Reproductive Health

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Predictive factors associated with sexual activity and consistent condom use during travel abroad: a cross-sectional survey of young Canadian adults

Emmanuelle Gareau[1] and Karen P. Phillips[1*]

Abstract

Background For young adults seeking new experiences, international travel provides opportunities for casual sexual encounters. The aim of this study was to identify the predictive factors associated with travel-associated sex and consistent condom use in a non-random sample of single and partnered young travelers.

Methods Sexually-active Canadians, aged 18–25 years, who traveled abroad in 2016, were purposively recruited to participate in an online survey. Two binomial logistic regressions were performed to examine the demographic, sexual health and lifestyle factors associated with (1) having sex abroad ($N=646$), or (2) consistent external condom use abroad ($n=271$ sexually-active travelers).

Results Packing condoms for international travel was associated with more than twice the odds of both having sex abroad (AOR: 2.58, 95% CI: 1.47–4.51 $p<0.001$) and using condoms consistently during intercourse (AOR: 2.62, 95% CI: 1.62–5.32, $p=0.008$). Sex under the influence of alcohol at-home, history of sexually transmitted infections, travel-related plans to have sex and drug consumption were also associated with sex abroad. Consistent external condom use abroad was associated with prior condom use at-home and penetrative sexual practices abroad. Unlike previous studies, gender, sexual orientation and relationship status were not significantly associated with either travel-associated sex nor condom use.

Conclusion Travelers' characteristics and domestic sexual behaviors will inform travel health interventions, but our findings support universal promotion of barrier protection during travel regardless of relationship status, sexual orientation or gender identity. Given the increasingly open and fluid nature of sexual expressions and relationships, pre-travel sexual health interventions should be sex-positive, broadly inclusive and promote strategies for safe sexual behaviors while travelling.

Plain English summary

The experience of international travel is often accompanied by risky behaviors including substance use and casual sex. Packing condoms for international travel was associated with a higher likelihood of travel-related sexual activity

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and consistent condom use. Behaviors at home including sex under the influence of alcohol, and history of sexually transmitted infections, were also linked with travel-related sex, whereas domestic condom use was associated with consistent condom use abroad. These factors can be incorporated in sex-positive, travel-sexual health promotion to ensure safe and responsible sexual activity abroad.

Keywords Sexual behavior, Risk factors, Travel, Condoms, Adult, Sexual partners, Health promotion, Sexual activity

Background

Travel provides a sense of anonymity, freedom and unique, immersive opportunities for self-discovery for young adults, with travel returning to pre-pandemic levels by the end of 2024 [1–3]. Escape from domestic responsibilities may foster sexual exploration while abroad, however, the situational disinhibition of travel may also influence behaviors like substance use and inconsistent use of condoms [2, 4–9], thereby contributing to the risk of sexually transmitted and blood-borne infections (STBBI). The global prevalence of travel-associated casual sex ranges from about 20.4% [10] to 35% [11] based on pooled findings from meta-analysis of studies using varied populations and timeframes, and is often accompanied by inconsistent condom use abroad [2, 4, 7, 8]. Awareness of traveler characteristics such as gender, age, sexual orientation, sexual experience, relationship status, expectations to have sex abroad, and risk behaviors may improve efficacy of pre-travel sexual health interventions [12].

Travel medicine is a dynamic, evolving field responsible for the prevention and treatment of travel-related illnesses including STBBI [13]. Pre-travel sexual health interventions tailored to destination, trip context and traveler characteristics may mitigate travel-risk behaviors, resulting in decreased risk of STBBI [12, 14, 15]. Such interventions may complement sexual health education, provided in public schools and mandated by each Canadian provincial and territorial government [16], and affirmed by the World Health Organization's (WHO) sexual health framework [17] as the cornerstone of sexual health.

Sexual behavior studies on travelers have often focused on high-risk groups, such as single, male, homosexual individuals, and backpackers or spring breakers, populations considered more likely to engage in casual sex abroad [10, 18–21]. Although large population-based surveys such as the United Kingdom (UK) National Survey of Sexual Attitudes and Lifestyles (Natsal) [22] and the Australian Study of Health and Relationships (ASHR) [23] evaluate sexual behaviors across recurring cycles, collection of travel-based behaviors is limited. Further, little is known about protective factors influencing sexual behaviors, including consistent condom use, in Canadian travelers who may not traditionally be categorized as high risk. Our study aims to address this gap by examining engagement in sex abroad, and consistent condom use as a protective behavior, in order to inform more inclusive, asset-based approaches to travel-related sexual health promotion..

Methods

Study design

Using a cross-sectional, quantitative, survey design, we explored sexual behaviors and condom use among young Canadian travelers, aged 18–25 years, within the context of their 2016 international travel. This study design was informed by the WHO sexual health framework [17], which recognises multilevel influences on sexual health.

Data collection

Participants were recruited (April to October 2017) through social media, using a purposive sampling method to ensure regional participation in the study setting of Canada. The online survey (SimpleSurvey, OutSideSoft Solutions Inc., Quebec, Canada), available in English and French, was divided into five different sections: 1) Lifestyle Practices, 2) Sexual and Reproductive Health, 3) Travel, 4) Perceptions, and 5) Demographics (Table 1). We adapted the survey questions from the literature [8, 19, 20, 24, 25]. Survey questions were framed inclusively, and queried use of STBBI barrier practices for both oral activities (e.g. dental dam) and penetrative practices (e.g. external condom). Here, condom use refers exclusively to external condoms or "male" condoms, to differentiate from "female" condoms used internally for both vaginal and anal sex.

