

# Promotion of human papillomavirus vaccination among Chinese men who have sex with men: abridged secondary publication

Z Wang \*, JTF Lau, PPK Lam, P Chan, F Fong, PKH Mo

## KEY MESSAGES

1. A theory-based online tutorial plus brief motivational interviewing via phone was effective in increasing the uptake of three doses of the human papillomavirus (HPV) vaccine over a 24-month follow-up period among men who have sex with men in Hong Kong.
2. Changes in perceived susceptibility to HPV/HPV-related diseases and perceived barriers to HPV vaccination during the follow-up period led to the behavioural change.
3. The intervention was integrated into existing human immunodeficiency virus (HIV) testing

and counselling services implemented by a non-governmental organisation focused on HIV prevention in Hong Kong.

Hong Kong Med J 2023;29(Suppl 3):S9-15  
HMRF project number: 13141651

<sup>1</sup> Z Wang, <sup>1</sup> JTF Lau, <sup>1</sup> PPK Lam, <sup>2</sup> P Chan, <sup>3</sup> F Fong, <sup>1</sup> PKH Mo

<sup>1</sup> Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong, Hong Kong SAR, China

<sup>2</sup> Department of Microbiology, The Chinese University of Hong Kong, Hong Kong SAR, China

<sup>3</sup> Neo-Health, Hong Kong SAR, China

\* Principal applicant and corresponding author: wangzx@cuhk.edu.hk

## Introduction

Human papillomavirus (HPV) can cause genital warts and penile/anal cancer in men.<sup>1</sup> Men who have sex with men (MSM) are at higher risks of contracting HPV and related diseases.<sup>2</sup> Vaccination for HPV is highly effective in preventing genital warts and cancers in MSM; thus, MSM aged  $\leq 45$  years are recommended to take HPV vaccination.<sup>3,4</sup> However, HPV vaccine uptake is very low among MSM in Hong Kong. We used an online tutorial based on the Health Belief Model (HBM), combined with motivational interviewing (MI),<sup>5</sup> to promote HPV vaccine uptake among MSM in Hong Kong.

This study aimed to evaluate the efficacy of two online theory-based interventions with and without brief MI via phone in increasing the rate of complete HPV vaccination (ie, three doses) within a 24-month follow-up period among Hong Kong Chinese MSM.

## Methods

This study was conducted between July 2017 and December 2019. Individuals eligible to participate in this study were Hong Kong Chinese-speaking men aged 18 to 45 years who self-reported having engagement in oral or anal intercourse with at least one man in the past 6 months, had no intention to leave Hong Kong for more than 1 consecutive month within the next 9 months, had regular Internet access, and were willing to be followed up by phone. Individuals who had received any HPV vaccine were excluded. Participants were recruited through outreach in gay bars/saunas, along with online solicitation and peer referral. Participant eligibility

was confirmed by fieldworkers either on site or through telephone/social media. Verbal informed consent was obtained from each participant to maintain anonymity.

After completion of the baseline survey, participants were randomly assigned to the control group, health communication (HC) group, or HC plus MI (HC-MI) group. Participants were followed up at 3, 6, 9, and 24 months. In the HC intervention, participants completed a 20-minute self-administered online tutorial. They watched a 5-minute online video, in which a peer MSM discussed the high risk and serious consequences of penile/anal cancers, as well as the efficacy of HPV vaccination and its duration of protection. Brief alarming images of genital warts, penile cancers, and anal cancers were displayed to increase perceived severity. HPV vaccination was emphasised as a valuable long-term investment, and HPV vaccination procedures were demonstrated. Participants then answered self-administered online multiple-choice questions and performed a short exercise to modify relevant perceptions. In the MI intervention, participants received brief MI via phone. Reminders were sent to participants in the HC and HC-MI groups at 1, 2, 4, 6, and 8 months. Participants in the control group received online health-focused messages unrelated to HPV or HPV vaccination, without any reminders. Participants were given discount coupons (10% discount off the market price of HK\$3800 [US\$490] for three doses) to take HPV vaccination at a collaborating private clinic. Participants also could choose to take HPV vaccination elsewhere.

The primary outcome was validated completion

of HPV vaccination within the 24-month follow-up period. Secondary outcomes were changes in the four-item Perceived Susceptibility Scale, the two-item Perceived Severity Scale, the five-item Perceived Benefits Scale, the six-item Perceived Barriers Scale, the two-item Cues to Action Scale, and the three-item Perceived Self-Efficacy Scale. Participants who had not received any dose of the HPV vaccine at 24 months were asked about their willingness to receive three doses of the HPV vaccine in the next year.

