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Forgone vaccination during childhood and adolescence: Findings of a statewide survey of parents

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ABSTRACT

Objective. Widespread immunization confers both individual- and community-level protection against vaccine-preventable diseases. To better understand vaccine hesitancy, we assessed correlates of forgone vaccination for children and adolescents.

Method. We analyzed weighted data from the 2010 Child Health Assessment and Monitoring Program survey of North Carolina parents ($n = 1,847$) of children ages 1–17.

Results. Overall, 12% of parents reported having refused or delayed a vaccine for their child. Forgone vaccination was more common for young children than for teenagers (16% versus 8%) and for children born before rather than on/after their due dates (16% versus 10%). Parents with high (versus low) scores on an index of healthy feeding practices were also more likely to report forgone vaccination (17% versus 5%). The most common reason for forgoing vaccines was concern about safety (34%). Other reasons included believing the child did not need (18%) or was too young (13%) for the vaccine, or that the child was sick (10%).

Conclusion. Forgoing vaccines is more common among parents who are socially advantaged and highly attentive to their children's health in other areas such as nutrition. Providers should reassure parents of premature or sick children that such circumstances are not typically contraindications to vaccination.

Although few parents in the United States categorically reject vaccination, many choose to refuse or delay certain vaccines for their children, leading to under-immunization (Smith et al., 2011). With regard to young children, recent research suggests that 13–40% of parents forgo (i.e., refuse or delay) at least one vaccine (Dempsey et al., 2011; Gust et al., 2008; Smith et al., 2010, 2011). Even more parents may be "at risk" for forgoing vaccines given that concerns about early childhood immunization are common, even among those parents who comply with recommended guidelines (Dempsey et al., 2011; Kennedy et al., 2011). Although surveillance of forgone vaccination is limited, some measures indicate the problem is growing (Kempe et al., 2011; Omer et al., 2006). For example, an increasing number of parents are claiming nonmedical exemptions to school-based immunization requirements (Omer et al., 2006).

Less is known about forgone vaccination with regard to older children and vaccines in the adolescent platform: tetanus, diphtheria, and pertussis (Tdap); meningococcal vaccine; and human papillomavirus (HPV) vaccine. However, given that as many as one-third of parents of unvaccinated adolescents report having received a provider recommendation for these vaccines, parental refusal or delay is likely one reason for suboptimal uptake (Dorell et al., 2011). Under-immunization is most pronounced for HPV vaccine with only 35% of girls and 1% of boys completing the three dose series (CDC, 2012). Coverage for Tdap (78%) and meningococcal vaccine (71%) is higher, but still shows room for improvement (CDC, 2012).

In response to these issues, a small, but growing literature addresses the need for healthcare providers to identify "vaccine-hesitant" parents so as to more effectively communicate with them (Fredrickson et al., 2004; Smith et al., 2006). Because parents with vaccine-related doubts are more likely to delay or refuse immunization (Gaudino and Robison, 2012; Gust et al., 2008; Smith et al., 2011), one approach is to classify parents based on their vaccine-related attitudes using survey instruments and typologies (Keane et al., 2005; Opel et al., 2011). However, given the constraints of the clinical encounter, using these tools for universal screening may not be feasible. For this reason, providers can also benefit from more readily available indicators of vaccine refusal or delay, including factors related to families' demographic characteristics, parenting style, or relationship with the healthcare provider. Knowing which vaccines and which concerns are most worrisome can also help providers focus their discussions.

To investigate these issues, we used data from a statewide survey of parents to (a) identify correlates of forgone vaccination and (b)

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assess which vaccines parents refused or delayed and their reasons for doing so.

Methods

Sample

We used data from two linked telephone surveys conducted in 2010. The North Carolina Behavioral Risk Factor Surveillance System (BRFSS) survey is a population-based survey of adults (NC SCHS, 2011a). Households with BRFSS respondents who report living with a child under age 18 are eligible to participate in the Child Health Assessment and Monitoring Program (CHAMP) survey (NC SCHS, 2011b). CHAMP is administered in a follow-up phone call to the adult caregiver the BRFSS respondent identifies as being most knowledgeable about the health of a randomly selected child in the household.

In 2010, the response rate for the North Carolina BRFSS was 61% (CDC, 2011). Of the 3,174 BRFSS respondents invited to participate in CHAMP, 2,009 parents (63%) completed the survey. We excluded parents of children less than one year of age ($n=79$) from our analytic sample because several survey items of interest were not relevant to infants. We also excluded respondents if they were unsure whether they had ever delayed or refused a vaccine for their child ($n=7$), did not provide the child's sex ($n=2$), or did not provide information on nutrition-related variables ($n=74$). Our sample consisted of the remaining 1,847 respondents. Because a majority of respondents in our sample (88%) reported being the biological parent of the child in question, we refer to respondents as "parents." The University of North Carolina Institutional Review Board determined that this study did not require review.