Participants

We received a total of 1585 complete survey responses. The sample was restricted on the basis of Canadian citizenship/residency status and history of international travel in 2016 ($N = 809$). For the purpose of this analysis, the sample was further limited to participants who had at least one sexual partner in their lifetime and identified as female (including trans female) or male (including trans male) ($N = 646$) for the binomial logistic regression predicting the probability of having sex abroad. We recognise the importance of representing the realities of non-binary individuals in research, however, we only included binary (male, female) in our final sample as the number of non-binary individuals was too small ($n = 2$) for meaningful analysis. Only travelers who reported penetrative sex abroad ($n = 271$), regardless of the identity

Table 1 Variables and response categories

Variable	Response Categories	Variable	Response Categories
Demographic Variables			
Gender[1]	[2]woman [cis or trans], man [cis or trans]	Ethno-racial identity[1]	[2]Caucasian, non-Caucasian
Sexual orientation[1]	[2]heterosexual, non-heterosexual	Religious Affiliation[1]	[2]non-religious, religious
Age	Continuous	Education (completed)[1]	[2]high school, > high school
Alcohol/Drug Consumption			
Alcohol consumption at home[1]	[3]never/< 1 × month, 1 × month, 1 × week, 2–3 × week, ≥ 4 × week	Drug consumption at home[1]	[3] never/< 1 × month, 1 × month, 1 × week, 2–3 × week, ≥ 4 × week
Sexual History and Behaviors			
Sexual debut[1]	[2] ≤ 14y, ≥ 15y	#Partners in lifetime[1]	[3]1, 2–5, 6–10, 11 +
#Partners last 12 months[1]	[3]0–1, 2–5, 6 +	#One-night stands[1]	[3]0, 1–2, 3 +
Multiple partners in same time window	[2]no, yes	Use of dating apps/websites	[2]no, yes
Frequency condom use during intercourse at home[1]	[3]never, rarely or sometimes, most or every time)	Frequency condom use during oral sex at home[1]	[2]no, yes [any frequency]
Lifetime STBBI diagnosis	[2]no, yes	STBBI screening[1]	[2]no, yes [any frequency]
Asking partner's STBBI history	[2]no, yes	Asking partner to be screened for STBBI	[2]no, yes
Sex under influence of alcohol at home[1]	[3]never, rarely, sometimes, most or every time	Sex under influence of drugs at home[1]	[3]never, rarely, sometimes or most of the time
Travel Experiences			
Travel experience[1]	[2]0–1 country/year, 2 + country/year	Organization of trip by association/organization	[2]no, yes
Setting of trip	Nominal (urban, rural, combination)		
Sexual Experiences Abroad			
Plan to have sex abroad	[2]no, yes	Penetrative sex abroad	[2]yes, no
Brought condoms abroad	[2]no, yes	Oral sex abroad	[2]yes, no
Relationship status during trip[1]	[2]in a partnership, single	#Partners during trip[1]	[2]1, 2 +
Contraception abroad	Nominal (no method, method other than barrier, barrier or mix)	Identity of sexual partners during trip[1]	[2]usual, new
Trip[1] alcohol consumption	[3]never, < 1 × week, 2–3 × week, 4–5 × week, everyday	Trip[1] drug consumption	[3]never, < 1 × week, 2–3 × week, 4–5 × week, everyday
Sex under the influence of alcohol on trip[1]	[2]no, yes	Sex under the influence of drug on trip[1]	[2]no, yes
Risk Perceptions			
Risk perception 1: *Having safe sex (use of condom) is important for me*[1]		[2]no (strongly disagree, disagree, neutral), yes agree, strongly agree)	
Risk perception 2: *I don't mind having sex with people I just met*[1]		[2]no (strongly disagree, disagree), yes (neutral, agree, strongly agree)	
Risk perception 3: *I feel that my sexual health and sexual well-being were more at risk during my most recent international trip compared to back at home*[1]		[2]no (strongly disagree, disagree, neutral), yes (agree, strongly agree]	

[1]Response options were collapsed in cases where small cell sizes limited analysis

[2]Dichtomous variables

[3]Ordinal variables

of their partner(s) (usual partner, new partner) were included in the second binomial logistic regression predicting the probability of using condoms consistently abroad.

Data analysis

As all questions were mandatory, there were no missing data to address in the analysis. Survey data was extracted to Excel (Microsoft 365, version 16.42), cleaned and

Table 2 Potential predictive variables of having sex abroad

Gender[1]	**STBBI screening****
Sexual orientation[1]	**STBBI diagnosis (lifetime)***
Age***	Asking partner's STBBI history
Ethno-racial identity	Asking partner to be screened for STBBI
Religious Affiliation*	Use of dating apps/websites
Education***	Travel experience
Sexual debut	Setting of trip
#Partners in lifetime***	**Organization of trip***
#Partners last 12 months**	**Planning to have sex abroad*****
#One-night stands**	**Bringing condoms abroad*****
Multiple partners last 12 months**	**Relationship status during trip****
Alcohol consumption at home***	**Alcohol consumption on trip*****
Drug consumption at home	**Drug consumption on trip*****
Sex under influence of alcohol at home***	Contraception abroad***
Sex under influence of drugs at home	Risk perception 1: *Having safe sex (use of condom) is important for me*
Frequency condom use during intercourse at home	Risk perception 2: *I don't mind having sex with people I just met*
Frequency condom use during oral sex at home	Risk perception 3: *I feel that my sexual health and sexual well-being were more at risk during my most recent international trip compared to back at home*

