COMMENTARY

No evidence that HPV vaccination leads to sexual risk compensation

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ABSTRACT

Uptake of the HPV vaccine has been lower than the uptake of most other childhood vaccines offered in public programs. Since the HPV vaccine protects against a sexually transmitted virus, one barrier to uptake specific to the HPV vaccine may be the concern that vaccination may encourage risky sexual behaviour. Unanimous findings from recent studies show that HPV vaccination does not lead to sexual risk compensation, which is an important message to parents, clinicians and other decision-makers regarding HPV vaccination. Some issues remain to be investigated, like HPV vaccination and sexual risk compensation among boys.

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It is clearly beneficial to minimize the risk of unwanted pregnancy and sexually transmitted infections (STIs), thus risk avoidance is often important in sexual decision-making. So will a vaccine that reduces some of the risk associated with sex affect sexual behavior?

Some parents worry that their child might be more likely to have sex, or to have unprotected sex, if vaccinated against the sexually transmitted human papillomavirus (HPV),¹ which is a necessary cause of cervical cancer.² This worry might be one of the reasons why the efficacious^{3,4} HPV vaccine has a lower uptake than many other vaccines, even when it is offered free of charge in organized childhood vaccination programs.⁵ Moreover, change in sexual behavior is among the issues raised by critics of the HPV vaccine. Addressing this concern is thus important from a public health perspective.

The underlying concept for the concern is sexual risk compensation. It is an intuitive and media-friendly concept, which has surfaced frequently in the public debate on HPV vaccination.⁶ Risk compensation assumes that people accept a certain level of risk, and that a reduction in risk to some extent may be offset by compensatory behavior, so that the net change in risk is diminished. Related terms sometimes used in the literature are risk homeostasis, behavioral adaptation and behavioral/sexual disinhibition. The concept of risk compensation is relevant for risk-reducing interventions in general, and is not limited to the sexual domain. For instance, it has been discussed in road safety research for a long time, and there is evidence consistent with the notions that car drivers compensate for road lighting by driving faster,⁷ that routine users of bicycle helmets compensate for helmet use by cycling faster,⁸ and that there is larger compensation for accident-reducing than for injury-reducing traffic intervention measures.⁹

Risk compensation has been investigated for several sexual health interventions, most of which are associated with the

prevention of the human immunodeficiency virus (HIV). Male circumcision, which can reduce the risk of heterosexual STI acquisition,^{10,11} has been associated with more risky sexual behavior in one large-scale study,¹² but another study found no evidence of risk compensation in men following circumcision.¹³ Several studies have shown simultaneous increases in contraception use and number of acts of intercourse, but no simultaneous increase in the number of sexual partners or in the risk of acquiring STIs.^{14,15} Note that in order to defeat the purpose of an efficient intervention, risk compensation must substantially increase the occurrence of adverse outcomes, which was not found in these studies on contraceptive use interventions. Mixed results emerge from studies regarding antiretroviral therapy for HIV,¹⁶ with some studies showing that sexual risk compensation may be associated with the treatment.^{17,18} On the other hand, use of pre-exposure prophylaxis against HIV does so far not seem to be associated with sexual risk compensation, but this intervention has yet to be implemented on a larger scale, and hence needs to be further investigated in clinical practice.¹⁹ In sum, although the results are mixed, studies on sexual health interventions that are not directly related to HPV indicate that sexual risk compensation may occur.

In the current issue of Human Vaccines and Immunotherapeutics, Kasting et al.²⁰ review the literature on HPV vaccination and sexual risk compensation. They identified 20 studies that examined sexual behaviors and/or biological outcomes after HPV vaccination. None of the studies found compelling evidence that HPV vaccination was associated with sexual risk compensation or higher rates of adverse outcomes such as STIs. It is important to communicate these findings to parents as well as to clinicians and other authorities responsible for decisions regarding HPV vaccination. Aside from concerns about vaccine safety, most reasons for parental HPV vaccine non-acceptance directly or

indirectly relate to sexual behavior, or a lack of information to make an informed decision.²¹ The currently reviewed studies can address some of these concerns and hopefully increase the willingness of parents to vaccinate their children against HPV.

Research from other domains indicates that risk compensation is a real phenomenon, although alternative explanations often cannot be ruled out. The current review²⁰ illustrates that risk compensation is not a universal feature of risk-reducing interventions. The relevance of risk compensation probably depends on the extent to which the intervention is perceived to reduce risk, which could be influenced by several factors. In the context of HPV vaccination, it is likely that most vaccine recipients understand that the HPV vaccine does not protect against unwanted pregnancies or other STIs, and that behavior to avoid these risks will continue to be beneficial. The popular awareness of HPV may also be lower than of some other risks associated with sex. Moreover, there will be a considerable time lag between receiving the HPV vaccine and deciding for or against risky sex, which could make a cognitive risk assessment less relevant than in a context of, say, a road safety intervention where the experience of the intervention and its targeted risk are simultaneous. For those who are vaccinated against HPV before puberty, the time lag will in most cases be several years.

So, is the question regarding HPV vaccination and sexual risk compensation solved? Although 20 studies all point in the same direction,²⁰ there are still some issues left to address. First, more large-scale longitudinal studies are needed. Most of the studies done so far are cross-sectional, which limits the possibility to address causal relationships. Second, there are important parts of the HPV vaccine eligible population that have not yet been investigated because the HPV vaccine is relatively new. The girls/women in the studies reviewed were mostly vaccinated opportunistically (i.e. not as part of an organized program), or as part of a catch-up vaccination program, and they were in general older at vaccination than the recommended optimal age for HPV vaccination. The HPV vaccine is most efficient if given before sexual debut, hence pre-adolescent girls, typically aged 10–13, are the prime targets of most vaccination programs.²² From a public health perspective, they constitute the most important group. The earliest HPV vaccination programs were introduced in 2007, and the first mass-vaccinated birth cohorts of girls who received the HPV vaccine as pre-adolescents were born in the latter half of the 1990s. Many of these girls are now reaching the age when they will experience sexual debut and acquire new sexual partners. Studies on sexual risk compensation are needed in this large group of girls who were offered routine vaccination against HPV as pre-adolescents. Moreover, the HPV vaccine has also been licensed for boys, and some countries have recently included boys into their HPV vaccination programs. Studies on HPV vaccination and sexual risk compensation among boys are also needed.

Since the HPV vaccine is a relatively new invention, research on its effects must continue. A decade since the licensure of the first HPV vaccine, its population-level

effects look very promising, both in terms of efficiency²³ and safety.²⁴ Adding to this picture, the current review²⁰ shows that a considerable number of studies find no indication that HPV vaccination leads to sexual risk compensation, hence such concerns seem unwarranted.

Disclosure of potential conflicts of interest

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