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ORIGINAL ARTICLE

Habitual condom use across partner type and sexual position among younger gay and bisexual men: findings from New Zealand HIV behavioural surveillance 2006–2011

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ABSTRACT

Objectives Our objectives were to investigate demographic and behavioural factors associated with condom use and to examine how habitual condom use was across partner types and sexual positions among younger men who have sex with men (YMSM), aged 16–29, surveyed in New Zealand.

Methods We analysed the 2006–2011 national HIV behavioural surveillance data from YMSM who reported anal intercourse in four scenarios of partner type and sexual position: casual insertive, casual receptive, regular insertive and regular receptive. For each, respondents' condom use was classified as frequent (always/almost always) or otherwise, with associated factors identified with multivariate mixed-effect logistic regression. Habitual condom use across scenarios was examined using a latent variable technique that estimated the intraclass correlation coefficient (ICC).

Results Frequent condom use was reported for 63.6% of 5153 scenarios reported from 2412 YMSM. Frequent use increased from boyfriend to fuckbuddy to casual partners. Infrequent use was associated with online recruitment, Pacific ethnicity, less education, HIV positivity, sex with women, having ≥ 20 sexual partners versus 1 and reporting insertive and receptive sexual positions. Frequent condom use was associated with having two to five sexual partners versus one and shorter regular partnerships. The ICC=0.865 indicated highly habitual patterns of use; habitual infrequent condom use was most prevalent with regular partners (53.3%) and habitual frequent condom use was most prevalent with casual partners (70.2%) and for either sexual position (50.5% and 49.1%).

Conclusions Habitual condom use among YMSM highlights the value of early, engaging and sustained condom promotion. Public health should provide better and more compelling condom education, training and promotion for YMSM.

INTRODUCTION

Condoms remain critical to comprehensive prevention programmes against HIV and other sexually transmitted diseases/infections (STIs) among gay, bisexual and other men who have sex with men (MSM).¹ In Europe and North America, there is increasing HIV incidence among a new generation of younger MSM (YMSM).^{2–3} Establishing and

maintaining a 'condom culture' among these new cohorts of YMSM is imperative.

Research with YMSM has highlighted the influence of partner type and sexual position (or anal modality) on sexual behaviour.⁴ As partner familiarity increases, condom use decreases.⁵ A 2010 meta-analysis revealed considerably greater HIV transmission risks for unprotected receptive anal intercourse than unprotected insertive anal intercourse.⁶ However, much research collapses condom use across partner type and/or sexual position, examining 'any unprotected anal intercourse', instead of responding to these nuances. While this approach creates a measure of any risk of HIV/STI transmission and simplifies statistical analysis, it may mask important patterns.

Certain statistical approaches, such as logistic regression, may stratify condom use by partner type and/or sexual position. However, these approaches analyse condom use outcomes for different partners and sexual positions in isolation. For example, they cannot examine 'within-person clustering' of condom use, which indicates the level of habitual condom use across different parties and sexual positions.⁷ Knowledge of the level of condom use clustering is critical to informing health promotion strategy. For example, high clustering coupled with frequent condom use suggests that prevention specialists could reaffirm universal condom use for the majority who use them and target interventions to the minority who do not, rather than emphasising event-specific recommendations. High clustering, but low prevalence of condom use would suggest that non-condom use is normative and population-wide; urgent multilevel health promotion action at scale would be needed. Alternatively, a low level of clustering suggests greater variability in condom use across partners and sexual positions, suggesting that health promotion concentrate on encouraging habitual frequent condom use.

Generalised linear mixed models provide an opportunity to explore condom use behaviour within the context of other factors such as partner type and sexual position. This has not yet been investigated using behavioural public health surveillance data, which offer large and diverse samples and a broad range of variables.

Our objectives were to investigate demographic and behavioural factors associated with condom

use and the level of within-person clustering in condom use across sexual positions and partner types among YMSM surveyed in New Zealand.

METHODS

National HIV behavioural surveillance for MSM in New Zealand was conducted in 2006, 2008 and 2011 using two complementary and similar cross-sectional questionnaires, the location-based Gay Auckland Periodic Sex Survey (GAPSS) and the web-based Gay men's Online Sex Survey (GOSS). The methods are described elsewhere.⁸ To be eligible for either survey, participants must have identified as a man aged 16 or older who reported sex with another man in the past 5 years; men were allowed to participate once per year in either GAPSS or GOSS, but not both. Responses were pooled across years, but limited to men completing the survey for the first time. Participation was voluntary, anonymous and self-completed. The Northern X Regional Ethics Committee granted ethical approval. This analysis was restricted to YMSM respondents aged 16–29 years who reported having anal intercourse with another man in the 6 months prior to survey.