[1]no association with having sex abroad, but included in regression model based on previous literature; *significant association with having sex abroad; bold included in regression model. Note some variables excluded from regression model due to strong multicollinearity with multiple variables. * $p<0.05$ **; $p<0.01$; *** $p<0.001$. *p-values* were determined by χ2 (or Fisher's test) for dichotomous variables, rank biserial correlation for ordinal variables and point-biserial correlation for continuous variables' association with outcomes

Table 3 Potential predictive variables of consistent condom use abroad

Gender[1]	**Asking partner to be screened for STBBI**
Sexual orientation[1]	Use of dating apps/websites
Age	Travel experience
Ethno-racial identity	Setting of trip
Religious Affiliation*	Organization of trip
Education	Planning to have sex abroad
Sexual debut	**Bringing condoms abroad*****
#Partners in lifetime	**Relationship status during trip***
#Partners last 12 months	Alcohol consumption on trip
#One-night stands	Drug consumption on trip
Multiple partners in same time window	**Penetrative sex abroad*****
Alcohol consumption at home	Oral sex abroad
Drug consumption at home	#Partners during trip
Sex under influence of alcohol at home	Identity of sexual partners during trip
Sex under influence of drugs at home	Sex under the influence of alcohol on trip
Frequency condom use during intercourse at home***	Sex under the influence of drug on trip
Frequency condom use during oral sex at home	Contraception abroad***
STBBI screening	**Risk perception 1: *Having safe sex (use of condom) is important for me*****
STBBI diagnosis (lifetime)	Risk perception 2: *I don't mind having sex with people I just met*
Asking partner's STBBI history	Risk perception 3: *I feel that my sexual health and sexual well-being were more at risk during my most recent international trip compared to back at home*

[1]no association with consistent condom use abroad, but included in regression model based on previous literature; *significant association with condom use abroad; bold included in regression model. Note some variables excluded from regression model due to strong multicollinearity with multiple variables; * $p<0.05$ **; $p<0.01$; *** $p<0.001$. *p-values* were determined by χ2 (or Fisher's test) for dichotomous variables, rank biserial correlation for ordinal variables and point-biserial correlation for continuous variables' association with outcomes

coded for further analysis in SPSS (v. 27) (IBM Corp., Armonk, NY) including descriptive statistics of sample socio-demographic characteristics. We conducted bivariate analyses (χ^2 for nominal variables, rank biserial correlation for ordinal variables and point-biserial correlation for continuous variables) to investigate associations between predictor variables and the dichotomous outcomes: (i) travel-related sexual relations (Table 2), and (ii) consistent condom use abroad (Table 3). We only retained statistically significant ($\alpha<0.05$) variables along with gender and sexual orientation. Variables were tested to ensure that the underlying assumptions of binomial logistic regression were met [26]. We conducted correlation matrix using Phi (ϕ) for dichotomous*dichotomous variables, Cramer's V (ϕc) for dichotomous*ordinal variables and Spearman's correlation for ordinal*ordinal variables to ensure the absence of multicollinearity. We considered Spearman correlation coefficients > 0.7 and ϕ or ϕc > 0.5 strong [27–29] and we excluded variables yielding coefficients exceeding those thresholds from the model. Preliminary model assessment included confirmation of linearity of the continuous variable (age) with respect to the logit of the dependent variable (having sex abroad) using Box-Tidwell [30] procedure. An interaction term was added based on conceptual relevance (gender * sexual orientation, for the condom use abroad regression). Logistic regression models (backward LR) were used to identify variables associated with travel-associated sexual activity, and consistent condom use, described below.

Travel-related sexual activity

The outcome variable, travel-related sexual activity, was dichotomised (yes/no), based on the number of sexual partners abroad (0/1 +) among all participants who traveled internationally in 2016 ($N=646$). Relevant identifiers (gender and sexual orientation) along with established modifiers of sexual activity (Table 2-bold) were included

in the binomial logistic regression (backward LR) to predict the probability that a participant had sexual relations with at least one sexual partner (usual or new) during their most recent 2016 international trip. Predictors of travel-associated sexual activity were identified based on adjusted odds ratio (AOR) and corresponding confidence intervals (CI).

Travel-related condom use

For the second regression, the outcome variable was the frequency of condom use abroad, dichotomised (consistent- "every time"/inconsistent-all other responses) among participants with at least one sexual (usual or new) partner abroad ($n = 271$). Relevant identifiers (gender and sexual orientation) along with established factors related to sexual risk behaviors (Table 3-bold) and interaction term (gender * sexual orientation) were included in the binomial logistic regression (backward LR). Predictors of consistent condom use abroad were identified based on AOR and corresponding CI.

