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Encouraging COVID-19 vaccination through behaviorally informed reminders: Results from a national randomized field experiment in Israel

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abstract

Inducing people to get vaccinated is critical for controlling the spread of COVID-19. We explored the effectiveness of two text messaging strategies for encouraging unvaccinated individuals to get their COVID-19 vaccination. One message emphasized social norms to harness people's tendency to act in ways that line up with society's expectations. The other message underscored the personal medical benefits of vaccination. Both messages indicated that the vaccine was reserved for the recipient at a nearby location. Over the course of eight days, the percentage of people who got vaccinated after receiving the medical benefit message was 2.1% higher than the percentage of people who got vaccinated after receiving the social norm message ($p < .001$). Our findings indicate that designing vaccination reminders that highlight the medical benefits of vaccination in addition to the availability of the vaccines can increase vaccination rates.

Berliner Senderey, A., Ohana, R., Perchik, S., Erev, I., & Balicer, R. D. (2022). Encouraging COVID-19 vaccination through behaviorally informed reminders: Results from a national randomized field experiment in Israel. *Behavioral Science & Policy, 8*(1), 25–32.

Core Findings

What is the issue?
Increasing vaccine uptake against communicable diseases like COVID-19 is critical to managing public health resources and outcomes. To do so, public health authorities have used different messaging strategies. It has been found, however, that messages designed to emphasize the personal medical benefits of vaccination are more effective than those based on social norms and peer pressure.

How can you act?
Selected recommendations include:
1) Highlighting the personal medical benefits of getting vaccinated in messaging strategies
2) Testing different vaccine messaging strategies' effectiveness to continuously improve outcomes

Who should take the lead?
Leaders and policymakers in public health

Finding strategies to boost vaccination rates is essential to controlling the COVID-19 pandemic.[1–3] In this article, we report on a study we conducted to compare the efficacy of two behavioral science–informed text message–based interventions, which we tested on nearly 800,000 unvaccinated members of Clalit Health Services (CHS), the largest health care provider in Israel. CHS provides primary, specialty, and inpatient care, and its comprehensive data warehouse combines hospital and community medical records.

Previous studies have demonstrated that carefully worded reminders informing patients that vaccines are reserved specifically for them are effective *nudges*—that is, gentle ways of influencing behavior that neither restrict choice nor significantly change people's economic incentives. In two large multipronged studies, these reminders increased influenza vaccine uptake by an average of 5%.[4,5] Our experiment builds on this finding, comparing the efficacy of two additional nudges: one that emphasizes social norms and another that focuses on the medical benefits of the vaccine.

Invoking social norms harnesses people's tendencies to act in ways that line up with other people's expectations. This strategy is often effective in encouraging beneficial health-related behaviors.[6] For example, social norm nudges have outperformed other types of nudges in reducing no-show rates for medical appointments;[7] they have also increased hand sanitizer use among hospital visitors.[8] In particular, informing individuals of the most socially acceptable behavior in a given setting or situation has been highly persuasive in motivating them to follow the norm.[9–12]

In the context of vaccination, however, emphasizing the social norm could backfire. Because vaccines can also protect the unvaccinated through indirect effects, a message that suggests that others have gotten vaccinated can lead to the *free rider* phenomenon, in which people decide to simply rely on the protection others provide rather than to protect themselves.[6] In situations where the free rider phenomenon might discourage vaccine uptake,

"emphasizing the social norm could backfire"

messages that underscore the medical benefits of getting vaccinated might be more persuasive.[13] In our experiment, we set out to test that hypothesis.