Logistic regression models (for categorical outcomes) and linear regression models (for continuous outcomes) were used to examine between-group differences, after adjusting for background variables (ie, variables that differed [ $P < 0.20$ ] between groups at baseline). Adjusted odds ratios (AORs) and adjusted standardised coefficients ( $\beta$  values) were obtained. The Baron and Kenny's method was used to determine whether changes in HBM constructs (24 months vs baseline) mediated the intervention effect.  $P$  values  $< 0.05$  were considered statistically significant.

## Results

In total, 624 participants completed the baseline survey. They were randomly assigned to the control group ( $n=208$ ), HC group ( $n=208$ ), or HC-MI group ( $n=208$ ). Among the participants, 504 (80.8%) were followed up at 3 months, 472 (75.6%) were followed up at 6 months, 439 (70.4%) were followed up at 9 months, and 459 (73.6%) were followed up at 24 months. The three groups were comparable in terms of all baseline characteristics, except for anal intercourse with regular male sex partners ( $P=0.03$ ) and the Perceived Barriers Scale score ( $P=0.03$ ). Adjustments were performed to control for these two background variables in subsequent analyses (Table 1). The loss-to-follow-up rate at 24 months was 24.5% in the control group, 31.3% in the HC group, and 23.6% in the HC-MI group. In a comparison of participants who were followed up and participants who were lost to follow-up at 24 months, there were significant differences with respect to current marital status, education level, anal intercourse with non-regular male sex partners, condomless anal intercourse with men, multiple male sex partners, sexualised drug use, and sexual potency drug use.

Among participants who had not taken any HPV vaccination at 24 months, more participants in the HC-MI group indicated that they intended to receive three doses of the HPV vaccine in the next year, compared with participants in the control group (23.3% vs 16.1%, AOR=1.49, 95% confidence interval [CI]=1.17-1.91,  $P=0.001$ , Table 2). In total, 75 participants had receipts to confirm completion of full HPV vaccination at 24 months. The HC-MI group had higher HPV vaccination uptake than the control group (17.3% vs

7.2%, AOR=1.57, 95% CI=1.14-2.17,  $P=0.006$ ; Table 3). However, after adjusting for changes in perceived susceptibility, the association between intervention status and completion of HPV vaccination was not significant (AOR=1.42, 95% CI=0.99-2.03,  $P=0.06$ ), whereas changes in perceived susceptibility remained strongly associated with intervention status (AOR=1.23, 95% CI=1.12-1.35,  $P < 0.001$ ). The association between intervention status and completion of HPV vaccination was weakened (from  $P < 0.001$  to  $P=0.05$ ) after adjusting for changes in perceived barriers, which remained significant ( $P < 0.001$ ). A partial mediation effect was observed (Table 3).

## Discussion

The combination of an online tutorial plus MI via phone led to a significant increase in the uptake of the three required doses of the HPV vaccine among MSM during the follow-up period. The use of an online tutorial alone did not significantly improve vaccine uptake, compared with the control group. Moreover, the addition of MI to the online tutorial approach did not demonstrate greater efficacy, compared with the use of an online tutorial alone. The lack of statistical significance may be related to an inadequate sample size and limited statistical power. Until further evidence is generated, we recommend using the combination of an online tutorial plus MI to promote HPV vaccination among MSM in Hong Kong. Our mediation analysis showed that perceived susceptibility and perceived barriers were theoretical components associated with behavioural changes. These findings extend the applicability of the HBM.

Hong Kong experienced a shortage of 9-valent HPV vaccines from May to December 2018. This unexpected event overlapped with the second half of the follow-up period and affected some participants. The supply rapidly resumed after December 2018; most participants had already received the first dose before the unexpected event, and the follow-up period was extended from 9 months to 24 months; thus, we assumed that the impact of this event on the primary outcome and internal validity was limited.

The present study, which was theory-based and supported by the results of exploratory analyses, had a long follow-up duration, low dropout rate, and well-validated primary outcome. The positive process evaluation results indicated that the intervention was well-received. However, this study had some limitations. First, the intervention was limited to MSM with Internet access. Second, our findings may not be generalisable to other Chinese cities. Third, attrition bias may have been present. Fourth, no information was collected regarding MSM who refused to participate. Fifth, MI sessions were not evaluated by audiotaping, which is considered the gold standard approach for fidelity assessment.

