But I’m Not at Risk for HPV: How Tailored Prevalence Rates can Increase Risk Accuracy

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Abstract
Research has shown that most people are inaccurate in estimating their susceptibility to many health concerns, including Human Papillomavirus (HPV); this is problematic because perceived susceptibility has an influence on preventative health behaviours such as obtaining HPV vaccines. Thus, the goal of the current study was to enhance the accuracy of young women’s perceived susceptibility to HPV through the provision of tailored prevalence information. The young women who participated in this study were provided with general HPV prevalence information (i.e., rate for all women), tailored HPV prevalence information based on age and number of sexual partners (e.g., rate for women ages 18-24 who have had three or more sexual partners), or no prevalence information. Accuracy of perceived susceptibility to HPV was then measured, as was fear and perceived stigma regarding HPV. The results revealed that participants who were provided with tailored information provided more accurate assessments of cancer-causing HPV susceptibility than those provided with general prevalence information. Furthermore, type of prevalence information did not affect participants’ fear or perceived stigma regarding HPV. Thus, the current study suggests that the provision of tailored prevalence information can be beneficial in increasing awareness and acceptance of one’s susceptibility to HPV, enabling individuals to make informed decisions regarding HPV and related risk-reduction behaviours.

ABBREVIATIONS
STI: Sexually Transmitted Infection; HPV: Human Papilloma Virus; CBR: Conditional Base Rates; GBR: General Base Rates

INTRODUCTION
The majority of sexually active women will contract HPV at some point in their life [1]; however, perceptions of one’s susceptibility to HPV tend to be inaccurate. Most individuals assume that their risk is substantially lower than that of the population at large [2,3]. Inaccurate perceptions regarding HPV susceptibility may be problematic. For example, low perceived susceptibility has been found to be a barrier to accepting [4] and obtaining [5,6] HPV vaccines. Conversely, a minority of women may perceive their susceptibility to be much higher than their actual risk, which may also create its own problems such as unnecessary fear, which may lead to denial or defensive avoidance [7]. Informed decision making regarding HPV vaccines and other risk reduction behaviours is more likely if the congruency between females’ perceived susceptibility to HPV and their actual susceptibility to this virus can be enhanced. Thus, the purpose of the current study is to enhance the accuracy of young women’s perceived susceptibility to HPV through the provision of tailored prevalence information.

HPV prevalence
HPV is a virus that has more than 100 different strains, over 30 of which are genital strains that can be transmitted through sexual activity [1]. Some of the genital strains may lead to genital warts, which are referred to as “low risk” or non-oncogenic strains; other strains may lead to cervical cancer, and as such, are classified as “high risk” or oncogenic strains [8]. At any given time, approximately 24% of Canadian women between the ages of 20 to 24 are infected with oncogenic HPV, and approximately 1.1% of Canadian women ages 15 to 49 have visible genital warts [9]. Lifetime prevalence is much higher. More than 75% of women in the United States have been or will become infected with some type of HPV during their lifetime [10].

HPV and unrealistic optimism
Despite the ubiquitous nature of HPV, most individuals do not consider themselves to be susceptible to this virus. This is a classic example of unrealistic optimism, or the optimism bias, which is the tendency to underestimate one’s risk to illnesses and negative events [11]. The optimism bias is based on perceived susceptibility (also referred to as perceived risk), which can be defined as an individual’s belief about their likelihood of harm or acquiring a health concern [3]. Unrealistic optimism has been
documented for a variety of health concerns, and this bias has been found to be particularly pervasive for STIs [11,12]. In a study in which 45 health hazards were presented, participants’ mean comparative risk judgement (the likelihood that it would not happen to them, which is indicative of unrealistic optimism) was the third most significant for venereal diseases [11].

The unrealistic optimism bias also emerged in a study of adolescent females’ perceptions of STIs [12]. The majority of participants in this study assumed that they had little to no risk of contracting an STI (88.9%); however, nearly a third of participants reported having a previous STI, and almost a quarter of participants were diagnosed with an STI during the duration of the study. As well, the majority of participants who contracted an STI in the year following the study had reported during the study that there was little or no risk of them contracting an STI [12].

