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Short communication

Nudging influenza vaccination among health care workers

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ABSTRACT

Our online randomized controlled trial on 6230 healthcare workers (HCWs) tests the impact that three nudges – social norms, reminding the impact on beneficiaries, and defaults – have on the intention to vaccinate against seasonal influenza across job families. Willingness to get a flu shot was higher among subjects invited to imagine themselves working at the local health authority (LHA) with the greatest immunization coverage within their region relative to their counterparts prompted to imagine working at the LHA with the lowest coverage. Reminding the impact of flu vaccination on beneficiaries had different effects across job families, with physicians caring more benefits for themselves, nurses about patients' benefits, and technicians about family and friends. Default responses anchoring toward a high rather than a low vaccination intention increased the willingness to immunize among all HCW except physicians. Targeted nudges can be considered in developing interventions to promote influenza vaccination among HCWs.

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1. Introduction

The World Health Organization and other national and international agencies strongly recommend that all healthcare workers (HCWs) receive an annual influenza vaccination to minimize flu-generated morbidity and mortality among professionals, prevent potential nosocomial outbreaks, and limit absenteeism and consequent disruption of medical services [1–3]. Although flu immunization is the most effective public health intervention to mitigate and prevent seasonal influenza [3], influenza causes up to 650,000 deaths per year worldwide [4] and vaccination rates among HCWs remains largely suboptimal [5–7]. Encouraging flu vaccination uptake among HCWs seems even more relevant and urgent as the world navigates through the COVID-19 pandemic [8].

In the absence of mandatory influenza vaccination and related ethical issues in its implementation [9,10], the Nudge Theory [11] illuminates our understanding of how low-powered incentives are predictably effective in gearing high-stake behaviors toward individual and societal good. Our work is among the pioneers in employing a randomized controlled trial (RCT) design to test the impact of three nudges – namely social norms, reminders

of beneficiary impact, and defaults – on the intention to vaccinate against seasonal influenza among 6,230 HCWs. Nudging-inspired interventions seem promising in complementing other strategies that have been proposed to increase flu vaccination uptake – such as removal of administrative barriers, on-site vaccination, educational campaigns, participation of senior personnel or opinion leaders as role models, vaccinate-or-mask policies, and requirement of declination forms.

At their core, “nudges are supposedly irrelevant factors that influence our choices in ways that make us better off” [12]. Those who design the environment in which individuals make decisions, thus, are warned that small variations in said context can greatly influence final decisions. Nudges are particularly useful when subjects make a difficult or rare decision, make a choice for which they do not get immediate or direct enough feedback, and when some aspects of the situation are difficult to understand or make concrete.

Extant scholarship suggests that social norms, reminders of beneficiary impact, and default options qualify as viable nudging interventions [11]. Firstly, social norms [13] may increase the uptake of a desirable behavior by triggering conformity. More precisely, as individuals like to conform to others rather than being outcasts [11,14], informing individuals that the majority of others are engaging in a positive conduct generate a virtuous cycle. This mechanism holds in the negative domain also, whereby subjects conform to undesirable conduct when that is what the majority

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of others do. Secondly, messages that focus decision makers' attention on the positive impact of vaccination on beneficiaries may increase vaccine uptake by leveraging on individuals' motivation to make a prosocial difference [15]. Being “the people and groups of people whom employees believe their actions at work have the potential to positively affect” [15], HCWs' beneficiaries include themselves, their family and friends, and their patients. Thirdly, using default settings for priming professionals to think in terms of a high rather than a low probability of vaccinating may encourage immunization because decision makers have a strong tendency to anchor on defaults when making subsequent judgments [16,17].

2. Materials and methods

Our study consists of a large-scale online RCT with 6230 HCWs. Subjects were recruited among the respondents to an employee viewpoint survey that was administered in March and April 2019 to all the employees of the public healthcare system of an Italian Region. At the end of the employee viewpoint survey, participants were invited to click on a link that would redirect them to a webpage to complete our online RCT. Participation was voluntary and responses were anonymous. The survey was developed and administered through Qualtrics.

Our RCT aims at investigating the main effect of each of the three nudges on the intention to vaccinate against the seasonal influenza across different categories of employees – namely, administrative staff, nurses, physicians, and technicians. We manipulated the three experimental factors at 2, 4 and 2 treatment-levels, respectively. The resulting factorial design featured 16 (i.e. 2*4*2) experimental conditions. Each respondent was presented with one vignette that was selected randomly from the pool of 16 and then asked about the probability of getting a flu shot in the upcoming influenza season. Respondents moved the cursor on a slider ranging from 0 to 100 percent probability.