Table 4 Demographics

Characteristic	All Participants ($N = 646$)	Sexually Active Travelers ($n = 271$)
Gender		
Women	541 (83.7%)	222 (81.9%)
Men	105 (16.3%)	49 (18.1%)
Mean age (years)	21.2 (SD[1]: 2.12)	21.66 (SD: 2.0)
Sexual orientation		
Heterosexual	518 (80.2%)	217 (80.1%)
Non-heterosexual[2]	128 (19.8%)	54 (19.9%)
Ethno-cultural identity		
Caucasian/white	505 (78.2%)	221 (81.5%)
Non-Caucasian	141 (21.8%)	50 (18.5%)
Religious affiliation	262 (40.6%)	95 (35.1%)
Highest level of education completed		
High School Diploma	241 (37.3%)	72 (26.6%)
College Diploma or above[3]	405 (62.7%)	199 (73.4%)
Occupation		
Student	546 (84.5%)	215 (79.3%)
Full or part-time work	92 (14.2%)	53 (19.6%)
Other/Unemployed	8 (1.2%)	3 (1.1%)

[1] *SD* standard deviation

[2] bisexual, homosexual, pansexual, asexual or other)

[3] Includes "Diplôme d'études collégiales" (pre-university diploma equivalent to Grade 12 high school + Year 1 University; Quebec, Canada)

Ethics

The Research Ethics Board at the University of Ottawa approved this study (File # H02-17–14). We provided the details of the study, benefits and risks associated with participation to all participants who could choose to consent to continue with the survey. To reimburse participants for their time, participants could voluntarily enter a draw for a $50 CAD Amazon gift card (1/50 chance of winning).

Results

Demographics

The full sample was predominantly comprised of women (83.7%; $n = 541$), who identified as heterosexual (80.2%, $n = 518$), Caucasian (78.2%, $n = 505$; Table 4), with most participants identifying as students at the time of the survey (84.5%, $n = 546$). Consistent condom use abroad was evaluated in a subsample ($n = 271$) of trip-sexually active individuals, regardless of the identity of their partner (usual or new). Both the full sample and trip-sexually active participants' sexual history, lifestyle behaviors at-home, travel information and sexual and lifestyle behaviors abroad appear in Tables 5, 6 and 7.

Predictors of sexual activity abroad

We performed a backward LR binomial logistic regression to ascertain the effects of factors (Table 2—bold) as potential predictors of travel-associated sex among the sample ($N = 646$), while recognizing that associations identified in this non-random, purposive sample are not necessarily causal. Cases with standardised residuals (ZResid) greater than 2.5 standard deviations ($N = 32$) were examined and retained in the model. The logistic regression model was statistically significant, $\chi^2(9) = 403.03$, $p < 0.001$. The model explained 62.4% (Nagelkerke R^2) of the variance in having sex abroad and correctly classified 85.6% of cases. In comparison, the null model, containing only the constant, correctly classified 58.0% of the cases. Sensitivity was 73.1%, specificity was 94.7%. Of the 14 factors evaluated (Table 2), seven were statistically significant factors associated with travel-related sex (Table 8): (1) age (2) religious affiliation, (3) history of sex under the influence of alcohol at-home in the past two years (most of the time or every time), (4) having been diagnosed with a STBBI at least once, (5) plan to have sex abroad, (6) did bring external condoms abroad, (7) drug consumption abroad (less than once a week).

The strongest factors associated with travel-related sex were *plans to have sex abroad* (AOR: 54.64; 95% CI: 28.71–103.99, $p < 0.001$) and *packing condoms for the trip* (AOR: 2.58; 95% CI: 1.47–4.51, $p < 0.001$; Table 8). Older age was associated with an increased likelihood of having sex abroad (AOR: 1.12, 95% CI: 1.00–1.25, $p = 0.047$),

Table 5 Sexual History and Lifestyle Behaviors At-Home

Characteristic	All Participants (*N* = 646)	Sexually Active Travelers (*n* = 271)
Sexual debut		
14 or less	64 (9.9%)	32 (11.8%)
15 or above	582 (90.1%)	239 (88.2%)
Number of sexual partners in lifetime		
1	162 (25.1%)	51 (18.8%)
2–5	255 (39.5%)	107 (39.5%)
6–10	123 (19.0%)	59 (21.8%)
11 +	106 (16.4%)	54 (19.9%)
Number of partners in the past 12 months		
0–1	391 (60.5%)	151 (55.7%)
2 –5	205 (31.7%)	89 (32.8%)
6 +	50 (7.7%)	31 (11.4%)
Multiple partners at a time during the past 12 months		
No	534 (82.7%)	211 (77.9%)
Yes	112 (17.3%)	60 (22.1%)
Number of one-night stands in lifetime		
0	292 (45.2%)	110 (40.6%)
1–2	199 (30.8%)	82 (30.3%)
3 +	155 (24.0%)	79 (29.2%)
Ever used of dating websites or apps in the past 2 years	303 (46.9%)	119 (43.9%)
Condom use during intercourse in the past 2 years		
Never or N/A	97 (15.0%)	47 (17.3%)
Rarely or sometimes	231 (35.8%)	99 (36.5%)
Most of the time or every time	318 (49.2%)	125 (46.1%)
Condom or dental dam use during oral sex in the past 2 years (Rarely, Sometimes, Most of the Time, Every Time)	128 (19.8%)	53 (19.6%)
Alcohol consumption in the past 12 months		
Less than once a month [including never]	95 (14.7%)	26 (9.6%)
Once a month	157 (24.3%)	59 (21.8%)
Once a week	217 (33.6%)	91 (33.6%)
2–3 times a week	144 (22.3%)	71 (26.2%)
At least 4 times a week	33 (5.1%)	24 (8.9%)
Drug consumption in the past 12 months		
Never	339 (52.5%)	140 (51.7%)
Less than once a month	183 (28.3%)	75 (27.7%)
Once a month	57 (8.8%)	21 (7.7%)
Once a week	38 (5.9%)	21 (7.7%)
At least twice a week	29 (4.5%)	14 (5.2%)
Sex under the influence of alcohol in the past 2 years		
Never	104 (16.1%)	23 (8.5%)
Rarely	242 (37.5%)	107 (39.5%)
Sometimes	249 (38.5%)	111 (41.0%)
Most of the time or every time	51 (7.9%)	30 (11.1%)
Sex under the influence of drug in the past 2 years		
Never	471 (72.9%)	196 (72.3%)
Rarely	114 (17.6%)	47 (17.3%)
Sometimes or most of the time [every time = 0]	61 (9.4%)	28 (10.3%)
STBBI screening- at least once in lifetime	411 (63.6%)	190 (70.1%)
At least one lifetime STBBI diagnosis	50 (7.7%)	28 (10.3%)
Precautionary Measures – Asking partner's history of STBBIs	388 (60.1%)	153 (56.5%)
Precautionary Measures – Asking partner to be screened before sex	172 (26.6%)	66 (24.4%)
Risk Perception—Having safe sex (use of condoms) is important for me (Agree or Strongly Agree)	524 (81.1%)	212 (78.2%)
Risk Perception—I don't mind having sex with people I just met (Strongly Agree, Agree or Neutral)	315 (48.8%)	143 (52.8%)