Evidence of unrealistic optimism has also been found for perceived susceptibility to HPV. Baer, Allen, and Braun [13] found that most male and female college students are not knowledgeable about HPV prevalence rates, particularly in comparison to other STIs. Eighty percent of the participants in Baer et al.’s [13] study believed that they were at low risk for contracting an STI, and of eight STIs discussed in this study, participants rated HPV as the least prevalent as well as the least concerning.

Unrealistic optimism about one’s risk of STIs has been demonstrated for both males and females; however, according to a survey conducted by the Kaiser Family Foundation [14], female adolescents are twice as likely as their male counterparts to believe that they are not at risk of contracting an STI. Correspondence between perceived susceptibility and one’s actual risk for HPV has been found to be particularly low among young adult women between the ages of 18 and 22 [15]. In fact, actual HPV prevalence rates have been found to be nearly identical (36% vs. 35%) in women who believed that they were at risk compared to those who did not believe that they were at any risk of contracting the virus, when none of the participants had received any educational counselling about HPV [15]. As well, increased knowledge about HPV does not necessarily lead to accurate perceptions about one’s susceptibility to HPV. In a study of HPV awareness and knowledge, researchers found that among both male and female participants awareness of HPV was relatively high while perceived risk of contracting HPV was found to be relatively low [5].

The tendency for young women to underestimate their susceptibility to HPV is of particular concern because this demographic is at an increased risk of developing detrimental consequences as a result of HPV [16,17] and this population is making decisions regarding related risk reduction behaviours (e.g., obtaining an HPV vaccine, being tested for HPV, getting a Pap test, etc.) based on misconceived knowledge of their susceptibility to this virus. In order to make informed decisions regarding risk reduction measures, it is necessary that young women are aware of their actual susceptibility to HPV.

Enhancing the Accuracy of Perceived Susceptibility

Research conducted by Greening and colleagues [18-20] demonstrates that it is possible to increase the accuracy of ones susceptibility to health concerns by manipulating the risk information that is provided. Typically, when individuals learn about their risk for various health concerns, including HPV, they obtain the information in the form of a percentage or statistic aimed at the public as a whole; such prevalence information can be referred to as General Base Rates (GBRs). However, most people believe that they possess or engage in characteristics or behaviours that are better than the “average” person, and this will adjust the GBR downwards, thereby demonstrating unrealistic optimism [19,20]. However, research has shown that providing people with prevalence rates that are based on their relevant behaviours and skills, known as Conditional Base Rates (CBRs), helps individuals accept prevalence statistics and reduces unrealistic optimism [12,20].

The importance of providing tailored prevalence information has been discussed by several researchers [11,21,22]; however, few studies have examined base rates in order to determine their effect on perceived susceptibility. An exception to this is Chandler, Greening and colleagues work [18-20], which has demonstrated that conditional base rate information has the potential of enhancing accuracy of susceptibility; however, these researchers have relied on fictitious base rates in each of their studies. In order to understand how effective conditional base rate information may be at improving accuracy of susceptibility if used by health promotion campaigns and health care professionals, genuine prevalence information must be used in the CBR framework. The current study seeks to fill this gap in the literature by examining whether the accuracy of HPV susceptibility can be improved by providing authentic base rates that are conditioned on relevant risk factors.

The Current Study

In utilizing CBRs, it is important to ensure that base rates are tailored according to pertinent skills or behaviours; thus, we based our CBRs on the two primary factors associated with incidence of HPV, age and number of sexual partners [23].

Hypotheses

We hypothesised that individuals provided with Conditional Base Rates (CBR) would make more accurate judgements about their HPV susceptibility than participants provided with General Base Rates (GBR), and that participants provided with any base rate information (CBR or GBR) would be more accurate than those provided with no base rate information. In addition to accuracy, fear and stigma were examined to ensure that we were not unintentionally alarming women by providing CBRs.

MATERIALS AND METHODS

Participants

Participants were female undergraduate students from a mid-size university in Ontario, Canada who were between the ages of 18 and 24 and had previously engaged in sexual intercourse with at least one partner. Five hundred and forty-eight women participated in this study, but 141 participants who had previously received the HPV vaccine as well as 6 participants who had previously been diagnosed with HPV were excluded, which left a total of 401 respondents.
Design and procedure

Participants were recruited through psychology courses and received course credit as compensation. The survey began by providing participants with a brief explanation of HPV that explained the difference between HPV types that are linked to cancer and HPV types that are linked to genital warts. Next, participants recorded the number of individuals with whom they have engaged in sexual intercourse. Participants were then assigned to one of three experimental conditions, which differed by HPV prevalence information.

