

Promotion of safe sex: evaluation of a community-level intervention programme in gay bars, saunas and sex shops

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Abstract

This study was an evaluation of a safe sex promotion programme in gay bars, saunas and sex shops in Québec City. The impact of the intervention on safe sex was assessed by means of an interrupted sequential pre-interventions and post-interventions quasi-experimental design with independent samples. At each measurement time, ~320 individuals were recruited in gay bars and saunas and were invited to complete a self-administered questionnaire. The intervention had a significant impact on safe sex mainly among the 18–29 age group (relative risk = 0.71; 95% confidence interval [CI_{95%}] = 0.55–0.92), even after controlling for the effect of gay venue frequentation. Thus, the effect size of the intervention corresponds to a significant reduction of 29% in risky unprotected anal sex among this age group. Implementation of a theory-based community-level intervention has a positive impact on reducing unsafe sex practices, particu-

larly among the 18–29 age group. However, if the preventive activities are not maintained on a regular basis, there is recrudescence in unsafe sex practices.

Introduction

The advent of highly active antiretroviral therapy (HAART) has resulted in a significant decrease in the acquired immune deficiency syndrome (AIDS) mortality rate among men who have sex with men (MSM) [1]. In spite of this progress, recent statistics have indicated that not only do the prevalence rates of these infections remain high among MSM in several urban areas [2–4] but the incidence rates of human immunodeficiency virus (HIV) and sexually transmitted diseases have also been rising in the gay community [5–10]. In recent years, an increase in high-risk sexual behaviours among MSM has also been observed in several countries [6,11–13]. These observations suggest that prevention efforts should be reinforced in the gay community to prevent future resurgence of the HIV epidemic among MSM. Thus, the aim of this study was to evaluate the impact of a community-level prevention programme which promotes the adoption and maintenance of safe sex among MSM who frequent commercial gay venues such as bars, saunas and sex shops.

Overview of the prevention programme

Theoretical background

The prevention programme was developed following the guidelines of ‘intervention mapping’ [14],

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a model that provides health education planners with a framework for effective decision making at each step in intervention planning, implementation and evaluation. One of the main advantages of this model is the possibility of integrating theoretical models, empirical findings from the literature and practical information collected from the population through an iterative process. Indeed, several authors reported that interventions, based on theoretical models, offer a higher potential for lowering unsafe sexual behaviours among MSM [15–18].

The main objective of the prevention programme was to promote the use of condoms during anal sex. To achieve this objective, four performance objectives were formulated: (i) ‘to plan’ the use of a condom during anal sex, (ii) ‘to negotiate’ with one’s partners the use of a condom during anal sex, (iii) ‘to refuse’ to have anal sex without a condom and (iv) ‘to maintain’ the use of a condom during anal sex in the future. Moreover, for each of the four performance objectives, four psychosocial constructs were retained because of their strong association with the targeted behaviour and of the possibility of modifying them through educational activities [19–22]. The four psychosocial factors retained were intention, self-efficacy, subjective norm and anticipated regret. In brief, intention and subjective norm are determinants from the Theory of Reasoned Action [23]. According to the postulates of this theory, the immediate predictor of a behaviour is the intention of the person to carry out or not carry out a targeted action. Within this perspective, the person analyses and then assesses the available information. The ‘subjective norm’ is related to the person’s perception of the approval or disapproval of significant people with respect to one’s adoption of the targeted behaviour. ‘Perceived self-efficacy’ is part of the Social Cognitive Theory [24]. It is defined as the judgement one makes on his capacity to carry out a specific behaviour correctly as a function of the difficulties and barriers encountered [24, 25]. With respect to these first three factors, a positive assessment favours adoption of the behaviour. Finally, ‘anticipated regret’ refers to the feelings one would

expect to experience if the undesired behaviour were adopted [26].

According to intervention mapping, learning objectives need to be clearly formulated. These learning objectives are at the intersection of performance objectives and their specific determinants. For example, in order ‘to plan the use of condom during anal sex’ (performance objective), the educational activities addressing perceived self-efficacy (personal determinant) consisted in ‘identifying past situations in which condoms were not used’, ‘estimating the probability that these situations will occur again’ and then ‘developing strategies to ensure condoms are used in these situations’ (learning objective) (Table I). Learning objectives were formulated for each of the four performance objectives.

