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Attention, intentions, and follow-through in preventive health behavior: Field experimental evidence on flu vaccination☆

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ABSTRACT

Preventive health behaviors like flu vaccination have important benefits, but compliance is poor, and the reasons are not fully understood. We conducted a large study across six colleges ($N = 9358$), with a methodology that offers an unusual opportunity to look at three potential factors: inattention to information, informed intentions to not comply, and problems following through on intentions. We also tested three interventions in an RCT. We find that inattention to information is not the primary driver of low take-up, while informed decisions to not get the vaccine, but also lack of follow-through, are important factors. A financial intervention increased take-up and had persistent, positive effects on intentions for vaccination in future years. Two low-cost "nudges" did not increase vaccination rates, although the peer endorsement nudge increased exposure to information, especially if aligned with social networks.

1. Introduction

Vaccination against influenza is a public good with important economic implications (e.g., increased workplace productivity, reduced absenteeism, lowered health care costs), as well as substantial private benefits.[1] As with many other recommended preventive health behaviors, however, compliance is poor; the fraction of the population that is vaccinated against the flu each year is well below the CDC's stated goal (CDC, 2013a).[2] The problem of low vaccination rates is not limited to the flu, but is observed for a variety of communicable diseases (CDC, 2013b). Similarly, low rates of participation are problematic, in terms of health outcomes and health care costs, for a range of other beneficial health behaviors, like medication adherence (Volpp et al., 2008b), recommended cancer screenings (Weller et al., 2009), physical exercise (Charness and Gneezy, 2009; Royer et al., 2012), or healthy diet (Dansinger et al., 2005).

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[1] Seasonal influenza has a high mortality rate, with 1 in 10,000 Americans dying each year from flu and its complications; for those over 65, the rate is 1 in 20 (Ward, 2014). Seasonal flu also results in more than 200,000 hospitalizations each year (Thompson et al., 2003), and over 75 million missed work days (Benson and Marano, 1998).

[2] The CDC recommends every adult get a yearly flu vaccine, preferably early in the fall.

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A challenge in improving compliance with recommended preventive health behaviors is that the underlying decision making has largely remained a black box. Low take-up could be caused by individuals' uncertainty about the benefits of an activity (Madrian and Shea, 2001; Duflo et al., 2006; Kessler, 2011), or inattention to relevant information (Karlan et al., 2010; Kast et al., 2011; Altmann and Traxler, 2012). Alternatively, people may be informed, but still have a strong aversion to the activity, either due to some aspect of preferences, or a strongly held prior belief that benefits are low. Or it could be that individuals *do* intend to undertake the activity, but fail to follow through on those plans. This could reflect deviations from the perfect rationality assumptions, such as present-biased preferences, or imperfect memory (O'Donoghue and Rabin, 1999; DellaVigna and Malmendier, 2006; Duflo et al., 2011; Milkman et al., 2011; Royer et al., 2012). A better understanding of the roles of these factors would shed light on the most relevant models for explaining low take-up, and help guide design of policy interventions.

The first main contribution of this paper is to partially lift the veil on the reasons for low take-up of the flu vaccine. Data for understanding decision making would ideally include: a way to assess whether individuals attend to information; a measure of intentions; and data on actual behavior, allowing the study of follow-through on intentions. Our study uses a methodology that combines these features. An electronic messaging system tracks whether subjects open e-mails about flu vaccines, provides an indicator for in-depth reading of e-mails, and elicits self-reported intentions to get vaccinated. We then match the e-mail campaign data to a second data source: information from campus health centers on whether or not individuals actually came in and got the vaccine. Subjects were not informed about being in a research study, to minimize Hawthorne effects (Levitt and List, 2011).

As is always the case, even with field experiments, the generalizability of results may be affected by the specific population and setting studied, but studying college students offers several offsetting advantages. The population is attractive due to the possibility to obtain data from the campus health centers, and to have a large sample size ($N = 9358$). To our knowledge, ours is the largest study on flu vaccination decisions to date. College students are also themselves a highly policy-relevant population for studying flu vaccination, as they are poised to enter the workforce, and formation of good habits is especially valuable if it occurs early in life.[3]

Our results reveal that lack of information, or inattention to information, are not the key factors determining low take-up of vaccine. Instead, many of those who are informed nevertheless express an intention to not get the vaccine, and among those who *do* plan to get the vaccine, many fail to follow through on these intentions. One explanation for the latter result could be that stated positive intentions were inflated, as a way to impress the health center (social desirability bias), but this seems unlikely because the health center is known to observe eventual decisions anyway.[4] Another possibility is that these individuals truly intended to come in for the vaccine, but had trouble following through on their own plans.[5]

A second contribution of the paper is an experimental test of different types of interventions for improving flu vaccine take-up. Within each campus, subjects were randomized into one of four conditions. In the control condition, students received a series of three e-mails (one initial e-mail and two reminders) from the campus health center, which provided information about how to obtain a vaccine on campus. In the three interventions, subjects received the same number and timing of e-mails as in the control group, but the e-mail content was different.

The first intervention involved a modest financial incentive for getting the vaccine at the campus health center ($30 minus any out-of-pocket cost of the vaccine), which was received within two weeks of getting the vaccine to help increase the immediacy of the reward. Our results show that the incentive is associated with a significantly higher rate of opening e-mails, reading conditional on opening, stating positive intentions conditional on reading, and following through on intentions to get the vaccine. Ultimately, the incentive had a substantial positive impact on actual vaccine take-up.

A challenge that often arises in field experiments testing the impact of incentives is that the observed response might reflect substitution. For example, a discount on healthy foods in a specific grocery store could lead to an increase in sales, but actually just reflect reduced purchases on healthy foods at other stores. In the case of our study, substitution would mean the incentive just shifted students from off-campus to on-campus vaccination. To better assess whether incentives truly affect participation we built into the study a third phase of data collection, a large-scale survey fielded among the subject population after the flu season was over, which measured (self-reported) vaccination rates on and off campus during the whole year. We find that even allowing for substitution there was a substantial increase in overall take-up

[3] Although the young may be less vulnerable to influenza than the elderly, greater efficacy of vaccine among younger adults can imply that vaccination of the young has positive externalities for the elderly (Ward, 2014). College students might be more responsive to certain interventions, such as financial incentives, than the general population, due to lower income levels. On the other hand, they are a relatively healthy and less vulnerable population, and thus it may be more difficult to motivate college students to get the vaccine, which would make our treatment estimates a lower bound.

[4] Stating intentions to come in for the vaccine, and then not following through, would not be a good strategy for making a good impression, so that the bias might even work against stating intentions to get vaccinated.

[5] One explanation for such dynamic inconsistency is quasi-hyperbolic discounting (see Laibson, 1997), such that individuals have extreme discounting of tomorrow relative to today, but have only mild discounting (standard, exponential discounting) when evaluating any two adjacent future periods. In the present, individuals postpone getting vaccinated, because the cost is immediate and the benefits accrue only in the future. When thinking about the future, their relatively mild discounting may cause them to plan to get vaccinated in the future. Preference reversals can occur, however, once the future becomes the present, because then the immediate cost will make it once again unattractive to get vaccinated. Here, present-bias could lead to perpetual postponement of getting vaccinated, even though the individual's current period self does want to get the vaccine (in the future).