In the GBR condition, participants were presented with one base rate for cancer-causing HPV (18%) and one for genital warts (2%), and were told that these rates are applicable to all women. In the CBR condition, participants were presented with a high (30%) and a low (6%) base rate for cancer-causing HPV, and a high (3%) and a low (1%) base rate for genital warts. These base rates are based on prevalence data from Sellors and colleagues [9] research with Canadian women in the province of Ontario. Sellors and colleagues obtained two cervical specimens from 955 randomly selected women ages 15 to 49, who were being seen in family practices for cytological screening. According to this study, 1.1% of sexually active women 15 - 49 have visible genital warts at any given time. In terms of cancer-causing HPV, 6% of women ages 15 - 19 who have had 1 or 2 sexual partners throughout their life and 27% of women ages 15 – 19 who have had 3 or more sexual partners in their life have a cancer-causing HPV strain. As well, 6% of women ages 20 – 24 who have had 1 or 2 partners and 31% of women 20 – 24 who have had 3 or more partners have a cancer-causing HPV strain [9].

Participants were informed that the low CBRs pertained to HPV risk for women between the ages of 18-24 who have had sex with one or two partners, and the high CBRs pertained to HPV risk for women aged 18-24 who have had sex with three or more partners. In the third condition, No Base Rate (NBR), participants were not provided with any base rate information. Following the prevalence information, participants filled out the remainder of the survey, which was identical for each condition, in the order listed in the measures section. Finally, participants were directed to a debriefing form, which provided participants accurate susceptibility rates for women of different ages and sexual histories and included a link to an HPV information website. This study received ethical clearance from a university REB.

Measures

**Perceived probability of susceptibility:** Participants were asked two questions, “What is the likelihood that you currently have or will contract a cancer-causing HPV strain in the next year?” and “What is the likelihood that you currently have or will contract a genital warts causing HPV strain in the next year?” They responded on a scale from 1-100%.

**Fear of HPV scale:** A modification of Greening and colleagues [18] worry item was used to assess participants’ fear of contracting HPV. Participants were asked to indicate how fearful they were that they would contract HPV, from 1 (not at all afraid) to 9 (extremely afraid).

**HPV stigma scale:** A 21-item HPV stigma scale was also used in this study. This stigma scale was first created and used by Schneider and colleagues [24], and has since been modified by Kahn and colleagues [25]. The modified version of the stigma scale was employed in this study, and had a Cronbach’s alpha of 0.96. Each item is measured on a 4-point Likert scale (strongly disagree, disagree, agree, strongly agree). The HPV stigma score was calculated by adding up the responses to each of the 21 items in the stigma scale. Possible scores range from 21-84, with higher scores indicating greater HPV-related stigma.

**Manipulation questions:** Participants in each of the conditions were asked to record the prevalence for the type of HPV that is linked to cervical cancer and the type of HPV that is linked to genital warts among women under three conditions: 1) when they are 18-24 and have had one or two partners, 2) when they are 18-24 and have had three or more partners, 3) regardless of age or the number of partners the women have had.

**Demographic questions:** Participants were asked demographic questions pertaining to their age, religious affiliation, level of education, sexual orientation, ethnicity, and previous experience with HPV and HPV-related preventative measures. Additional questions regarding HPV risk-related behaviours were asked of participants, but are not used in this manuscript.

RESULTS AND DISCUSSION

**Participant Characteristics**

Participants had a mean age of 19 (SD = 1.07). Fifty-eight percent of participants (n = 231) had had sexual intercourse with one or two partners, 32% have had three to six partners (n = 130), 6% had engaged in sexual intercourse with seven to ten partners (n = 25), and 4% of participants have had more than ten partners (n = 15). Of this sample, 89% identified themselves as European, 4% identified themselves as South Asian, and 7% were other ethnicities (e.g., Aboriginal, African, Arab).