3. Experimental manipulation of social norms

HCWs were shown a bar graph displaying the 2017 seasonal influenza vaccination rates among the employees of the nine LHAs in their Region. Immunization coverage percentages referred to the most recent available data and varied from 13% to 69%. Professionals were asked to imagine working for the LHA highlighted in the bar chart, which was the one with lowest immunization rate (i.e. 13%) for a random half of respondents and the one with highest immunization rate (i.e. 69%) for the other half of participants. The rationale behind this manipulation was to set two different social norms, whereby the majority of colleagues either get vaccinated or do not vaccinate against influenza.

4. Experimental manipulation of beneficiary impact

HCWs in the control condition (Ctrl) were asked to state their intention to get a flu shot during the next flu season without being reminded about the positive impact that this behavior may have on oneself or others. Their counterparts in the three treatments were exposed to a message reminding them about the potential benefits of flu immunization on three categories of beneficiaries: oneself, family and friends, or patients.

5. Experimental manipulation of defaults

The slider was preset at 20 for a random half of respondents and at 80 for the remainder of participants. The rationale behind this manipulation was to prime subjects with either a low or a high default probability of getting immunized.

6. Results

Table 1 displays the distribution of the 6,230 HCWs in our sample in terms of their job family (i.e. administrative staff, nurses, physicians, and technicians), work setting (i.e. hospital, ambulatory, teaching hospital), gender, and age group.

Fig. 1 shows the average probability of vaccinating against the seasonal influenza by social norm and job family. A series of analyses of variance (ANOVAs) demonstrate that, across HCWs job family, the probability of immunizing against seasonal influenza is higher among those randomly assigned to the high-coverage condition - in which the majority of colleagues vaccinated - as compared to their peers randomly assigned to the low-coverage condition - in which the majority of colleagues did not vaccinate. More precisely, the difference in the probability of getting a flu shot between the high- and low-coverage groups is 5.56 percentage points ($p = .048$) among administrative personnel, 6.75 ($p < .0005$) among nurses, 8.03 among physicians ($p < .0005$), and 9.23 percentage points ($p = .005$) among technicians.

Fig. 2 displays the mean probability of getting a flu shot by beneficiary prime and job family. A series of ANOVAs reveal that the effect of messages emphasizing the potential positive impact of vaccinating on different categories of beneficiaries vary across HCWs. Among administrative staff, the intentions to get a flu shot did not significantly vary across the four experimental conditions ($p = .515$). In the case of nurses, reminding benefits for patients increased the probability of vaccinating by 4.80 percentage points ($p = .068$) as compared to a message that emphasized the personal benefits of immunization. Among physicians, the probability of vaccinating against seasonal influenza was 9.25 percentage point higher among those reminded about the personal benefits of vaccinating as compared to the control group ($p = .057$). Priming technicians about the benefits of getting vaccinated against the seasonal influenza for family and friends increased the stated probability of getting a flu shot by 15.05 percentage points as compared to the control group ($p = .014$) and by 13.23 percentage points relative to the personal benefit message ($p = .043$).

Fig. 3 reports the average probability of immunizing against seasonal influenza by default and job family. ANOVAs find that setting the default probability of vaccinating at 80 rather than at 20 in the response scale encourage vaccination among all HCWs but

Table 1
Percentage distribution of HCWs in our sample by job family, work setting, gender, and age group (n = 6230).

	n	%
Job family		
Administrative staff	827	13
Nurses	3881	62
Physicians	922	15
Technicians	600	10
Work setting		
Hospital	3919	63
Ambulatory	1415	23
Teaching hospital	874	14
n.a.	22	–
Gender		
Female	4346	70
Male	1862	30
n.a.	22	–
Age group		
<25	35	1
25–34	1050	17
35–44	1492	24
45–54	2299	37
>54	1349	21
n.a.	5	–