In the operationalization of the programme, ‘intention’ was addressed with the help of the Theory of Implementation Intentions [27]. This theory refers to the process of self-regulating a behaviour and includes the planning and control of the action. The planning allows one to transform intention into more detailed instructions and specify the sequence of actions which aim to fulfil these instructions. Thus, according to this theory, MSM, who specify how and when their intention to use condoms is to be carried out, are expected to increase the likelihood of using them. ‘Subjective norm’ was operationalized in reference to Bandura’s Social Cognitive Theory [25]. According to this theory, the presentation of a given behaviour adopted by another significant person, viewed as a role model, contributes to promote the adoption of a similar behaviour. Thus, according to this theory, MSM should be more positive toward using condoms if significant role models of the community are perceived as condom users. Bandura’s Social Cognitive Theory also makes it possible to enhance ‘self-efficacy’ by leading people not only to identify difficulties and barriers but also to identify strategies for change when confronted with them. Finally, the construct of ‘anticipated regret’ was useful when examining negative emotions to avoid if the target behaviour was not adopted and identifying protective actions against their emergence.

Table I. Illustration of learning objectives at the intersection of performance objectives and personal determinants

Performance objective	Personal determinants and learning objectives			
	Intention	Subjective norm	Self-efficacy	Anticipated regret
To plan the use of condom during anal sex	• Formulate their intention to use a condom during anal sex • Formulate their plan how to use a condom during anal sex	• Describe how a significant individual of the community plans to use a condom during anal sex	• Identify past situations where barriers were not overcome • Estimate the probability that these situations will occur again • Develop strategies to overcome these barriers	• Identify the negative feelings and emotions felt just after having anal sex without a condom • Identify strategies to avoid the situations which could lead to feel these negative feelings and emotions

Thus, the development of the intervention consisted in organizing strategies into a deliverable programme that considered both target groups and settings (Table II).

Methods

Format of the program

The content of the activities was developed in order to address the four performance objectives (i.e. plan, negotiate, refuse and maintain) as well as the four targeted determinants (i.e. intention, self-efficacy, subjective norm and anticipation of regret). An advisory group, consisting in owners of the commercial gay venues, a community worker of a local AIDS community-based organization and a member of the research team, chose the project's name and logo, and determined the date, place and nature of the activities.

The intervention consisted in three series of preventive activities offered over a period of 15 months (Intervention 1 in Spring 2002 with 10 activities, Intervention 2 in Autumn 2002 with 7 activities and Intervention 3 in Spring 2003 with 7 activities). These 24 activities were conducted in seven gay commercial venues (three bars, three saunas and one sex shop) in Quebec City during peak business hours. These venues were chosen because a substantial number of MSM socialized in these gay venues, making these adequate access points for HIV prevention educational activities aimed at

this population. Four types of activities were planned: (i) group activities such as a fashion show, drag queen shows, quiz shows, writing contest and a rally led by popular figures of the community, (ii) individual counselling offered on site by a community worker, (iii) free condom pockets with humorous prevention messages distributed in all gay venues and (iv) posters with preventive messages displayed at each of the gay venues. For example, in one of the activities where anticipation of regret was addressed, the participants/clients in a gay bar were invited to write a story alone or in group. The instructions were that the text had to start with the following sentence "I should have ..." and the word condom had to be used at least once in the text. Seven stories were produced. The authors read their text in front of the audience and four prizes were drawn. Another activity held in a sauna in the presence of dancers was the launching of a poster carrying a message related to self-efficacy to negotiate the use of condom. The poster shows a young man with a condom placed at the edge of a towel wrapped around his waist while the accompanying text states: The condom ... difficult to talk about it? Not for me! and you? (Fig. 1).

In keeping with the intervention mapping approach [14], the first series of activities (Intervention 1) was structured in such a way to develop a relationship of trust between the venues' owners and the team of researchers. It was also used to monitor the acceptability of this type of intervention and to better adapt the intervention activities to the

Table II. Theoretical basis and specific strategy used to address learning objectives

Personal determinants: learning objectives	Theoretical basis	Specific strategy
Intention: formulate one's intention to use a condom during anal sex	Implementation of intention	Elaboration of a plan for condom use (when, how, where)
Subjective norm: describe how a significant individual of the community plans to use a condom during anal sex	Social cognitive theory: • Modelling • Role model	Significant community leaders making public statements
Self-efficacy: develop strategies to previously met barriers to condom use	Social cognitive theory: • Modelling • Persuasive communication	Specific suggestions and examples on how to overcome barriers
Anticipated regret: identify strategies to avoid situations which could lead to feel negative feelings and emotions experienced previously	Anticipated regret theory	Activities exploring the negative emotions if condoms were not used



Fig. 1. Example of an educative poster.

needs and reality of gay venues. This information was taken into account for the development of activities in the subsequent two series. Throughout the

activities, attendance varied between 25 to 100 individuals.

