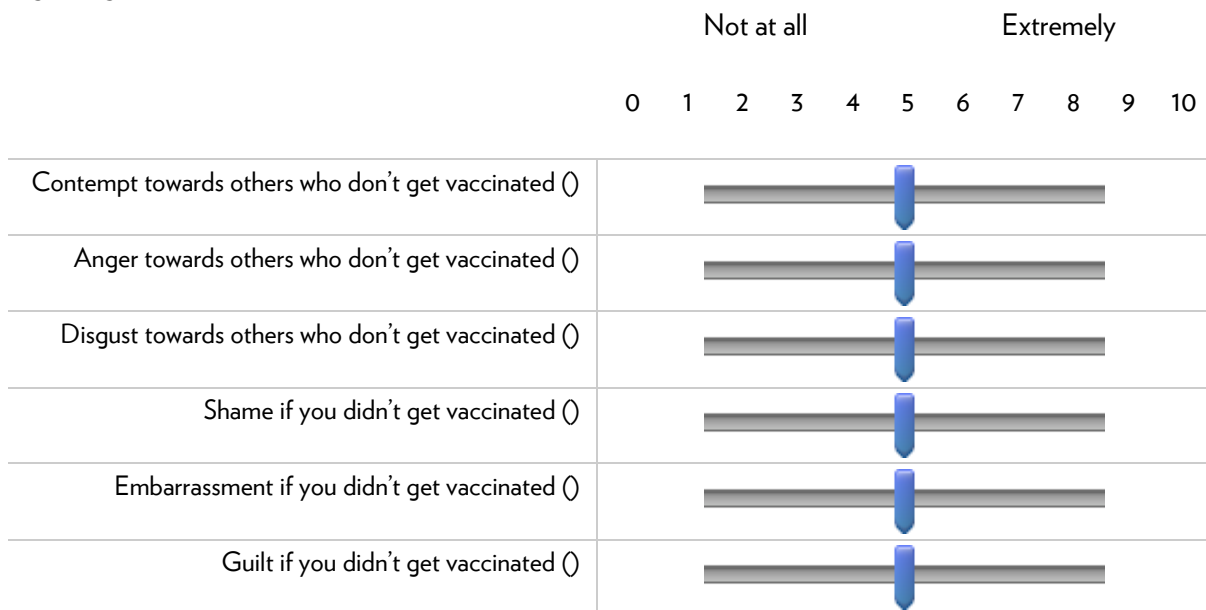
Not at all      Completely  
 0 1 2 3 4 5 6 7 8 9 10



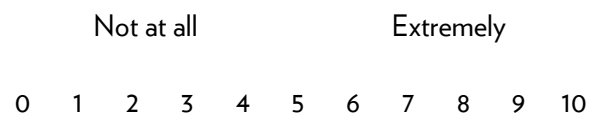
Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
 Predict Vaccine Uptake in India







Q16 On a scale of 1 (*not at all*) to 10 (*extremely*), rate the extent to which you feel the following emotions regarding the COVID-19 vaccine:



Q17 On a scale of 1 (*not at all*) to 10 (*extremely*), rate the extent to which you feel the following emotions regarding the COVID-19 vaccine:



Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
Predict Vaccine Uptake in India

Gratitude towards others who get vaccinated ()	
Awe towards others who get vaccinated ()	
Compassion towards others who get vaccinated ()	
Pride for getting vaccinated ()	

Q18 If tomorrow, a vaccine would be offered to you how soon would you register to take it?

- Within a week (1)
- Within a few weeks (2)
- After a few months (3)
- Not likely to take it ever (4)

Q19 Would you pay to be able to get a vaccine?

- Yes (1)
- No (2)
- Maybe (3)

Q20 How much would you be willing to pay to get vaccinated? (enter number only in INR)

\_\_\_\_\_

Q21 How would you rate your overall mental health?

- Poor (1)
- Fair (2)
- Good (3)
- Very Good (4)
- Excellent (5)

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
Predict Vaccine Uptake in India

Q22 What is your age in years?

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Q23 What is your sex?

- Male (1)
- Female (2)
- Other (3)

Q24 What is your current occupation?

- Student (1)
  - Employed (full-time) (2)
  - Employed (part-time) (3)
  - Self-employed (4)
  - Unemployed (5)
  - Retired (6)
- 

Q25 What is your highest educational level?

- Less than Std. X (10th) (1)
  - Std. X (10th) (2)
  - Std. XII (12th) (3)
  - Graduation (BA, BSc, BMS, etc.) (4)
  - Post-graduation (MA, MSc, MMS, MBA, MPhil, etc.) (5)
  - Doctorate (MD, PhD) (6)
-

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust  
Predict Vaccine Uptake in India

Q26 What is your family's annual post-tax income:

- 5 Lakhs or less (1)
  - Between 5 and 10 Lakhs (2)
  - Between 10 and 20 Lakhs (3)
  - Between 20 and 40 Lakhs (4)
  - Above 40 Lakhs (5)
- 

Q27 What caste do you belong to?

- General (1)
- Scheduled Caste (SC) (2)
- Scheduled Tribe (ST) (3)
- Other Backward Class (OBC) (4)
- None (5)
- Do not want to disclose (6)

Q28 What religion do you follow?