TABLE I. Baseline characteristics of participants in control, health communication (HC), and HC plus motivational interviewing (HC-MI) groups

	Control group (n=208)*	HC group (n=208)*	HC-MI group (n=208)*	P value
<b>Sociodemographic characteristics</b>				
Age group, y				
18-26	65 (31.3)	73 (35.1)	64 (30.8)	0.57
27-36	101 (48.6)	91 (43.8)	91 (43.8)	
37-45	42 (20.2)	44 (21.2)	53 (25.5)	
Current marital status				
Single	171 (82.2)	162 (77.9)	177 (85.1)	0.24
Cohabiting with/married to a man	35 (16.8)	45 (40.5)	31 (14.9)	
Cohabiting with/married to a woman	2 (1.0)	1 (0.5)	0 (0.0)	
Education level				
Secondary or below	29 (13.9)	31 (14.9)	35 (16.8)	0.71
University or above	179 (86.1)	177 (85.1)	173 (83.2)	
Current employment status				
Full-time	166 (79.8)	165 (79.3)	161 (77.4)	0.82
Part-time/unemployed/retired/student	42 (20.2)	43 (20.7)	47 (22.6)	
Personal monthly income, HK\$				
<10 000	32 (15.4)	36 (17.3)	33 (15.9)	0.38
10 000-19 999	74 (35.6)	71 (34.1)	62 (29.8)	
20 000-39 999	79 (38.0)	67 (32.2)	77 (37.0)	
≥40 000	21 (10.1)	34 (16.3)	35 (16.8)	
Refuse to disclose	2 (1.0)	0	1 (0.5)	
Sexual orientation				
Gay	179 (86.1)	189 (90.9)	189 (90.9)	0.31
Bisexual	28 (13.5)	19 (9.1)	19 (9.1)	
Heterosexual	1 (0.5)	0	0	
<b>HIV/STI-related service utilisation in the past 6 months</b>				
HIV testing				
No	93 (44.7)	98 (47.1)	87 (41.8)	0.55
Yes	115 (55.3)	110 (52.9)	121 (58.2)	
Other HIV/STI preventive services a				
No	102 (49.0)	109 (52.4)	113 (54.3)	0.55
Yes	106 (51.0)	99 (47.6)	95 (45.7)	
<b>Sexual behaviours in the past 6 months</b>				
Anal intercourse with regular male sex partners				
No	31 (14.9)	39 (18.8)	52 (25.0)	
Yes	177 (85.1)	169 (81.3)	156 (75.0)	0.03
Anal intercourse with non-regular male sex partners				
No	103 (49.5)	101 (48.6)	99 (47.6)	0.93
Yes	105 (50.5)	107 (51.4)	109 (52.4)	
Condomless anal intercourse with men				
No	133 (63.9)	139 (66.8)	132 (63.5)	0.74
Yes	75 (36.1)	69 (33.2)	76 (36.5)	
Multiple male sex partners				
No	90 (43.3)	92 (44.2)	95 (45.7)	0.88
Yes	118 (56.7)	116 (55.8)	113 (54.3)	

Abbreviations: HPV, human papillomavirus; MSM, men who have sex with men; STI, sexually transmitted infection

\* Data are presented as No. (%) of participants or mean ± standard deviation

TABLE I. (cont'd)