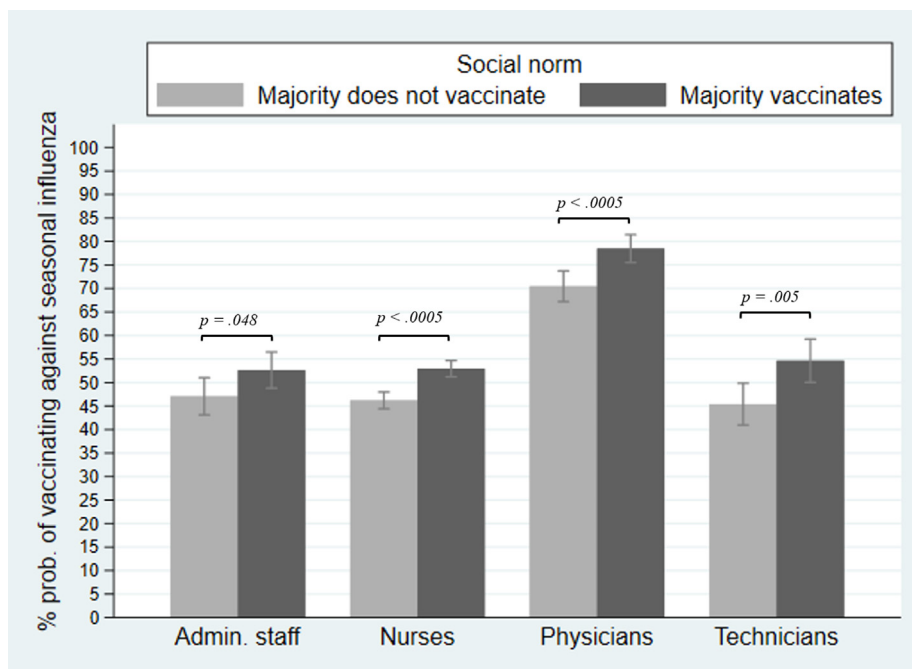


Fig. 1. Mean percentage probability of vaccinating against seasonal influenza, by social norm, by HCW (n = 6230).

physicians ($p = .609$). In particular, the size of that increase is 9.78 percentage points among administrative staff ($p < .0005$), 5.15 percentage points among nursing personnel ($p < .0005$), and 7.90 percentage points among technical staff ($p = .016$).

A series of tests for the equality of means across randomized treatments show that medical doctors tend to show a propensity to immunize against seasonal influenza that is about 24 percentage points higher relative to all other HCWs (physicians: $n = 922$, $M = 74.32$, $SD = 34.48$; administrative staff: $n = 827$, $M = 49.93$,

$SD = 40.43$; nurses: $n = 3,881$, $M = 49.60$, $SD = 39.63$; technicians: $n = 600$, $M = 50.02$, $SD = 40.95$, $p < .0005$).

7. Discussion

Our large-scale randomized study aimed at exploring the main effect of three nudges on the intent to get a flu shot in four different groups of HCWs. Firstly, the positive and negative impact of social norms hold across administrative staff, nurses, physicians, and

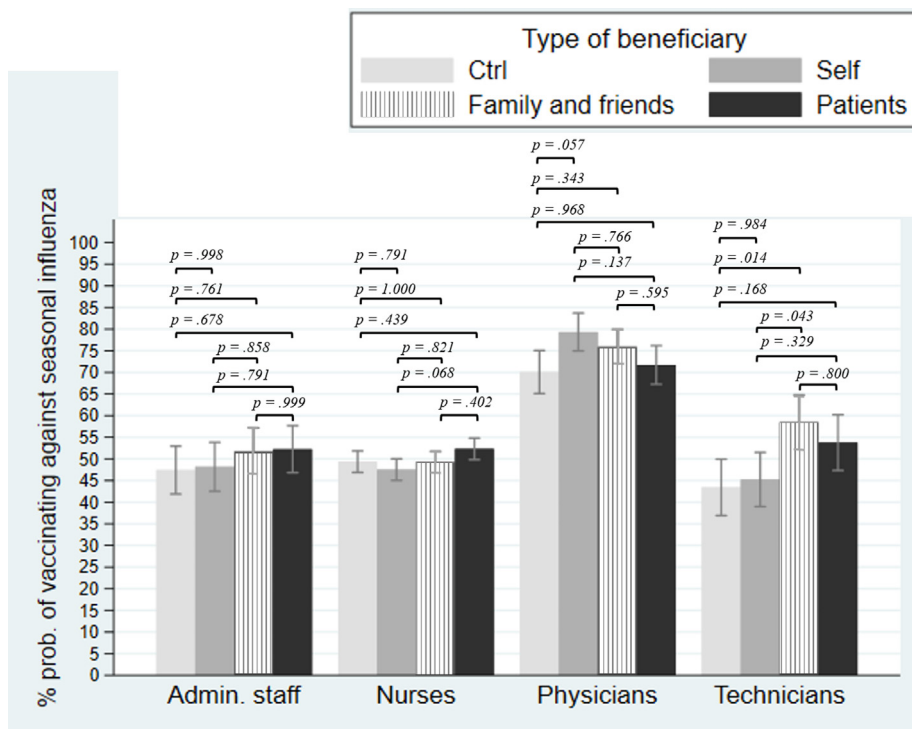


Fig. 2. Mean percentage probability of vaccinating against seasonal influenza, by type of beneficiary group, by HCW (n = 6230).