Table 6 Travel Information

Characteristic	All Participants($N=646$)	Sexually Active Travelers ($n=271$)
Travel experience (average #trips taken outside of the country per year)		
No (0–1 country visited per year)	205 (31.7%)	86 (31.7%)
Yes (2 or more countries visited per year)	441 (68.3%)	185 (68.3%)
Setting of most recent 2016 international trip		
Mostly Urban	346 (53.6%)	153 (56.5%)
Mostly Rural	108 (16.7%)	38 (14.0%)
Equally Urban and Rural	192 (29.7%)	80 (29.5%)
Organization of the trip		
Organized by an association/organization	538 (83.3%)	237 (87.5%)
Not organized by an association/organization	108 (16.7%)	34 (12.5%)

Table 7 Sexual Activity and Lifestyle Behaviors Abroad

Characteristic	All Participants ($N=646$)	Sexually Active Travelers ($n=271$)
Plan to have sex during trip	199 (30.8%)	186 (68.6%)
Did bring external condom(s) during trip	156 (24.1%)	116 (42.8%)
Partnered-relationship status during trip	382 (59.1%)	178 (65.7%)
Alcohol consumption on trip		
Never	120 (18.6%)	21 (7.7%)
Less than once a week	66 (10.2%)	26 (9.6%)
Once a week	77 (11.9%)	31 (11.4%)
2–3 times a week	140 (21.7%)	69 (25.5%)
4–5 times a week	116 (18.0%)	58 (21.4%)
Everyday	127 (19.7%)	66 (24.4%)
Drug consumption on trip		
Never	554 (85.8%)	211 (77.9%)
Less than once a week	45 (7.0%)	33 (12.2%)
Once a week	18 (2.8%)	8 (3.0%)
At least twice a week	29 (4.5%)	19 (7.0%)
Multiple sexual partner(s) during trip (2 +)		56 (20.7%)
New sexual partner(s) during trip		110 (40.6%)
Sex under influence alcohol on trip (sometimes/most of time)		176 (64.9%)
Sex under influence drug on trip (sometimes/most of time)		25 (9.2%)
Penetrative sex on trip (vaginal, anal or both)		233 (86.0%)
Oral sex on trip		201 (74.2%)
Contraception method used during trip		
No method	82 (12.7%)	38 (14.0%)
Method other than barrier methods	421 (65.2%)	96 (35.4%)
Barrier method or combination of barrier method and other type of contraception	143 (22.1%)	137 (50.6%)
Risk Perception—I feel that my sexual health and sexual well-being were more at risk during my most recent international trip compared to back at home (agree/strongly agree)	89 (13.8%)	44 (16.2%)

whereas religiosity was associated with a decreased likelihood of having sex abroad (AOR: 0.56, 95% CI: 0.34–0.91, $p=0.019$). Having sex under the influence of alcohol *most of the time or every time* in the past two years had significantly higher odds of having sex abroad (AOR: 3.65, 95% CI: 1.33–10.00, $p=0.012$). In contrast, infrequent drug use abroad (less than once a week during trip) was associated with greater odds of having sex abroad (AOR: 3.35; 95% CI: 1.33–8.44, $p=0.010$), compared to drug abstinence or drug consumption more than once a week. Finally, at least one lifetime STBBI diagnosis was associated with increased odds of having sex abroad (AOR: 2.39, 95% CI: 1.11–5.15).

Predictors of consistent condom use abroad

We performed a backward LR binomial logistic regression to ascertain the effects of factors (Table 3—bold) as potential predictors of consistent condom use abroad among trip-sexually active participants ($n=271$), while recognizing that associations identified in this non-random, purposive sample are not necessarily causal. Cases with standardized residual (ZResid) values of 2.5 standard deviations or higher ($N=4$) were examined and retained in the analysis. The logistic regression model was statistically significant $\chi2(3)=120.075$, $p<0.001$. The model explained 51.7% (Nagelkerke R^2) of the variance in condom use abroad and correctly classified 81.5% of cases. In comparison, the null model, containing only the constant, correctly classified 72.3% of the cases. Sensitivity was 65.3%, specificity was 87.8%. Of the eight factors evaluated, three were statistically significantly associated with consistent condom use abroad (Table 9): (1) frequency of condom use during intercourse at-home in the past two years, (2) bringing condoms abroad, and (3) penetrative sex abroad.