- Hinduism (1)
- Islam (2)
- Christianity (3)
- Sikhism (4)
- Buddhism (5)
- Zoroastrianism (6)
- Do not want to disclose (7)

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India

Appendix B: Supplementary Analyses

Table B.1: COVID-19 vaccine uptake determinants by gender

VARIABLES	(1) Male	(2) Female	(3) Male	(4) Female	(5) Male	(6) Female	(7) Male	(8) Female
Previously infected	0.307 (0.252)	-0.209 (0.391)	-0.391 (0.239)	-0.201 (0.414)	-0.409 (0.262)	-0.240 (0.387)	-0.249 (0.248)	-0.689 (0.353)
Previously tested	0.221 (0.206)	-0.160 (0.223)	0.359 (0.223)	-0.454 (0.301)	0.0100 (0.238)	-0.475 (0.268)	0.280 (0.218)	-0.353 (0.248)
Share of immediate role models to total	-2.946** (0.279)	-2.388** (0.357)						
Share of powerful role models to total	-2.545** (0.357)	-3.201** (0.488)						
Trust in family members	0.193** (0.0661)	0.0919 (0.0687)						
Trust in neighbors	0.0890 (0.0683)	0.0644 (0.0700)						
Trust in people you know personally	0.111* (0.0496)	0.0149 (0.0872)						
Trust in social media	0.0492 (0.0568)	0.0331 (0.0595)						
Trust in scientists	0.0242 (0.0552)	0.222** (0.0827)						
Trust in medical community	0.0622 (0.0550)	0.145* (0.0727)						
Trust in hospitals	0.179** (0.0531)	0.0841 (0.0683)						
Trust in politicians	0.0287 (0.0413)	-0.0698 (0.0543)						
Contempt			0.111 (0.0667)	0.144 (0.0864)				

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India

Anger	0.0472 (0.0622)	0.0412 (0.0870)				
Disgust	-0.132* (0.0646)	0.00762 (0.0653)				
Shame	0.00905 (0.0683)	-0.0636 (0.0794)				
Embarrassment	-0.00862 (0.0663)	-0.0705 (0.0764)				
Guilt	0.0961 (0.0684)	0.0571 (0.0861)				
Gratitude	0.219** (0.0814)	0.296** (0.102)				
Awe	0.0659 (0.0580)	0.0783 (0.0759)				
Compassion	0.112* (0.0538)	0.0763 (0.0723)				
Pride	0.200** (0.0740)	0.0672 (0.0817)				
Positive moral emotions			0.125** (0.0161)	0.106** (0.0180)		
Negative moral emotions			0.0255* (0.0100)	0.0121 (0.0103)		
Stayed at home					0.255** (0.0877)	0.224* (0.0947)
Avoided social gatherings					0.211** (0.0614)	0.167 (0.0891)
Kept physical distance					-0.00770 (0.0484)	0.105 (0.0692)
Wore a mask					0.162* (0.0732)	0.00164 (0.111)
Wore a mask around strangers					0.224** (0.0761)	0.402** (0.124)
Washed hands regularly					0.0294 (0.0495)	-0.0690 (0.0652)

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India

Constant	-1.921 (18.32)	16.53 (20.79)	-33.34* (16.53)	-17.85 (20.13)	-53.19** (16.94)	-18.77 (19.83)	3.314 (19.01)	-9.089 (17.30)
Observations	366	237	368	237	398	269	397	270
R-squared	0.786	0.779	0.706	0.675	0.621	0.603	0.672	0.710

Note: Results reported are coefficients of ordinary least squares (OLS) regression of vaccine uptake on explanatory variables run separately for each gender for the entire sample. Additional controls included were age (in years), occupation, educational qualification, income group, caste group, and religion. Additional controls for log of number of confirmed cases and vaccinations on day of survey response also included in all estimations. Robust standard errors in parentheses \*\* p<0.01, \* p<0.05

Appendix for Thank You for Getting Vaccinated! Moral Emotions, Role Models, and Trust Predict Vaccine Uptake in India

Table B.1: COVID-19 vaccine uptake and preventive behaviours by gender

VARIABLES	Stayed at home		Avoided social gatherings		Maintained distance of 2 metres		Wore a mask		Wore a mask around strangers		Washed hands frequently	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Previously infected	-0.724*	0.654*	-0.359	0.941*	0.0106	0.645	-0.878*	-0.172	-1.064**	0.247	-1.092**	-0.0156
	(0.333)	(0.332)	(0.361)	(0.400)	(0.384)	(0.419)	(0.367)	(0.412)	(0.357)	(0.367)	(0.384)	(0.463)
Previously tested	0.101	-0.615*	-0.0231	-0.584	0.139	-0.420	0.574*	0.420	0.742**	0.242	0.363	0.494
	(0.273)	(0.303)	(0.277)	(0.338)	(0.299)	(0.368)	(0.292)	(0.333)	(0.277)	(0.328)	(0.281)	(0.378)
Not vaccinated	-0.837**	-1.340**	-1.250**	-1.774**	-1.149**	-1.461**	-0.801*	-0.920**	-0.677*	-1.233**	-0.585	-0.566
	(0.270)	(0.313)	(0.287)	(0.336)	(0.318)	(0.383)	(0.317)	(0.332)	(0.295)	(0.332)	(0.342)	(0.387)
Constant	-64.64**	-69.45	-87.44**	-361.3**	-51.29*	-151.7**	-73.18**	-80.16	-83.98**	-59.96	-72.82**	-196.7*
	(20.96)	(40.11)	(20.33)	(48.04)	(24.29)	(56.68)	(17.36)	(47.32)	(16.87)	(49.23)	(22.83)	(80.83)
Observations	402	276	400	274	400	272	401	274	401	275	398	275
R-squared	0.340	0.484	0.446	0.527	0.370	0.441	0.386	0.431	0.411	0.464	0.348	0.259

Note: Results reported are coefficients of ordinary least squares (OLS) regression of preventive behaviours on explanatory variables run separately for each gender for the entire sample. Additional controls included were age (in years), occupation, educational qualification, income group, caste group, and religion. Additional controls for log of number of confirmed cases and vaccinations and stringency index on day of survey response also included in all estimations. Robust standard errors in parentheses \*\* p<0.01, \* p<0.05