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ARTICLE COMMENTARY



## Applying linguistic theories to design effective public health messages: Implications for HPV vaccination promotion among Chinese-English bilinguals in Hong Kong

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### ABSTRACT

Language is a fundamental means of human communication. However, the values of linguistic theories in designing effective public health messages are often overlooked. To address this gap, this commentary essay illustrates the applications of two linguistic theories in persuasive vaccination communications. The first theory is linguistic agency assignment, which refers to the ascription of action or change to different entities in a sentence. Studies have shown that strategic assignments of linguistic agency can effectively improve people's risk perceptions of the human papillomavirus (HPV) and intentions to get vaccinated among native speakers of Chinese and English. The second theory is the foreign language effect, which refers to the varying perceptions of bilingual speakers when processing the same information in their first or second language. Studies have shown that a strategic choice of language varieties can improve bilingual speakers' self-control, trust in the COVID-19 vaccine, and intentions to receive the vaccine. These studies point to the utilities of applying linguistic theories to improve people's perceived risk of HPV and perceived effectiveness of the HPV vaccine. Public health researchers and practitioners in Hong Kong should consider integrating these linguistics theories in their health messaging designs and further testing them in experimental studies.

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Recent public health scholarship has repeatedly emphasized the need to raise people's awareness of the human papillomavirus (HPV) and promote gender-neutral vaccination programs in Hong Kong<sup>1–3</sup> Several studies have identified common barriers that hinder the promotion of HPV vaccination among Hong Kong residents, such as low-risk awareness, high concerns for vaccine safety, and limited information from public sectors.<sup>1,4–6</sup> One challenge in addressing these barriers, however, is that public health practitioners may be less knowledgeable of the specific messages that they can design to improve people's health beliefs about HPV, such as its severity and susceptibility, as well the efficacy of the vaccine.

Recent research in applied linguistics has demonstrated the benefits of integrating linguistic theories in the design of effective public health messages.<sup>7,8</sup> While behavioral theories connect people's behaviors to their health beliefs and attitudes, linguistic theories map out the intrinsic correspondence between subtle language features and people's affection and cognition. Taking the two threads together, public health practitioners can yield a repertoire of strategies that link specific linguistic features to desirable behavioral outcomes by improving the recipients' beliefs and attitudes. The purpose of this paper, therefore, is to elaborate on two emerging theory-informed and evidence-based linguistic features that could be strategically adapted to improve the effectiveness of public health education on

HPV among Chinese-English bilingual speakers in Hong Kong.

### Linguistic agency assignment

Linguists have observed that human languages can semantically encode entities in an event in different ways and subsequently shape people's perceptions of them.<sup>9</sup> In linguistics, entities that carry out the action are encoded as agents, and those that receive the action are called patients/themes.<sup>10</sup> The former often communicates a sense of responsibility, control, and sentience of the entity, whereas the latter implies that the entity is causally affected by another and undergoes changes.<sup>9</sup> When communicating the risk of HPV, for example, placing humans as the agent (e.g., *You can contract HPV and develop several forms of cancer*) implies that humans have control over their personal activities and contracting the virus is a result of their own actions. In contrast, placing humans as the patient/theme (e.g., *HPV can infect you and cause several forms of cancer*) suggests that people are losing control to the virus, leading them to perceive the viral infection as more severe and more susceptible to themselves. Following the health belief model, raising people's risk attitudes, such as severity and susceptibility, is an important antecedent for positive behavioral changes.

Studies examining American English and Mandarin Chinese speakers have demonstrated the persuasive advantage of this subtle language impact strategy.<sup>11,12</sup> For example, based

on a sample of American undergraduate students, Bell et al.<sup>11</sup> found that assigning agency to HPV or the HPV vaccine rather than to humans significantly elevated participants' perceived severity of HPV, the effectiveness of the HPV vaccine, and their attitudes toward mandatory HPV vaccination policies for boys and girls. A subsequent replication using Mandarin Chinese also reported similar findings in that the viral agency assignment led to a higher level of fear arousal, higher perceived effectiveness of the vaccine, and a more positive attitude toward mandatory vaccination policies.<sup>12</sup> The Chinese and English languages tested in these two studies correspond to the two official languages that are used in Hong Kong, pointing to a promising direction for further experimental tests in the region.

