Smoking Cessation Programs for LGBTI People:

A Systematic Review of Content and Effect

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Executive Summary

Despite widespread evidence of smoking's harms to health, rising costs of tobacco products, and the visibility of public health interventions aimed at tobacco users, tobacco use remains high among lesbian women, gay men, bisexual people and transgender people (LGBT[1]) internationally, with US data showing at least double the smoking rates of the general population. [1-5] Although anecdotal evidence suggests similar rates internationally, no formal smoking data exist for intersex people, representing an important area for research.[6] There are many reasons why LGBT people may begin or continue smoking. Commonly cited reasons include minority stress due to the effects of discrimination, harassment, and violence; lack of social support; and fear of weight gain.[7,8]

The NSW Tobacco Strategy 2012-17 stresses the importance of promoting smoking cessation and assistance to priority groups, i.e. those with high smoking prevalence.[9] Similarly to LGBT communities internationally, 30% of Australia's LGB people smoke compared to 16% of the general population.[10-13] While smoking rates have declined among heterosexual people, the 2013 National Drug Strategy Household Survey shows no significant change among LGB people since 2010.[10] There is little specific Australian data regarding smoking rates amongst trans people, but one study in 2006 reported smoking rates of 44% of trans men and 35% of trans women.[14] Applying existing public health interventions to marginalised populations without modifying, piloting, and evaluating them may lead to further inequalities.

In 2014, ACON received a Cancer Institute NSW Evidence to Practice Grant to develop a smoking cessation intervention to address the high and stable smoking rate among sexual minority women in Australia. The current review is intended to guide development of that intervention and promote future research on smoking cessation interventions for LGBT people.

[1] To avoid tokenism, we use the letters that are relevant to the populations being specifically discussed. For example, given that no studies specifically recruited or reported intersex participants, we use 'LGBT' rather than 'LGBTI' to discuss these findings.

Method

We searched multiple databases and contacted authors and experts in the field for published or unpublished work in any language reporting the results of an intervention aimed at affecting tobacco use in lesbian, gay, bisexual, transgender, and/or intersex populations. Studies were excluded if LGBTI participants comprised less than half the sample and were not reported separately. Literature reviews, book chapters, etc. that did not report primary research on an intervention to reduce tobacco use in LGBTI populations were also excluded. Sixteen reports were included in the final sample, consisting of 19 studies examining 17 intervention variants (from 14 original interventions).

Behavioural change techniques (BCTs) were coded according to a well-known taxonomy of BCTs for smoking cessation.[15] Cultural modifications were coded according to a modification of four of Kreuter et al.'s identified strategies: peripheral, evidential, linguistic, and constituent involving and the addition of topics specific to LGBTI smokers/quitters.[16] Study space analysis allowed analysis of multiple studies with differing components in order to give perspective as to which components may be particularly important or effective and allow for in-depth study of promising components in future research. Rather than provide definitive answers, study space analysis provides direction in the face of complex and limited data.

Findings

Quit rates:

- Efficacy of smoking cessation programs for LGBT people was high: the quit rate was 60.99% at the end of the interventions.
- Quit rates declined over time, most dramatically and predictably within the first month (to 43.56%), then between one and three months (to 38.60%) before stabilising between 3 and 6 months (at 38.61%).

Population covered:

- All studies included gay men.
- Two thirds of studies used general terms such as 'LGBT' but each population group was not necessarily fully included in the usage.

- Despite most studies being nominally open to women, only a fifth of participants were women (for studies where gender was reported).
- Twelve studies mentioned bisexual people as targets or actual participants, but there was insufficient recording of bisexual status.
- Trans people were mentioned in 25% of studies but only constituted 3% of participants. Trans people may have been undercounted in that female, male, and transgender were often treated as mutually exclusive categories.
- No studies reported intersex participants. This may reflect a combination of time and location in that the coalition between intersex and LGBT populations is a recent phenomenon spearheaded by Australia.

Funding and Location:

- Community-based organisations played a key role, administering 78.98% of interventions.
- Almost half (47.37%) of interventions were administered by health centres (with some overlap with community and government).
- Most interventions received funding from universities (31.58%) and/or private foundations (31.58%), both of which provide grants that are typically used to test out an intervention rather than provide sustained support. There was, however, some form of government funding for 42.11% of interventions.

Interventions – cultural modifications:

- Strategies that sought to enhance the perceived relevance of smoking cessation for LGBT people by presenting evidence of its impact on LGBT people (evidential strategies) may be the most effective cultural modifications.
- Interventions merely packaged as LGBT relevant such as through LGBT imagery (peripheral strategies) had a lower effect, perhaps because packaging was alienating rather than affirming.
- Discussion of HIV and smoking did not appear to connect with participants generally, perhaps because it was not relevant to the majority of LGBT people, who are HIV-negative.

Interventions – behaviour change:

- The most effective behaviour change techniques (BCTs) actively involved the participant in their own quit attempt, whether by having them think about barriers and facilitators to

quitting, participating in an assessment of their current and past positions, or making a commitment.

- BCTs that were aimed at providing advice were less effective.

Recommendations

Researchers need to be cautious about the use of general terms such as 'LGBT' when each population is not necessarily fully included in the usage. The danger of this approach is that it effectively hides the lack of knowledge about these population groups, as a scan of the literature appears to cover LGBT people. Researchers can avoid tokenistic use by being explicit about what attempts they have made to include specific populations and by collecting and reporting complete demographic data on their samples.

There was a striking lack of research about intersex people's smoking and smoking cessation. Intersex people may have specific smoking cessation needs related to hormone replacement therapy, metabolic concerns, experiences of trauma, and smoking-related risk for reconstructive or endocrine surgery. While some of these concerns may be similar to those of trans people, others may be distinctly different and must be taken into account in providing a tailored curriculum.

With predominantly short-term funding for specific programs, agencies often aim to treat as many people as possible and only measure pre- and post-intervention (with or without follow up). Follow up was often limited in our sample, and many studies only followed participants to the final class meeting. Given the decrease in quit rate over the first three months, researchers should follow participants for at least 3 months after completion of the intervention. Use of control groups and even comparison of programs was limited. Future research should be designed to compare particular components of LGBT(I)-focused interventions to better characterise effective strategies.

Our study space analysis sheds some light on which LGBT-specific modifications appear to be effective, but we can only speculate on the reasons. Qualitative parallel studies would provide an opportunity to gain greater understanding of the mechanisms by which LGBT-specific modifications lead to higher quit rates and how peripheral strategies can be used more effectively.

