

SUPPLEMENTAL DIGITAL CONTENT

**Anal human papillomavirus prevalence among vaccinated and unvaccinated gay, bisexual,
and other men who have sex with men in Canada**

ADDITIONAL REFERENCES

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SUPPLEMENTAL TABLES

Table S1. RDS recruitment characteristics by city, Engage Cohort Study, 2017-2019

	Overall	Montreal	Toronto	Vancouver
Engage Cohort Study				
Recruitment start date	Feb-2017	Feb-2017	May-2017	Feb-2017
Recruitment end date	Aug-2019	Jun-2018	Aug-2019	Jul-2019
Final number at enrollment	2,449	1,179	517	753
Number of seeds	240	27	96	117
Number of coupons distributed	14,324	6,822	3,078	4,424
Number of seeds recruiting ≥ 1 person, n (%)	145 (60.4)	21 (77.8)	53 (55.2)	71 (60.7)
Number of recruitment waves, median (range) ^a	4 (1-17)	7 (1-17)	3 (1-12)	3 (1-10)
Cluster size, median (range) ^b	5 (2-413)	11 (2-413)	3 (2-78)	5 (2-92)
Nested HPV prevalence study				
Eligible for HPV sub-study ^c	1,003	435	249	319
Provided anal specimen for HPV genotyping, n (%)	847 (84.4)	392 (90.1)	215 (86.3)	240 (75.2)
Valid anal specimen for HPV genotyping, n (%) ^d	645 (76.2)	270 (68.9)	171 (79.5)	204 (85.0)
Self-reported social network size, median (range) ^e	30 (1-150)	25.5 (2-150)	30 (1-150)	30 (1-150)
RDS-II weights, median (IQR) ^f	0.53 (0.28-1.06)	0.62 (0.32-1.06)	0.48 (0.22-0.96)	0.47 (0.23-1.40)

HPV=human papillomavirus; IQR=interquartile range; RDS=respondent-driven sampling

^a Excluding seeds.

^b Among clusters with ≥ 2 participants.

^c Based on age 16-30 years at enrollment.

^d Defined as specimens with detection of either human β -globin or HPV DNA.

^e Based on response to: "How many men who have sex with men aged 16 years or older, including trans men, do you know who live or work in the [city] metropolitan area (whether they identify as gay or otherwise)? This includes gay/bi guys you see or speak to regularly, e.g. close friends, boyfriends, spouses, regular sex partners, roommates, relatives, people you regularly hang out with, etc." Values truncated at a minimum of 1 and a maximum of 150.

^f RDS-II weights are inversely proportional to self-reported RDS network size within each city; RDS-II weights sum to total number of participants in each city with a mean of 1.00.

Table S2. RDS-weighted anal HPV prevalence by city and HPV vaccination status among gay, bisexual, and other men who have sex with men aged 16-30 years, Engage Cohort Study, 2017-2019

	Overall, weighted % ^a				Unvaccinated, weighted % ^a				Vaccinated, weighted % ^a			
	MTL (N=270)	TOR (N=171)	VAN (N=204)	p-value	MTL (N=163)	TOR (N=95)	VAN (N=105)	p-value	MTL (N=87)	TOR (N=68)	VAN (N=90)	p-value
≥1 HPV type	72.9	63.3	61.2	0.312	71.9	54.3	58.7	0.244	76.3	82.3	64.5	0.200
≥1 4vHPV type	27.3	27.3	21.2	0.636	25.1	27.8	27.0	0.957	30.2	19.2	8.9	0.049
HPV-6	7.8	11.6	6.0	0.438	7.6	15.0	6.2	0.333	7.8	5.8	3.9	0.611
HPV-11	9.1	12.0	4.2	0.294	5.6	7.6	6.1	0.900	13.9	11.4	0.7	0.134
HPV-16	13.6	6.0	11.8	0.301	11.2	8.3	16.0	0.559	15.6	3.5	4.0	0.025
HPV-18	7.4	1.9	2.9	0.071	3.7	1.0	3.6	0.453	18.2	1.7	1.8	<0.001
≥1 additional 9vHPV type	9.0	23.8	12.5	0.014	9.7	19.4	13.6	0.294	5.6	23.3	11.5	0.047
HPV-31	2.3	4.5	3.7	0.698	2.4	6.6	4.5	0.546	0.3	2.0	2.4	0.404
HPV-33	0.6	5.9	1.6	0.011	0.4	2.8	1.0	0.176	0.8	0.0	3.1	-
HPV-45	1.3	11.1	2.6	<0.001	0.8	4.5	3.4	0.173	1.9	10.5	1.2	0.011
HPV-52	3.5	6.6	3.8	0.603	4.7	3.4	3.2	0.817	1.4	1.5	5.7	0.058
HPV-58	2.2	11.5	2.4	0.001	2.7	7.7	1.7	0.159	1.3	9.5	4.2	0.180
≥1 9vHPV type	33.8	43.5	29.8	0.271	31.2	42.2	37.0	0.583	35.4	41.3	15.7	0.056
≥1 non-9vHPV type	63.2	41.8	46.7	0.017	61.3	39.3	40.1	0.043	68.4	57.2	59.1	0.619