**Manipulation check**

A manipulation check was conducted to ensure that participants read and understood the population prevalence rates that were provided in the GBR and the CBR conditions. To complete the manipulation check, participants’ population prevalence scores were coded as accurate, an underestimation or an overestimation. Six Chi square analyses were carried out on the coded prevalence responses, one for each question asked regarding the prevalence of HPV in women (for means and standard deviations see Table 1).

Statistically significant Chi-square results revealed a difference between CBR and NBR or GBR participants in regard to accuracy of perceived prevalence for cancer-causing HPV among women 18-24 years old who have had one or two partners (χ² (2) = 31.25, p < .001) and three or more partners (χ² (2) = 16.25, p < .001).Significant differences also emerged for accuracy of perceived prevalence for genital warts-causing HPV among women 18 – 24 with one or two (χ² (2) = 22.39, p < .001) and
Table 1: Perceived HPV Prevalence as Indicated by Responses to Six Manipulation Check Questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Conditional Base Rate</th>
<th>General Base Rate</th>
<th>No Base Rate</th>
<th>Overall Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Genital Warts, ALL</td>
<td>26.12</td>
<td>20.85</td>
<td>25.75</td>
<td>20.59</td>
</tr>
<tr>
<td>Genital Warts, 1-2 partners</td>
<td>14.97</td>
<td>15.13</td>
<td>16.11</td>
<td>13.73</td>
</tr>
<tr>
<td>Genital Warts, 3+ partners</td>
<td>24.73</td>
<td>18.25</td>
<td>25.79</td>
<td>20.38</td>
</tr>
<tr>
<td>Cervical cancer-causing HPV, ALL</td>
<td>33.22</td>
<td>18.80</td>
<td>27.47</td>
<td>17.71</td>
</tr>
<tr>
<td>Cervical cancer-causing HPV, 1-2 partners</td>
<td>15.93</td>
<td>16.21</td>
<td>17.37</td>
<td>16.10</td>
</tr>
<tr>
<td>Cervical cancer-causing HPV, 3+ partners</td>
<td>27.25</td>
<td>18.42</td>
<td>26.17</td>
<td>18.50</td>
</tr>
</tbody>
</table>

Table 2: Perceived Probability of Susceptibility to HPV, by Condition and HPV Type.

<table>
<thead>
<tr>
<th>HPV Type</th>
<th>Low CBR</th>
<th>High CBR</th>
<th>GBR</th>
<th>NBR</th>
<th>Overall Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Genital Warts</td>
<td>6.12</td>
<td>12.65</td>
<td>3.75</td>
<td>8.31</td>
<td>7.54</td>
</tr>
<tr>
<td>Cervical Cancer</td>
<td>9.12</td>
<td>13.31</td>
<td>15.11</td>
<td>18.94</td>
<td>12.31</td>
</tr>
</tbody>
</table>

Table 3: Accuracy of Perceived Susceptibility to Genital Warts-Causing and Cervical Cancer-Causing HPV.

<table>
<thead>
<tr>
<th>HPV Type</th>
<th>CBR</th>
<th>GBR</th>
<th>Z Scores CBR vs GBR</th>
<th>CBR &amp; GBR</th>
<th>NBR</th>
<th>Z scores CBR &amp; GBR vs NBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital Warts</td>
<td></td>
<td></td>
<td>No sig difference across conditions</td>
<td>55.2%</td>
<td>59.6%</td>
<td>-.40 vs .60</td>
</tr>
<tr>
<td>Underestimate</td>
<td>54.2%</td>
<td>56.1%</td>
<td></td>
<td>55.2%</td>
<td>59.6%</td>
<td>-.40 vs .60</td>
</tr>
<tr>
<td>Accurate</td>
<td>14.1%</td>
<td>9.7%</td>
<td></td>
<td>11.8%</td>
<td>6.6%</td>
<td>2.10 vs -3.20</td>
</tr>
<tr>
<td>Overestimate</td>
<td>31.6%</td>
<td>34.2%</td>
<td></td>
<td>33.0%</td>
<td>39.8%</td>
<td>-.50 vs .70</td>
</tr>
<tr>
<td>Cervical Cancer</td>
<td></td>
<td></td>
<td></td>
<td>71.4%</td>
<td>77.4%</td>
<td>-.50 vs .80</td>
</tr>
<tr>
<td>Underestimate</td>
<td>68.4%</td>
<td>74.1%</td>
<td>-.60 vs .50</td>
<td>71.4%</td>
<td>77.4%</td>
<td>-.50 vs .80</td>
</tr>
<tr>
<td>Accurate</td>
<td>8.5%</td>
<td>2.5%</td>
<td>2.0 vs -1.8</td>
<td>5.3%</td>
<td>0.0%</td>
<td>1.5 vs -2.30</td>
</tr>
<tr>
<td>Overestimate</td>
<td>23.2%</td>
<td>23.4%</td>
<td>-.10 vs .00</td>
<td>23.3%</td>
<td>22.6%</td>
<td>.30 vs -.40</td>
</tr>
</tbody>
</table>

