

# Conscious Consideration of Herd Immunity in Influenza Vaccination Decisions

Andrew M. Parker, PhD, Raffaele Vardavas, PhD, Christopher S. Marcum, PhD,  
Courtney A. Gidengil, MD, MPH

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**Background:** Influenza vaccination decisions may be influenced by perceived risk reduction related to herd immunity.

**Purpose:** This paper examines how free-riding (i.e., foregoing vaccination because of reduced risk perceptions related to herd immunity) or protective benefits to the community affect vaccination decisions.

**Methods:** A survey of a nationally representative panel of U.S. adults (N=442 respondents; data collected and analyzed during 2012) asked about how respondents made vaccination decisions, including whether and how vaccination among the members of respondents' social networks influenced their own vaccination decisions.

**Results:** Most individuals (61%) reported that vaccination in the social network would not influence their decision. Among those perceiving being influenced by vaccination in their social network, most stated that an increase in network vaccination coverage would make them more likely to get vaccinated, rather than less. Overall, only 6% (28 of 442) gave a response consistent with the reduced-risk logic of herd immunity, which was more common among those stating that they would be less likely to get vaccinated (emphasizing free-riding) than among those more likely to get vaccinated (emphasizing social protection; 33% vs 11%, two-sided,  $p=0.0005$ ). The reduced-risk logic of herd immunity, and more specifically free-riding, is consciously considered by relatively few individuals. Far more common are social influences bolstering personal vaccination, such as peer pressure and social learning (6% vs 11%, two-sided,  $p=0.015$ ).

**Conclusions:** Interventionists may be more successful by capitalizing on existing social-influence considerations than by trying to combat the conscious lure of free-riding.

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## Introduction

Influenza vaccination is universally recommended, but uptake is dismal among adults, at 46%.<sup>1</sup> The decision to be vaccinated depends largely on the perceived risks and benefits,<sup>2</sup> potentially including the perceived risk or protection provided by an individual's social networks. If people associate transmission risk with the infectiousness of their social networks,

increasing vaccination, resulting in “herd immunity,” should reduce the expected benefits of personal vaccination because individuals perceive a lower likelihood of contact with infection.<sup>3</sup> Such reduced risk perceptions related to herd immunity may lead individuals to act in their own interest and forgo vaccination—the so-called free rider problem.<sup>4,5</sup>

Other influences arising from social networks, such as social learning and peer pressure, could lead to increased or decreased vaccination rates. In particular, the flip side to free-riding is the “indirect protection” of others by one's own vaccination. Individuals electing to vaccinate not only protect themselves but also contribute to herd immunity, protecting those in their social networks.<sup>6</sup>

This brief report extends current understanding of social influences on vaccination decisions, which has been based largely on experimental studies,<sup>6,7</sup> small-sample qualitative

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From the RAND Corporation (Parker), Pittsburgh, Pennsylvania; the RAND Corporation (Vardavas, Marcum), Santa Monica, California; and the RAND Corporation and Division of Infectious Diseases (Gidengil), Children's Hospital Boston, Harvard Medical School, Boston, Massachusetts

Address correspondence to: Courtney A. Gidengil, MD, MPH, RAND Corporation, 20 Park Plaza, Suite 920, Boston MA 02116. E-mail: gidengil@rand.org.

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**Table 1.** Coding scheme classifying open-text reasons for being more or less likely to get vaccinated

Code	Example
<b>Codes for respondents who agreed that vaccination in their social network would make them more likely to get vaccinated</b>	
Social influence	“Because the people I surround myself with are responsible enough to take care of themselves and others, so why shouldn’t I?”
Specifically herd immunity (protecting others)	“Because none of us would be able to pass on the flu to each other.”
Risk of getting sick	“I believe getting vaccinated prevents me from getting the flu and less colds.”
Past behavior	“I get vaccinated for the flu every year.”
Reduced barriers	“I am likely to get vaccinated when it is easily available to me.”
<b>Codes for respondents who agreed that vaccination in their social network would make them less likely to get vaccinated</b>	
Herd immunity (free-riding)	“If everyone else is vaccinated I wouldn’t need to be because the people around me aren’t sick and therefore I won’t get sick.”
Don’t need the vaccine	“I just don’t think I need it, I have never been sick with anything like it.”
Vaccine not effective/safe	“They do not work, they are filled with things that should not be injected into the human body.”
Past behavior	“I have NEVER had a flu shot.”
Barriers to vaccination	“Because it cost money to get the shot.”
Low trust in authorities	“I do not trust the government.”