Measures

One item on the CHAMP survey assessed this study's primary outcome: "Have you ever postponed or refused to get a vaccine shot for [child's name]?" For parents who responded "yes" to this item, interviewers asked respondents to give their reason(s) and to name which vaccine(s). Our measure of forgone vaccination combined vaccine refusal and delay because both behaviors are associated with under-immunization (Smith et al., 2011).

The survey also assessed factors related to forgone vaccination identified in the research literature, including parents' relationship with their child's healthcare provider, perceptions of their child's health, and parenting behaviors. In terms of the parent-provider relationship, CHAMP assessed (1) whether the child had a "personal" healthcare provider who knew him/her well; (2) how often in the last year providers spent enough time with the child; and (3) how often in the last year providers helped the parent feel like a partner in the child's care. In terms of the child's health status, CHAMP assessed (1) the child's general health; (2) whether the child was born before his/her due date; and (3) whether the child was limited in his/her ability compared to children of the same age.

With regard to parenting behaviors, CHAMP assessed whether the child had ever been breastfed. Using a 4-point response scale, the survey also assessed the child's daily consumption of fruits, vegetables, and sweetened beverages as well as the weekly frequency of fast food meals and home-cooked family meals. To reduce collinearity in the final model, we combined the latter five items into an index of healthy child feeding practices. After reverse-coding variables related to fast food and sweetened beverage consumption, we calculated the sum of the items and collapsed the resulting totals into three categories: low (5–10), medium (11–15), and high (16–20).

We used demographic variables from both CHAMP and BRFSS. CHAMP assessed child's sex, age, and race, as well as whether the child had health insurance, parent's sex, and the highest level of education attained by anyone in the household. BRFSS assessed household income and location. We defined households within a metropolitan statistical area (MSA) as "urban or suburban" and those outside an MSA as "rural" (U.S. Census Bureau, 2011).

Statistical analyses

We used logistic regression to identify bivariate correlates of forgone vaccination. We entered statistically significant correlates into a multivariate model. We chose not to stratify our analyses by child's age because our study examined vaccine refusal or delay that occurred at any time in the child's life. To further explore the association of child feeding practices with forgone vaccination, we used linear regression to examine the bivariate association separately for each component of the child feeding practices index. We analyzed data using Stata Version 12.0 (Statacorp, College Station, TX), incorporating sample weights to account for unequal probability of selection. We report unweighted frequencies and weighted proportions and odds ratios. All statistical tests were 2-tailed with a critical alpha of 0.05.

Results

Sample characteristics

Participants were equally likely to be the parent of a son (50%) or a daughter (50%) (Table 1). The mean age of children was 9.7 years, and most were non-Hispanic white (62%) or black (22%). Most parents were female (85%). Half of respondents indicated an annual household income of $50,000 or more (50%), and about three quarters reported that someone in their household had attended college (78%).

Correlates of forgone vaccination

Overall, 12% of parents reported having ever refused or delayed a vaccine for their child. In multivariate analysis, forgone vaccination was more common for young children (ages 1–6) than for older children (ages 13–17) (16% versus 8%). Female respondents reported forgone vaccination more often than did male respondents (13% versus 7%). The practice was also more common among respondents living in households with high versus low educational attainment (14% versus 5%). Although bivariate analyses indicated that child's race and annual household income correlated with refusal or delay, these variables did not retain statistical significance in the multivariate model (Table 2).

Beyond demographic characteristics, forgone vaccination was more common for children born before versus on or after their due dates (16% versus 10%). Forgone vaccination also correlated with high versus low scores on the index of healthy child feeding practices (17% versus 5%). In exploratory bivariate analyses, 4 of 5 items in the index achieved

Table 1
Sample characteristics, 2010 Child Health Assessment and Monitoring Program (CHAMP) survey, North Carolina, USA ($n=1847$).

	n	(%)
Child's sex		
Male	936	(50)
Female	911	(50)
Child's age (years)		
1–6	582	(36)
7–12	599	(35)
13–17	666	(29)
Child's race		
Non-Hispanic white	1271	(62)
Non-Hispanic black	310	(22)
Other	266	(16)
Child covered by health insurance		
No/don't know	108	(5)
Yes	1739	(95)
Parent's sex		
Male	299	(15)
Female	1548	(85)
Annual household income		
<$50,000	751	(42)
≥$50,000	938	(50)
Not reported	158	(8)
Highest education in household		
High school or less	392	(22)
Some college or more	1455	(78)
Urbanicity		
Rural	445	(26)
Urban/suburban	1402	(74)

Note: Table shows raw frequencies and weighted percentages. Percentages may not total 100% due to rounding.