	Control group (n=208)*	HC group (n=208)*	HC-MI group (n=208)*	P value
<b>Sexualised drug use</b>				
No	193 (92.8)	198 (95.2)	194 (93.3)	0.56
Yes	15 (7.2)	10 (4.8)	14 (6.7)	
<b>Sexual potency drug use</b>				
No	193 (92.8)	197 (94.7)	193 (92.8)	0.66
Yes	15 (7.2)	11 (5.3)	15 (7.2)	
<b>History of HIV/STI</b>				
<b>Self-reported HIV serostatus</b>				
Negative	183 (88.0)	185 (88.9)	184 (88.5)	0.96
Positive	11 (5.3)	7 (3.4)	8 (3.8)	
Refuse to disclose	3 (1.4)	4 (1.9)	5 (2.4)	
Never tested for HIV antibodies	11 (5.3)	12 (5.8)	11 (5.3)	
<b>History of other STI</b>				
No	170 (81.7)	170 (81.7)	163 (26.1)	0.61
Yes	38 (18.3)	38 (18.3)	45 (21.6)	
<b>Lifestyle characteristics</b>				
<b>Current smoker</b>				
No	165 (79.3)	162 (77.9)	166 (79.8)	0.88
Yes	43 (20.7)	46 (22.1)	42 (20.2)	
<b>Drinking in the past year</b>				
No	39 (18.8)	28 (13.5)	36 (17.3)	0.32
Yes	169 (81.2)	180 (86.5)	172 (82.7)	
<b>Knowledge related to HPV/HPV vaccination</b>				
<b>Both men and women can be affected by HPV</b>				
Yes	156 (75.0)	174 (83.7)	163 (78.4)	
No	9 (4.3)	11 (5.3)	15 (7.2)	
Do not know	43 (20.7)	23 (11.1)	30 (14.4)	
<b>HPV infection can cause STI</b>				
Yes	129 (62.0)	144 (69.2)	135 (64.9)	
No	20 (9.6)	18 (8.7)	19 (9.1)	
Do not know	59 (28.4)	46 (22.1)	54 (26.0)	
<b>HPV infection can cause cancers in men</b>				
Yes	89 (42.8)	114 (54.8)	99 (47.6)	
No	34 (16.3)	37 (17.8)	37 (17.8)	
Do not know	85 (40.9)	57 (27.4)	72 (34.6)	
<b>HPV can be totally cured by available treatments</b>				
Yes	31 (14.9)	28 (13.5)	35 (16.8)	
No	110 (52.9)	132 (63.5)	112 (53.8)	
Do not know	67 (32.2)	48 (23.1)	61 (29.1)	
<b>Effective HPV vaccination is available for men in Hong Kong</b>				
Yes	113 (54.3)	131 (63.0)	110 (52.9)	
No	18 (8.7)	28 (13.5)	26 (12.5)	
Do not know	77 (37.0)	49 (23.6)	72 (34.6)	
<b>No. of shots required to prevent HPV infection in men</b>				
3	56 (26.9)	69 (33.2)	68 (32.7)	
Other answers/Do not know	152 (73.1)	139 (66.8)	140 (67.3)	

TABLE I. (cont'd)

	Control group (n=208)*	HC group (n=208)*	HC-MI group (n=208)*	P value
<b>No. of correct responses</b>				
0	33 (15.9)	19 (9.1)	27 (13.0)	0.26
1-2	45 (21.6)	40 (19.2)	46 (22.1)	
3-4	100 (48.1)	104 (50.0)	95 (47.9)	
5-6	30 (14.4)	45 (21.6)	40 (19.2)	
<b>Perceptions related to HPV/HPV vaccination based on the Health Belief Model</b>				
<b>Perceived susceptibility to HPV (% high/very high)</b>				
Perceived risk of contracting HPV in lifetime	42 (20.2)	52 (25.0)	49 (23.6)	
Perceived risk of contracting genital warts in lifetime	39 (18.8)	51 (24.5)	47 (22.6)	
Perceived risk of developing penile/anal cancers in lifetime	20 (9.6)	25 (12.0)	21 (10.1)	
Perceived HPV infection rate among MSM in Hong Kong	63 (30.3)	53 (25.5)	55 (26.4)	
Perceived Susceptibility Scale score	10.8±3.0	10.9±3.3	10.4±3.5	0.38
<b>Perceived severity of HPV-related diseases (% high/very high)</b>				
Harmful effects of genital warts on physical health	119 (57.2)	119 (57.2)	128 (61.5)	
Harmful effects of penile/anal cancers on physical health	135 (64.9)	153 (73.6)	137 (65.9)	
Perceived Severity Scale score	7.6±1.9	7.7±1.7	7.5±1.8	0.59
<b>Perceived benefit of HPV vaccination (% agree/strongly agree)</b>				
HPV vaccination is highly effective in preventing HPV infection	143 (68.8)	166 (79.8)	147 (70.7)	
HPV vaccination is highly effective in preventing genital warts	142 (68.3)	151 (72.6)	138 (66.3)	
HPV vaccination is highly effective in preventing penile/anal cancers	129 (62.0)	138 (66.3)	123 (59.1)	
HPV vaccination provides long-term protection	104 (50.0)	113 (54.3)	105 (50.5)	
HPV vaccination provides peace of mind	142 (68.3)	127 (61.1)	139 (66.8)	
Perceived Benefits Scale score	18.9±3.1	18.9±2.9	18.6±2.9	0.58
<b>Perceived barriers to HPV vaccination (agree/strongly agree)</b>				
HPV vaccination is not worth the cost (HK\$2000-3000)	64 (30.8)	44 (21.1)	38 (18.3)	
The procedures involved in HPV vaccination are complicated	33 (15.9)	30 (13.3)	17 (8.2)	
Severe adverse effects can occur after HPV vaccination	20 (9.6)	15 (7.2)	17 (8.2)	
HPV vaccination can cause embarrassment	25 (12.0)	20 (9.6)	18 (8.7)	
Others would think I was engaging in high-risk behaviours if I took HPV vaccination	33 (15.9)	25 (12.0)	25 (12.0)	
I would be stigmatised by service providers if I took HPV vaccination	18 (8.7)	15 (7.2)	13 (6.3)	
Perceived Barriers Scale score	13.5±5.2	12.6±4.0	12.4±4.2	0.03
<b>Perceived cues to action related to HPV vaccination (% agree/strongly agree)</b>				
Medical professionals suggest that I take HPV vaccination	3 (1.4)	6 (2.9)	7 (3.4)	
MSM peers suggest that I take HPV vaccination	8 (3.8)	15 (7.2)	5 (2.4)	
Cues to Action Scale score	2.7±1.3	2.9±1.5	2.8±1.4	0.56
<b>Perceived self-efficacy related to HPV vaccination (% agree/strongly agree)</b>				
The choice to take HPV vaccination is completely in my control	172 (82.7)	169 (81.3)	183 (88.0)	
I am confident that I could take HPV vaccination in the next year if I wanted to	142 (68.3)	139 (66.8)	147 (70.7)	
It would be easy for me to take HPV vaccination in the next year if I wanted to	154 (74.0)	145 (69.7)	153 (73.6)	
Perceived Self-Efficacy Scale score	12.6±2.4	12.4±2.6	12.6±2.4	0.61

