Untangling the psychosocial predictors of HPV vaccination decision-making among parents of boys

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ABSTRACT

Background: HPV vaccination uptake in boys is suboptimal in many jurisdictions, particularly in the absence of publicly funded HPV vaccination programs. Parents represent key decision-makers of HPV vaccination and their HPV vaccine decision-making stage is influenced by multiple psychosocial determinants. Our objective was to assess the relationship between a broad range of psychosocial factors and parents of boys' HPV vaccine decision-making stage.

Methods: Data were collected through an online survey from a nationally representative sample of Canadian parents of boys in February (T1) and November 2014 (T2). We assessed a broad number of psychosocial factors including: socio-demographics, health behaviours and validated scales for assessing HPV knowledge, attitudes and beliefs. Parents selected their HPV vaccination adoption stage based on the Precaution Adoption Process Model (PAPM). Multinomial logistic regression was used to test the association between predictors and PAPM stage at T1 and T2.

Results: Discussion with a healthcare provider about the HPV vaccine and increased HPV knowledge was associated with increased odds of being in the more advanced PAPM stages. Increased perception of risks in the absence of HPV vaccination, increased perception that others endorse HPV vaccination and positive attitudes related to vaccines in general were associated with increased odds of being in the *decided to* vaccinate stage. Believing that HPV vaccination is harmful increased, and perceiving the benefits of HPV vaccination decreased the odds of *deciding not* to vaccinate.

Conclusions: This study highlights the psychosocial predictors of the decision-making stage reported by parents regarding HPV vaccination of their sons, that were significant at two time-points. Targeted interventions that consider the impact of the health care provider and address knowledge gaps as well as individual beliefs about benefits, risks, and harms of the HPV vaccine and vaccines in general should be implemented to help parents make better informed decisions that is, to move closer to actual vaccination adoption.

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1. Introduction

While Human papillomavirus (HPV) vaccination has been available for females in many countries for nearly 10 years; HPV vaccine uptake rates for males remains low worldwide [1]. Because HPV vaccination targets pre-adolescents, parental acceptance of vaccination is critical.

There are eighteen systematic reviews attempting to identify and to understand what factors are associated with HPV vaccination intentions and uptake with emphasis typically on knowledge, attitudes, and behaviours in different populations, e.g., adolescents, adults, parents (mostly among mothers), or a combination [2–19]. A recent systematic review examined the factors associated with HPV vaccine acceptability among parents of sons [19]. Most studies reviewed did not use theoretical frameworks and/or did not use

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validated scales to measure the factors related to HPV vaccine acceptability [19].

Also, nearly all the studies reviewed focus on the factors that are associated with vaccination intentions or uptake [19]. The presumption is then that parents are already aware, engaged, and have made a decision about HPV vaccination, when in fact many parents report that they are unaware of the HPV vaccine generally and that the HPV vaccine is available for their son [11,12,15,19]. Previous studies have shown that there are more stages of vaccine decision-making than the stages of intentions and uptake, such as earlier stages when individuals never heard of the vaccine (i.e., precontemplation) or are undecided about HPV vaccination [20,21]. The fact that there are more decision-making stages than previously reported may be important because some parents may encounter their health care provider when the notion of HPV vaccination for their son is simply not "on their radar" [22]; what may influence these parents might be different than what would influence parents who already contemplative or who have intentions to vaccinate [23]. Examining HPV vaccine decision-making using multiple stages of adoption is key to understanding better the nuance of the determinants of HPV vaccine decision-making. There is also insufficient evidence to confirm what are the important predictive factors that are related to parents' HPV vaccine acceptability. In the absence of publicly funded HPV vaccine programs for boys, our study's objective was to establish the association between a broad number of psychosocial determinants with multiple stages of HPV vaccine decision-making among a national sample of Canadian parents of boys.

2. Methods

The study's methodology including recruitment, sample characteristics, measurement tool as well as preliminary findings are described in detail elsewhere [24]. To summarize, an online self-report survey was employed assessing socio-demographics, HPV and HPV vaccine knowledge, attitudes and beliefs, and health behaviours from a nationally representative sample of Canadian parents of boys aged 9–16 at baseline (February 2014: Time 1, T1) and at follow- up (November 2014: Time 2, T2).