Healthcare practitioners and policymakers may consider implementing this language influence strategy to raise people's risk awareness of HPV, the perceived efficacy of the vaccine, and their attitudes toward gender-neutral vaccination programs in Hong Kong. First, recent studies have shown that Hong Kong parents of boys are less likely to accept the HPV vaccine than parents of girls,<sup>5,6</sup> and such gap remains even if the vaccine was to be offered freely for all children.<sup>13</sup> This can be attributed to the common belief that HPV is less risky and less susceptible to males.<sup>6,14,15</sup> To improve people's risk perception of the virus, health practitioners could consider strategically assigning linguistic agency to the virus rather than to humans in health promotion materials such as factsheets and mobile text reminders. A set of sample messages are shown in Table 1.

Moreover, assigning agency to the vaccine than to humans could also improve people's perceived efficacy of the vaccine which is an important facilitator of promoting HPV vaccination in Hong Kong.<sup>1,4</sup> Following the previous agency assignment research on HPV vaccine in the U.S. and the Chinese mainland,<sup>11,12</sup> healthcare professionals may design similar messages by assigning agency to the vaccine rather than to humans.

Finally, a similar design can also be extended to the promotion of gender-neutral vaccination programs in Hong Kong which is another effective solution to improving HPV vaccine acceptance rate among Hong Kong residents.<sup>1,2</sup> Specifically, policy advocates may consider assigning agency to the vaccination program than to humans when communicating such information to the public. A set of sample messages are shown in Table 2.

## The foreign language effect

Linguists often do not confine their research to a single language and have highlighted the need to explore whether and how people use and understand different languages. This comparative endeavor is often associated with the famous Sapir-Whorf hypothesis which describes the plausible influence of language on people's perception of the world.<sup>10</sup> An extension of this hypothesis is that people who speak more than one language are likely to think and behave differently if they process the information in one over the other language.

Understanding how a single speaker uses different languages could bring significant implications in bilingual societies. For example, although both English and Chinese are official languages in Hong Kong, most people speak Cantonese or Mandarin Chinese as their first language and English as their second or foreign language. In particular, contrary to the common belief that people are disadvantaged when processing information in a foreign language, psycholinguists have documented a "foreign language effect" (FLE) which suggests that using one's foreign language rather than their first language can lead to desirable behavioral outcomes such as reduced decision-making biases.<sup>16</sup>

Several studies have demonstrated the persuasive advantage of adopting a learned foreign language over their mother tongue in promoting COVID-19 vaccinations across languages and cultures.<sup>8,17,18</sup> When examining COVID-19 vaccine promotion among bilingual speakers in Hong Kong, for example, Geipel et al.<sup>17</sup> found that presenting the vaccine information in their L2 English than their L1 Chinese significantly reduced participants' vaccine hesitancy by increasing their trust in the safety and effectiveness of the vaccine. In a similar vein, Saile et al.<sup>18</sup> found that L1 German speakers of L2 English reported a stronger sense of control when the information was presented in their L2 English rather than their L1 German. These participants also reported higher intentions to adhere to the COVID-19 health instructions and perceived these instructions as more effective when the information was presented in their second rather than in their first language.

A recent study suggests that the FLE may be better described as an "English language effect" because of the global status of the English language.<sup>8</sup> These researchers found that

**Table 1.** Sample messages of viral and human agency assignment.

	English	Chinese
Viral Agency	<i>HPV can infect both men and women</i>	人類乳突病毒可以感染男性和女性
	<i>HPV can spread themselves through sexual contact</i>	人類乳突病毒可以透過性行為進行傳播
Human Agency	<i>Both men and women can contract HPV</i>	男性和女性都可能感染人類乳突病毒
	<i>People can spread HPV through sexual contact</i>	人們可以透過性行為傳播人類乳突病毒