Community-based organisations played a key role in the delivery of interventions, demonstrating the importance they have in LGBT(I) public health and in reaching potential participants.[17] Recognition of this role in the design of future interventions and in associated funding is important for engaging LGBTI people in their own population health.

Most interventions received funding from universities and/or private foundations, grants which are typically designed to test an intervention rather than provide sustained support. Local and national government financial support is essential to reduce the very high smoking rates among LGBT people.

One potential way to increase the effect of media campaigns on a specific population whilst reaching a wide audience is through subtle culture-specific imagery. Although cultural modifications involving peripheral strategies such as LGBT images had lower effects on quit rates, this may be due to poor choices that serve to alienate rather than affirm the participants. For example, images of muscular, hairless young men may not resonate with all sub-groups, such as gay men who identify as ‘bears’ and lesbian women. Additionally, trans and intersex people may not identify as LGB and may feel alienated by prominent gay imagery.

Discussing HIV and smoking did not appear to connect with participants generally. HIV-related health issues may not be relevant to people without HIV, so this may be seen as a waste of valuable class time for these participants. Content should be tailored to the people in the group and the group dynamics. Consider also HIV-specific smoking cessation groups so that they can freely discuss HIV-related issues and disclose HIV status comfortably.

Providing advice, focusing on smoking behaviours, focusing on ex-smoker identity, and measuring carbon monoxide (CO) appear to be ineffective. Expired CO during brief interventions leads to greater intention to quit smoking.[18] While it may appear to provide regular encouragement with lower and lower expired CO levels over time, we are unaware of any controlled studies evaluating the efficacy of regular measurement of expired CO on quit rates. Rather than simply providing encouragement, the process itself of doing test regularly, particularly in a group setting, may be a shaming experience for quitters. Similarly, focus on smoking behaviours and ex-smoker identity may be a source of shame such that participants may feel they cannot escape their smoking past. While they may provide useful information

to participants, they should perhaps not be relied upon heavily in LGBT populations without further research. Using more participatory methods, getting participants to consider their own barriers and facilitators to quitting, assessing current readiness and ability to quit, and encouraging a commitment may be most effective.

Conclusion

The efficacy of the reviewed interventions to LGBT people was high, and a study space analysis identified features associated with higher quit rates. These features may be suitable for specific research on the mechanism of complex smoking cessation interventions with LGBT people and should be included in interventions. The study space analysis also identified features that are associated with lower quit rates, which may indicate that these have been done poorly and require special consideration of how or whether they apply to the populations to which interventions are aimed.

[1] Background

Despite widespread evidence of smoking's harms to health, rising costs of tobacco products and the visibility of public health interventions aimed at tobacco users, tobacco use remains high among LGBT populations internationally, with US data showing at least double the smoking rates of the general population.[1-5] Although anecdotal evidence suggests similarly high smoking rates among intersex people internationally, no formal data has been collected on smoking rates for intersex people.[6] High smoking rates among LGBT people overseas have, in part, been fuelled by tobacco industry strategies and targeted tobacco marketing in gay bars and magazines since the 1980s but particularly after public outcry against billboards and television advertisement of tobacco products reduced general public exposure to tobacco advertising and alternative markets were sought.[19-21] To our knowledge, there has been no empirical research of tobacco promotion targeting LGBTI communities in Australia.

There are many reasons why LGBT people may begin or continue smoking. Commonly cited reasons (based primarily on US research) include minority stress due to the effects of discrimination, harassment, and violence; lack of social support; and fear of weight gain.[7,8] Specific factors for LGB people correlated with tobacco use include internalised homophobia and negative reactions to disclosure of sexual orientation, stress, depression, alcohol use, and victimisation.[8,22] Lower SES has also been associated with smoking in LGB populations, as have lack of health insurance (in the US), frequent attendance at gay bars, and fewer perceived deterrents to smoking in lesbians and bisexual women.[23-25] Similar factors are likely to be associated with trans and intersex smoking, although there is currently little data in these areas. There has been limited research on protective factors and resiliency, but access to LGBTI resources and maintaining healthy habits such as diet and exercise may be protective against LGBTI tobacco use.[26-29]

Systemic factors within LGBTI spaces include perceived cultural/peer pressures to smoke, smoking to appear/feel more masculine/feminine, and bar and nightclub culture.[22,30-32] While the advent of smoke-free spaces has meant that there may be less pressure to smoke inside and less exposure to second-hand smoke, groups go outside to smoke and further socialise, leaving those who wish to avoid second-hand smoke or smoking triggers either outside the group or so exposed.[30] Fears around such changes in social dynamics may have led to the low support reported for smoke-free environments in a 2011 study of Missouri's LGBT population at Pride festivals and on the web.[33] Lack of culturally appropriate smoking cessation programs (interventions that seek to reduce or eliminate smoking in an individual using psychological, behavioural, pharmacological, and/or social strategies) and general healthcare services have also been cited as barriers to quitting smoking.[7,34,35] Substance abuse research has shown differences in efficacy of programs, particularly in the context of gay men and methamphetamine abuse, that are tailored to LGBT populations vs. simply demonstrating awareness of LGBT needs, although LGBT participants fare similarly or better to non-LGBT participants in quitting.[36]

Citing the disparities seen between LGBT and non-LGBT populations, Sell & Dunn argue for inclusion of LGBT statuses in general public health data collection to better assess smoking rates and associated factors.[7] This call has been made in Australia as well with regard to public data collection and other large-scale national health surveys in order to better quantify health disparities that may exist, plan geographically based LGBTI-relevant services, and evaluate policy initiatives, and survey participants have been found to be willing to respond.[37,38] LGBTI demographic questions must be worded carefully, as those who do not *identify* as lesbian, gay, bisexual, trans, and/or intersex are unlikely to choose these labels.[39,40] Even with inclusion of LGBTI demographic questions in standard forms,

people who are afraid of others knowing their LGBTI status may not identify themselves accurately.[37] It is important to recognise that responding to a question does not necessarily mean accurately responding, but this is a problem inherent in self-report data and not limited to demographic variables. The necessity of data collection at the national level is especially evident when considering the (US) Institute of Medicine's (IoM) report on LGBT health, which reported limited evidence of tobacco disparities after neglecting to use standard tobacco-related search terms and thus failing to review 56 LGBT tobacco-use studies.[41,42] Given that IoM and similar agencies' reports can be influential in policy-making and funding decisions within their own countries as well as internationally, large scale population-based data is important for demonstrating the 'truth' of what is already known through the literature and community-based samples. In Australia, inclusion in national data collection such as that of the 2010 and 2013 National Drug Strategy Household Survey (NDSHS) have been important sources of information on the health of LGBT Australians and largely mirror the findings of LGBTI community-based research[2].[10]

