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# Intervention effects from a social marketing campaign to promote HPV vaccination in preteen boys

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ABSTRACT

*Objectives:* Adoption of human papillomavirus (HPV) vaccination in the US has been slow. In 2011, HPV vaccination of boys was recommended by CDC for routine use at ages 11–12. We conducted and evaluated a social marketing intervention with parents and providers to stimulate HPV vaccination among preteen boys.
*Methods:* We targeted parents and providers of 9–13 year old boys in a 13 county NC region. The 3-month intervention included distribution of HPV vaccination posters and brochures to all county health departments plus 194 enrolled providers; two radio PSAs; and an online CME training. A Cox proportional hazards model was fit using NC immunization registry data to examine whether vaccination rates in 9–13 year old boys increased during the intervention period in targeted counties compared to control counties ($n = 15$) with similar demographics. To compare with other adolescent vaccines, similar models were fit for HPV vaccination in girls and meningococcal and Tdap vaccination of boys in the same age range. Moderating effects of age, race, and Vaccines for Children (VFC) eligibility on the intervention were considered.
*Results:* The Cox model showed an intervention effect ($\beta = 0.29$, HR = 1.34, $p = .0024$), indicating that during the intervention the probability of vaccination increased by 34% in the intervention counties relative to the control counties. Comparisons with HPV vaccination in girls and Tdap and meningococcal vaccination in boys suggest a unique boost for HPV vaccination in boys during the intervention. Model covariates of age, race and VFC eligibility were all significantly associated with vaccination rates ($p < .0001$ for all). HPV vaccination rates were highest in the 11–12 year old boys. Overall, three of every four clinic visits for Tdap and meningococcal vaccines for preteen boys were missed opportunities to administer HPV vaccination simultaneously.
*Conclusions:* Social marketing techniques can encourage parents and health care providers to vaccinate preteen boys against HPV.



## 1. Introduction

Public health interventions often take years to be broadly adopted and sustained in practice settings, [1] and the human papillomavirus (HPV) vaccine is no exception [2,3]. Two vaccines have been approved by the Food and Drug Administration (FDA) for use in the United States: HPV2, which protects against two types (16 and 18) of the virus, and HPV4, which protects against four types (6, 11, 16, 18). HPV types 6 and 11 cause genital warts and types 16 and 18 are associated with cervical, vaginal, vulvar, anal, penile, and throat cancers [4,5]. Initial studies of vaccine effectiveness in reducing HPV infection and disease are promising [4,6].

Vaccination against HPV is most effective when given before sexual exposure to the virus [7,8]. The Centers for Disease

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Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP) first recommended HPV4 vaccination for routine clinical use in females, ages 11–12, in 2006 [7] and in males, ages 11–12, in 2011 [8]. HPV4 vaccine is the only one licensed for males. However, adoption of the vaccine has been slower than expected [2]. At the end of 2012, completion of the 3-dose HPV4 vaccine series among females and males ages 13–17 in the US was only 33% and 7% respectively [2]. By contrast, coverage estimates among teens aged 13–15 years for ≥1 Tdap vaccine dose and ≥1 meningococcal vaccine dose were 85% and 74%, respectively, indicating that the Healthy People 2020 goal of 80% vaccination coverage for adolescent vaccines is achievable [2,9]. This lag in HPV vaccination coverage exists in spite of ACIP's recommendation that all age-appropriate vaccines be administered at a single visit [2].

HPV vaccine has been primarily marketed to females to protect against cervical cancer [10]. Yet, HPV vaccination of boys would prevent most of an estimated 7490 cases of HPV-associated cancer cases diagnosed annually in males [6,11,12]. A significant barrier to HPV vaccination among preteens is reluctance by both healthcare providers and parents to vaccinate at a young age [2,11,13,14]. Health care providers play an influential role in parents' decisions to vaccinate their sons against HPV, yet evidence suggests providers are not yet fully promoting the vaccine at the recommended ages of 11–12 [2,13–16]. Lack of parental awareness coupled with underutilization of the vaccine lead to missed opportunities to reduce HPV disease and associated cancers [2,14,17,18].

