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Making vaccine refusal less of a free ride

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Abbreviations: AAP, American Academy of Pediatrics

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Herd immunity against vaccine-preventable diseases is a public good because it is both non-excludable (meaning that there is no way to exclude people from using it) and non-rivalrous (meaning that one person's use does not limit or restrict others' use). Like other public goods, such as lighthouses, street lights and national defense, herd immunity is vulnerable to the "free rider" problem. We discuss four conventional responses to the free rider problem (participation mandates, exclusion, incentives, and social norms) and highlight how a public good perspective can inform the design of interventions to increase vaccine acceptance.

If vaccination is so beneficial, why doesn't everyone agree to it? In his insightful review,[1] Ropeik identifies several salient emotional factors related to the risk perceptions that shape parental vaccine hesitancy and decision-making. Given that many of these emotional factors make conventional approaches to health education ineffective, Ropeik advocates policy responses to limit the costs and harms associated with vaccine refusal. Suggested responses include making opting out of vaccine mandates more difficult, providing incentives to vaccinate, restricting unvaccinated children's participation in social activities, and increasing mandatory vaccines for adults. We build on Ropeik's suggestions here by highlighting the public good aspects of herd immunity and reflecting on how this perspective can further inform the design of interventions to increase vaccine acceptance.

Herd immunity against vaccine-preventable diseases is a public good because it is both non-excludable (meaning that there is no way to exclude people from using it) and non-rivalrous (meaning that one person's use does not limit or restrict others' use).[2,3] Like other public goods, such as lighthouses, street lights and national defense, herd immunity is vulnerable to the "free rider" problem: Those who do not chip in to support the public good can still benefit from it. The free rider problem typically leads to underinvestment in activities that benefit others (like planting flowers in your front yard for all to enjoy) and overinvestment in activities that hurt others (like driving polluting cars).

There are many possible responses to the free-rider problem; we highlight four responses here. First, free riders can be forced to contribute to the public good, which is essentially what school-entry immunization mandates do in the case of herd immunity against vaccine-preventable diseases. As Ropeik notes, however, mandates can increase parental perceptions of vaccine risks. Second, the benefits of herd immunity can be made excludable. While it is not feasible to make herd immunity itself excludable (short of forcing unvaccinated children to only socialize or attend school with other unvaccinated children), it is possible to exclude some children from enjoying the benefits of herd immunity. Ropeik's suggestion to restrict the community and social activities in which unvaccinated children can participate accomplishes this exclusion, in addition to reducing others'

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potential exposure to disease. Children whose parents choose not to vaccinate are not permitted to enjoy the socialization that is made safer by the herd immunity generated by other parents' willingness to vaccinate. While most state laws related to exemption from school-entry vaccine mandates allow for unvaccinated children's exclusion from school in the case of an outbreak, more stringent exclusion policies to reduce outbreak risk could make parents think twice about refusal.

Third, incentives could be provided to promote vaccination. Incentivizing the production of a public good, either through rewards or fines, "internalizes" the economic externalities produced. While extrinsic incentives can work in many contexts, they risk reducing intrinsic motivation for the target behavior. Incentives that are posed as rewards for vaccination are also economically inefficient, in that they often reward those who would vaccinate anyway. On the other hand, while penalties for non-vaccination can be better targeted, they may create a way to "buy out" of vaccination. For example, when a day care program introduced fines for parents who came late to pick up their children, late pick-ups paradoxically increased[4]—as if parents interpreted the fines as a price that could be paid, similar to purchasing an indulgence. In the case of vaccination, incentives may work best when aimed at health care providers (through insurance payments) or at schools, who could be incentivized to keep exemption rates to a minimum.

Fourth, social norms could be reshaped to induce prosocial behavior. There is considerable evidence that letting people know what other people do is one of the most effective ways of increasing that behavior. In a classic study, hotel guests prompted by a sign in bathroom about the environmental benefits of reuse were much more likely to reuse their towels if the sign included wording indicating that "most hotel guests reuse their towels."[5] This simple social nudge has been replicated in many other settings. In another study performed at a university health service, the most powerful way to convince students to get vaccinated for influenza was telling them that a large proportion of fellow students had also opted for vaccination.[6] A challenge in promoting a social norm in favor of vaccination is to make visible an activity that for many parents is both private and routine; creative examples of tackling this challenge in other contexts include stickers that brag about blood donation or voting, or prompts to tweet a health behavior throughout to your social network are useful examples. The opposite approach—making vaccine refusal more visible—is likely to backfire, however. A one billion dollar National Youth Anti-Drug Media ad campaign, which aimed to get children aged 12–18 to reject drugs, actually increased drug use[7]—almost certainly because while the ad's manifest message was that drugs are bad for you, its latent message was that many teenagers use them.

The most fundamental principle of persuasion is that people do things for their own reasons, not your reasons. Herd immunity against vaccine-preventable childhood diseases is a public good—one that is created by self-interest, but cannot be maintained by self-interest. It is also a "last mile" problem: Vaccine coverage is generally very good, but reaching those few who resist is difficult. Indeed, it is the last mile of herd immunity that is the most fragile, where self-interest begins to create free-riding defectors rather than pro-social contributors. For this reason, we should recognize that policy creation and policy promotion require fundamentally different approaches. Policy responses to vaccine refusal must reflect the realities of how individuals make decisions, including their perceptions of risk, vulnerability, altruism, and obligation.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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