The primary outcome was condom use during anal intercourse. Men were asked to rate their condom use frequency during anal intercourse in the 6 months prior to survey for up to four sexual scenarios: (1) insertive with casual partners, (2) receptive with casual partners, (3) insertive with a regular partner and (4) receptive with a regular partner. Casual partners were defined as someone they had sex with no more than three times, while current regular partners were defined as anyone they had sex with four times or more, and further classified as a boyfriend or fuckbuddy. Participants with more than one current regular partner were invited to report on the one they had the most sex with. Level of condom use was dichotomised into frequent condom use ('always' or 'almost always') and infrequent condom use ('never', 'rarely' or 'about half the time').⁹

Explanatory variables include recruitment site; demographic factors such as age, sexual identity, ethnicity and education; time spent with other gay men; timing and result of last HIV test; sexual behaviours such as sex with a woman and number of male sexual partners; and relationship factors such as partner type, regular partner relationship length and sexual position. Participants were classified as insertive only, receptive only or versatile (both insertive and receptive) in three partner contexts (with casual partners, with main regular partner, and overall) based on their responses to the four aforementioned questions on condom use.

All statistical analyses were completed using StataSE V.11.2 and controlled for survey year. Data were analysed to determine the overall prevalence of frequent condom use in the sample as well as the prevalence of different combinations of frequent or infrequent condom use across partner types and sexual positions. Frequent condom use versus not was regressed onto explanatory variables using mixed-effects logistic regression, a type of generalised linear mixed model. A manual forward-stepwise model building approach with Stata's *xtmelogit* command was used with individual participants represented by a random intercept. Univariate analyses were conducted to screen independent variables for an association with the outcome variable using a liberal *p* value of 0.2.¹⁰ Variables for partner type (regular or casual) and for sexual position (insertive or receptive) were forced into the model, as fixed effects, to distinguish the scenario of each observation. Confounding was assessed at each step by evaluating a change in coefficients greater than 30%.¹⁰ Likelihood ratio tests were used to confirm

removal of a categorical variable if $p \geq 0.05$. Interpreting ORs for mixed-effect models are similar to fixed-effect regression, except that the random effect is also held fixed; in this case, it would mean an individual with identical random intercepts. Final adjusted ORs are presented with 95% CIs. To measure within-person clustering, the latent variable technique was used to estimate the intraclass correlation coefficient (ICC) and percentage variation at each level for the final model.

RESULTS

A total of 3387 responses from YMSM were pooled. Of these, 2412 YMSM (71.2%) reported anal intercourse with either a regular and/or casual partners in the past 6 months. Overall, 5153 condom use frequency observations (2.14 per participant) were reported from up to four possible scenarios. Frequent condom use was reported for 63.6% of all scenarios ($n=3276/5153$). A quarter of participants reported anal intercourse in only one scenario ($n=676$, 28.0%): 243 only casual insertive, 248 only casual receptive, 94 only regular insertive and 91 only regular receptive.

Prevalence of frequent condom use and the results of univariate and multivariate mixed-effect logistic regressions are shown in table 1. Age was not a significant factor. Based on the mixed-effects multivariate model, frequent condom use was less likely among YMSM who were recruited online versus in-person, reported a Pacific versus European ethnicity, had no tertiary education versus at least some, were HIV positive versus HIV negative, or reported also having sex with women versus only men. Compared with men who reported one sexual partner in the past 6 months, frequent condom use was more likely for men reporting 2–5 partners, similarly likely for men reporting 6–20 partners, but less likely for men reporting greater than 20 partners. Frequent condom use was more likely with casual partners than with fuckbuddies, which in turn was more likely than with boyfriends. Frequent condom use was more likely among YMSM with shorter regular partner relationships, who were receptive versus versatile with their regular partner, or who were insertive only versus versatile across all partner types.

The final model included 4838 observations from 2276 individuals. The variance of the random intercept (participant) was 21.1, resulting in an ICC of 0.865, which indicates a high level of clustering. After controlling for the fixed effects in the model, 86.5% of the remaining variation of condom use in the entire population is explained by the clustering within individuals and 13.5% is the unexplained variation.