TABLE 2. Between-group comparisons of control, health communication (HC), and HC plus motivational interviewing (HC-MI) groups

	Control group*	HC group*	HC-MI group*	HC group vs control group		HC-MI group vs control group		HC-MI group vs HC group	
				Adjusted odds ratio (95% confidence interval)	P value	Adjusted odds ratio (95% confidence interval)	P value	Adjusted odds ratio (95% confidence interval)	P value
Uptake of three doses of the HPV vaccine within 24 months	15/208 (7.2%)	24/208 (11.5%)	36/208 (17.3%)	1.61 (0.82-3.18)	0.17	1.57 (1.14-2.17)	0.006	1.55 (0.89-2.72)	0.13
Willingness to receive three doses of the HPV vaccine after 24 months among individuals who had not taken HPV vaccination	31/193 (16.1%)	29/184 (15.8%)	40/172 (23.3%)	0.94 (0.54-1.64)	0.82	1.49 (1.17-1.91)	0.001	1.63 (0.96-2.78)	0.07
<b>Perceptions based on the Health Belief Model</b>				<b>Adjusted <math>\beta</math></b>	<b>P value</b>	<b>Adjusted <math>\beta</math></b>	<b>P value</b>	<b>Adjusted <math>\beta</math></b>	<b>P value</b>
<b>Perceived Susceptibility Scale</b>									
Baseline	10.8±3.0	10.9±3.3	10.4±3.5	0.01	0.91	-0.07	0.19	-0.06	0.22
24 months	10.6±3.1	10.5±3.5	11.0±3.4	-0.01	0.88	0.05	0.26	0.06	0.23
Change	-0.2±3.1	-0.3±3.5	0.5±3.8	-0.01	0.79	0.12	0.02	0.11	0.02
P value	0.29	0.19	0.05						
<b>Perceived Severity Scale</b>									
Baseline	7.6±1.9	7.7±1.7	7.5±1.8	0.04	0.37	0.01	0.82	-0.04	0.38
24 months	8.7±1.7	8.8±1.6	8.8±1.5	0.01	0.80	0.03	0.62	0.02	0.68
Change	1.2±1.9	1.1±1.7	1.3±1.9	-0.03	0.52	0.02	0.75	0.06	0.24
P value	<0.001	<0.001	<0.001						
<b>Perceived Benefits Scale</b>									
Baseline	18.9±3.1	18.9±2.9	18.6±2.9	-0.02	0.70	-0.06	0.20	-0.05	0.30
24 months	18.4±3.0	18.5±3.4	18.7±3.0	-0.001	0.98	0.03	0.53	0.02	0.69
Change	-0.5±3.4	-0.3±3.2	0.1±3.3	0.02	0.75	0.09	0.09	0.07	0.19
P value	0.04	0.12	0.82						
<b>Perceived Barriers Scale</b>									
Baseline	13.5±5.2	12.6±4.0	12.4±4.2	-0.10	0.05	-0.12	0.02	-0.03	0.60
24 months	15.0±4.6	13.4±4.3	12.5±4.1	-0.11	0.01	-0.21	<0.001	-0.10	0.02
Change	1.4±4.8	0.8±3.5	0.1±4.1	-0.12	0.01	-0.21	<0.001	-0.11	0.02
P value	<0.001	0.001	0.79						
<b>Cues to Action Scale</b>									
Baseline	2.7±1.3	2.9±1.5	2.8±1.4	0.06	0.26	0.02	0.68	-0.04	0.48
24 months	2.9±1.6	2.9±1.5	2.9±1.5	-0.004	0.93	0.01	0.78	0.01	0.87
Change	0.2±1.8	0.03±1.8	0.1±1.9	-0.05	0.34	-0.003	0.95	0.03	0.49
P value	0.14	0.79	0.27						
<b>Perceived Self-Efficacy Scale</b>									
Baseline	12.6±2.4	12.4±2.6	12.6±2.4	-0.08	0.10	-0.05	0.29	0.03	0.55
24 months	12.3±2.1	12.1±2.5	12.0±2.5	-0.06	0.22	-0.09	0.08	-0.04	0.45
Change	-0.3±2.5	-0.3±2.6	-0.6±2.8	0.02	0.66	-0.03	0.53	-0.06	0.23
P value	0.05	0.12	0.002						