MTL=Montreal; TOR=Toronto; VAN=Vancouver

4vHPV types include HPV-6/11/16/18; 9vHPV types include HPV-6/11/16/18/31/33/45/52/58.

^a Prevalence estimates weighted using RDS-II weights to account for the RDS recruitment approach.

Table S3. RDS-weighted prevalence ratios for anal HPV infection with vaccine-preventable types comparing vaccinated to unvaccinated gay, bisexual, and other men who have sex with men aged 16-30 years, Engage Cohort Study, 2017-2019

Model ^a	Anal HPV prevalence				Unadjusted PR (95% CI)	Adjusted ^b PR (95% CI)
	Unvaccinated		Vaccinated			
	Weighted n/N ^c	Weighted % ^c	Weighted n/N ^c	Weighted % ^c		
4vHPV types						
Overall (≥1 dose) ^d	111/404	27.5	37/186	19.8	0.72 (0.41-1.25)	0.61 (0.36-1.02)
Number of doses						
≥2 doses ^e	110/401	27.5	31/132	23.3	0.85 (0.47-1.54)	0.68 (0.38-1.20)
3 doses ^f	108/394	27.5	18/91	19.6	0.71 (0.40-1.28)	0.59 (0.31-1.12)
Time since vaccination						
>1 year before enrollment	105/382	27.5	22/88	24.4	0.89 (0.44-1.81)	0.67 (0.35-1.27)
>2 years before enrollment	103/375	27.5	2/35	5.9	0.21 (0.09-0.53)	0.15 (0.06-0.40)
Age at first dose						
≤23 years	111/403	27.5	18/96	18.9	0.69 (0.30-1.61)	0.54 (0.26-1.11)
>23 years	111/403	27.5	16/81	20.2	0.73 (0.39-1.38)	0.66 (0.33-1.29)
9vHPV types						
Overall (≥1 dose) ^d	147/404	36.4	55/186	29.7	0.82 (0.53-1.25)	0.63 (0.43-0.93)
Number of doses						
≥2 doses ^e	146/401	36.4	47/132	36.0	0.99 (0.64-1.53)	0.72 (0.48-1.08)
3 doses ^f	143/394	36.4	27/91	29.9	0.82 (0.51-1.34)	0.59 (0.37-0.93)
Time since vaccination						
>1 year before enrollment	139/382	36.3	33/88	37.6	1.04 (0.63-1.72)	0.71 (0.45-1.11)
>2 years before enrollment	136/375	36.4	4/35	10.4	0.29 (0.14-0.58)	0.19 (0.09-0.40)
Age at first dose						
≤23 years	146/403	36.4	27/96	28.1	0.77 (0.42-1.43)	0.61 (0.35-1.04)
>23 years	146/403	36.4	26/81	31.9	0.88 (0.52-1.49)	0.64 (0.39-1.03)

CI=confidence interval; PR=prevalence ratio; RDS=respondent-driven sampling

4vHPV types include HPV-6/11/16/18; 9vHPV types include HPV-6/11/16/18/31/33/45/52/58.

^a Analyses restricted to 590 (97.0%) participants who had complete data for all covariates.

^b Analyses adjusted for age group, city, education, lifetime smoking history, lifetime history of STIs (excluding HIV and anogenital warts), and number of condomless receptive anal sex encounters in the past 6 months.

^c Prevalence estimates weighted using RDS-II weights to account for the RDS recruitment approach.

^d HPV vaccination status defined as self-reported receipt of ≥1 dose or unknown number of doses (vs. 0 doses).

^e HPV vaccination status defined as self-reported receipt of ≥2 doses (vs. 0 doses); excludes participants who self-reported 1 dose or had an unknown number of doses.

^f HPV vaccination status defined as self-reported receipt of 3 doses (vs. 0 doses); excludes participants who self-reported 1 or 2 doses or had an unknown number of doses.