Design

An interrupted sequential pre-tests and post-tests quasi-experimental design with independent samples was used to evaluate the impact of the intervention (Fig. 2). Each series of intervention and no intervention periods between the series of activities were 3 months long. This design was adopted for two reasons: (i) most MSM go to several gay venues during the same evening making it impossible to build experimental versus control groups and (ii) matching subjects over time was not possible for either ethical considerations (anonymity of the participants) or change in the 'clientele' frequenting a given venue over time. Thus, the evaluation consisted of assessing the impact of the intervention by contrasting the pre-intervention versus post-intervention measures.

Population and sample

The targeted population was the MSM of Quebec City who socializes in gay bars, saunas and sex shops. To minimize potential bias, special effort was made to obtain as representative a sample as possible. Recruitment was scheduled on different days of the week and at different times of the day. Two stratification variables were retained: age and venues. These two criteria were selected in order to take into consideration the type of clientele at

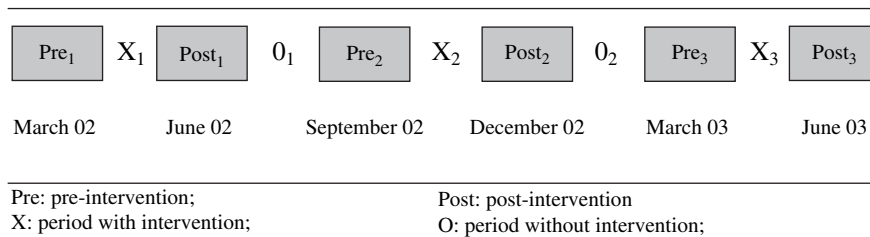


Fig. 2. Sequence of evaluation design.

a given venue. Thus, a non-probabilistic and convenience sampling was used and proportional sampling quotas were applied. A total of 1921 men socializing in gay bars and saunas were recruited at different assessment times (first pre-intervention: $n = 328$; first post-intervention: $n = 325$; second pre-intervention: $n = 316$; second post-intervention: $n = 314$; third pre-intervention: $n = 330$; third post-intervention: $n = 308$).

Of these 1921 questionnaires, 164 were excluded from the analyses because of missing data on the dependant variable ($n = 47$) and age ($n = 117$). Analyses were performed with the data from the remaining 1757 subjects.

Data collection

Data collection took place in the bars and saunas where the preventive activities were offered. Data were collected 2 weeks before the onset of each series of intervention and 1 week after the end of the preventive activities. Two teams of two trained community workers invited participants to fill out a self-administered questionnaire that could be completed in 3–5 min. Respondents who clearly appeared to be inebriated were not approached. To prevent duplication, respondents were asked if they had already completed a questionnaire within the previous 2 weeks. To increase co-operation, respondents were offered three dollars (Canadian) for completing the questionnaire. In some cases, payment motivated individuals to participate. However, several individuals agreed to participate without the monetary token and elected to donate the money to the local AIDS community group (this was an option offered to the participants). This

study was approved by the ethics committee of the local university.

Variables measured

The main study outcome was defined as engaging or not in risky unprotected anal intercourse during the month preceding data collection. Risky unprotected anal intercourse was defined as having anal sex without a condom either with an unknown partner, an occasional partner or with a regular serodiscordant partner or of unknown HIV status. It was operationalized by means of several questions: (i) self-reported sexual behaviour in the previous month, (ii) having been tested for HIV and (iii) personal HIV antibody status. The questions used to assess the outcome variable were borrowed and validated in previous studies on safe sex and condom use [28–30]. The second outcome was the four psychosocial variables (i.e. intention, subjective norm, self-efficacy and anticipated regret). These variables were each measured by means of three questions on 10-point scales (i.e. ‘intention’ [$\alpha = 0.92$]: e.g. I will always use a condom during my next anal intercourses; ‘subjective norm’ [$\alpha = 0.66$]: e.g. Most people who are important to me would recommend I always use a condom during my next anal intercourses; ‘self-efficacy’ [$\alpha = 0.88$]: e.g. I feel capable of using a condom during my next anal intercourses; ‘anticipated regret’ [$\alpha = 0.90$]: e.g. If during my next anal intercourses, I did not always use a condom, I would regret it the following day). The other variables assessed were level of education, age, HIV status and frequentation of gay bars, saunas and sex shops.