Penetrative sexual practices abroad were significantly associated with higher odds of consistent condom use (AOR: 20.84; 95% CI: 2.65–164.08; Table 9). Travelers who packed condoms had 2.62 times higher odds of using condoms consistently compared to travelers who did not bring condoms with them (95% CI: 1.29–5.32, $p=0.008$). History of unprotected sexual intercourse (no condom use) at-home was associated with significantly lower

Table 8 Logistic regression analysis of variables associated with having sex abroad

	B[1]	Standard Error	Wald Chi-Square	p-value	Adjusted Odds Ratio	95% C.I. for Odds Ratio	
						Lower	Upper
Age*	0.111	0.056	3.940	**0.047**	1.117	1.001	1.246
Religious affiliation (No)[a]							
Yes*	−0.587	0.251	5.463	**0.019**	0.556	0.340	0.910
Sex under the influence of alcohol past 2 years (Never)[a]							
Rarely	0.493	0.389	1.604	0.205	1.636	0.764	3.507
Sometimes	0.454	0.391	1.344	0.246	1.574	0.731	3.390
Most of the time or every time*	1.295	0.514	**6.343**	**0.012**	3.651	1.333	10.002
Lifetime STBBI diagnosis (No)[a]							
Yes*	0.872	0.391	**4.980**	**0.026**	2.392	1.112	5.147
Plan to have sex abroad (No)[a]							
Yes***	4.001	0.328	148.489	**< 0.001**	54.641	28.711	103.989
Did bring condoms abroad (No)[a]							
Yes***	0.947	0.286	10.980	**< 0.001**	2.577	1.472	4.511
Drug consumption on trip (Never)[a]							
Less than once a week*	1.210	0.471	6.606	**0.010**	3.353	1.333	8.435
Once a week	0.327	0.657	0.248	0.618	1.387	0.383	5.026
At least twice a week	0.657	0.580	1.283	0.257	1.930	0.619	6.019

[a]reference category; * $p < 0.05$; *** $p < 0.001$

Table 9 Logistic regression analysis of variables associated with consistent condom use abroad

	B[1]	Standard Error	Wald Chi-Square	*p*-value	Adjusted Odds Ratio	95% C.I. for Odds Ratio	
						Lower	Upper
Did bring condoms abroad (No)[a]							
Yes	0.963	0.361	7.113	0.008	2.619	1.291	5.316
Penetrative sex abroad (No)[a]							
Yes	3.037	1.053	8.319	0.004	20.838	2.646	146.077
Frequency of condom use for intercourse at-home (Most of the time or every time)[a]							
Never	−2.517	0.426	34.931	< 0.001	0.081	0.035	0.186

[a]reference category

odds of consistent condom use abroad (AOR: 0.081, 95% CI: 0.035–0.186, $p < 0.001$).

Discussion

Travel-related sexual activity among young adults is typically framed in terms of risk behaviors. Here we discuss our findings through a sex-positive lens, with consideration of modifiable elements which can contribute to safe and consensual travel-related sexual activity [31–33]. Our findings are based on a non-random purposive sample that was predominantly composed of Caucasian heterosexual women, which limits the generalizability of our results. Still, we identified seven factors that were statistically associated with travel-associated sex among our young Canadian adult sample, including travelers' intentions to have sex abroad, packing condoms and frequent sex under the influence of alcohol in past two years relevant for travel sexual health promotion. Similarly, future travel-related sexual health interventions can be informed by the three factors most strongly associated with consistent condom use abroad: packing condoms, trip-related penetrative sexual activities and domestic condom use. Our findings demonstrate that the most relevant behaviors to ensure sex-positive, healthy travel begin prior to departure, providing opportunities for sexual health promotion in the context of travel guidance.

Our first outcome variable, young travelers having sex abroad, enabled characterization of the population of travelers who may most benefit from pre-travel sexual health promotion. Sexual activity itself, whether at-home or abroad, should not be framed as a risk activity, rather a natural inclination among sexually-active young adults. Recognizing, however, that healthy sexual expression requires consent, freedom from discrimination and disease, and access to health services (17), the characterization of this population of sexually-active travelers including their motivations and behaviors, may contribute to the design of effective health sexual promotion.

Gender identity and sexual orientation

Travel-associated sexual activity, particularly among young adults, is typically studied in populations of single travelers in terms of casual sexual encounters [10]. Casual encounters, by definition, would naturally preclude extensive sharing of sexual history, thereby posing a risk of STBBI transmission [10]. Traveler characteristics including male gender, single status, and homosexual orientation are among the factors identified with sexual risk-taking abroad in previous studies [8, 19–21, 25, 26, 34, 35]. However, in our Canadian sample, gender and sexual orientation was not significantly associated with sex abroad. As all genders and orientations will benefit from sexual health promotion, sexual health travel interventions should be sex positive and inclusive.