Abbreviation: HPV, human papillomavirus

\* Data are presented as No. (%) of participants or mean ± standard deviation

TABLE 3. Test for independent effects of changes in Health Belief Model scale scores on the association between intervention status (health communication plus motivational interviewing [HC-MI] group vs control group) and uptake of three doses of the human papillomavirus vaccine during the follow-up period (n=416)

Model	Variables	B	Standard error	Adjusted odds ratio (95% confidence interval)	P value
1	Intervention status (HC-MI group vs control group)	0.47	0.17	1.61 (1.14-2.26)	0.006
2A	Changes in Perceived Susceptibility Scale score	0.22	0.05	1.25 (1.14-1.38)	<0.001
3A	Intervention status (HC-MI group vs control group)	0.35	0.18	1.42 (0.99-2.03)	0.06
	Changes in Perceived Susceptibility Scale	0.21	0.05	1.23 (1.12-1.35)	<0.001
2B	Changes in Perceived Barriers Scale score	-0.18	0.04	0.84 (0.77-0.91)	<0.001
3B	Intervention status (HC-MI group vs control group)	0.37	0.18	1.44 (1.01-2.06)	0.05
	Changes in Perceived Barriers Scale score	-0.16	0.04	0.85 (0.79-0.92)	<0.001

## Conclusion

The combination of a theory-based online tutorial plus brief MI via phone was effective in increasing completion of HPV vaccination among MSM in Hong Kong.

## Funding

This study was supported by the Health and Medical Research Fund, Health Bureau, Hong Kong SAR Government (#13141651). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

## Disclosure

The results of this research have been previously published in:

1. Wu T, Qu S, Fang Y, Ip M, Wang Z. Behavioral intention to perform risk compensation behaviors after receiving HPV vaccination among men who have sex with men in China. *Hum Vaccin Immunother* 2019;15:1737-44.
2. Wang Z, Lau JTF, Ip TKM, et al. Two web-based

and theory-based interventions with and without brief motivational interviewing in the promotion of human papillomavirus vaccination among Chinese men who have sex with men: randomized controlled trial. *J Med Internet Res* 2021;23:e21465.

## References

1. World Health Organization. Human Papillomavirus Vaccines: WHO Position Paper, May 2017. Available at: <http://apps.who.int/iris/bitstream/handle/10665/255353/WER9219.pdf;jsessionid=0F6E736DC1E29E420436DE39CD4551DD?sequence=1>.
2. D'Souza G, Wentz A, Wiley D, et al. Anal cancer screening in men who have sex with men in the multicenter AIDS cohort study. *J Acquir Immune Defic Syndr* 2016;71:570-6.
3. Centers for Disease Control and Prevention. HPV Vaccine Recommendations. Available at: <https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html>. 2016.
4. Centers for Disease Control and Prevention. Evidence to Recommendations for HPV Vaccination of Adults, Ages 27 through 45 years. Available at: <https://www.cdc.gov/vaccines/acip/recs/grade/HPV-adults-etr.html>. 2018.
5. Miller WR, Rollnick SR. *Motivational Interviewing: Helping People Change*. New York: Guilford Press; 2013.