Using Behavioral Science to Increase COVID-19 Vaccination Uptake: Synthesis of Evidence from the Office of Evaluation Sciences Portfolio

The COVID-19 vaccine rollout represents a critical time in vaccination distribution and uptake efforts, and knowledge sharing across agencies can play a key role. To inform COVID-19 vaccination efforts, this document describes lessons learned from eight vaccination uptake evaluations conducted at scale in the U.S. government context by the Office of Evaluation Sciences (OES).[1]

What is the Office of Evaluation Sciences (OES)?

OES is an interdisciplinary team of experts within the Federal government, housed at the U.S. General Services Administration. Our team translates and tests evidence-based insights into concrete recommendations for how to improve government.

Lessons Learned from OES's 8 Vaccination Uptake Evaluations

From 2015 to 2019, OES conducted eight randomized evaluations of **behaviorally-informed direct communications to promote vaccination uptake**. These evaluations had a median sample size of 55,000 recipients and used administrative data to measure uptake of influenza and other recommended adult and childhood vaccinations. The evaluations were conducted in collaboration with the Department of Health and Human Services Office of Infectious Disease and HIV/AIDS Policy (formerly the National Vaccine Program Office) as well as directly with implementation entities such as state Departments of Health and US Department of Veterans Affairs health facilities.

The interventions ranged from email, postcard, letter, or social media notifications for potential vaccine recipients, to a more formal report card of a school's vaccination compliance rate for school administrators, to an intensive change to a hospital's electronic health record (EHR) clinical reminders for clinicians. The behavioral insights used in the interventions included reminders, planning prompts, social norms messaging, persuasive appeals, and message timing variations. Four key lessons are particularly important in anticipating later stages of the U.S. COVID-19 vaccination program, when vaccine supply matches or exceeds demand:

(1) Interventions: Behaviorally-informed direct communications (letters, emails, etc.) can increase vaccination rates at scale but may have smaller, less reliable effects on vaccination behavior than the published literature suggests.
OES evaluations were implemented within active vaccination efforts by relevant parties, measured actual vaccination uptake with administrative data, have a median sample size of 55,0000 participants,

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and are reported with no publication bias. These attributes make the OES evaluations a good benchmark for what to expect from direct communications targeting vaccination uptake at scale.

Two of the eight evaluations found significant (yet small) increases in vaccination, resulting in hundreds of additional vaccinations. But, a meta-analysis of the eight evaluations showed a small and statistically non-significant overall effect on vaccination uptake, with a confidence interval suggesting that interventions like those in the OES evaluations are unlikely to reliably generate effects of more than about 0.6 percentage points.

There are several published examples of similar interventions producing increases of 4 or more percentage points in vaccination uptake, in much smaller samples (< 10,000 recipients).[2] This academic literature might (mis)lead those planning a vaccination campaign to overestimate the likely effects of direct communications on vaccination uptake. The effect sizes observed in the OES evaluations suggest that direct communications should be used alongside, not instead of, commercial ad campaigns and vaccination policy.

(2) <u>Rapid evaluation</u>: Rapid evaluations of vaccination-uptake interventions in real-world contexts at scale are essential for learning what works in specific contexts for populations of interest.
Interventions may look different when scaled up due to practical constraints or differences in the populations targeted. These practical constraints and population differences will vary over time during the COVID-19 vaccination program, as well as between regions and implementation entities. These differences may change the efficacy of the intervention in ways that are hard to identify without evaluation.

Additionally, COVID-19 vaccination beliefs and uptake are expected to differ across recipient populations, and rapid evaluations at scale will identify what works for each target population. Even if the overall result of an intervention is unchanged, evaluation at scale can build a better understanding of how age, race, gender, or other sample characteristics moderate intervention effects.

(3) <u>Randomized evaluation infrastructure</u>: Designing vaccination administration systems to support randomized evaluations can make evidence building easier and cost-effective.
An efficiently-designed vaccine delivery system contributes to efforts to build evidence at scale. Standardized immunization information systems support rapid evaluation by enabling random assignment of potential vaccine recipients to different intervention strategies. Data collection and analysis can be facilitated by ensuring that state immunization registries and other health records are updated rapidly and comprehensively to capture COVID-19 vaccination events. When an intervention (e.g. a communication strategy or procedural change) proves effective in one region, this creates real-time learning and enables adoption possibilities for other regions.

(4) <u>Cost-effectiveness</u>: Additional evidence is needed to evaluate the cost effectiveness of behaviorally-informed direct communications relative to other interventions.
More evidence is needed about the cost per additional person vaccinated of different interventions. Communications are often low-cost per person targeted, but cost-effectiveness depends on the

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[2] Milkman, K. L., *et al.*(2011); Rand, C.M. *et al.*, (2015); Stockwell, M. S. *et al.* (2012).

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relative benefits of possible approaches. Collecting data on administrative costs to design and deliver COVID-19 vaccination uptake interventions will inform this question.

OES Evaluation Web Pages

1. [Encouraging flu vaccination uptake among Medicare beneficiaries](#)
2. [Encouraging flu vaccination uptake among pregnant women at Duke Medical Center](#)
3. [Testing variations of maternal immunization messages in a social media campaign](#)
4. [Encouraging uptake of the recommended adult vaccines among seniors in Louisiana](#)
5. [Increasing immunization compliance among schools and daycares in a mid-sized city](#)
6. [Increasing flu vaccination uptake at the VA St. Cloud Health Care System](#)
7. [Increasing flu vaccination uptake at the VA New York Harbor Health Care System](#)
8. [Increasing vaccine uptake among Veterans at the Atlanta VA Health Care System](#)

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