Relationship status-partner characteristics

In contrast to previous studies which emphasised single travelers [10, 11, 36–38], young Canadians' relationship status during travel was not significantly associated with having sex abroad. In the design of sexual health promotion, the concept of relationship status as protective of sexual risks is predicated on the assumption that relationships are monogamous [39–41]. We have previously reported that a small number of our partnered-travelers acquired new travel-associated sexual partners [42]. Relationship configurations, sexual identities and sexual orientations in Generation Z adults are increasingly fluid [43, 44], such that traditional categorization of high-risk groups may be outdated and fail to capture evolving sexual norms. Our findings challenge the dogma that only single travelers have casual sex and acquire new sexual partners while travelling. Further, we report that neither relationship status nor identity of trip-associated partner was significantly associated with sex abroad or condom use, thereby suggesting that partnered travelers are not exempt from adverse sexual health during travel.

Condom practices

Young Canadians were about 2.5 times more likely to have sex abroad when they brought condoms on their trip, consistent with previous studies which reported correlations between packing condoms and travel-associated sexual activity [11]. Packing condoms for travel is a protective sexual health behavior and should be a component of travel health promotion. The International Association for Medical Assistance to Travelers [45] recommends that all travelers pack condoms regardless of intentions to have sex-abroad, recognizing that condoms, along with oral contraceptives and emergency contraceptives, may be limited or inaccessible in the destination region.

Consistent condom use abroad

In our second regression analysis, we identified that packing condoms and trip-related penetrative sex were factors related to consistent condom use abroad, similar to previous findings [46]. Bringing condoms abroad is not a guarantee that they will be used properly and consistently, as young travelers typically report inconsistent condom use [8, 19, 20, 26, 47–50]. Additional determinants of condom use abroad include travel companions [19], gender, identity of sex partner(s) [26], alcohol consumption [51], and mental health [21]. Incorporation of condom negotiation skills and consistent condom practices in domestic and travel-sexual health education/promotion is recommended.

We recognise the growing acceptability of fluidity in terms of gender, sexual orientation, sexual practices and sexual expression, such that all travelers should be encouraged to pack condoms/barrier protection in anticipation of travel. Neither relationship status, sexual orientation nor identity/number of sex partner(s) abroad were significantly associated with consistent travel-related condom use in our study. Although it is likely that other forms of contraception may be employed by travelers having sex with their usual partners [25, 26], many factors reduce the efficacy of oral contraceptives (e.g. vomiting/diarrhea, antibiotics), supporting the need for condoms. Unanticipated acquisition of new sexual partners together with possible barriers to condom purchase, are further reasons why packing condoms/barrier protection should be standard travel guidance.

History of unprotected sex (no condom use) at-home was significantly associated with lower odds of consistent condom use abroad in our sample, reinforcing that the best practices for sexual health must begin prior to travel. Barriers to unprotected sex or inconsistent use of condoms include access barriers (e.g. low quality/selection, embarrassment), partner communication barriers (e.g. poor condom negotiation skills, perceptions that condoms will disrupt the mood/suggest promiscuity), and sensation barriers (e.g. reduction/modification of sensations/pleasure) and/or ability to maintain erection (mainly reported by males), pain/discomfort in the genital area (mainly reported by females) [9, 48]. Access barriers and condom negotiation skills can be mitigated by sexual health promotion and recommendations to pack condoms for international travel.

Drugs and alcohol

Sex under the influence of alcohol in the past two years was significantly associated with travel-associated sex, reaffirming the need for at-home risk behavior mitigation. Engaging in sexual activity while under the influence of alcohol presents important considerations. Relevant to sexual health abroad, alcohol consumption

impairs consistent condom use [10, 15, 48, 51], may impair the ability to consent [51, 52], and contributes to casual sexual encounters while travelling [8, 12, 19, 21, 51]. Infrequent drug use while travelling was also significantly associated with sex abroad, in contrast to more frequent drug consumption. The disinhibiting effects of excessive alcohol consumption and/or drug use can elevate risks, such as vulnerability to robbery, physical and sexual assault, injury or even fatal outcomes, and may contribute to unintended behaviors, including unlawful activities [11, 53–56]. Risk mitigation strategies around safe substance use and situational awareness are relevant sexual health promotion strategies both at-home and abroad. Although we did not find an association between sex under the influence of alcohol abroad and consistent condom use, alcohol-disinhibited sexual activity was reported by 65% of our sample, increasing the likelihood of victimization or unlawful activities. Sustainable changes in travel-associated excessive alcohol consumption will require both promotion at the individual (safe consumption, intake limits, moderate drinking guidelines) [57] and population levels (cultural norms, whole of government/whole of society approach, alcohol public health policies) [55].