Many marginalised groups have higher rates of smoking than the general population, with complex and often poorly understood reasons for the differences.[43] More than a quarter of mortality differences between social groups may be attributed to smoking.[44-47] Evaluating interventions in marginalised populations can be challenging, as the psychosocial contexts go beyond cultural values and beliefs (e.g., socioeconomic disparities and poly-substance use). For example, a recent review of interventions applicable to reducing smoking rates in pregnant Aboriginal and Torres Strait Islander women (who are more than three times more

[2] However, sexuality data has to date been reported without gender disaggregation. Assuming that sexuality predominates over gender, ignores both the relevance of gender (for example we know that in the general population there are significant differences in smoking rates between men and women) and the effects of the intersection of sexuality and gender.[10]

likely to smoke during pregnancy than non-Indigenous women) discussed the applicability of multiple modifications yet found little evidence of effective interventions in these populations.[48]

Applying existing public health interventions to marginalised populations without modifying, piloting, and evaluating them may lead to further inequalities. Certain formats may not work for certain groups, making interventions aimed at the general population a potential source of inequality (despite an overall improvement) by effecting changes in more advantaged groups without as much change in more disadvantaged groups or by having a knock-on effect in other areas of life.[49] For example, media campaigns and workplace smoking bans increase inequalities between socioeconomic groups.[50] One study of LGBT people reported that current smokers had greater awareness of anti-tobacco general media campaigns but that women were less aware overall.[51] For LGBT-specific media, awareness of anti-tobacco campaigns was associated with younger age, current smoking, frequent attendance at LGBT bars, and frequent reading of LGBT newspapers or magazines.[51] For both general media and LGBT-specific media, Latino participants were less aware of anti-tobacco campaigns.[51] The finding that women, older people, people who are less connected to the 'LGBT community', and Latino people were less aware of anti-tobacco messages in media mirror findings on SES in that less advantaged groups were not accessed by the campaign as well as others.[50,51]

[1.1] Quitting

The SWASH study found that of lesbian, bisexual, and other same-gender-attracted women smokers, approximately two-thirds intended to quit.[52] This may be more than the general population, in which studies have found approximately 55% of smokers intend to quit.[53,54]

However, it is similar to findings of a survey of gay men in Zurich, which also found approximately two-thirds of participants intended to quit.[55]

An analysis of Framingham Heart Study data found that people tend to quit smoking in clusters and that people in small firms with co-workers who quit smoking were 34% more likely to quit themselves, 36% for friends, and 25% for siblings.[56] Spouses were an astounding 67% more likely to quit if their partner had quit. In a study of women quitters, live-in partner support (gender unspecified but predominantly married) was the primary predictor of maintaining smoking cessation, accounting for 32% of variance.[57] Negotiation of smoke-free homes is particularly important to LGBT quitters and is associated with preparation to quit smoking.[30,58]

In a model based on a meta-analysis of smoking cessation interventions, Kottke et al. predicted that an idealised program with two treatment modalities and 6 follow up sessions over a year could expect a 48% quit rate.[59] In actuality, quit rates for self-help typically range from 3-7%, individual therapy 10-26%, and group therapy 7-35%.[60] For quitters who are also in recovery from substance abuse, the outlook is better. Behavioural smoking cessation interventions aimed at this population average at quit rates around 38%.[61] Despite relatively good quit rates, finding a program can be a challenge for LGBTI people. In a study of transgender Virginians, only 16% of smokers who wanted to quit had successfully found a smoking cessation program; 5% were unable to locate one in their area; and 5% were afraid to go to a program for fear of their trans status being found out.[5]

Current recommendations in Australia for smokers who are willing to quit and are physically dependent on nicotine is to offer referral to an intensive support program with eight weeks of

nicotine replacement therapy (NRT) to those who are not opposed to NRT.[62] If they maintain abstinence, periodic GP visits are recommended for maintenance. If they are unable to maintain abstinence with the treatments offered thus far, buproprion or varenicline should be offered. The Pharmaceutical Benefits Scheme (PBS) allows only one concurrent smoking cessation medication subsidy.[63]

Women's smoking cessation interventions have primarily focused on pre-pregnancy and antenatal smoking cessation.[64] Although the risks of smoking to the foetus are great, women-specific smoking cessation interventions focus on pregnancy-related complications rather than the long-term health risks to the women themselves. This is in contrast to men-specific smoking cessation interventions, which are aimed to benefit men's long-term health.[65] By focusing on pregnancy, women-specific interventions fail to reach a significant portion of the population who may benefit most from smoking cessation.

[1.2] Local Context to the Current Review

The NSW Tobacco Strategy 2012-17 stresses the importance of promoting smoking cessation and assistance to priority groups, i.e. those with high smoking prevalence.[9] Similarly to LGBT communities internationally, double Australia's LGB people smoke compared to the general population.[10,12-14] While smoking rates have declined among heterosexual people, the 2013 National Drug Strategy Household Survey shows no significant change among LGB people since 2010.[10] The Private Lives 2 report found that approximately 26% of LGBT respondents were current smokers, with 10% of all respondents identifying as heavy or chain smokers.[11] In a recent study of men who have sex with men (MSM) in Australia, 40% of men were current smokers, with similar rates among gay men and men with other sexual identities.[66] One study found that smoking amongst lesbian, bisexual, and

other same-gender-attracted women was overall between 30-37% in Australia.[52] However, a recent Australian online survey completed by 521 lesbian, bisexual, queer, pansexual and other same-sex attracted women found higher smoking rates overall and reported differences across sexual identity: a larger proportion of queer/pansexual (67%) women smoked compared to bisexual (44%) and lesbian (44%) women.[67] The smoking rates among young LGBT people in Australia are potentially much higher. A recent survey of 13-24 year olds attending an LGBT festival in Brisbane, Australia found that 50% of respondents used tobacco: 36% of men, 49% of women, and 88% of trans-identified people.[68]

Of particular relevance to some LGBTI people is smoking among people living with HIV. As advances in anti-retroviral medications have extended the life expectancies of people with HIV, non-communicable diseases have become important sources of morbidity and mortality in this population. The HIV Futures surveys (primarily of gay-identified men) shows that smoking has dropped by almost half from 55% to 30% over a ten year period; it remains much higher than the general population.[69,70] This drastic reduction has undoubtedly contributed to an observed slight overall decline in smoking rates amongst LGBT people by removing some gay men from the pool of smokers. However, smoking amongst lesbian, bisexual, and other same-gender-attracted women has remained relatively stable over the past decade.[52] There is little specific Australian data regarding smoking rates amongst trans people, but the first Private Lives study reported smoking rates of 44% of trans men and 35% of trans women.[14] No formal data has been collected on intersex smoking rates. Disaggregated data on smoking among bisexual people is rarely published and usually appears within gay and lesbian data.