For participants who reported at least two frequency observations, the combination of individuals' condom use levels are shown in table 2. The vast majority of participants reported habitual infrequent or habitual frequent condom use levels, the former combination being most prevalent with regular partners (53.3%) and the latter combination being most prevalent with casual partners (70.2%) and for either sexual position (50.5% and 49.1%). Habitual frequent or infrequent condom use with a regular partner and casual partners was reported by 96.4% and 93.0% of YMSM, respectively. Habitual frequent or infrequent condoms use during insertive and receptive anal intercourse was reported by 76.3% and 76.6% of YMSM, respectively.

Of all 2412 participants who reported recent anal intercourse, a total of 221 men (9.2%) reported on three of four possible scenarios and 392 men (16.3%) reported on all four possible scenarios. For these latter 392 YMSM, the prevalence of individuals' condom use level combinations are presented in

Table 1 Prevalence of and factors associated with frequent condom use among younger gay and bisexual men in New Zealand (2006–2011)

	Frequent condom use observations, n (%)	Univariate OR (95% CI), p<0.20	Multivariate AOR (95% CI), p<0.05
Recruitment site			
In-person (fair day, bars, saunas)	1170 (66.9)	1.00	1.00
Online dating sites	2106 (61.9)	0.32 (0.19 to 0.56)	0.16 (0.09 to 0.30)
Identity			
Gay	2374 (63.3)	1.00	1.00
Bisexual	745 (67.2)	1.48 (0.79 to 2.78)	2.27 (0.99 to 5.22)
Other	150 (52.1)	0.28 (0.09 to 0.84)	0.40 (0.12 to 1.36)
Ethnicity			
European/Pākehā	2235 (63.4)	1.00	1.00
Māori	408 (68.7)	1.67 (0.74 to 3.77)	1.47 (0.63 to 3.42)
Pacific	129 (53.3)	0.29 (0.09 to 0.94)	0.24 (0.07 to 0.83)
Asian	273 (64.3)	0.96 (0.40 to 2.34)	0.52 (0.20 to 1.36)
Other	216 (67.1)	2.21 (0.73 to 6.65)	1.44 (0.47 to 4.41)
Education			
Less than tertiary	2096 (62.1)	1.00	1.00
At least some tertiary	1149 (66.7)	2.33 (1.36 to 4.01)	2.40 (1.34 to 4.32)
Time spent with other gay men			
Little or none	1155 (69.0)	1.00	Not selected
Some or a lot	2074 (61.0)	0.66 (0.38 to 1.12)	
Time of last HIV test			
<6 months ago	1157 (65.6)	1.00	Not selected
>6 months ago	889 (62.7)	0.60 (0.21 to 1.14)	
Never tested	1180 (62.5)	0.59 (0.32 to 1.08)	
Result of last HIV test			
HIV negative	1979 (64.8)	1.00	1.00
HIV positive	20 (36.4)	0.05 (0.00 to 0.54)	0.06 (0.01 to 0.67)
Unsure	36 (63.2)	0.69 (0.06 to 8.00)	0.99 (0.08 to 12.11)
Never tested	1180 (62.5)	0.71 (0.42 to 1.20)	0.69 (0.39 to 1.23)
Sex with woman (<6 m)			
Yes	589 (61.2)	1.00	1.00
No	2669 (64.0)	1.84 (0.96 to 3.54)	4.05 (1.69 to 9.70)
Number of male sex partners (<6 m)			
One	376 (45.8)	1.00	1.00
2–5	1540 (70.6)	9.34 (4.63 to 18.86)	3.92 (1.80 to 8.54)
6–10	593 (66.0)	4.59 (2.00 to 10.54)	1.46 (0.58 to 3.69)
11–20	423 (69.2)	5.85 (2.26 to 15.16)	1.53 (0.53 to 4.38)
21–50	236 (54.0)	0.85 (0.30 to 2.37)	0.30 (0.10 to 0.97)
>50	73 (45.9)	0.32 (0.07 to 1.60)	0.17 (0.03 to 0.94)
Partner types			
Casual partners	2266 (74.9)	4.96 (3.28 to 7.51)	4.70 (3.02 to 7.33)
Current boyfriend	497 (38.6)	0.04 (0.02 to 0.08)	0.04 (0.02 to 0.08)
Current fuckbuddy	513 (61.0)	1.00	1.00
Regular partner relationship length			
No regular partner	1225 (76.8)	0.65 (0.32 to 1.30)	1.24 (0.53 to 2.88)
Less than 6 months	991 (66.9)	1.00	1.00
6 months—1 year	384 (58.8)	0.46 (0.19 to 1.08)	0.81 (0.32 to 2.02)
>1–2 years	347 (47.8)	0.09 (0.04 to 0.21)	0.14 (0.06 to 0.35)
Three or more years	282 (44.5)	0.06 (0.03 to 0.15)	0.11 (0.04 to 0.28)
Sexual position (forced into model)			
Insertive role	1657 (64.7)	1.24 (1.00 to 1.55)	1.15 (0.88 to 1.52)
Receptive role	1619 (62.5)	1.00	1.00
Sexual position with regular partner (<6 m)			
No regular partner	1225 (76.8)	3.45 (1.80 to 6.61)	1.24 (0.53 to 2.88)
No regular partner anal intercourse	80 (80.8)	5.94 (0.75 to 46.21)	2.55 (0.38 to 17.12)
Insertive only	272 (65.4)	3.54 (1.48 to 8.38)	1.69 (0.50 to 5.71)
Receptive only	342 (65.4)	2.78 (1.23 to 6.25)	3.96 (1.36 to 11.55)
Both insertive and receptive	1357 (53.9)	1.00	1.00

