Disparities in COVID-19 Vaccine Booster Uptake in the USA: December 2021–February 2022

J Gen Intern Med 37(11):2918–21
DOI: 10.1007/s11606-022-07648-5

BACKGROUND

Disparities in initial COVID-19 vaccination have narrowed,[1] although disparities in booster uptake among the vaccinated have received little study.

METHODS

We analyzed respondents aged ≥ 18 to the Household Pulse Survey (Phase 3.3), fielded December 1–13, 2021 (n = 60,826); December 29, 2021–January 10, 2022 (n = 74,995); and January 26–February 7, 2022 (n = 75,482). Respondents were contacted by text message and email and completed the survey online. Response rates were 5.8%, 7.2%, and 7.2% in our three samples, respectively. Each survey ascertained the number of vaccine doses and brand of initial dose. We limited our sample to "vaccinated" adults, defined as having received 1+ vaccine dose among initial recipients of the Janssen vaccine and 2+ doses among initial recipients of Pfizer-BioNTech or Moderna. We defined individuals as "boosted" if they received 2+ or 3+ doses, respectively.

We examined booster rates according to health insurance, four socio-demographic characteristics (gender, race/ethnicity, income, and education), and six health conditions (anxiety [positive GAD-2 screen], depression [positive PHQ-2 screen], and vision, hearing, mobility, and memory difficulties).

We performed separate logistic regressions examining the association between each characteristic and booster uptake, unadjusted and adjusted for age, given the known correlation between age and vaccine uptake.[1]

Received March 30, 2022
Accepted April 28, 2022
Published online May 24, 2022

We used weights that account for non-response and permit nationally representative estimates, and Stata/SE survey procedures to calculate confidence intervals.

RESULTS

Among n = 182,779 vaccinated respondents, the proportion boosted rose from 42.2 to 62.8% from our first to final sample (data not shown).

Figure 1 displays odds ratios for booster receipt by insurance and socio-demographic characteristics. Relative to persons with non-VA coverage, the uninsured had lower booster uptake with (OR 0.45; 95% CI 0.40, 0.50) and without (OR 0.35; 95% CI 0.31, 0.39) age adjustment, while those with VA coverage showed mixed results. Compared to cisgender males, cisgender females had lower odds of booster receipt with (OR 0.91; 95% CI 0.88, 0.94) and without (OR 0.94; 95% CI 0.90, 0.97) age adjustment; the lower odds of transgender persons were non-significant after age adjustment. Compared to White adults, Black (OR 0.52; 95% CI 0.49, 0.55), other/multiple race (0.64; 95% CI 0.58, 0.70), and Hispanic (OR 0.51, 95% CI 0.48, 0.54) individuals had lower booster uptake without age adjustment and Asian individuals had higher uptake; differences persisted after age adjustment. Less-educated and lower-income individuals had lower booster uptake.

Individuals with depression, anxiety, and visual or memory impairment had reduced booster uptake with and without age adjustment; those with hearing and mobility difficulties had higher booster uptake before age adjustment but lower age-adjusted uptake (Fig. 2).

CONCLUSIONS

Among vaccinated (presumably non-vaccine-hesitant) adults, uninsured, cisgender-female, Black, Hispanic, lower-socioeconomic-status, depressed, and anxious individuals, and those with visual and memory impairment, were less likely to receive boosters.