In 2009, ACON received funding from the Cancer Council NSW and in-kind support from the NSW HIV Health Promotion Interagency to develop a smoking cessation campaign for HIV-positive people, which targeted straight people and gay men in parallel advertisements. In 2014, ACON received a Cancer Institute of NSW Evidence to Practice Grant to develop a smoking cessation intervention for sexual minority women to address their high and stable smoking rate in Australia. The current review is intended to guide development of that intervention and promote future research on smoking cessation interventions for LGBTI people. Specifically, this review aimed to:

1. Identify what has been done and for whom (e.g., gender, age, sexual orientation, socioeconomic status [SES]);
2. Identify whether/how program evaluations utilised control groups;
3. Identify outcomes measured and at what follow up(s); and
4. Identify gaps in knowledge, especially with regard to women.

The primary research questions were:

1. What smoking cessation interventions have been delivered to LGBTI populations?
2. What smoking cessation interventions are successful for LGBTI populations?

[2] Method

A comprehensive Medline search was conducted incorporating 53 population keywords (including trans and intersex keywords adapted from an existing comprehensive search strategy), 8 population MeSH subject headings, 19 intervention keywords, and 1 intervention MeSH subject heading (Appendix A).[72] Due to a lack of additional results in this search, subsequent searches of six other databases used a modified search reducing the population keywords to 17. Search engines using natural language (Google Scholar) were searched with

three sets of keywords: “lgbt smoking cessation”, “intersex smoking cessation”, and “transgender smoking cessation” and the first 20 pages of each examined for potential cases.

Inclusion criteria were:

1) Any published or unpublished work in any language reporting the results of an intervention aimed at affecting tobacco use in lesbian, gay, bisexual, transgender, and/or intersex populations

Exclusion criteria were:

1) LGBTI participants are less than half and not reported separately
2) Literature reviews, book chapters, etc. that do not report primary research on an intervention to affect tobacco use in LGBTI populations

258 article records were saved for further examination. A 20% random sub-sample was double-coded for inclusion (K=.80) and disagreement resolved through discussion. IB applied the inclusion and exclusion criteria to all 258 abstracts and, where necessary, full articles. Additional studies were identified through reference lists, citations of included papers, review articles, and communication with authors, colleagues, and experts in the field. Sixteen reports were included in the final sample of evaluated interventions, which consisted of 19 studies examining 17 intervention variants (from 14 original interventions) (Table 1). Efforts were made to contact authors of published abstracts for intervention details and evaluation results, but yield was low. A recent review looking at types of interventions and promotional efforts described these in narrative format.[17] Thirteen studies were reviewed based on peer-reviewed publications, three on agency reports, one on a dissertation, and two on manuscripts under review at journals. Supplementary information was obtained from three intervention manuals as required.

The final data set was coded on the following dimensions:

1. Study characteristics
    a. Country
    b. LGBTI populations (targeted or actual participants)
    c. Other participant demographics (gender, trans status, age, SES, ethnicity, HIV status)
    d. Study design
    e. Comparison groups
    f. Follow-up (months)
    g. Administration bodies
    h. Funding sources
2. Format
3. Theoretical background
4. Stage(s) of change targeted
5. Cultural modifications
6. Behaviour change techniques (BCTs)
7. Outcomes

We coded intervention variants for the stage of change that was targeted.[73,74] BCTs were coded according to Michie et al.'s taxonomy of BCTs for smoking cessation.[15] Cultural modifications were coded according to a modification of Kreuter et al.'s identified strategies (Table 2).[16] Self-reported smoking cessation at specified time points (quit rates) were used to determine efficacy of interventions, and a study space analysis was utilised to examine which intervention elements might be most effective. In evaluating complex interventions, it is not possible to definitively assess individual components. A study space analysis allows the analysis of limited data from multiple studies with differing components in order to give perspective to which components may be particularly important or effective and allow for in-depth study of promising components in future research.

Table 1. Study Characteristics, Detailed						
First Author, Year, Country	**Intervention name(s)**	**Study Design**	**Comparison Groups**	**N**	**Follow Up (mo.)**	**Quit Rates**
Alexander (2010), USA[75]		experiment	LGBT vs. heterosexual, advertising imagery	LGBT 61 non-LGBT 209	0	
Bryant (2012), USA[76]		qualitative	None	not reported	0	
Covey (2009), USA[77]		repeated measures	gay/bisexual vs. heterosexual	gay/bisexual 54 heterosexual 243	0	0 mo: 59%
Dickson-Spillmann (2014), Switzerland[78]	Queer Quit, based on Harding (2004)[82]	repeated measures	None	70	6	0 mo: 65.7% 6 mo: 28.6%
Eliason (2012), USA[79]	The Last Drag	repeated measures	None	326	6	0 mo: 65% 1 mo: 53% 3 mo: 36% 6 mo: 36%
Fallin (2015), USA[80]	CRUSH	pre-post cross-sectional	None	2395	0	
Grady (2014), USA[81]	Clear Horizons	repeated measures	LGBT vs. non-LGBT	LGBT 136 non-LGBT 641	24	3 mo: 55% 6 mo: 50%
Greenwood (2002), USA[31]	QueerTIPs	repeated measures	none	18	0	0 mo: 40%
Greenwood (2002), USA[31]	The Last Drag	repeated measures	none	56	0	0 mo: 48.63%
Harding (2004), UK[82]		repeated measures	none	69	0	0 mo: 76%
Matthews, Conrad (2013), USA[83]	Project Exhale	repeated measures	none	31	3	1 mo: 16% 3 mo: 6%
Matthews, Li (2013), USA[84]	Bitch to Quit (based on Call it Quits)	repeated measures	none	33	1	1 mo: 27.27%
Matthews, Li (2013), USA[84]	Call it Quits, based on ALA-FFS (later renamed Bitch to Quit and Put it Out with modifications)	repeated measures	none	105	1	1 mo: 39.05%