Data analysis

Univariate descriptive analyses were performed to assess the association between sexual risk behaviour and socio-demographic variables as well as venues frequented. First, a series of post-hoc analysis (Mantel-Haenszel chi-square) were applied to examine whether there was any changes at each interval-intervention phase. Then, pre-intervention data were contrasted to verify if they differed over time. This was also verified for the post-intervention data. To assess the impact of the intervention, pre-intervention data were combined and compared with post-intervention data by means of multivariate binomial regression. Variables (i.e. level of education, age, HIV status, frequentation of gay bars, saunas and sex shops) with a P -value of ≤ 0.20 in univariate analysis were tested in the multivariate model for confounding effect. Finally, the interaction terms were tested between intervention and the stratification variables (age and gay venues). The SAS 8.2 statistical software was used for the analysis.

Results

Overall, 48% of the participants who completed the questionnaire were between 18 and 29 years of age and the remaining 52% were ≥ 30 years old. Most of them (69%) had completed college or university and 4% were HIV positive. The proportion of MSM frequenting bars, saunas and sex shops was 93, 56 and 48%, respectively. There were no significant differences in terms of age, level of education, HIV status and frequentation of commercial gay venues between the groups at the pre-intervention and post-intervention periods (Table III). At the end of each intervention period, the proportions of individuals who reported to be exposed to at least one preventive activity during the last 3 months were 37% (post 1), 65% (post 2) and 65% (post 3).

The means and standard deviations presented in Table IV show that MSM had very high scores on the targeted determinants at baseline. A significant correlation was also observed between risky unprotected anal sex in the last month and the four targeted psychosocial variables. At each measurement

time, risky unprotected anal sex during the last month was significantly correlated to each of the four psychosocial variables indicating the relevance of targeting these determinants.

Furthermore, a series of post-hoc analyses were performed to examine whether there was any change at each interval-intervention phase. The result of these analyses indicated (i) no significant change at the first interval-intervention, (ii) a significant change at the second interval-intervention among the younger age group (Mantel-Haenszel chi-square = 4.05, degree of freedom [df] = 1, $P = 0.0441$) and (iii) a significant change at the third interval-intervention among the younger age group (Mantel-Haenszel chi-square = 6.35, df = 1, $P = 0.0118$) as well as among the whole group (Mantel-Haenszel chi-square = 5.11, df = 1, $P = 0.0238$) (Fig. 3). The proportion of MSM engaging in risky unprotected anal intercourse at the pre-intervention periods averaged 21.4% (pre-intervention 1: 19%; pre-intervention 2: 22%; pre-intervention 3: 23%) and 18.2% at the post-intervention periods (post-intervention 1: 20%; post-intervention 2: 19%; post-intervention 3: 16%) (Fig. 3).

Binomial regression analysis, contrasting pre-intervention data, yielded non-significant effects over time (Global: Wald chi-square = 1.40, df = 2, $P = 0.50$; 18–29 years old: Wald chi-square = 3.63, df = 2, $P = 0.16$; ≥ 30 years old: Wald chi-square = 0.42, df = 2, $P = 0.81$). Contrasting the post-intervention data also yielded non-significant effects over time (Global: Wald chi-square = 0.81, df = 2, $P = 0.67$; 18–29 years old: Wald chi-square = 0.89, df = 2, $P = 0.64$; ≥ 30 years old: Wald chi-square = 0.74, df = 2, $P = 0.69$). In addition, given the research design there was a possibility that few respondents completed the questionnaire more than once over time. Therefore, this potential effect was verified; it was found non-significant ($P = 0.82$).

Contrasting pre- and post-intervention data indicated that the effect of the intervention on sexual behaviour was significant (relative risk (RR) = 0.81; 95% confidence interval [CI_{95%}] = 0.67–0.98), even after controlling for the potential confounding effects