research,<sup>8,9</sup> and limited populations such as college students. It is hypothesized that herd immunity, and specifically free-riding, will play a relatively minor conscious role in vaccination decisions. The paper presents open-ended reporting of a national sample’s perceptions related to (1) the risk-reduction logic of herd immunity; (2) the two logical extensions of the herd immunity concept—free-riding and protection of others—and (3) how these perceptions relate to the likelihood of influenza vaccination.

## Methods

From April to June of 2012, a web-based survey was fielded to a nationally representative sample of U.S. adults aged  $\geq 18$  years participating in RAND’s American Life Panel ([mmicdata.rand.org/alp/](http://mmicdata.rand.org/alp/)). The study protocol was approved by the IRB of the RAND Corporation, and analyses were conducted in 2012.

As part of a larger survey, respondents were asked: *If enough people that you have regular, face-to-face contact with get vaccinated, would you be more or less likely to get vaccinated yourself?* Response options were *much more likely, somewhat more likely, neither more nor less likely, somewhat less likely, and much less likely*. Respondents were then asked the open-ended question: *Why do you think you would be more [less] likely to get vaccinated?* (excluding those who were neither more nor less likely to be vaccinated). Respondents also reported on influenza vaccination during the prior year.

The coding scheme for the open-text responses incorporated reasons for being more or less likely to get vaccinated, with codes based on initial review of responses and existing literature (Table 1). Two researchers coded responses, achieving agreement on 86% of

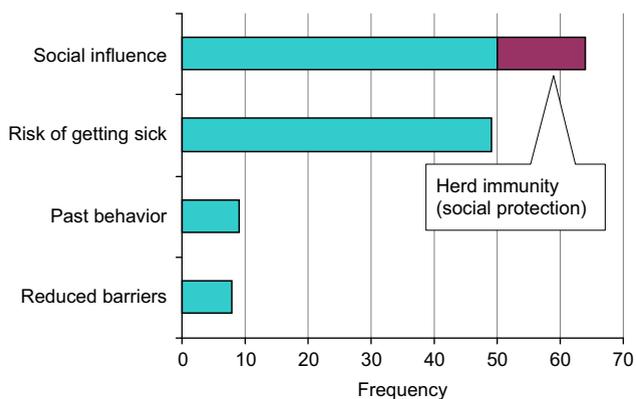
passages and resolving discrepancies by consensus. Frequency distributions summarize responses. Chi-squared tests of independence compare relationships between two categorical variables; z-tests compare proportions in independent samples; and McNemar tests compare proportions among dependent samples.

## Results

The overall response rate was 85.5% (N=442). The mean age was 49.7 years; 47.1% were male, 86.4% were white, and 44.1% had a bachelor’s degree or higher. Half (44.8%) reported influenza vaccination in the prior year, consistent with CDC’s 46% estimated vaccination rate.<sup>1</sup>

Most (61%) reported that vaccination in their social network would not influence their decision to receive an influenza vaccine. Of the 39% of respondents who did report that the rate of vaccination in their network influenced their decision, most (132 of 174) agreed that it would make them more likely to get vaccinated. Self-reported vaccination rates were highest for this group (64.1%), followed by those reporting no influence (39.7%) or a negative influence (19.0%,  $p < 0.001$ ).