First Author, Year, Country	Intervention name(s)	Study Design	Comparison Groups	N	Follow Up (months)	Quit Rates
Matthews, Li (2013), USA[84]	Put it Out (based on Call it Quits)	repeated measures	none	60	1	1 mo: 23.33%
McElroy (under review), USA[85]		repeated measures	none	33 (198 in class)	ran for 14 months, follow-up at one time	3 mo: 27.3%
Meloche (2008), Canada[30]	Stop Dragging Your Butt/Fierté sans fumer	self-report post-test only	none	48 registered, 22 completed, 20 filled in post-test	1	0 mo: 19.14%
Miele (2005), USA[86]	The LGBT Incubation Project - using Fenway curriculum @ Fenway, ALA curriculum at Howard Brown and Los Angeles	repeated measures	none	139	6	
Spina (2010), Australia[71]	No More Butts	qualitative	none	13 for focus groups	0	
Walls (2011), USA[87]	The Last Drag	repeated measures	none	44	0	0 mo: 72.73%

Table 2. Common Strategies for Enhancing Cultural Appropriateness[16]	
Peripheral Strategies	"seek to give programs or materials the appearance of cultural appropriateness by packaging them in ways likely to appeal to a given group. This may include using certain colors, images, fonts, pictures of group members, or declarative titles … that overtly convey relevance to the group."
Evidential Strategies	"seek to enhance the perceived relevance of a health issue for a given group by presenting evidence of its impact on that group."
Linguistic Strategies	"seek to make health education programs and materials more accessible by providing them in the dominant or native language of the target group."
Constituent-involving Strategies	"draw directly on the experience of members of the target group. These strategies include hiring staff members who are indigenous to the population served, training paraprofessionals …"
Sociocultural Strategies[a]	"discuss health-related issues in the context of broader social and/or cultural values and characteristics of the intended audience."
[a] Sociocultural strategies has not been used as a broad category in this review; rather specific approaches have been identified.	

[3] Results

[3.1] Study characteristics

Of the 19 included studies, the majority were repeated measures (n=16, 84.21%), of which one was an experiment and another used pre- and post-campaign cross-sectional surveys. One study recorded post-intervention smoking status only (on the assumption that all participants started out as smokers), and two studies used qualitative methods. Three studies compared performance of the interventions with LGBT vs. non-LGBT participants, and 16 studies did not use a control or comparison group. Comparisons in this review will be based on only the LGBT group where applicable; the sample in our review therefore had a total of 3663 participants. Of the studies that reported mean age (n=15), the mean across studies was 42.08 years. The median follow up was 0.55 months, ranging from no follow up to 24 months. The most common follow up was 1 month (n=4, 21.05%), but nearly half had no follow up (n=9, 47.37%). Study characteristics are summarised in Table 3.

Table 3. Study Characteristics, Aggregated		
	N	**%**
Country		
United States	15	78.95
Australia	1	5.26
Canada	1	5.26
Switzerland	1	5.26
UK	1	5.26
Participant Groups		
Gay men	19	100
"LGBT" etc.	13	68.42
Lesbian women	13	68.42
Bisexual people	12	63.16
Trans people	5	26.32
Intersex people	0	0.00
Participant Demographics		
LGBT Participants (N)	3663[a]	
Age (M)	42.08	
% women	21.18	
% women (open to women)	27.78	
% trans	3.02	
% white	71.59[b]	
Study Design		
Repeated measures	16	84.21
Post-test only	1	5.26
Qualitative	2	10.53
Comparison groups		
LGBT/non-LGBT	3	15.79
none	16	84.21
Follow-up (months) [c]		
none	9	47.37
1 month	4	21.05
3 months	11	10.53
6 months	3	15.79
24 months	1	5.26
Administration		
Community-based	15	78.95
Health centre	9	47.37
Government	1	5.26
Not disclosed	1	5.26
Funding		
Private foundation	6	31.58
University	6	31.58
Pharmaceutical company	1	5.26
Local government	3	15.79
National government	5	26.32
Not disclosed	1	5.26

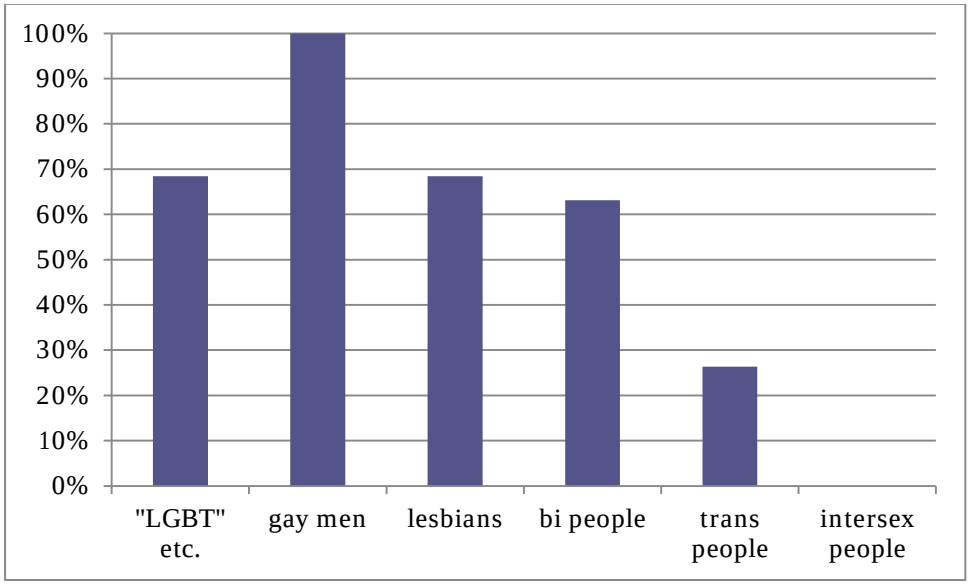
[a] One study did not report participant numbers. Another had some non-LGBT participants for an LGBT-focussed program and reported aggregates.
[b] %white is reported for interventions exclusively with quitters. The CRUSH campaign was aimed at nightclubs with a strong Latino clientele measuring smoking in the community before and after. Inclusion of this study makes the overall sample appear more ethnically diverse, at 38.41% white.
[c] One study ran for 14 months and followed up all participants at the same time.

Most interventions were administered by community-based organisations. These interventions were funded by a variety of sources: 6 (40.00%) by private foundations, 5 (33.33%) by universities, 3 (20.00%) by local government, 2 (13.33%) by national government, and 1 (6.67%) undisclosed.