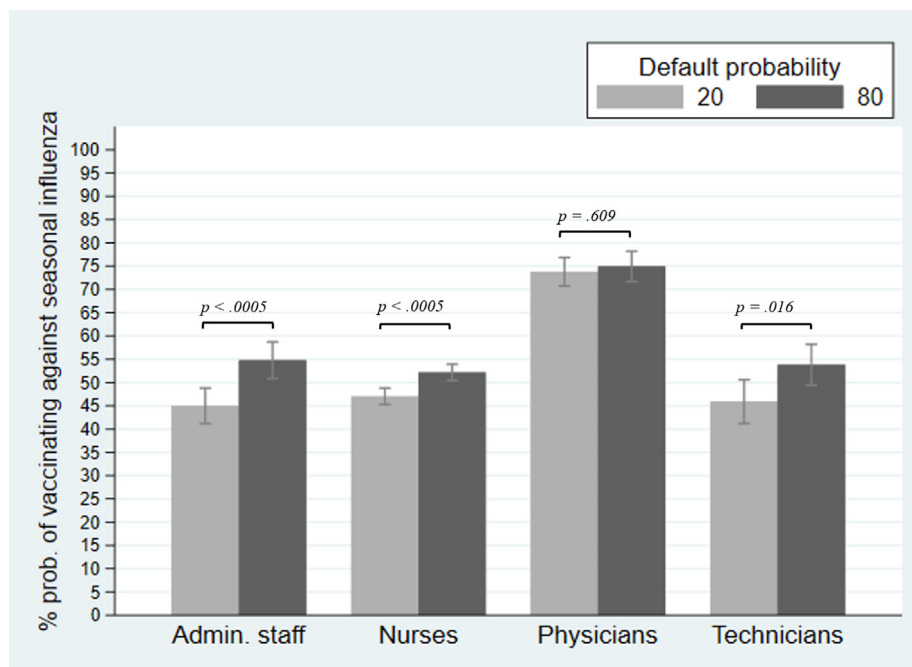


Fig. 3. Mean percentage probability of vaccinating against seasonal influenza, by default probability, by HCW (n = 6230).

technical personnel. In particular, the probability of undertaking a desired behavior – namely vaccinating against the seasonal influenza – was greatly enhanced by a social norm emphasizing that the majority of colleagues engage in that same behavior. To the contrary, we found a sizably smaller probability of vaccinating for the random half of participants informed that most of their colleagues did not get a flu shot. Secondly, the effect of messages reminding the positive impact that one can have on oneself and on others by getting vaccinated tended to be conditional on the professional group. A prompt reminding benefits onto others (i.e., family and friends and patients) increased technicians' and nurses' propensity to vaccinate, respectively. Messages highlighting personal benefits, instead, encouraged vaccination intent among physicians. Thirdly, setting a high rather than low default probability of getting a flu shot increased intentions to vaccinate for all HCWs with the only exception of physicians.

Our novel experimental evidence provides three main general contributions to efforts aimed at enhancing the uptake of flu vaccination among Italian HCWs [18] in the absence of mandatory immunization [19,20]. A nudging intervention may prove more effective than another. For instance, emphasizing social norms whereby the majority undertake a desirable behavior may be more effective than other nudges. Nudges, however, can backfire. For example, our results tend to discourage the use of data about vaccination coverage in organizations where most employees engage in negative conduct such that avoiding immunization. Then, the effect of any given nudge may differ across groups of HCWs. Thus, administrative personnel, nursing staff, physicians, and technicians may react differently to the same intervention. In short, our study puts an unprecedented accent on the fact that one-nudge-does-not-fit-all.

Results from our study should be used with caution in light of two main limitations that pave the way for future research projects. On the one hand, although RCTs are the gold standard in unveiling cause-effect links and estimating the magnitude of the average treatment effect, they fall short in explaining the mechanism through which the impact plays out. On the other hand, the generalizability of findings to naturally occurring settings is yet

to be tested. In fact, the intention to vaccinate does not correspond to vaccination. In our context, only 31.7 percent of healthcare workers and technicians actually got vaccinated in 2017 in the Region considered in the study.

In the wake of recent Nobel Prizes awarded to Richard Thaler and Esther Duflo, combining behavioral science insights and experimental methodologies seems to be a viable tool to improve decisions about public health. Our large-scale RCT with real HCWs may provide valuable implications for scholars and practitioners alike as health care organizations around the world fight to increasing the uptake of seasonal influenza vaccination among their employees under the not-yet fully understood threats of COVID-19.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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