Method

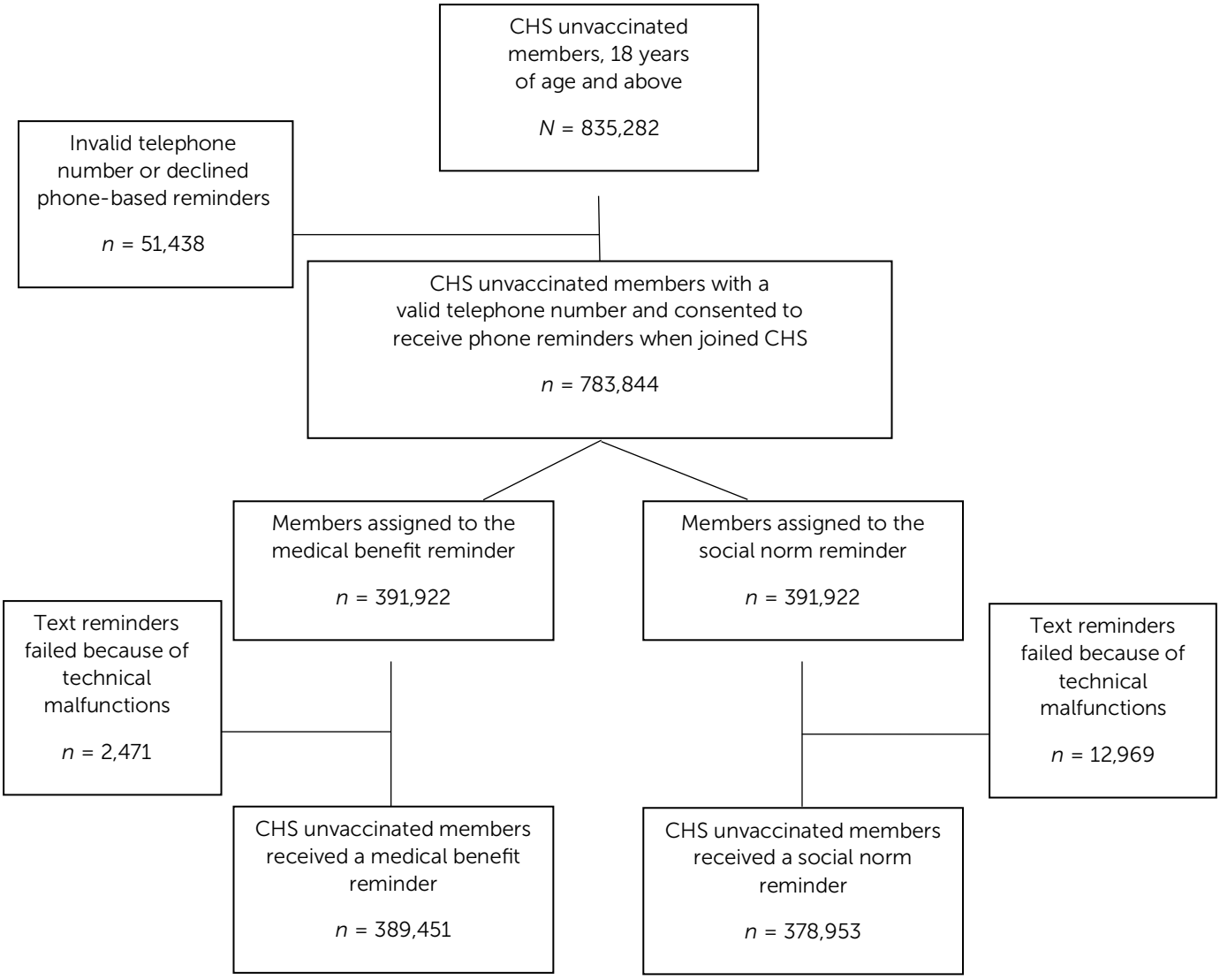
To compare the effects of the social norm and medical benefit nudges we have described, we designed a study in which eligible unvaccinated CHS members were randomly assigned to receive one of two reminders about a week after they received what we called a *baseline* reminder, which merely informed recipients of the vaccine's availability. After another week, we compared the relative effects of the social norm and medical benefit reminders on COVID-19 vaccination rates.

In Israel, COVID-19 vaccination efforts began on December 20, 2020, and by February 4, 2021, vaccines were available to everyone ages 16 years and older. Using CHS's comprehensive health care data warehouse, we identified all unvaccinated members in this age group with a valid cell phone number who, when they joined CHS, had consented to receive text or voice reminders on their cell phones—a total of 783,844 people. See Figure 1 for details of our selection procedure.