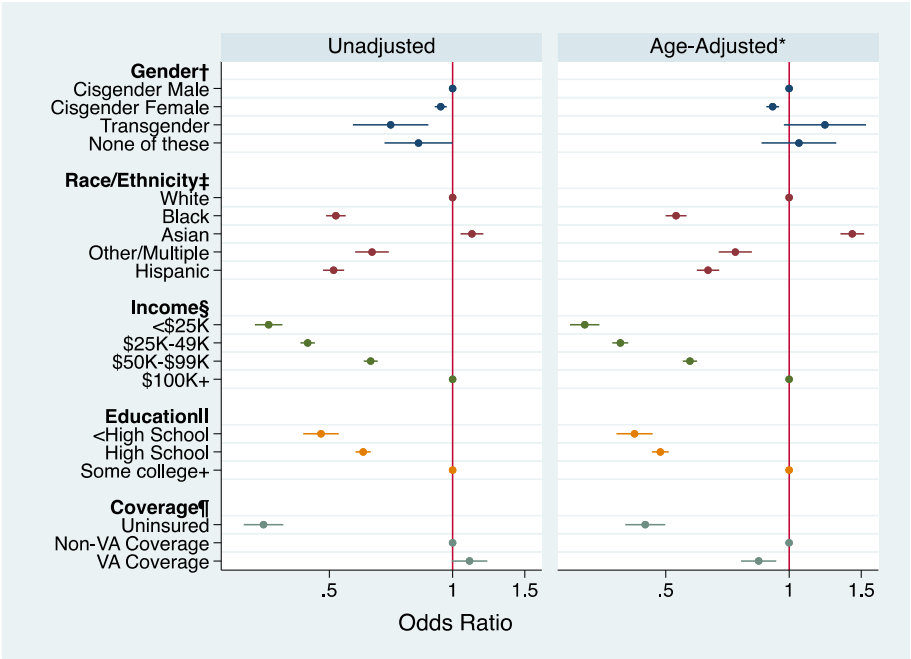

Figure 1 Association of health insurance and socio-demographic characteristics with booster uptake among COVID-19 vaccinated individuals, with and without age adjustment (n = 182,779). *Age categorized as 18–29, 30–39, 40–49, 50–59, 60–69, 70–79, and 80+ years. Age estimated as 2022 − birth year. †Gender was based on two questions: (1) "What sex were you assigned at birth, on your original birth certificate?" (Responses included male and female; data imputed by the Pulse for ~ 1% of those with missing data), and (2) "Do you currently describe yourself as male, female or transgender?" (Responses included male, female, transgender, and "none of these"; data not imputed for those with missing responses). Those who indicated a current gender different than the one assigned at birth were asked a follow-up confirmation question to ensure the reported responses were correct. Following the approach of the Pulse, we defined individuals as transgender if they either (1) indicated a current gender different than the one assigned at birth or (2) provided the "transgender" response to the question about current gender. However, we treated all of those with imputed sex at birth as missing, an approach suggested in Pulse documentation albeit not used in its official specifications. N = 1804 with missing data for our constructed gender variable, leaving N = 180,975 for analysis. ‡Race/ethnicity defined as White = non-Hispanic White only; Black = non-Hispanic Black only; Asian = non-Hispanic Asian only; other/multiple = "any other race alone, or race in combination"; Hispanic = those of any race who are of "Hispanic, Latino, or Spanish origin." None with missing data. §Income is family income pre-taxes; we reduced this 8-category variable to 4 categories. N = 27,917 with missing data, leaving n = 154,862 in analyses. ||Education defined as < high school = "less than high school" or "some high school"; high school = "high school graduate or equivalent (for example, GED)"; some college+ = "some college, but degree not received or is in progress" or associate's, bachelor's, or graduate degree. None with missing data. ¶Uninsured defined as those who do not report any public (Medicare; Medicaid or other government assistance plan; or VA coverage) or private (insurance through an employer or union; purchased directly from an insurance company; or TRICARE/other military) coverage; those with only "other" or Indian Health Service coverage are considered uninsured. VA coverage includes "those who have ever used or enrolled for VA health care." N = 17,093 with missing data, leaving N = 165,686 for analysis.

Numerous studies have examined initial COVID-19 vaccination according to coverage, race/ethnicity, disability,[2] and mental health,[3] though few have examined disparities in boosters. CDC publishes administrative data on boosters by age, sex, and race/ethnicity, although race data is missing for ~one-third.[1] The racial/ethnic disparities in boosters we found are consistent with that administrative data.[1] Although vaccination rates may be overestimated in the Pulse survey,[4] it uniquely permits timely assessment of insurance-, mental-health-, socioeconomic-, and disability-related disparities in booster uptake. Additionally, while our booster rates are higher than those suggested by CDC data, they are similar to those of the Kaiser Family Foundation COVID-19 Vaccine Monitor, which offers reassurance in light of the Pulse's low response rate.

Lower uptake of both initial vaccination and boosters by the uninsured suggests that healthcare access affects use of preventive services, even when free. Lack of primary care may contribute; both county-level primary-care-physician density[5] and receipt of a recommendation for vaccination from a healthcare provider[6] have been associated with higher initial COVID-19 vaccine uptake rate. However, other factors may play a role. While we assumed that fully vaccinated individuals are less vaccine hesitant, it is plausible that hesitancy could develop among some after initial vaccination. Moreover, lack of paid time off and limited access to transportation could impede booster uptake for others. Low uptake among the visually impaired suggests that inadequate accessibility may reduce booster access for the disabled.