Continued

Table 1 Continued

	Frequent condom use observations, n (%)	Univariate OR (95% CI), p<0.20	Multivariate AOR (95% CI), p<0.05
Sexual positions with casual partners (<6 m)			
Only regular partners	325 (41.4)	0.33 (0.16 to 0.66)	Not selected
Insertive only	464 (70.9)	2.76 (1.22 to 6.26)	
Receptive only	415 (65.9)	0.96 (0.47 to 2.06)	
Both insertive and receptive	2072 (67.2)	1.00	
Sexual position across all partner types (<6 m)			
Insertive only	400 (73.1)	3.96 (1.18 to 8.81)	2.81 (1.02 to 7.73)
Receptive only	359 (65.4)	1.22 (0.61 to 2.47)	0.50 (0.20 to 1.25)
Both insertive and receptive	2517 (62.0)	1.00	1.00

Missing values excluded from the table. Bolded text indicates statistical significance at p<0.05. <6 m, last 6 months; AOR, adjusted OR.

table 3 to illustrate habitual condom use patterns for YMSM engaging in both sexual positions with both partner types. Of these, 74.5% reported either habitual frequent use (n=181, 46.2%) or habitual infrequent use (n=111, 28.3%). A further 70 YMSM (17.9%) reported habitual *infrequent* condom use with their regular partner, but habitual *frequent* use with casual partners.

DISCUSSION

Of 2412 YMSM who reported anal intercourse in the 6 months prior to survey, frequent condom use was reported for 63.6% (n=3276/5153) of all scenarios (insertive or receptive with casual partners, insertive or receptive with regular partners). Frequent condom use was most prevalent with casual partners (74.9%), then fuckbuddies (61.0%) and then boyfriends (38.6%). YMSM's condom use was habitual, or highly clustered (ICC=0.865), indicating that YMSM tended to be habitual frequent or habitual infrequent condom users across partner types and sexual positions. Habitual infrequent condom use was most prevalent with regular partners across sexual positions (53.3%) and habitual frequent condom use was most prevalent with casual partners across sexual positions (70.2%) and during insertive or receptive anal intercourse across partner types (50.5% and 49.1%, respectively).

Internationally, 100% consistent condom use has been documented for 33.8% of HIV-negative MSM in Australia,¹¹ and 37.1% and 28% of HIV-negative MSM in San Francisco in 2004 and 2008, respectively.^{12 13} However, these studies did not examine condom use frequency by partner type or sexual position. We disaggregated condom use by partner type and sexual position and found that habitual frequent or infrequent condom use was more prevalent within a partner type across sexual positions than it was for a sexual position across partner types. For example, during both insertive and receptive anal

intercourse, habitual frequent or infrequent condom use with a regular partner and casual partners was reported by 96.4% and 93.0% of YMSM, respectively. Although difficult to compare directly, habitual frequent condom use (always or almost always in the past 6 months) was more prevalent among New Zealand YMSM than 100% condom use in the past 12 months among YMSM in the USA: 43.1% versus 32–38% with main partner and 70.2% versus 54–57% with casual partners.¹⁴ Swiss MSM's consistent condom use with casual partners (67.4%) was more similar to New Zealand YMSM.¹⁵ Our finding of a high degree of clustering with generally high prevalence of frequent condom use may result from New Zealand's continued focus on promoting universal condom use during any anal intercourse between men, delivered at scale and supported by comprehensive health promotion action over several decades. Exceptions to this in our data may also reflect deficiencies in condom promotion to some YMSM (particularly in online environments before 2011).