On February 8, 2021, all of these individuals were sent the baseline reminder to get vaccinated via the same texting system that CHS uses to send its members reminders of upcoming appointments, notifications of available clinical services, and the like. This message read,

> This is a reminder to get vaccinated for COVID-19. This is the quickest way to get back to daily life. The vaccine is available for you at the closest CHS vaccination area [link]. If you'd prefer, you can schedule an appointment [here].

Figure 1. Flowchart showing how Clalit Health Services (CHS) study participants were chosen



Note. If the text reminder failed, members received a voice reminder.

We then randomly assigned each of these individuals to receive one of two additional text message reminders a week later—at 10 a.m. on February 16, 2021—excluding anyone who had scheduled a vaccination appointment by then.

One of these reminders indicated that getting vaccinated was the social norm. It read,

> It's time for you to join 3.5 million vaccinated citizens who protected themselves and those they care about. The vaccine is reserved for you today, at the [closest CHS vaccination area] until 21:00. If you'd prefer, you can schedule an appointment [here].

The other reminder emphasized the medical benefits of the vaccine. It stated,

> In a large scale research study conducted by the Clalit Research Institute, the vaccine was found to be effective and reduces 94% of COVID-19-related morbidity! The vaccine is reserved for you today, at the [closest CHS vaccination area] until 21:00. If you'd prefer, you can schedule an appointment [here].

"The medical benefit reminder had an immediate effect"

3.5m

Vaccinated individuals in Israel during February 2021

94%

COVID-19 vaccine efficacy in Israel in February 2021

2.1%

Increased effectiveness of medical benefit messaging over social norm messaging for cumulative vaccine uptake

The number of people who received the social norm and medical benefit reminders by text message was roughly equal—378,953 and 389,451, respectively—but differed slightly because of technical glitches that predominantly affected those assigned to the social norm group. Because of the glitches, an additional 15,440 members who did not receive the text message reminder instead received an identical recorded voice reminder. For our analysis, we focused on the effect of the text message reminders and so excluded those who received the voice reminders from our main analysis, although we did calculate how many of them got vaccinated during the eight-day study period. Including them in the analysis would not have changed the findings appreciably (see Figure S1 in the Supplemental Material for more details).

We made sure that the two groups did not differ clinically, demographically, or in other ways that could confound the results (see Table S1 in the Supplemental Material for details). Approximately half of each group was female, and the average age of participants was 37.5 years for both groups.