The objective of our study was to conduct and evaluate a social marketing intervention with parents and providers to stimulate HPV vaccination among preteen boys at a critical time when the vaccine was new to both parents and clinical practice.

## 2. Methods

We evaluated a set of social marketing strategies intended to promote HPV vaccination in preteen boys, especially among racial and ethnic populations at greater risk of disease. We report here county-level vaccination data from the North Carolina Immunization Registry (NCIR) to assess outcome effects from the intervention. We also compared self-reported pre and post intervention vaccine knowledge, attitudes, beliefs, intentions and behaviors in parents and providers in intervention counties; and assessed campaign exposure and recall by parents and use of campaign materials by providers. Findings from these surveys are reported elsewhere [19,20].

### 2.1. Setting

We conducted an intervention to promote HPV vaccination with parents of preteen boys and healthcare providers who serve them in a 13 county region in NC in June–September, 2012. This region [21] includes relatively higher percentages of minority (non-Caucasian) groups than those for the state (Black/African American, 31.3% vs. 24.3%; American Indian, 8.0% vs. 1.2%; Hispanic/Latino, 10.4% vs. 9.8%) [22]. These racial and ethnic groups have higher reported rates of sexually transmitted infections and cancer-related consequences than do whites [23].

### 2.2. Intervention description

Within the first year after the HPV4 vaccine was routinely recommended for males, ages 11–12, we tested a set of social marketing strategies to motivate parents of preteen boys to initiate HPV vaccinations and providers to start the vaccine series at the recommended ages of 11–12. Social marketing is the use of persuasive principles to influence human behavior in order to improve health or benefit society [24]. We based the intervention on four principles of social marketing: [24,25] to promote (with radio public service announcements, posters, brochures, doctor's recommendation) the product (HPV vaccine), while considering the price (cost, perception of safety and efficacy, and access), and place (healthcare providers' office).

Intervention counties were exposed to a campaign (*Protect Him*) with materials designed and pretested with racially and ethnically diverse parents of preteen boys, while control counties received no intervention [26]. The campaign ran for 3 months before the school year started and when parents were most likely to seek vaccinations for their children.

Key features of the intervention were based on our formative research [26] with parents and providers in the region and included:

- Two public service announcements designed to raise awareness about HPV vaccine for boys; ads ran for eight weeks with seven radio stations targeting parents of preteen boys in the 13 counties.
- Posters and brochures in English and Spanish (25,000 distributed to enrolled providers and 13 health departments) with the risk-related message, "One in two people will get HPV, which can lead to genital warts and cancer," and multi-cultural images of parents and sons close together;
- One hour CME webinar with video vignettes modeling communication among providers, parents and preteen boys available to enrolled providers at no charge;
- One page tip sheet for providers to discuss HPV vaccination with parents and boys;
- Website (protecthim.org) with links to credible information sources, (e.g. CDC, pediatric and family medicine associations), useful for both parents and providers.

Additional description of the intervention and findings from the pre and post intervention surveys with parents and providers are reported in a second paper.

### 2.3. Study design

To measure the immunization impact of the intervention, we examined data from the NCIR, a population based Web application containing consolidated demographic and immunization history information on all of the recommended and required vaccines for NC citizens of all ages [27]. NCIR includes data reported regularly by NC healthcare practices by age, race/ethnicity and eligibility for Vaccines for Children (VFC), which provides vaccines recommended by ACIP and for children who might not be able to pay [27]. We compared HPV vaccine uptake (initial dose) in 13 intervention counties with a control group of 15 counties with socioeconomic characteristics similar to the intervention region [21]. To minimize possible contamination effects from intervention activities that may stimulate HPV vaccination among preteen males in a comparison group, we selected a control group of northeastern NC counties that was geographically distant and in a different radio market from the intervention region. We compared HPV vaccination in preteen males with HPV vaccination in preteen females and with two other adolescent age vaccines, Tdap and meningococcal. The Tdap vaccine is required for NC school entry in sixth grade while the meningococcal vaccine is voluntary [27]. To place these comparisons in context, we also examined vaccine uptake in all 100 counties in NC.

### 2.4. Data collection and measures

We received cohort data from NCIR for all children in the registry who: (1) were 9–13 years old at any time during the intervention



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