This is the first analysis to measure condom use clustering within YMSM giving consideration to various sexual positions and partnership contexts using behavioural surveillance data. This research is based on a large and diverse second-generation HIV behavioural surveillance programme utilising location-based and web-based recruitment. Condom use data were collected retrospectively in four contexts, which allowed for more nuanced investigation of these behaviours through the novel use of a generalised linear mixed model. However, a limitation is that condom use was measured once across all casual partners and only reported for the current regular partner with whom the most sex was had. Condom use measures with shorter recall periods, or that are event specific, are more accurate.¹⁶ Data regarding partner HIV status and the degree of HIV concordant partnering, which while available only for current regular partner yielded insufficient statistical power (eg, 7 YMSM report being HIV-positive concordant with their current regular

Table 2 Combinations of condom use among participants who reported at least two anal intercourse frequency observations

Condom use level combinations across two scenarios	Reporting both sexual positions...		Reporting both partner types...	
	With casual partners (n=1098), n (%)	With regular partners (n=809), n (%)	When insertive (n=594), n (%)	When receptive (n=621), n (%)
Both infrequent	250 (22.8)	431 (53.3)	153 (25.8)	171 (27.5)
Frequent and infrequent	77 (7.0)	29 (3.6)	141 (23.7)*	145 (23.3)†
Both frequent	771 (70.2)	349 (43.1)	300 (50.5)	305 (49.1)

*130/141 men (92.2%) reported infrequent use with a regular partner and frequent use with casual partners.

†133/145 men (91.7%) reported infrequent use with a regular partner and frequent use with casual partners.

Table 3 Combinations of condom use among participants who reported anal intercourse in both sexual positions with a regular and casual partners

Condom use level combinations across four scenarios	n (%)
Habitual infrequent (4)	111 (28.3)
Infrequent (3) and frequent (1)	9 (2.3)
Half frequent (2) and half infrequent (2)	77 (19.6)*
Frequent (3) and infrequent (1)	14 (3.6)
Habitual frequent (4)	181 (46.2)

*During both insertive and receptive anal intercourse, 70/77 men (90.9%) reported habitual infrequent use with a regular partner, but habitual frequent use with casual partners.

partner), may contextualise the finding that HIV-positive YMSM were less likely to report frequent condom use than HIV-negative YMSM. Finally, cross-sectional designs introduce recall bias and limitations to causal inference. For example, we were not able to determine temporality between lower condom use and men who tested HIV positive. Although surveillance data are rarely longitudinal, a mixed-effect model provides additional analytic information on the degree of clustering within individuals' condom use and should be considered in future epidemiologic and behavioural research.

Some YMSM in our sample reported infrequent condom use with a regular partner, but frequent use with casual partners during insertive (92.2%, n=130/141) and receptive (91.7%, n=133/145) anal intercourse. These practices may be consistent with some aspects of 'negotiated safety',¹⁷ but additional data regarding extra-relational sexual agreements and adherence to these, which were not collected, would be required to support this claim. In fact, more YMSM reported habitual infrequent condom use across multiple partner types during insertive (n=153) and receptive (n=171) anal intercourse. This risk reduction practice may not be as common among these New Zealand YMSM compared with other jurisdictions.¹¹

YMSM were most likely to report infrequent condom use with a boyfriend. These findings help explain previous research that associates regular partners with increased HIV transmission risk.¹⁸ Public perceptions that conflate condoms with risk, infidelity and HIV/STIs impose barriers to their use within relationship contexts of love, trust and support.¹⁹ Community-based social marketing such as New Zealand's *Get It On!* and *Love Your Condom* campaigns could engage YMSM on the high potential for HIV/STI transmission within regular relationships due to concurrent partnering and lack of testing between new partners. Improved access to couples' voluntary HIV counselling and testing and other partner-based interventions could support YMSM before condom use wanes within their relationships.²⁰