Table III. *Characteristics of the sample*

	All, <i>n</i> = 1757	Pre-intervention, <i>n</i> = 905	Post-intervention, <i>n</i> = 852	Chi-square
Age				
19–29 age group	844 (48%)	430 (48%)	414 (49%)	<i>P</i> = 0.65
≥30 years old	913 (52%)	475 (52%)	438 (51%)	
Education level				
High school	547 (31%)	274 (30%)	273 (32%)	<i>P</i> = 0.43
College and university	1207 (69%)	629 (70%)	578 (68%)	
Missing data	3	2	1	
HIV status				
Positive	70 (4%)	39 (4%)	31 (4%)	<i>P</i> = 0.45
Negative	1648 (96%)	843 (96%)	805 (96%)	
Missing data	39	23	16	
Bar frequentation				
Never	129 (7%)	78 (9%)	51 (6%)	<i>P</i> = 0.14
Less than once a month	375 (21%)	182 (20%)	193 (23%)	
One to four times a month	719 (41%)	370 (41%)	349 (41%)	
Two times or more a week	527 (30%)	271 (30%)	256 (30%)	
Missing data	7	4	3	
Sauna frequentation				
Never	765 (44%)	410 (45%)	355 (42%)	<i>P</i> = 0.33
Less than once a month	495 (28%)	244 (27%)	251 (29%)	
One to four times a month	401 (23%)	199 (22%)	202 (24%)	
Two times or more a week	94 (5%)	52 (6%)	42 (5%)	
Missing data	2	–	2	
Sex shop frequentation				
Never	908 (52%)	471 (52%)	437 (51%)	<i>P</i> = 0.86
Less than once a month	714 (41%)	369 (41%)	345 (40%)	
One to four times a month	109 (6%)	53 (6%)	56 (7%)	
Two times or more a week	26 (1%)	12 (1%)	14 (2%)	

Table IV. *Mean and standard deviation (SD) of the psychosocial variables at baseline (*n* = 328) and the point–bi-serial correlation with risky unprotected anal sex in the last month*

Psychosocial variables	Mean ± SD	Risky unprotected anal sex in the last month bi-serial correlation
Intention	8.75 ± 2.31	–0.40*
Self-efficacy	8.82 ± 1.98	–0.31*
Subjective norm	8.45 ± 1.75	–0.21**
Anticipated regret	8.82 ± 2.25	–0.36*

Psychosocial variables: range from 1(definitely no) to 10 (definitely yes). Risky unprotected anal sex: from 0 (no) to 1 (yes).

P* < 0.0001, *P* < 0.0002.

of age (*RR* = 0.70; *CI*_{95%} = 1.22–1.98) and sex shops frequentation (*RR* = 1.38; *CI*_{95%} = 1.15–1.68); these latter two variables were the only ones to reach significance in the multivariate analysis. Since an interaction between intervention and age was also observed (*RR* = 1.37; *P* = 0.1174), the impact of the intervention was assessed separately for both age groups while controlling for sex shop frequentation (*RR* = 1.39; *CI*_{95%} = 1.14–1.68). This analysis indicated that the intervention had an impact on the younger age group (*RR* = 0.71; *CI*_{95%} = 0.55–0.92) but not on the older group (*RR* = 0.97; *CI*_{95%} = 0.72–0.77). The effect size of the intervention was a significant reduction of 29% in risky unprotected anal sex among the younger age group whereas the corresponding 3% among the

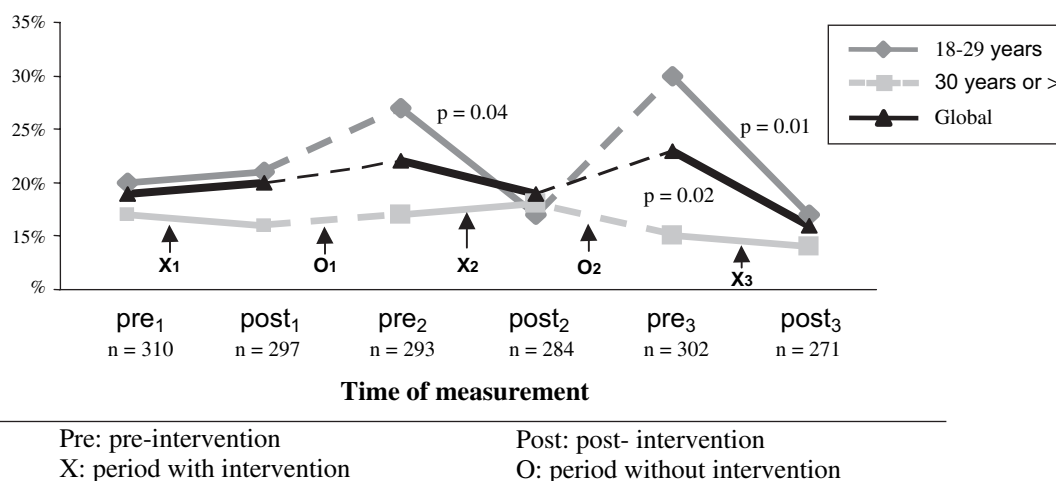


Fig. 3. Proportion of MSM engaging in risky unprotected anal intercourse over the periods of intervention (X).

older age group was not significant. Finally, no significant effects of intervention were observed on intention, subjective norm, self-efficacy and anticipated regret.