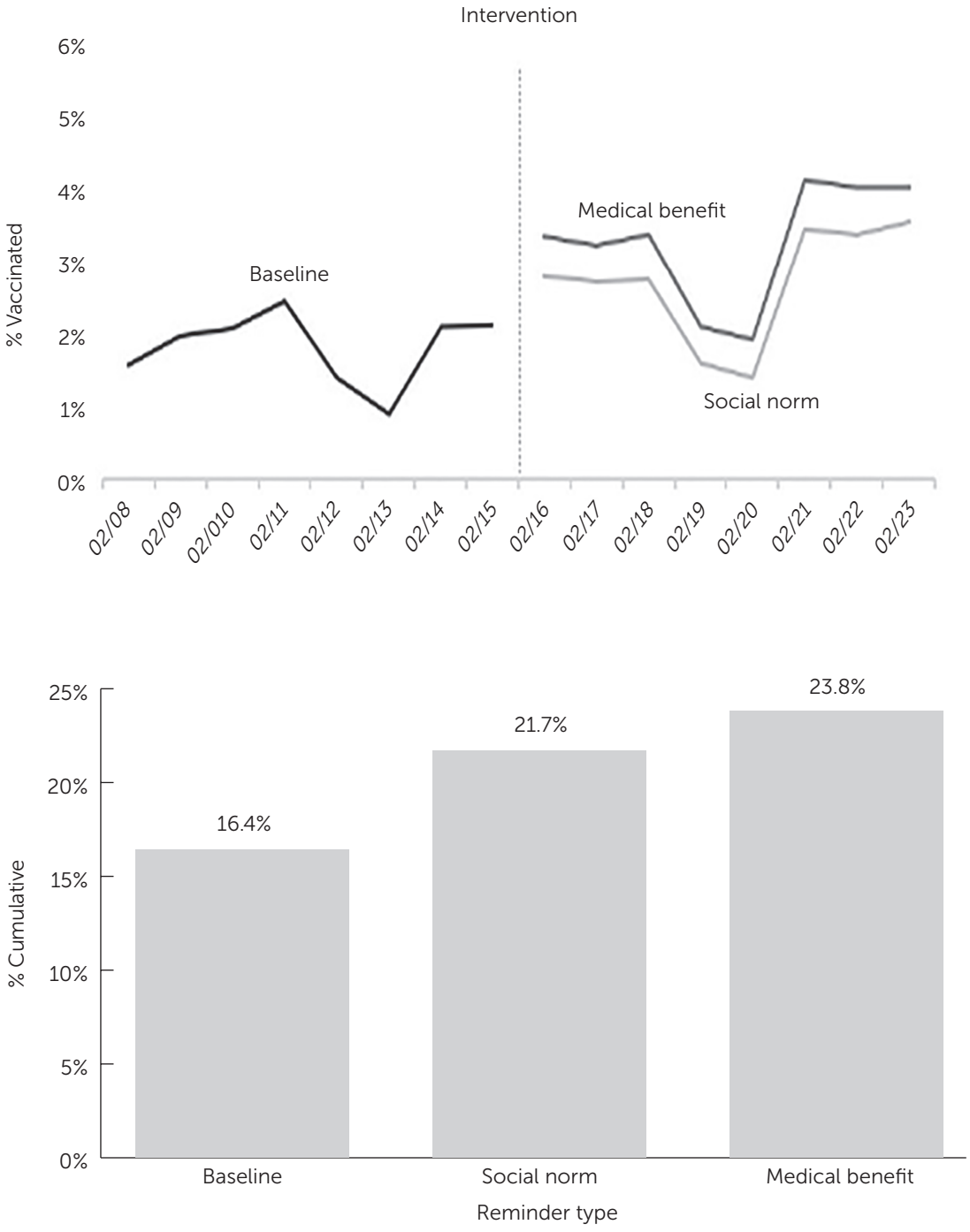
We then recorded the percentage of people in each group who received the COVID-19 vaccine each day of the week after the intervention. The data were analyzed using chi-square tests. We considered differences between the groups to be statistically significant when p values from two-sided tests (those allowing for both positive and negative effects of an intervention) were .05 or less. (See note A for more details about the statistics mentioned in this article.)

Results

Figure 2 shows the results. The medical benefit reminder had an immediate effect and was more effective than the social norm reminder. One day after members received our intervention, the daily vaccination rate was 3.6% among those who received the medical benefit reminder and 3% among those who received the social norm reminder. The advantage of the medical benefit nudge remained clear throughout the study. Over the eight days, the total percentage of people who got vaccinated—the *cumulative vaccination rate*—was 23.8% among members who received the medical benefit reminder and 21.7% for those who received the social norm reminder; that is, the medical benefit reminder increased the vaccination rate 2.1 percentage points more than the social norm reminder did, a statistically significant result ($p < .001$). Both messages improved the vaccination rate over baseline, which was 16.4% just prior the intervention.

We were aware that if individuals in the same household received different intervention messages, the effect of one message could be influenced by the other message, given that these individuals are likely to make vaccination decisions together. We wondered how this dynamic might affect responses to the reminders. We therefore conducted a household-based analysis (see Figure S2 in the Supplemental Material). *Households* were defined as two partners aged 18 years or older living at the same address. (All participants under the age of 18 years received the reminder through their parents.) We included 154,808 households in this analysis, of which 55,329 received heterogeneous reminders (one social norm reminder and one medical benefit reminder). In households in which both members received the medical benefit reminder, the vaccination rate rose to 23.6%, significantly higher than the 21.4% rate in households in which both members received the social norm reminder ($p < .001$), which was in line with our broader findings. In households with mixed interventions, the effects roughly averaged out: 22.7% of members who received the medical benefit reminder got vaccinated and 22.3% of those who received the social norm reminder got vaccinated. The result is consistent with the idea that the medical benefit reminder has a greater effect on vaccination decisions than the social norm reminder does.