**Abbreviations:** CBR = Conditional Base Rate; GBR = General Base Rate; NBR = No Base Rate

To examine if participants in the GBR condition were more accurate than participants in the CBR or NBR conditions when it came to reporting prevalence rates of all women, two Chi Square analyses were carried out. The Chi Square analysis for cervical cancer-causing HPV was found to be significant ($\chi^2 (2) = 68.66$, $p < .001$), as was the analysis for genital wart-causing HPV, ($\chi^2 (2) = 34.33$, $p < .001$). For both cancer-causing and genital wart-causing HPV, participants in the GBR condition were significantly more likely to be accurate in their estimates of perceived susceptibility than those in the CBR and NBR conditions.

**Accuracy of perceived susceptibility**

Following Greening and Chandler's [19] procedures, the probability scores were coded such that participants received a score of -1 (underestimate), 0 (accurate), or +1 (overestimate) based on their response and their base rate condition. For participants in the GBR and the NBR conditions, scores were calculated by comparing participants’ probability score to the GBR provided (i.e., 18% for oncogenic HPV was scored as accurate). Accuracy for CBR participants was calculated by comparing probability scores to the congruent base rate according to number of sexual partners they reported having had (e.g., if had three or more partners, 30% was scored as accurate). See Table 2 for means and standard deviations of perceived susceptibility to HPV. Accuracy across conditions was assessed using a series of Chi Square analyses. See Table 3 for accuracy of perceived susceptibility.

**CBR vs. GBR: Cervical cancer**

A 2 (base rate condition: CBR, GBR) x 3 (accuracy: underestimate, accurate, overestimate) Chi Square revealed a significant difference in accuracy of susceptibility to oncogenic HPV between the CBR and the GBR conditions, $\chi^2 (2) = 7.83, p = .020$. The standardized residual scores (Table 3) indicated that participants in the CBR condition were significantly more likely to provide accurate accounts of their susceptibility to oncogenic HPV and although the difference was not significant, they were less likely to underestimate their risk compared to those in the GBR condition.
**CBR vs. GBR: Genital warts:** There was no significant difference in accuracy between the CBR and the GBR conditions with regards to perceived susceptibility to non-oncogenic HPV, $\chi^2(2) = 1.05, \text{ns.}$

**CBR and GBR vs. NBR: Cervical cancer**

There was a significant difference in accuracy of oncogenic HPV susceptibility between women in CBR and the GBR conditions compared to women in the NBR condition, $\chi^2(2) = 9.04, p = .011$. Participants in the NBR condition were significantly less likely to provide accurate estimates and more likely to underestimate their susceptibility, but they were slightly less likely to overestimate than participants in the CBR and GBR conditions.

**CBR and GBR vs. NBR: Genital warts:** Again, there was a significant difference in accuracy between women in the CBR and the GBR conditions compared to women in the NBR condition with regards to non-oncogenic HPV, $\chi^2(2) = 15.51, p < .001$. Participants in the NBR condition were significantly less likely than participants in the GBR and CBR conditions to provide an accurate account of their susceptibility and were more likely to both underestimate and overestimate than participants in the GBR and CBR conditions.