**Table 2.** Sample messages of vaccine and human agency assignment.

	English	Chinese
Vaccine	<i>The HPV vaccine can reduce your chances of getting HPV-related cancers</i>	人類乳突病毒 (HPV) 疫苗可以降低罹患 HPV 相關癌症的機率
Agency	<i>A gender-neutral HPV vaccination program can effectively reduce economic and public health burdens that are caused by HPV-related diseases</i>	性別中立的人類乳突病毒 (HPV) 疫苗接種計劃可以有效減輕由 HPV 相關疾病所引起的經濟和公共健康負擔。
Human	<i>You can reduce your chances of getting HPV-related cancers with the HPV vaccine</i>	您可以透過接種人類乳突病毒 (HPV) 疫苗來降低罹患 HPV 相關癌症的機率
Agency	<i>We can effectively reduce economic and public health burdens that are caused by HPV-related diseases with a gender-neutral HPV vaccination program</i>	我們可以透過性別中立的人類乳突病毒 (HPV) 疫苗接種計劃，有效減輕由 HPV 相關疾病所引起的經濟和公共健康負擔。

non-native speakers of English reported lower COVID-19 vaccine hesitancy when the information was presented in English than in their first language, whereas the opposite effect was found for native speakers of English who read the health information in a foreign language such as French and German. Although the persuasive advantage of using other non-native languages is still unclear, the effect of using English to boost L2 English speakers' trust in health information is consistent across the studies reviewed above.<sup>8,17,18</sup> Certainly, these findings do not entail a similar effect in all health communication contexts, but they form a solid basis for further investigations in other vaccine communication contexts among bilingual speakers.

One such context is to use the foreign English language to address the growing misconception of the HPV vaccine in Hong Kong, where a large number of residents speak Chinese/Cantonese as their first language and English as their second language. Specifically, public health scholars have repeatedly identified the concerns for vaccine safety and efficacy as major barriers of accepting HPV vaccines in Hong Kong.<sup>1,4,6</sup> As a result, when communicating with proficient bilingual speakers, public health professionals can consider strategically presenting the vaccine safety information in English to boost its efficacy. Nevertheless, it is important to point out that no study has directly tested the FLE on the HPV vaccination in Hong Kong. Moreover, since people's language attitudes often shift overtime as society progresses,<sup>10</sup> Hong Kong residents may also shift their attitudes as the society transforms from a former British colony to a special administration area of China. As such, participants' attitudes toward the English language may also induce complex emotional reactions across different generations. All of these need to be further examined in empirical studies.

## Conclusions

In view of the urgent need to promote HPV vaccination in Hong Kong,<sup>1,3</sup> this paper discusses the pathways of applying linguistics theories to facilitate effective public health communication. Specifically, health professionals may consider consistently placing HPV as the linguistic agent when describing the viral infection and its consequences as well as placing the HPV vaccine or the vaccination program as the agent when describing its effectiveness and its social benefits. When communicating such information to bilingual speakers in Hong Kong, presenting the information in their foreign English language may further elevate the recipients' trust in the vaccine.

One major limitation of the essay is that these recommendations are based on previous research in relevant vaccine communication contexts but not specifically on Hong Kong residents' attitudes toward the HPV vaccination campaigns. Therefore, more empirical studies are needed to better contextualize the persuasiveness of these language influence strategies. For example, researchers can design A/B testing experiments to examine how Hong Kong bilingual speakers react to vaccination messages that are presented with different linguistic agency assignments and in different languages. Moreover, since parents and young adults may react very

differently to the same HPV message,<sup>19</sup> it is also important to examine the effects of these strategies across different demographic groups. Furthermore, all the studies reviewed above focused on measuring participants' behavioral intentions as opposed to their actual intentions. Future studies will also benefit from adding behavioral measures such as following up with the participants on whether they have signed up for HPV vaccination appointments and received the vaccine later. Taken together, the findings of these empirical studies can better inform public health professionals to effectively communicate their HPV vaccination messages to different audiences in Hong Kong.

## Author contributions

CRedit: **Mian Jia**: Conceptualization, Investigation, Writing – original draft.

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## Statement of ethical approval

Ethical approval is not applicable because no human participants were involved in this study.

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