[3.1.1] LGBTI Populations

Populations targeted varied, and it was often not clear whether interventions reached the target audience (Figure 1). No studies discussed intersex people's smoking cessation needs or targeted them as participants. Thirteen studies used non-specific terms such as "LGBT people" (n=13, 68.42%) to describe their participant pool, yet not necessarily including all four populations. Gay men were most frequently mentioned (n=19, 100%), followed by lesbians (n=13, 68.42%). Three studies specifically targeted HIV-positive gay men. Twelve studies explicitly mentioned bisexual participants, and a further four practised bisexual erasure by, for example, using terms such as "LGB", "LGBT", or "sexual minority" but discussing only gay men and lesbians.

Figure 1. Percent Interventions Targeting or Reaching LGBTI Populations



Overall, of the studies that reported gender, only 21.18% (n=211) of participants were women, and of the studies that asked trans status, only 3.02% (n=16) were self-identified trans people. Trans people were recorded as targets or actual participants in 13 studies, but 7

of these studies asked gender as "male, female, transgender," thereby both potentially undercounting trans participants as well as alienating trans people who identify as simply women or men. As one of these 8 studies noted, "Only five transgender individuals started … and only one attended more than one class."[79]

Eight studies reported reaching or targeting participants with low SES. Ethnic composition of studies varied widely, with some studies exclusively targeting African American or Latino communities and some studies being overwhelmingly white (See Table 3).

[3.1.2] Format

Fifteen interventions used group sessions, meeting for a mean of 7.27 (SD=2.43) sessions, one used only individual sessions, and an additional individual intervention attempted group sessions but cancelled them due to low attendance. Three interventions used simple web-based media, and three used social marketing, one of which was also an environmental modification and community campaign based in nightclubs and bars.

[3.1.3] Theoretical background

The majority of original interventions (n=8, 57.14%) reported engaging social and/or psychological theory in the design of the intervention (Table 4)

Table 4. Theories reported in designing original interventions

Theory	**n(%)**
TTM/'stages of change'	2(14.29)*
5'As Model	1(7.14)
Community-based participatory research	1(7.14)
CBT	2(14.29)*
Social cognitive theory	1(7.14)
Emancipatory transformative learning	1(7.14)
"models of behavioural change"	1(7.14)
Kreuter et al. cultural modifications	1(7.14)
Any theory	8(57.14)
* 3 variants of the same intervention, 1 original intervention	

The majority of intervention variants were aimed at contemplation, preparation, and action, key stages in the time period around stopping smoking (Table 5). However, six were also aimed at pre-contemplation and four at maintenance, indicating consideration of the long-term process of smoking cessation.

Table 5. Stages of change targeted for intervention variants	
Stage of Change	**n(%)**
Pre-contemplation	6(31.58)
Contemplation	18(94.74)
Preparation	17(89.47)
Action	16(84.21)
Maintenance	4(21.05)

[3.1.4] Cultural modifications

Most (n=17, 89.47%) interventions used a cultural modification of some sort to tailor the intervention to LGBT smokers/quitters, most commonly by holding the intervention in LGBT spaces, discussing LGBT-specific anti-smoking evidence (e.g., tobacco marketing to LGBT people, tobacco company funding for ring wing lobbyist groups), using LGBT presenters/facilitators, and discussing LGBT-specific triggers for smoking.

Table 5. LGBT Cultural modifications to intervention variants	
Strategy	**n(%)**
Peripheral strategies (e.g. imagery)	7(36.84)
Evidential strategies a: LGBT targeting by tobacco	9(46.78)
Evidential strategies b: LGBT social justice	10(52.63)
Linguistic strategies	6(31.58)
Constituent involving strategies a: peer facilitators (ex-smokers)[a]	3(15.79)
Constituent-involving strategies a: peer facilitators (LGBT)	9(46.78)
Constituent-involving strategies b: LGBT space	12(63.16)
Discuss minority stress	5(26.32)
Discuss LGBT-specific triggers	10(52.63)
Discuss HIV and smoking cessation	8(42.11)
Discuss HRT and smoking cessation[3]	4(21.05)
Any cultural modification	17(89.47)
[a] Studies that used ex-smokers as facilitators used LGBT ex-smokers	

[3.1.5] Behaviour change techniques

Interventions used a variety of BCTS, with 37 represented out of the 43 described by Michie et al.[15] The most frequently reported BCTs were providing normative information about others' behaviour and experiences, boosting motivation and self-efficacy, facilitating relapse

[3] HRT can refer to testosterone, estrogen, and similar hormonal medications. Risk of deep vein thrombosis (DVT) is increased with estrogen use and compounded further by smoking.[88] Testosterone may increase the risk of cardiovascular disease, for which smoking is an independent risk factor.[89,90] These issues are of obvious relevance to trans and intersex people, but the same information may be relevant to other people who use or have considered taking testosterone or to menopausal women.

prevention and coping, advising on/facilitating use of social support, facilitating action planning/developing treatment plans, providing information, advising on medication, and offering/directing towards written materials (Table 6).

Table 6. Behaviour change techniques used in intervention variants	
Behaviour Change Technique	**n(%)**
Provide normative information about others' behaviour and experiences	15(78.95)
Boost motivation and self-efficacy	13(68.42)
Facilitate relapse prevention and coping	13(68.42)
Advise on/facilitate use of social support	13(68.42)
Facilitate action planning/develop treatment plan	12(63.16)
Provide information on consequences of smoking and smoking cessation	11(57.89)
Advise on stop-smoking medication	10(52.63)
Offer/direct towards appropriate written materials	10(52.63)
Prompt commitment from client there and then	9(47.37)
Facilitate barrier identification and problem solving	9(47.37)
Advise on environmental restructuring	9(47.37)
Adopt appropriate local procedures to enable clients to obtain free medication	9(47.37)
Provide rewards contingent on successfully stopping smoking	8(42.11)
Explain expectations regarding treatment programme	7(36.84)
Measure expired CO	6(31.58)
Give options for additional and later support	6(31.58)
Assess current and past smoking behaviour	6(31.58)
Assess current readiness and ability to quit	6(31.58)
Strengthen ex-smoker identity	5(26.32)
Facilitate goal setting	5(26.32)
Assess past history of quit attempts	5(26.32)
Build general support	5(26.32)
Elicit client views	5(26.32)
Prompt self-recording	4(21.05)
Provide information on withdrawal symptoms	4(21.05)
Identify reasons for wanting and not wanting to stop smoking	3(15.79)
Advise on changing routine	3(15.79)
Advise on avoiding social cues for smoking	3(15.79)
Tailor interactions appropriately	3(15.79)
Assess withdrawal symptoms	3(15.79)
Provide reassurance	3(15.79)
Provide rewards contingent on effort or progress	2(10.53)
Emphasize choice	2(10.53)
Explain the purpose of CO monitoring	2(10.53)
Provide feedback on current behaviour	1(5.26)
Advise on conserving mental resources	1(5.26)
Ask about experiences of stop smoking medication that the smoker is using	1(5.26)