**Fear of susceptibility**

In order to ensure that none of the experimental conditions produced greater fear in participants than other conditions, a one-way ANOVA was carried out. No significant difference was found between the NBR ($M = 3.88, SD = 2.19$), GBR ($M = 4.09, SD = 2.10$), high CBR ($M = 4.64, SD = 2.30$) and low CBR ($M = 3.92, SD = 1.91$) conditions, $F(3, 397) = 1.85, \text{ns.}$

**Stigma**

An ANOVA revealed that there was no significant difference in stigma scores between the NBR ($M = 58.85, SD = 9.58$), GBR ($M = 58.30, SD = 9.66$), high CBR ($M = 56.98, SD = 11.18$) and low CBR ($M = 57.92, SD = 10.37$) conditions, $F(3, 397) = 0.53, \text{ns.}$

**DISCUSSION**

The purpose of the current study was to enhance the accuracy of females’ perceived susceptibility to HPV, and this was achieved through the provision of varying amounts of prevalence information. As predicted, participants who were presented with base rate information (GBR or CBR) were more likely to provide accurate assessments of their susceptibility to HPV than participants who were not provided with base rate information (NBR). Furthermore, participants who received additional base rate information regarding relevant risk factors (CBR) were more accurate with regards to determining their risk for oncogenic HPV than those who received general base rate information. Thus, the results revealed that the provision of conditional base rates helped participants understand and accept their susceptibility to HPV and deterred them from subscribing to the unrealistic optimism bias and underestimating their prevalence to cervical cancer-causing HPV.

In addition, enhancing the accuracy of perceived susceptibility to HPV was accomplished without increasing fear or stigma. This is potentially quite beneficial because it suggests that CBRs may help individuals make an informed decision about HPV-related behaviours, without being influenced by either unrealistic optimism or fear, both of which may negatively impact risk reduction behaviours. Unrealistic optimism has been found to adversely affect risk reduction behaviours regarding various health concerns, including lung cancer, sunstroke, tooth decay, and vitamin deficiency [11]. And although the specific impact of unrealistic optimism on HPV related behaviours has not been examined, research shows that women who do not feel susceptible to HPV are less likely to obtain the HPV vaccine [26]. Not only is it important to help reduce unrealistic optimism regarding HPV, it is also important to ensure that the prevalence of HPV is not overestimated by participants. In the current sample a substantial minority overestimated their susceptibility to HPV, so it would not be prudent to attempt a general increase in perceptions of susceptibility for everyone as this may unduly increase fear. The current focus on increasing accuracy of perceived susceptibility to HPV, rather than increasing subjective susceptibility of all participants, is an effective way to provide individuals with the knowledge necessary to make an informed decision without relying on fear induction, an approach that has been met with mixed results [7].

Research on fear appeals has demonstrated that while there are certain circumstances in which inducing fear has been shown to be an effective means of producing behaviour change, if specific conditions are not met, fear appeals can backfire in that they can create anxiety and hinder risk reduction behaviour. Specifically, if individuals are not confident that they can perform an effective recommended action to reduce the threat, they look to other ways to reduce their fear, which typically involves denial or avoidance [7]. Thus, fear induction is not the best strategy to use for enhancing awareness of HPV prevalence, particularly because one of the most common risk reduction behaviours, obtaining the HPV vaccine, can be costly and thus may not promote the self-efficacy that is necessary in order for fear appeals to be effective. Instead, increasing one’s awareness of their actual risk for HPV without inducing fear, as CBRs have been shown to do, can be considered a more appropriate and effective approach.

The current study shows that using CBRs may also help to provide normalizing information about HPV and its risk factors. Specifically, the CBRs in the current study provide accurate statistics, which clearly reflect the fact that having a greater number of sexual partners is associated with an increased risk of contracting HPV. However, this awareness was not associated with an increase in stigma; instead, CBRs may help to normalize the prevalence of HPV. Although stigma has been found to be associated with the HPV virus [2,27-30], providing CBRs was not shown to increase stigma. Perhaps this is not surprising given that research has shown that educating individuals about the pervasiveness of HPV is associated with less stigma, shame and anxiety regarding HPV than among individuals who are not aware of prevalence rates [2,31]. Thus, CBRs may be an effective way to educate the public about HPV risk factors (e.g., number of partners) and their susceptibility to HPV while simultaneously helping to “normalize” the prevalence of HPV.