Figure 2. The percentage of people vaccinated per day before & after the intervention & the cumulative rate



Note. The graphs show that vaccination rates increased more on a daily basis (line graph, top) and cumulatively (bar graph, bottom) after study participants received the medical benefit reminder than after they received the social norm reminder. The dips on February 12–13 and February 19–20 in the line graph reflect lower vaccination rates on the weekends, when some vaccination stations were closed. The increase in the daily vaccination rate after the weekend of February 21—which was similar for both intervention groups—was likely due to the implementation of a national policy that granted vaccinated people access to public facilities.

"text messages that simply inform people that a vaccine is reserved for them can increase vaccination rates"

Conclusion & Policy Implications

Previous research has demonstrated that text messages that simply inform people that a vaccine is reserved for them can increase vaccination rates.[4,5] In this study, we compared two types of messages that build on the "reserved for you" message and found that an addition emphasizing the medical benefit of a vaccine was more effective than one that focused on the social norm of receiving a vaccine.

Why would the medical benefit message be more effective than the social norm one? One reason may relate to its emphasis on protection. Prior research has shown that reminders stressing personal protection work about as well as those that stress the protection of others in convincing people to get a flu shot.[5] In our study, the medical benefit reminder underscored both the personal and the societal protection the vaccination provided in its mention of an evidence-based reduction of overall COVID-19-related morbidity (that is, the vaccine reduced the chance of severe disease). By contrast, our social norm reminder did not stress protection so much as apply peer pressure, pointing out that a large number of citizens have already protected themselves and those they care about. As such, our results suggest that when it comes to vaccination, messages that highlight protection or safety, whether individual or societal, may be more convincing than those that rely on people wanting to follow the crowd.

Another reason for the heightened efficacy of the medical benefit reminder could be that it is better at combating procrastination. By the time the intervention took place, COVID-19 vaccines had been available for more than a month. Some of the individuals who had not yet been vaccinated may have been vaccine skeptics, but at that relatively early stage of the vaccine rollout, many were probably simply procrastinating. The medical benefit reminder may have had an outsized influence on procrastinators because the data supporting a big reduction in morbidity injected some urgency into the vaccination decision.

As Figure 2 shows, a large increase in vaccine uptake occurred about five days after both study interventions, around February 21, 2021. This spike may have stemmed from the national implementation of the Green Pass policy, in which those with vaccine certification (a Green Pass) were granted access to public facilities[14,15]—a change that would be expected to increase COVID-19 vaccination rates across the nation. The relative advantage of the medical benefit nudge over the social norm nudge did not change, which indicates that this difference is robust.

Overall, our results show that both of the strategies we tested were beneficial but that medical benefit messages like the one we sent would likely be the most effective in future campaigns. Policymakers beyond Israel could use this central finding to potentially improve the effectiveness of their own COVID-19 vaccine promotion programs.

endnote

A. Editors' note to nonscientists: For any given data set, the statistical test used—such as the chi-square (χ^2) test, the *t* test, or the *F* test—depends on the number of data points and the kinds of variables being considered, such as proportions or means. The *p* value of a statistical test is the probability of obtaining a result equal to or more extreme than would be observed merely by chance, assuming there are no true differences between the groups under study (this assumption is referred to as the *null hypothesis*). Researchers traditionally view $p < .05$ as the threshold of statistical significance, with lower values indicating a stronger basis for rejecting the null hypothesis. The analyses in this study were performed with the following software: R version 3.5.3, Python version 3.6, Anaconda version 5.1.0, and tableone version 0.6.6.

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We thank Maya Kotler, Michal Bar Kochva, Yaniv Shimkovich, Ruthi Optovsky, Tami Gorman, Michal Kizelstein, Inbar Zach, Alex Bodic, Adi Hadad, and Anna Krichly for their contributions to the intervention's conceptual framing, its design, and the implementation of the randomization process. We also thank Sydney Krispin for her editorial support. This study was approved by the Clalit Health Service's institutional review board (0036-21-COM1), which granted a waiver of consent for this research because it was not a clinical trial but rather an organizational initiative to optimize internal policy.

supplemental material

- https://behavioralpolicy.org/publications/
- Additional Analysis

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