[3.1.6] Outcomes

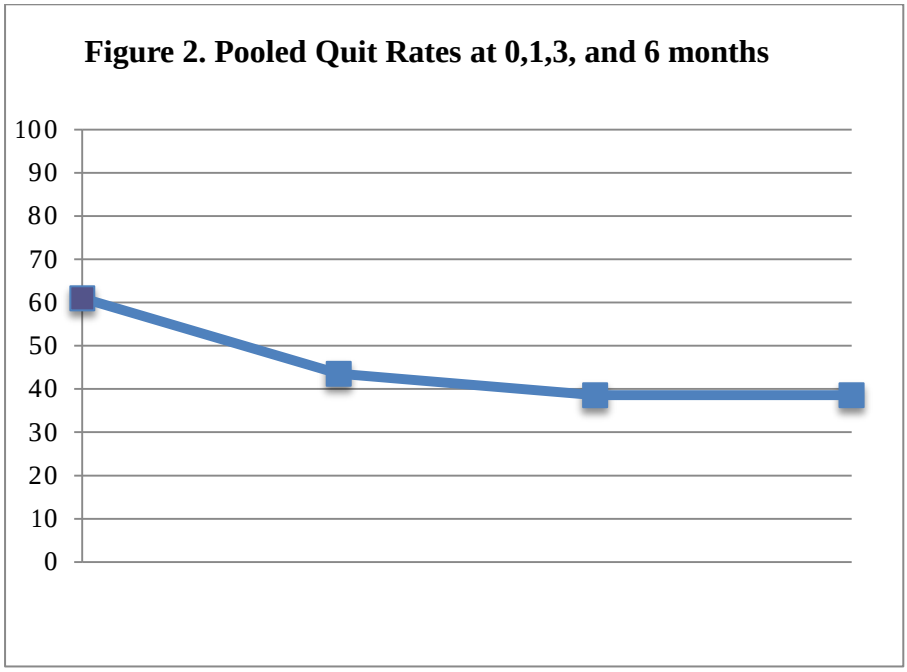
Outcomes included smoking abstinence or 7-day point prevalence by self-report with or without biological verification (most commonly expired CO measurements). Three studies

also collected the number of cigarettes smoked per day if not abstinent, and 7 studies reported course completion rates (M=70.09%, SD=15.60).

[3.2] Efficacy

Overall, efficacy of smoking cessation programs for LGBT people was high (Figure 2). At the end of the programs, the quit rate was 60.99% (95% CI 60.26-61.72). Quit rates declined over the first 3 months, most dramatically within the first month to 43.56% (95% CI 42.94-44.18), t(1239)=31.95, p<.001, then to 38.60% (95% CI 37.71-39.49), t(1080)=9.19, p<.001, at 3 months. Quit rates remained stable at 6 months at 38.61% (95% CI 38.14-39.08), t(1057)=-0.02, p=0.98.

Figure 2. Pooled Quit Rates at 0,1,3, and 6 months



[3.2.1] Study Space Analysis

Studies for which quit rate was assessable (n=14) were divided into high (at or above the median for all time-points) and low (less than the median at at least one time-point) quit rates such that 6 studies were high and 8 studies were low effect (Tables 7-9). We stress that a sample of 14 studies is too small to make definitive conclusions on complex interventions in which combinations of components are inherent in intervention design. Based on expected values, strategies with greater than 42.86% (6/14) high quit rates may, however, be

particularly worthy of further investigation. Less than this does not necessarily mean that an approach should not be tried or that inclusion will necessarily be detrimental to an intervention but that perhaps its use requires greater consideration to use well with these populations.

Table 7. Study Space Analysis: Format & Theory		
Format	**High Quit Rate**	**% High Quit Rate**
group sessions	6/13	46.15*
individual sessions	1/2	50.00*
Theory		
theory-based approach	5/11	45.45*
Stage of Change Targeted		
Pre-contemplation	0/1	0
Contemplation	6/13	46.15*
Preparation	6/14	42.86*
Action	6/14	42.86*
Maintenance	1/3	33.33
* expected value (42.86%) or greater high quit rate		

Table 8. Study Space Analysis: Cultural Modifications		
Cultural Modification	**High Quit Rate**	**% High Quit Rate**
Peripheral strategies (e.g. images)	2/5	40.00
Evidential strategies: community targeting by tobacco	4/9	44.44*
Evidential strategies: LGBT social justice	4/8	50.00*
Linguistic strategies	2/5	40.00
Constituent involving strategies: peer facilitators (ex-smokers)	0/1	0
Constituent involving strategies: peer facilitators (LGBTI)	3/7	42.86*
Constituent involving strategies: LGBTI space	5/10	50.00*
Discuss minority stress	2/5	40.00
Discuss LGBT-specific triggers	5/10	50.00*
Discuss HIV and smoking	3/8	37.50
Discuss HRT and smoking	2/4	50.00*
Any cultural modification	5/12	41.67