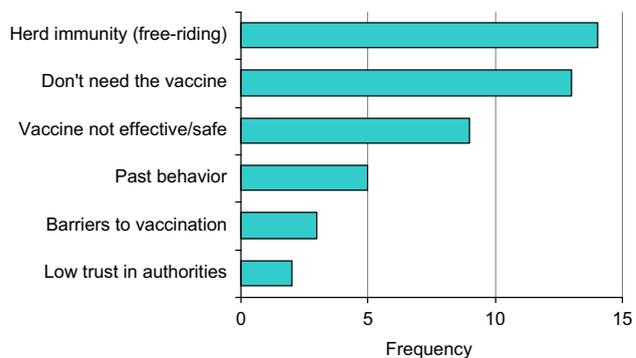
Of 132 respondents stating that vaccination in their social network would make them more likely to get vaccinated, 126 (95%) gave open-ended explanations, and 64 (51%) were socially related (Figure 1). Fourteen of those 64 (22%) reflected the social-protection logic behind herd immunity (“fewer people will get sick”). However, most of the social reasons (50 of 64) related to social influence, either through information obtained



**Figure 1.** Reasons for getting vaccinated if enough of those around you are getting vaccinated

from the social network (“if many around me are getting vaccinated, it must be a good idea”) or social pressure (“peer pressure”). With regard to actual vaccination, those giving any socially related reason were somewhat more likely to report getting vaccinated than the rest of the sample (63% vs 44%,  $p=0.05$ ), but those giving social-protection reasons were substantially more likely to get vaccinated (92% vs 44%,  $p=0.0005$ ).

Of the 42 who stated that vaccination in their network would make them less likely to get vaccinated, 40 (95%) gave text responses (Figure 2). Fourteen of those 40 (35%) mentioned socially related factors, all consistent with herd immunity and free-riding (“less likely those around me will get the flu and pass it on to me”). This rate of herd-immunity-related responses was significantly higher than it was among those saying that they would be more likely to get vaccinated if enough people in their social network got vaccinated ( $p=0.0005$ ). Compared to the rest of the sample, those giving free-riding-related reasons were no more or less likely to self-report actually getting vaccinated (36% vs 45%, nonsignificant). Overall, only 6% (28 of 442) gave a response consistent with the reduced-risk logic of herd immunity (either free-riding or social protection).



**Figure 2.** Reasons against getting vaccinated if enough of those around you are getting vaccinated

## Discussion

This study examines whether the reduced-risk logic of herd immunity is consciously considered in vaccination decisions. Most people asserted that vaccination by those around them is irrelevant to their personal vaccination decisions, but those seeing an influence were more likely to increase than decrease their willingness to get vaccinated. Even among those claiming to be influenced by their social network, most did not express thoughts about herd immunity specifically.

Many gave nonsocial reasons, even though the preceding question asked specifically about social influences, highlighting the rarity of herd immunity as a prominent conscious consideration. Proportionally, the logic of herd immunity was more likely among those who stated that if enough people around them got vaccinated, they would be less likely to get vaccinated (consistent with free-riding) than among those who stated that they would be more likely to get vaccinated (consistent with protecting others). Overall, these results support the main hypothesis.

The data are self-reports (prompted by specific question wording) and thus limited to cognitions of which people are aware and willing to report.<sup>10</sup> Given that free-riding is a rational extension of recognizing herd immunity,<sup>4,5</sup> it is appropriate to consider conscious rationales. Although the number of respondents providing open-ended responses limits the ability to cross-tabulate with other factors, the diverse national sample provides evidence on the prevalence and influence of herd immunity considerations and complements past research using small interview samples<sup>8,9</sup> and detailed scenarios.<sup>6,7</sup> Although free-riding was not consciously considered by most of the current sample, some may subconsciously take advantage of herd immunity. That said, models of vaccination behavior<sup>11,12</sup> often focus on herd immunity, neglecting the potentially greater effects of social learning and social pressure.<sup>13</sup>

The reduced-risk logic of herd immunity is consciously considered by few, and these considerations are as likely to relate to social protection as to free-riding. Far more common are social influences bolstering vaccination, such as peer pressure and social learning. Instead of trying to combat the conscious lure of free-riding, interventionists may be more successful if they capitalize on existing social-influence considerations.

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