Although individuals in the CBR condition were found to be more accurate in regard to their perceived susceptibility of oncogenic HPV, the relationship between the CBR and GBR...
condition was not significant for non-oncogenic HPV. This may indicate that CBRs are more effective at increasing the accuracy of susceptibility for high prevalence health concerns than low prevalence health concerns. As well, the base rates for non-oncogenic HPV (i.e., 1% and 3%) may have been too similar and too close to zero to allow for substantial underestimates or differentiation between groups. The mean raw estimates of perceived susceptibility to non-oncogenic HPV were higher than would be expected, and in each of three experimental conditions, 32-40% of participants overestimated their risk. This result demonstrates why attempting to increase perceived susceptibility in general, rather than increasing the accuracy of perceived susceptibility, would be problematic. Women who already over-estimated their risk of contracting non-oncogenic HPV would likely have increased their perceived susceptibility even further, resulting in a less accurate assessment of their risk.

Limitations

A limitation of the current study is that the conditional base rate condition likely did not provide base rate information that was tailored enough. Although the intention of the CBR condition was to circumvent participants’ need to make error-prone adjustments based on individuating information, it is conceivable that the CBR information provided still left room for personal adjustment. In the CBR condition, participants were provided with prevalence information based on a range of sexual partners (i.e., one or two partners vs. three or more partners), and there was a significant gap in cancer-causing HPV prevalence rates provided for women with two or less partners compared to those with three or more partners (i.e., 6% vs. 30%). Thus, an individual who had only had sexual intercourse with three partners might feel that although the base rate that pertained to them stated their risk for cancer-causing HPV as 30%, since the prevalence rate also applied to people who have had substantially more sexual partners, they may actually be closer in susceptibility to those who have only had two partners (and were told their risk was 6%). As such, participants might have provided susceptibility estimates lower than 30%, thereby underestimating their susceptibility. The opposite scenario may have occurred for participants in the low CBR condition, such that participants who have had two partners may have thought that they are at greater risk than just 6%. Despite this problem, significant differences were still found between the experimental conditions; however, we would expect that information that was more tailored (i.e., prevalence rates for exactly 1, 2, or 3 partners) would be even more effective at impacting the accuracy rates, especially with regards to underestimates.

Another limitation to the current study is that the accuracy of participants’ prevalence estimates were judged based on population-level statistics, and informed by only two characteristics (i.e., age and number of sexual partners). As there are a number of other potential personal factors that may contribute to an individual’s actual and perceived risk for HPV, it is difficult, if not impossible, to identify a specific base rate that can be considered to be wholly “accurate” for a particular individual, as was attempted in the current study. This mismatch between individual level risk and population level statistics has also been highlighted as a concern in the broader public health literature (e.g., Rockhill, 2005) [32]. In addition, providing the participants with prevalence data to inform their estimates of acquiring HPV in the next year (i.e., incidence) is somewhat problematic because prevalence and incidence data can vary substantially. With this concern in mind, we deliberately chose wording that included their risk of current infection as well as their risk of infection within the next year because this would more accurately reflect the prevalence data to which we had access (incidence data was not available). In practice however, the prevalence numbers that we used should be very similar to incidence data, given the transient nature of this virus, as most cases of infection clear spontaneously in 4 to 24 months [33]. Despite this limitation, the use of Sellors et al. data was the best available data for our sample, and is a substantial improvement over other studies that have used an accuracy framework with only hypothetical numbers.

The current study focused on 18-24 year old university women, a demographic that is highly susceptible to HPV, but it will be important to examine the impact of CBR on a younger sample because HPV vaccines are being targeted to young girls who may not appreciate the information provided by CBRs as much as an older and well educated sample of women.

CONCLUSION

This study is unique from previous research in that it uses genuine base rate statistics in order to demonstrate that CBRs may be an effective way to increase the accuracy of individual’s perceived susceptibility to HPV. However, in using authentic base rate information, this study also demonstrates that CBRs may not be as effective when used for health concerns that have very low prevalence rates (e.g., non-oncogenic HPV). As well, the emphasis of this study was not on increasing perceived susceptibility to HPV overall, but rather on improving the accuracy of perceived susceptibility to HPV, which may be more beneficial for informed decision making regarding HPV and relevant risk reduction behaviours. The results of this study reveal that by using CBRs, the accuracy of perceived susceptibility can be increased without inducing fear or stigma, either of which can cause emotional distress as well as negatively impact risk reduction behaviours.

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