Discussion

This theory-based intervention had a significant impact on reducing risky unprotected anal intercourse in the gay community. The overall effect of 19% found in the present study was similar to the values reported in the meta-analyses of Johnson *et al.* [31, 32]. In their most recent meta-analysis [32], they reported that behavioural interventions for MSM reduced unprotected sex between 16 and 27%.

This positive outcome provides further support to the growing scientific evidence that health promotion programmes are most likely to be effective when they are theory and evidence based [14, 33–35]. This is congruent with the present intervention which used several relevant behaviour modification theories [23–26] as suggested in the guidelines of intervention mapping [14]. These activities were also developed based on the knowledge of the specific population and the context of intervention. In applying the framework of inter-

vention mapping, community leaders were involved in the various phases of the intervention and an iterative movement within the phases of planning, development, implementation and evaluation of the intervention took place. These back and forth movements throughout all the steps of the intervention provided the opportunity to modify and adapt the preventive activities and to better fit these to the context and reality of commercial gay venues.

According to Ellis *et al.* [34] and Johnson *et al.* [31], community-level interventions involving peers and popular opinions leaders are particularly effective in reducing risky sexual behaviours among MSM, especially for interventions which promote interpersonal skills among younger populations or sub-groups at higher behavioural risk. Kegeles and Hart [36] also noted that community-based interventions offer the advantage of reaching people who would not otherwise participate in facility-based interventions and who may be at higher risk than many who enrol in small group or individual interventions. Such intervention also allow reaching a significant number of MSM through their social network, even those who are not seeking out preventive interventions [37]. This study is in line with this strategy. Indeed, several

authors have emphasized the effectiveness of community-level interventions in reducing risky sexual behaviours among MSM [31, 34, 37, 38].

Very high scores were observed at baseline on the targeted determinants (i.e. intention, self-efficacy, subjective norm and anticipated regret), which yielded a very narrow margin for improvement. Therefore, it is not surprising that the values of the psychosocial variables were not improved by the present intervention offered at the community level. Nonetheless, since behaviour was positively changed, this needs some explanation. The observed impact on behaviour in spite of no significant change in psychosocial variables is congruent with the observation of Webb and Sheeran [39]. In their meta-analysis, they reported that interventions that did not produce significant changes in intention and self-efficacy could still have a significant effect on behaviour. Thus, it is likely that the intervention acted as a 'cue to action'. Indeed, people frequenting gay venues over the periods of intervention were socializing in an environment where the norm promoted was 'safer sex'. Therefore, the intervention likely activated cognitions rather than increasing them. Support for this view can be found in Verplanken and Holland research [40], which suggested that behaviours are most likely to be adopted when the underlying cognitions are activated. Similar explanations are offered by Webb and Sheeran [39]. They suggested that such interventions can activate behaviour-relevant goals outside of participant's conscious awareness and initiate behaviour automatically, in agreement with the automotive model [41].

Interestingly, the intervention had a significant effect among individuals aged 18–29 years. This age group is considered at a higher risk of engaging in unsafe sex [42]. This suggests that the intervention was more relevant to younger individuals either because of its content or because the prevalence of risky unprotected anal sex was higher, and consequently more likely to be lowered by the intervention. Indeed, the lack of effect in the older group could be attributed to a lower prevalence of risky unprotected anal intercourse in this group before the intervention. A similar conclusion was reported by Johnson *et al.* [43].

The findings of this study also support that a resurgence of risky unprotected anal sex can occur when no preventive activities are offered. In other words, if preventive activities are not maintained on a regular basis, unsafe sexual practices are likely to resume. Given this observation, one could suggest that the recent major gains in life expectancy and quality of life, as the result of HAART have created an 'optimistic' view among the gay community [44]. Consequently, the frequency and intensity of preventive activities have been lowered, thus opening the door to a return to unsafe sex. Thus, it is important to maintain continuous preventive activities in the gay venues in order to promote maintenance safe sexual practices. This was also recommended by Kegeles and Hart [36].

Caution is well advised in generalizing this study's findings to other settings because this intervention took place in a middle-sized city of French speaking individuals. Among the limitations, it should be mentioned that even though special effort was made to obtain a representative sample, the recruitment was nevertheless based on a non-probabilistic and convenience sample. Also, there was no control over the number of times individuals were exposed to the preventive activities. Individuals could have been exposed to none or several of the preventive activities over the study period. Finally, since the study ran over a period of 15 months, seasonal variations (i.e. Spring and Summer versus Fall and Winter) in sexual behaviour could affect the observation in risk-taking sexual behaviour.

