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Determinants of influenza vaccination among high-risk Black and White adults

Sandra Crouse Quinn [a,*], Amelia M. Jamison [b], Vicki S. Freimuth [c], Ji An [d], Gregory R. Hancock [d]

[a] Department of Family Science, School of Public Health, University of Maryland, 4200 Valley Drive, College Park, MD 20742-2611, United States
[b] Maryland Center for Health Equity, University of Maryland, College Park, MD, United States
[c] Center for Health and Risk Communication (Emeritus), University of Georgia, Athens, GA, United States
[d] Department of Human Development and Quantitative Methods, University of Maryland, College Park, MD, United States

A B S T R A C T

Background: Adults with chronic conditions are at much greater risk of influenza-related morbidity and mortality, yet flu vaccine uptake remains suboptimal. Research focused on the high-risk population has been limited, particularly related to racial disparities in vaccination. We explore a broad range of demographic, racial, and psychosocial factors to identify predictors of vaccination among high-risk adults, with a focus on identify differences between Black and White adults.
Methods: We conducted an online survey in March 2015, utilizing international research firm GfK's KnowledgePanel, for a nationally representative sample of Black and White adults (≥18, USA) and limited analysis adults with high-risk of influenza-related complications. Using two-way ANOVA, we assessed demographic, racial, and psychosocial predictors across vaccine uptake in the past five years and across racial group.
Results: 424 (52.2%) Black and 388 (47.8%) White respondents with high-risk complications completed the survey. 383 (47.3%) reported vaccination annually, 99 (12.2%) most years, 104 (12.9%) once/twice, and 223 (27.6%) never. ANOVA confirmed significant differences in vaccine behavior for most demographic predictors (except education), all racial factors (including racial fairness, experiences of discrimination, etc.), and most psychosocial factors (including vaccine attitudes, trust in the vaccine, etc.). ANOVA confirmed significant differences for most factors by race. We observed significant interaction effects between race and vaccine behavior for subjective social status, access to medical care, knowledge of vaccine recommendations, vaccine attitudes, perceived side effect risks, descriptive norms, subjective norms, flu vaccine hesitancy, and flu vaccine confidence, thus implying racial differences in the connection between vaccine uptake and key demographic, racial, and psychosocial factors.
Conclusions: This study provides a novel examination of flu vaccine behavior among high-risk Blacks and Whites that identified factors influencing vaccine uptake. We found significant differences by race. Health care professionals can use this information to more effectively target high-risk adults during flu season.

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1. Introduction

Adults with certain chronic diseases are at greater risk for influenza-related complications, including hospitalizations and death [1]. These high-risk conditions include asthma, chronic lung disease, heart disease, neurological conditions, kidney and liver disorders, endocrine disorders (including diabetes), and living with weakened immune systems (including adults living with HIV and cancer) [1]. Flu can exacerbate cardiovascular diseases, resulting in increased cardiac dysfunction and heart failure, worsen type II diabetes, and further complicate breathing for those with asthma and other lung conditions [2–5]. A recent meta-analysis concluded that influenza comorbidity with any single risk factor was significantly associated with pneumonia infection, hospital admission, admission to an intensive care unit, and death [6].

The Advisory Committee on Immunization Practices (ACIP) strongly recommends yearly vaccination for this high-risk group, a recommendation echoed by major medical organizations [5,7–10]. During the 2015–16 flu season, only 46% of high-risk adults age 18–64, and 63% of all adults over age 65 were immunized [11]. Furthermore, there is evidence of racial disparities among high-risk populations, with racial/ethnic minorities less likely to receive an influenza vaccine [12–14].

Despite the importance of immunization for high-risk groups, scholarship on this high-risk population is still limited. Existing studies have utilized national datasets to confirm suboptimal influenza vaccination, but are limited in their investigation of psychosocial factors that explain vaccination behavior [13,15,16]. Known predictors tend to be based on demographics and healthcare access; influenza vaccination rates increase with age, the number of comorbid conditions, and as access to care improves [13,15,16]. Vaccination rates also vary by condition, with separate studies dedicated to specific conditions, such as asthma or COPD, but fewer comprehensive investigations [16–19]. While studies of national datasets are useful in documenting the prevalence of influenza immunization among high-risk populations, they are limited in their ability to explore the full range of factors that may influence vaccine decisions, and consequently, to assist in increasing vaccination rates. Furthermore, in most studies, analysis has been limited to vaccine behavior for a single flu season.

Racial disparities in immunization among high-risk populations are even less studied. This is particularly concerning when considering that minority populations shoulder a disproportionate burden of many chronic diseases, placing them at greater risk for influenza-related complications [12]. There is a well-documented disparity in influenza immunization in the total population, with Black adults significantly less likely to be immunized than White adults [11,20]. Research on the racial disparities in influenza immunization in the general population have identified several psychosocial and behavioral factors associated with vaccine uptake including; perceived risk, trust, vaccine attitudes, social norms, and experiences of racism in the healthcare system [20–22]. Among the high-risk populations, this disparity varies by age group and disease type but has been observed under varying conditions in several studies [13,23,24].