Our study provides little evidence that 'strategic positioning'¹⁷ (the HIV-negative partner taking the insertive role to reduce risk of HIV acquisition) affects condom use among these New Zealand YMSM. Strategic positioning may be better understood with event-level data on sexual behaviour and partner HIV/STI status. However, YMSM who reported both insertive and receptive anal intercourse (either with their regular partner or across all partner types) comprise the majority of the sample and had lower odds of frequent condom use compared with YMSM with exclusive anal modalities. Given that versatile YMSM engage in high-risk behaviour for both acquisition (receptive) and transmission (insertive),^{15 21} clusters of HIV or STI transmission will be more likely if such individuals report habitual infrequent

condom use. Since sustained alteration of sexual positioning is neither realistic nor ethical,²¹ HIV/STI prevention efforts should improve condom negotiation and self-efficacy skills. Previous intervention research has demonstrated efficacy for improved condom use during insertive sex for YMSM, who may perceive themselves to be at low risk.²²

These New Zealand YMSM were predominantly HIV negative and condom promotion remains the leading population-based primary prevention strategy for the prevention of many STIs, including HIV. The maintenance and improvement of frequent, habitual and correct use of condoms is especially important given that many MSM are unaware of their HIV infection,¹⁴ and indeed lack of awareness may be more likely for younger MSM in New Zealand.²³ However, habitual infrequent condom use for certain YMSM indicates a network nexus with potential for rapid HIV transmission that may also be effectively interrupted by targeted individual- or couple-based interventions. Future research should investigate these sexual and relationship contexts in YMSM as well as HIV risk perceptions and prevention practices. Prospective condom use data that include event-level and partner-level factors, especially partner concurrency and HIV/STI status concordance, would help tailor and target the most efficacious interventions for infrequent condom using YMSM.

Among HIV-negative YMSM who remain unresponsive to these interventions, a high frequency of engagement in HIV and STI screening would be required to diagnose infections early and prevent secondary transmission. All novel biomedical advances in HIV prevention must be evaluated within a broad sexual health framework that integrates knowledge of growing STI epidemics among MSM globally and their synergy with HIV, as well as realistic implementation costs. Any potential HIV prevention benefit of pre-exposure prophylaxis must consider the extant social, economic and structural barriers to current prevention technologies and healthcare. For HIV-positive YMSM (including those undiagnosed), New Zealand has universal State-funded provision of HIV antiretroviral therapy; a comprehensive prevention programme should encourage condom use and couple this with anti-stigma efforts, HIV testing campaigns, accessible sexual health services and appropriate linkage to and retention in care for those living with HIV.

Finally, infrequent condom use among certain YMSM subgroups such as those who were recruited online, less educated, HIV positive, of Pacific ethnicity, and who reported sex with

Key messages

- ▶ Younger gay and bisexual men were highly habitual in being frequent condoms users or infrequent condom users across partner types and sexual positions.
- ▶ Habitual frequent condom use was most common with casual partners and even among younger gay and bisexual men who reported infrequent regular partner condom use.
- ▶ Condom promotion must consider the higher likelihood of infrequent condom use reported by younger gay and bisexual men who were versatile (both insertive and receptive).
- ▶ Condom education, training and promotion should address, especially within online environments, younger men who have sex with men who are HIV positive, less educated, of Pacific ethnicity and/or report frequent partner change.

women, ≥ 20 sexual partners, and a regular partnership > 1 year suggest important targets for culturally appropriate prevention programming. However, regardless of intention, adherence to any safer sex or risk reduction practice can be difficult to maintain, especially for some subsets of MSM,¹³ providing both a challenge and an opportunity to prevention specialists who aim to maintain or alter certain behaviours. Learning from YMSM who are frequent condom users about the strategies they currently employ to negotiate, encourage and maintain condom use could inform the development of more effective interventions for other YMSM who are less frequent condom users. As the use of condoms is highly clustered and because they effectively prevent transmission of many STIs, including HIV, public health needs to develop more compelling and sustained health promotion interventions to support condom use in high-risk YMSM.

Correction notice Author affiliations have been corrected since published Online First.

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Contributors NJL conceived of the research question, performed the statistical analysis with CED, and drafted the manuscript. PJWS, NPD and AJH designed and coordinated the Gay Auckland Periodic Sex Surveys and Gay men's Online Sex Surveys. CED, RRM and AJSS helped to draft the manuscript and support statistical analyses. All authors helped to interpret the data and read and approved the final manuscript.

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