Nevertheless, the results of this study illustrate that application of a theory-based community-level intervention in commercial gay venues can be successful in modifying unsafe sexual behaviour. These findings could be attributed to the nature of the present intervention (i.e. theory based), but also to the fact that it strongly involved the community leaders in all the phases of the programme. Finally, it is suggested that if the interventions are not maintained on a regular basis, there is a return to unsafe sexual practices. Thus, it appears important to have continuous prevention activities within the gay community to promote safe sex.

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Conflict of interest

None declared.

References

- Centers for Disease Control and Prevention. HIV/AIDS Surveillance Report 2002. Available at: <http://www.cdc.gov/hiv/stats/hasr1402.htm>. Accessed: October 2004.
- Koblin BA, Torian LV, Guilin V *et al.* High prevalence of HIV infection among young men who have sex with men in New York City. *AIDS* 2000; **14**: 1793–800.
- Valleroy LA, MacKellar DA, Karon JM *et al.* HIV prevalence and associated risks in young men who have sex with men. Young Men's Survey Study Group. *JAMA* 2000; **284**: 198–204.
- Catania JA, Osmond D, Stall RD *et al.* The continuing HIV epidemic among men who have sex with men. *Am J Public Health* 2001; **91**: 907–14.
- Center for Disease Control and Prevention. HIV incidence among young men who have sex with men—seven US cities, 1994–2000. *MMWR* 2001; **50**: 440–4.
- Calzavara L, Burchell AN, Major C *et al.* Increases in HIV incidence among men who have sex with men undergoing repeat diagnostic HIV testing in Ontario, Canada. *AIDS* 2002; **16**: 1655–61.
- Hogg RS, Weber AE, Chan K *et al.* Increasing incidence of HIV infections among young gay and bisexual men in Vancouver. *AIDS* 2001; **15**: 1321–2.
- Katz MH, Schwarcz SK, Kellogg TA *et al.* Impact of highly active antiretroviral treatment on HIV seroincidence among men who have sex with men: San Francisco. *Am J Public Health* 2002; **92**: 388–94.
- Dukers N, Spaargaren J, Giskus R *et al.* HIV incidence on the increase among homosexual men attending an Amsterdam sexually transmitted disease clinic: using a novel approach for detecting recent infections. *AIDS* 2002; **16**: F16–24.
- Geduld J, Gatali M, Remis RS *et al.* Estimates of HIV prevalence and incidence in Canada. *Can Commun Dis Rep* 2003; **29**: 197–206.
- Dodds JP, Mercey DE, Parry JV *et al.* Increasing risk behaviour and high levels of undiagnosed HIV infection in a community sample of homosexual men. *Sex Transm Infect* 2004; **80**: 236–40.
- Chen SY, Gibson S, Weide D *et al.* Unprotected anal intercourse between potentially HIV-serodiscordant men who have sex with men, San Francisco. *J Acquir Immune Defic Syndr* 2003; **33**: 166–70.
- Alary M, Remis RS, Otis J *et al.* Persistent increase in risky sexual behaviour but stable HIV incidence among men who have sex with men (MSM) in Montreal. *Can J Infect Dis* 2003; **14**: 42A.
- Bartholomew LK, Parcel GS, Kok G *et al.* *Intervention Mapping: Designing Theory- and Evidence-Based Health Promotion Programs*. Mountain View, CA: Mayfield Publishing Company, 2001.
- Fishbein M, Guenther-Grey C, Johnson WD *et al.* Using a theory-based community intervention to reduce AIDS risk behaviors: the CDC's AIDS community demonstration projects. In: Oskamp S, Thompson SC (eds). *Understanding and Preventing HIV Risk Behaviors: Safer Sex and Drug Use*. Thousand Oaks, CA: Sage Publications, 1996, 177–206.
- Coleman LM, Ford NJ. An extensive literature review of the evaluation of HIV prevention programs. *Health Educ Res* 1996; **11**: 327–38.
- Holtgrave DR, Qualls NL, Curran JW *et al.* An overview of the effectiveness and efficiency of HIV prevention programs. *Public Health Rep* 1995; **110**: 134–46.
- Kok G, Van Den Borne B, Dolan Mullen P. Effectiveness of health education and health promotion: meta-analyses of effect studies and determinants of effectiveness. *Patient Educ Couns* 1997; **30**: 19–27.
- Richard R, Van der Pligt J, de Vries N. Anticipated affective reactions and prevention of AIDS. *Br J Soc Psychol* 1995; **34**: 9–21.
- Sheeran P, Taylor S. Predicting intentions to use condoms: a meta-analysis and comparison of the theories of reasoned action and planned behavior. *J Appl Soc Psychol* 1999; **29**: 1624–75.
- Albarracín D, Johnson B, Fishbein M *et al.* Theories of reasoned action and planned behavior as models of condom use: a meta-analysis. *Psychol Bull* 2001; **127**: 142–61.
- Sample SJ, Patterson TL, Grant I. Partner type and sexual risk behavior among HIV positive gay and bisexual men: social cognitive correlates. *AIDS Educ Prev* 2000; **12**: 340–56.
- Fishbein M, Ajzen I. *Belief, Attitude, Intention and Behavior: An Introduction to Theory of Research*. Reading, MA: Addison-Wesley, 1975.
- Bandura A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall, 1986.
- Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev* 1977; **84**: 191–215.
- Richard R, de Vries N, Van Der Pligt J. Anticipated regret and precautionary sexual behavior. *J Appl Soc Psychol* 1998; **28**: 1411–28.
- Gollwitzer PM. Implementation intentions, strong effects of simple plans. *Am Psychol* 1999; **54**: 493–503.
- Dufour A, Alary M, Otis J *et al.* Risk behaviours and HIV infection among men having sexual relations with men: baseline characteristics of participants in the Omega Cohort Study, Montreal, Quebec, Canada. *Can J Public Health* 2000; **91**: 345–9.