This study aimed to assess immunization attitudes and behaviors among Black and White adults at higher risk for influenza-related complications. The first objective was to document vaccine behaviors in the past five years for high-risk Black and White adults. A second objective was to test for the main effect of vaccine behavior, the main effect of race, and also identify any interaction effects associated with vaccine behavior and race across demographic, racial, and psychosocial factors.

2. Methods

In this cross-sectional study, we conducted a nationally representative survey of non-institutionalized, non-Hispanic, White and Black adults ($\geq$18 years) residing in the United States. Analysis was limited to high-risk adults, who self-identified as having one or more of these conditions: asthma, chronic bronchitis, COPD, cancer (all types except for skin cancer), cystic fibrosis, diabetes, epilepsy, heart attack, heart disease, high blood pressure, HIV/AIDS, kidney disease, and/or stroke.

Theoretically, we were guided by the principles of Public Health Critical Race (PHCR) Praxis, an interdisciplinary approach, rooted in the scholarship of Critical Race Theory, which seeks to explicitly highlight the role of race in understanding racial disparities in health [25,26]. We designed our survey instrument to assess a wide range of vaccine attitudes and behaviors, building upon extensive preliminary qualitative research with Black and White adults in the Washington, DC metropolitan area (n = 110) [27]. Qualitative research was guided by the grounded theory, an inductive and iterative process that is designed to explore emergent themes [28]. All survey items were pre-tested in cognitive interviews (n = 16) to ensure item clarity. We contracted with The GfK Group to conduct the survey. To recruit participants for its KnowledgePanel, GfK utilizes an address-based sampling frame that captures approximately 97% of U.S. households, including those without landline telephone service or Internet access [29]. Panel members are provided with laptops and Internet access, if needed. Consent is obtained at the time of recruitment to the panel. For each survey, samples are drawn from active panel members using a probability-proportional-to-size weighted sampling approach. Selected panelists were invited to participate via email, and received reminder e-mails and phone calls after 3 days to ensure high response rates. Participants receive no more than one survey per week, to minimize participant fatigue. For completing the survey, respondents were rewarded with an incentive equivalent to $5. GfK both pre-tested and pilot tested the survey items prior to the final survey entering the field. The final survey was in the field from March 27 to April 4, 2015. Data analysis was performed from April to June of 2017. The Institutional Review Board for the University of Maryland, College Park, reviewed and approved the study.

Many factors are known to influence vaccine decisions; we focused our analysis on a set of key demographic, racial, and psychosocial variables, described in detail in a supplemental file. Demographic variables included self-reported gender, age, education level, household income, health insurance status, and access to a regular care provider. We also adapted the MacArthur Scale of Subjective Social Status [30]. Racial factors were designed to assess the lived experience of race in a healthcare setting including measures of racial consciousness, racial fairness, and both frequency and impact of racial discrimination, again influenced by PHCR Praxis. Psychosocial factors related to vaccination included self-reported flu vaccine knowledge and specific flu vaccine knowledge, knowledge of vaccine recommendations, attitude toward the flu vaccine, use of naturalism in lieu of the vaccine, trust in the flu vaccine, perceived risk of influenza, perceived risk of vaccine side effects, descriptive and subjective norms, general and flu specific vaccine hesitancy, confidence in the flu vaccine, and barriers to vaccination. We utilized exploratory factor analysis to finalize our measures. Our outcome variable was flu vaccine uptake over the past five years, with four response categories: every year, most years but not all, once or twice, and never.

GfK provided a data file with de-identified data, including census-based post-stratification weights. Sample weights reflect the composition of both non-Hispanic White and non-Hispanic African American population in the United States based on the 2014 Current Population Survey from the U.S. Census. Specific benchmarks for stratification include gender by age, census region, metropolitan status, education level, household income, and internet access. Data analysis was conducted using SPSS version 22 [IBM, Chicago, IL]. Two-sided tests yielding $p < .05$ were considered statistically significant; more stringent levels of 0.01 and 0.001 were also noted. Analyses reported are for complete case data. Individuals who completed the survey in considerably under the median time (suggesting survey item "speeding") were excluded from analysis.

Vaccine behavior in the past five years was assessed using chi-square tests. A two-way ANOVA was used to identify differences in demographic, racial, and psychosocial factors as a function of vaccine behavior, race, and their interaction. To complement the main effect and interaction tests, Tukey's honestly significant difference (HSD) post hoc tests were used to isolate differences between specific flu behavior categories.

3. Results

Of the 1329 White adults and 1499 Black adults sampled, 838 (63.1%) and 819 (51.2%) completed the survey, respectively. Analysis was restricted to the 812 (388 White, 424 Black) adults who