Sex-positive, pre-travel health promotion

Our sample of sexually experienced young travelers affirmed their intentions to have sex abroad represented by both planning and packing/preparation behaviors. Domestic behaviors, including sex under the influence of alcohol and never using condoms during intercourse or using condoms inconsistently, are modifiable risks to sexual health, both at-home and abroad, that may be mitigated by sexual health education. In Ontario and Quebec, the home provinces of 84.7% ($n = 549$) of our participant sample, sexual health is a compulsory part of the public-school curriculum, with emphasis on risk reduction [16, 57, 58]. A risk-reduction approach in sexual health education can successfully convey information and associations between behaviors and disease risk [16]. However, a more comprehensive, sex-positive approach would be preferable to address the varied reasons for inconsistent condom use, including development of skills to negotiate consistent and appropriate condom use [59]. Transitioning from a risk-based sexual health discourse to dialog that encourages healthy, enjoyable and consensual sexual activity requires a paradigm shift for both health and education fields in Canada [16]. Implementation of sexual health curricula varies with instructor and school [16], however both Ontario and Quebec sexual health curricula aim to provide age-based education with that is comprehensive, and emphasizes consent, autonomy and respect for diversity including gender expression and sexual orientation [58, 59]. Conceptualizations of sex positivity commonly incorporate autonomy, consent, and health and safety [60], and thus do not preclude discussion of sexual health risks such as STBBI. Although we did not examine intimate partner violence (IPV; rape, coercion, control) in our study, IPV remains a significant risk to sexual health within relationships. Abroad, partners may lack their typical social support networks or face barriers to healthcare or legal options [2, 56, 61], such that resources should be included in travel-health interventions. Beyond the classroom, sex-positive, comprehensive sexual health education can be reinforced by social and political strategies which promote person-centered sexual and reproductive rights, recognition of the breadth of sexual and gender identities, and ensure access to sexual and reproductive healthcare, including abortion and emergency contraceptives, barrier protection against STBBI, and contraception.

Travel health promotion aims to reduce risk of illness and injury during travel, with emphasis on destination-specific risks and traveler characteristics [13]. Although there is some debate about the effectiveness and usefulness of existing pre-travel sexual health interventions [7, 11, 26], innovative strategies using social media, new technologies (e.g. targeted ads on social media) and social marketing strategies might improve uptake of sexual health promotion messaging [49). Travel sexual health promotion should incorporate a broader, sex-positive approach to increase relevance and uptake by young travelers [21, 22]. The experience of international travel can be enhanced by cultural engagement including interactions with local citizens, exposure to foreign languages, and respectfully adhering to regional norms and traditions, particularly around public sexual expressions and alcohol use [57]. Culturally-appropriate, anti-racist travel guidance would improve dyadic tourist-host country relations, but also challenge the consumer-driven approach of appropriating travel for personal indulgence and escape [62]. Such travel health promotion would also enable pragmatic discussions about condom/contraceptive access abroad and strategies for safe, public and private forms of sexual expressions in various travel destinations—particularly for countries with regressive laws and social norms restricting premarital sex, non-heteronormative relationship practices and non-binary gender expressions [18, 63].

Limitations

Although our sexually-inclusive study design and geographic breadth are among the strengths of our cross-sectional study, several limitations need to be considered. The sample is not representative of the Canadian 18–25-year population due to the purposive, non-random sampling method used and the overrepresentation by Caucasian heterosexual women. Participant

characteristics were not compared to probability-based population data. Respondents were mostly post-secondary university students, such that potential socioeconomic factors (e.g. educational attainment, household income and job status) and their relationships with sexual behaviors could not be examined. Finally, we acknowledge that the outcome variables were selected due to their relevance for public health and potential STBBI transmission, however, consent, agency, autonomy and satisfaction associated with sexual activity abroad are also relevant outcomes for future sex-positive, sexual health research.

Conclusion

Sexual activity during travel can be a healthy, positive life experience when accompanied by appropriate sexual risk mitigation. Travel-associated sexual health promotion should be inclusive of diverse gender identities and sexual orientations, and use a sex-positive, harm-reduction approach to mitigate risk and affirm healthy sexual expressions while travelling. Our findings provide insights about factors influencing the sexual activity of young Canadian travelers abroad which may be useful to tailor sexual health counselling during pre-travel interventions. Traveler domestic characteristics most associated with having sex abroad included history of having sex while under the influence of alcohol, history of STBBI, plans to have sex abroad and packing condoms. Packing condoms, along with penetrative sexual practices abroad, were also significantly associated with consistent condom use while travelling. As relationship status, sexual orientation and identity/number of sexual partners while travelling were unrelated to sexual activity abroad or consistent condom use, all travelers should be encouraged to pack condoms/barrier protection. We recommend comprehensive, sex-positive travel health promotion with an emphasis on safe, situational awareness related to public gender and sexual expressions and substance use in the context of social norms and legal prohibitions in destination regions.

Abbreviations

AOR	Adjusted odds ratio
CAD	Canadian dollar
CI	Confidence interval
IBM	International Business Machines
IPV	Intimate partner violence
LR	Logistic regression
MSc	Masters of Science degree
NY	New York
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
STBBI	Sexually transmitted and blood-borne infections
WHO	World Health Organization
ZResid	Standardized residual

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Authors' contributions

EG and KP conceived the research project. EG analyzed survey data, with oversight from KP. The manuscript was written by both EG and KP. This work comprised EG's MSc thesis project, supervised by KP.

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Data availability

Most of the survey data that support the findings of this study is included in manuscript tables. Some additional data for this manuscript is currently embargoed as part of a MSc thesis. It will eventually be available at the University of Ottawa online thesis portal: https://ruor.uottawa.ca/handle/10393/242 or https://doi.org/10.20381/ruor-26058.

Declarations

Ethics approval and consent to participate

All methods were performed in accordance with relevant medical ethics and research guidelines and regulations. All experimental/study protocols were reviewed and approved by Research Ethics Board at the University of Ottawa (File # H02-17–14). All participants indicated electronic consent prior to survey completion which summarized the purpose of the study, risks and benefits to participants and mechanisms of participation.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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