29. Godin G, Savard J, Kok G *et al.* HIV seropositive gay men: understanding adoption of safe sexual practices. *AIDS Educ Prev* 1996; **8**: 529–45.
30. Myers T, Godin G, Lambert J *et al.* Sexual risk and HIV-testing behaviour by gay and bisexual men in Canada. *AIDS Care* 1996; **8**: 297–309.
31. Johnson WD, Hedges LV, Diaz RM. Interventions to modify sexual risk behaviors for preventing HIV infection in men who have sex with men (Cochrane Review). In: *Cochrane Library*. Chichester, UK: John Wiley & Sons, 2004.
32. Johnson WD, Holtgrave DR, McClellan WM *et al.* HIV intervention research for men who have sex with men: a 7-year update. *AIDS Educ Prev* 2005; **17**: 568–9.
33. Fishbein M. The role of theory in HIV prevention. *AIDS Care* 2000; **12**: 273–8.
34. Ellis S, Barnett-Page E, Morgan A *et al.* HIV prevention: a review of reviews assessing the effectiveness of interventions to reduce the risk of sexual transmission. Available at: <http://pubs.cpha.ca/PDF/P28/22598.pdf>. Accessed: 3 July 2007.
35. Schaalma HP, Abraham C, Rogers Gillmore M *et al.* Sex education as health promotion: what does it take? *Arch Sex Behav* 2004; **33**: 259.
36. Kegeles SM, Hart GJ. Recent HIV-prevention interventions for gay men: individual, small-group and community-based studies. *AIDS* 1998; **12**: S209–15.
37. Elford J, Hart G. If HIV prevention works, why are rates of high-risk sexual behavior increasing among MSM. *AIDS Educ Prev* 2003; **15**: 294–308.
38. The CDC AIDS Community Demonstration Projects Research Group. Community-level HIV intervention in 5 cities: final outcome data from the CDC AIDS Community Demonstration Projects. *Am J Public Health* 1999; **89**: 336–45.
39. Webb TL, Sheeran P. Does changing behavioral intentions engender behavior changes? A meta-analysis of the experimental evidence. *Psychol Bull* 2006; **132**: 249–68.
40. Verplanken B, Holland RW. Motivated decision making: effects of activation and self-centrality of values on choices and behavior. *J Pers Soc Psychol* 2002; **82**: 434–47.
41. Bargh JA. Auto-motives: preconscious determinants of social interaction. In: Higgins ET, Sorrentino RM (eds). *Handbook of Motivation and Cognition*. New York: Guilford, 1990, 93–130.
42. Stall RD, Hays RB, Craig WR *et al.* The gay 90s: a review of research in the 1990s on sexual behavior and HIV risk among men who have sex with men. *AIDS* 2000; **14**: S101–14.
43. Johnson WD, Hedges LV, Ramirez G *et al.* HIV prevention research for men who have sex with men: a systematic review and meta-analysis. *J Acquir Immune Defic Syndr* 2002; **30**: S118–29.
44. Elford J, Bolding G, Maguire M *et al.* Combination therapies for HIV and sexual risk behavior among gay men. *J Acquir Immune Defic Syndr* 2000; **232**: 266–71.

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