2.1. Outcome

Our nominal, dependent variable (DV) was parents' stage according to the Precaution Adoption Process Model (PAPM), which theorizes that people commence health-protective behaviours as a series of distinct, categorical stages [23]. Notable advantages of the PAPM is that it allows us to examine those individuals who are vaccine hesitant, as well as parents who are not yet aware or engaged in the HPV vaccine decision-making process. Using the PAPM as our theoretical framework, parents chose one of following six stages: 1. Unaware that the HPV vaccine can be given to males, termed *unaware*; 2. Aware that the HPV vaccine can be given to males, but have not thought about getting the HPV vaccine for my son, termed *unengaged*; 3. Thought about giving the HPV vaccine to my son, but are undecided about giving it to him, termed *undecided;* 4. Decided against giving their son the HPV vaccine, termed *decided not to vaccinate;* 5. Decided in favor of giving their son the HPV vaccine, termed *decided to vaccinate*, and; 6. Vaccinated their son, termed *vaccinated*. At T2, parents' HPV-decision-making stage (referred to as PAPM stage) was re-assessed similarly.

2.2. Predictors

The psychosocial predictors of HPV vaccine decision-making (i.e., the study's independent variables (IVs)) consisted of four categories:

(1) **Socio-demographic characteristics** of parents and their sons (12 variables) included the following nominal categorical variables: parents' gender, language, marital status, religion, ethnicity, Canada born, education level, household income, employment status, size of town/city of residence. Parents' age and son's age were continuous variables.

(2) **Health behaviours** (4 variables) included the following nominal categorical variables with yes/no/I don't know response options: son having attended a routine medical check-up with a doctor/health care provider (HCP) in the last year, son having received all the recommended childhood vaccines; having a daughter who was vaccinated against HPV; having had a discussion with the doctor/HCP about HPV vaccination for their son.

(3) **HPV and HPV vaccine Knowledge** (2 variables) were measured with previously validated scales [25] using a true/-false/I don't know response options for which a total score was calculated based on correct answers: general HPV knowledge (23 items, range 0–23) and HPV vaccine knowledge (11 items, range 0–11). Higher scores indicate higher levels of knowledge.

(4) **Attitudes and beliefs** (9 variables) were measured with the previously validated HPV attitudes and beliefs Scale (HABS) [26] on a 7-point Likert scale where 1 = strongly disagree and 7 = strongly agree. All constructs were specific to beliefs about HPV vaccination (for their son), with the exception of 'general vaccination attitudes'. A total mean score was calculated for each of the following 9 constructs, where higher scores indicate higher agreement with the items. Perceived benefits (10 items) e.g., 'Getting my son the HPV vaccine would protect his current/future partner against cancer'. Perceived threat (3 items) e.g., 'It would be serious if my son contracted an HPV-related cancer later in life'. Perceived influence (8 items) e.g., 'Other parents in my community are getting their sons the HPV vaccine'. Perceived harms (6 items) e.g., 'The HPV vaccine is unsafe'. Perceived risk (3 items) e.g., 'Without the HPV vaccine, my son would be at risk of getting an HPV-related cancer later in life'. Affordability (3 items) e.g., 'The HPV vaccine is too expensive'. Communication (5 items) e.g., 'I am uncomfortable talking to my son about the HPV vaccine'. Accessibility (4 items) e.g., "The process of actually getting the HPV vaccine for my son would be easy'. General vaccination attitudes (4 items) e.g., 'Vaccines are a good way to protect public health'.

2.3. Data cleaning and analysis

To identify extreme outliers, standardized z scores were calculated. Values higher than $z = 2.58$ or lower than $z = -2.58$ (99% confidence interval (CI)) on two or more scales from the HABS were considered outliers and removed [27].

Multinomial logistic regression was used to analyze the DV, PAPM stage. The log odds of the PAPM stages were modeled as a linear combination of the predictor variables. The PAPM stage *unaware* was selected as the reference category. Odds ratios and 95% confidence intervals (CI) were calculated for each PAPM stage for the change in odds for every one-unit increase in the IV. For nominal IVs, we report the change versus the reference category (e.g. married vs. single, divorced vs. single) and for continuous IVs (e.g. HPV knowledge, HPV attitudes and beliefs), we report the change represented by a one-unit score increase.

Bivariate analyses were first conducted for all predictors to explore their individual relationship with PAPM stage. To assess multicollinearity, the Variation Inflation Factor (VIF) was calculated for all predictors using a cutoff of VIF < 5. Multivariate analyses were then conducted in three steps. First, we fitted a model