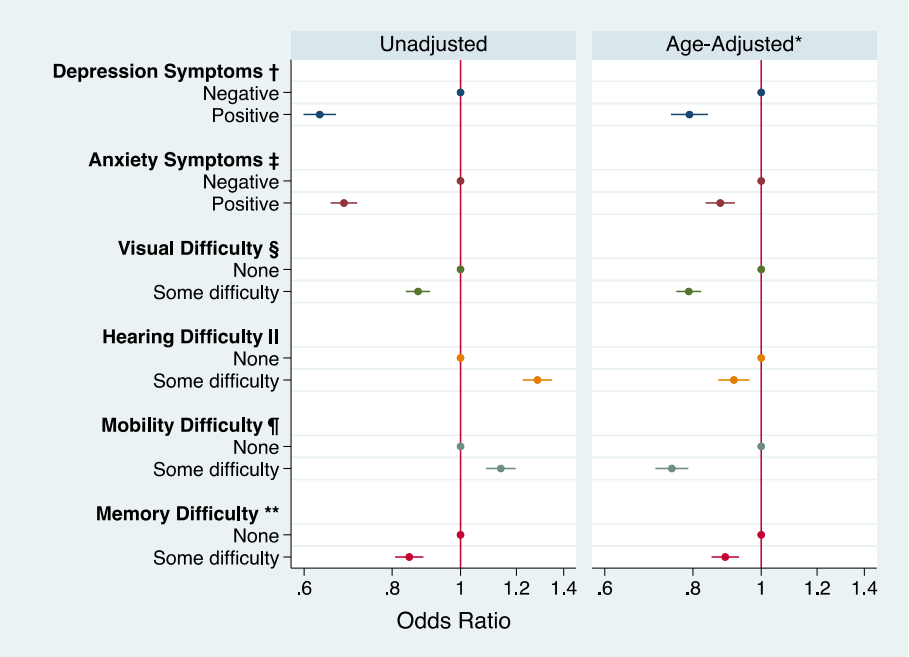

Figure 2 Association of health characteristics with booster uptake among COVID-19 vaccinated individuals, with and without age adjustment (n = 182,779). *Age categorized as 18–29; 30–39; 40–49; 50–59; 60–69; 70–79; and 80+. Age was estimated as 2022 − birth year. †Ascertained with two questions adapted from the PHQ-2 depression screener: "Over the last 2 weeks, how often have you been bothered by having little interest or pleasure in doing things?" and "Over the last 2 weeks, how often have you been bothered by feeling down, depressed, or hopeless?" Responses to each included the following: not at all (=0); several days (=1); more than half the days (=2); and nearly every day (=3). We then summed numerical values for the two responses; those with a score of 3+ are considered screen positive for depression. N = 14,699 with missing responses, leaving N = 168,080 for analysis. ‡Ascertained with two questions adapted from the GAD-2 anxiety screener: "Over the last 2 weeks, how often have you been bothered by feeling nervous, anxious, or on edge?" and "Over the last 2 weeks, how often have you been bothered by the not being able to stop or control worrying?" Responses include not at all (=0); several days (=1); more than half the days (=2); and nearly every day (=3). We then summed numerical values for the two responses; those with a score of 3+ are considered screen positive for anxiety. N = 14,540 with missing data, leaving N = 168,239 for analysis. §Ascertained with the question, "Do you have difficulty seeing, even when wearing glasses?" Responses include (1) "No—no difficulty"; (2) "Yes—some difficulty"; (3) "Yes – a lot of difficulty"; (4) "Cannot do at all." We dichotomized these responses as none (response 1) or some difficulty (responses 2–4). N = 18,687 with missing data, leaving N = 164,092 for analysis. ||Ascertained with the question, "Do you have difficulty hearing, even when using a hearing aid?" Responses and outcome same as for visual difficulties above. N = 18,933 with missing data, leaving N = 163,846 for analysis. ¶Ascertained with the question, "Do you have difficulty walking or climbing stairs?" Responses and outcome same as for visual difficulties above. N = 18,625 with missing data, leaving N = 164,154 for analysis. **Ascertained with the question, "Do you have difficulty remembering or concentrating?" Responses and outcome same as for visual difficulties above. N = 18,741 with missing data, leaving N = 164,038 for analysis.

Ongoing medical responses, e.g., periodic revaccination, will be key to reducing morbidity and mortality from COVID-19. Outreach to socially and medically disadvantaged groups, including those with disabilities, together with reforms that improve access to care, may be needed to reduce the pandemic's unequal toll.

Adam Gaffney, MD, MPH[1,2]
David U. Himmelstein, MD[1,2,3,4]
Danny McCormick, MD MPH[1,2]
Steffie Woolhandler, MD MPH[1,2,3,4]

[1]Department of Medicine, Cambridge Health Alliance, Cambridge, MA, USA
[2]Harvard Medical School, Boston, MA, USA
[3]Hunter College, City University of New York, New York, NY, USA
[4]Public Citizen Health Research Group, Washington, DC, USA

Corresponding Author: *Adam Gaffney, MD, MPH; Harvard Medical School, Boston, MA, USA (e-mail: agaffney@cha.harvard.edu).*

Declarations:

Disclosures: *Adam Gaffney, David Himmelstein, Steffie Woolhandler, and Danny McCormick are, or have served as, leaders of Physicians for a National Health Program (PNHP), a non-profit organization that favors coverage expansion through a single-payer program; however, none of them receive any compensation from that group, although some of Dr. Gaffney's travel on behalf of the organization was previously reimbursed by it. The spouse of Adam Gaffney is an employee of Treatment Action Group (TAG), a non-profit research and policy think tank focused on HIV, TB, and hepatitis C treatment.*

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