Table 9. Study Space Analysis: Behaviour Change Techniques		
Behaviour Change Technique	**High Quit Rate**	**% High Quit Rate**
BM1 Provide information on consequences of smoking and smoking cessation	4/9	44.44*
BM2 Boost motivation and self-efficacy	4/9	44.44*
BM3 Provide feedback on current behaviour	0/1	0
BM4 Provide rewards contingent on successfully stopping smoking	4/8	50.00*
BM5 Provide normative information about others' behaviour and experiences	5/11	45.45*
BM6 Prompt commitment from client there and then	4/8	50.00*
BM7 Provide rewards contingent on effort or progress	0/1	0
BM8 Strengthen ex-smoker identity	2/5	40.00
BM 9 Identify reasons for wanting and not wanting to stop smoking	2/3	66.67*
BM11 Measure CO	2/5	40.00
BS1 Facilitate barrier identification and problem solving	3/8	37.50
BS2 Facilitate relapse prevention and coping	6/13	46.15*
BS3 Facilitate action planning/develop treatment plan	5/12	41.67
BS4 Facilitate goal setting	2/5	40.00
BS6 Prompt self-recording	2/4	50.00*
BS7 Advise on changing routine	1/3	33.33
BS8 Advise on environmental restructuring	3/8	37.50
BS10 Advise on conserving mental resources	1/1	100*
BS11 Advise on avoiding social cues for smoking	1/3	33.33
A1 Advise on stop-smoking medication	2/8	25
A2 Advise on/facilitate use of social support	6/12	50.00*
A3 Adopt appropriate local procedures to enable clients to obtain free medication	2/7	28.57
A4 Ask about experiences of stop smoking medication that the smoker is using	1/1	100*
A5 Give options for additional and later support	2/4	50.00*
RD1 Tailor interactions appropriately	0/2	0
RD2 Emphasize choice	0/1	0
RI1 Assess current and past smoking behaviour	2/5	40.00
RI2 Assess current readiness and ability to quit	3/5	60.00*
RI3 Assess past history of quit attempts	2/3	66.67*
RI4 Assess withdrawal symptoms	2/3	66.67*
RC1 Build general support	1/4	25.00
RC3 Explain the purpose of CO monitoring	1/2	50.00*
RC4 Explain expectations regarding treatment programme	3/7	42.85*
RC5 Offer/direct towards appropriate written materials	4/8	50.00*
RC6 Provide information on withdrawal symptoms	2/4	50.00*
RC8 Elicit client views	1/4	25.00
RC10 Provide reassurance	1/2	50.00*

[4] Discussion

Overall, efficacy of smoking cessation interventions amongst LGBT people was much higher than can be expected in the general population.[60] LGBT participants often fare similarly to or better than non-LGBT participants in programs for quitting substances other than tobacco.[36] This may be due to participants feeling an automatic sense of commonality, reinforcement of existing social circles, direct applicability to one's life, or even that people looking for population-specific programs have put more thought into the smoking cessation process than people who are recruited into general population interventions. There is no way to say concretely at this stage why quit rates were so much higher overall with the data available, and this is an area for further research. However, this does tell us that LGBT-specific smoking cessation programs are likely to be effective in facilitating quitting both in the short term (0-1 month post-intervention) and long term (3-6 months). In the following sections, we discuss participant demographics and specific features of the interventions. Although it is impossible for a small sample of complex interventions to provide definitive answers, we unpack some of the features that may affect outcomes and would be suitable for further exploration.

[4.1] Study populations

All of the studies included gay men, yet only two-thirds included lesbians and bisexual people. Despite many of the studies' apparent openness to women, only a quarter of participants in studies that were open to women and reported gender were actually women. Two-thirds of studies also used general terms such as 'LGBT' when each population was not necessarily fully included in the usage. Researchers should avoid tokenistic use of terms like 'LGBT', be explicit about what attempts they have made to include specific population groups, and collect and report complete demographic data on their samples.

Trans people were only mentioned in a quarter of the studies and often in an (unintentionally) exclusionary way. Because many of the studies that collected data on trans status asked about it as part of a single question on gender, trans people may have been undercounted. By making female, male, and transgender mutually exclusive categories, trans people who identify simply as men or women must choose between counting their gender and counting

their trans status. Research should always include trans status as a separate question to gender to improve accuracy and reduce bias. Similarly, intersex people are likely to be under-counted without explicit questions about intersex status (most intersex people identify as women or men). The lack of intersex inclusion likely reflects a combination of time and location in that the coalition between LGBT and intersex communities is a recent phenomenon spearheaded in Australia. Intersex people may have specific smoking cessation needs related to hormone replacement therapy, metabolic concerns, experiences of trauma, and smoking-related risk for reconstructive or endocrine surgery. While some of these concerns may be similar to those of trans people, others may be distinctly different and must be taken into account.

Although no control groups were used in the reviewed studies, we know from the literature that self-guided smoking cessation offers modest results.[91] Thus we can conclude that the quit rates reported are primarily due to the interventions. Ideally, control groups would aid the research agenda, but community organisations and health centres often aim to treat as many as possible with a small budget. For the three studies that included 6-month follow-up, over a third of participants were still smoke-free at 6 months. Even in the event that a particular intervention's strategies are themselves ineffective, any intervention with which people can engage, socialise, and discuss issues appears to be helpful for smoking cessation.[60] Even with this conservative view, many of the interventions reviewed in this report had quit rates well beyond that expected from general population data (7-35%)[60]

Although it may seem that ethnic diversity was lacking overall in that nearly three quarters of current smokers were white, this may reflect the demographics of LGBT smokers in the locations where studies took place. According to the 2010 United States Census, 62.6% of the US population is white (not Hispanic or Latino), whereas European countries tend to be even higher (e.g., 85.4% white in the UK).[92,93] Lee et al. describe studies in multiple cities where smoking rates were highest among white LGBT people, the reasons for which are unknown.[4] Focused smoking cessation efforts should continue in the most disadvantaged populations as well as the populations with the highest smoking rates in order to close the smoking gap and effect overall change.

[4.2] Funding and Administration

The majority of interventions were administered by community-based agencies, and about half were administered by health centres (with some overlap with community and government). Although health professionals may be able to recruit people who do not identify as LGBT or are not part of an LGBT community, community-based organisations play a key role in LGBT public health and in reaching potential participants. Lee et al. also found that LGBT agencies were best placed to deliver existing evidence-based smoking cessation programs.[17] Funding was quite varied, with relatively little government funding. Most interventions received funding from universities and/or private foundations, grants which are typically designed to test an intervention rather than provide sustained support. Local and national government financial support is essential to reduce the very high smoking rates among LGBT(I) people.

[4.3] Format and theoretical background

Although all theories have flaws, using a theory-based approach may help maintain a coherent message to participants and help participants think about their own behaviour change. Using the Transtheoretical Model (TTM) as a framework for understanding participants' readiness to quit, the stages of Contemplation, Preparation, and Action are most amenable to focused behaviour change programs.[73,74] It is at these stages that intensive, focused work can be done to effect change and promote progress. Individual support such as that of a practice nurse or general practitioner could be reasonably aimed at people in the Pre-contemplation, Contemplation, and Maintenance stages of change. However, it should be noted that stage-matched interventions are not necessarily more effective than non-stage-matched interventions.[94] Intervention can inspire health-related behaviour change regardless of readiness to quit, and people do not necessarily progress through predictable stages.

Although media campaigns may increase inequity between groups despite an overall improvement, this appears to occur when media campaigns are broadcast to the general population due to differential effects the message has on disadvantaged groups.[49,50] This should not be taken to mean that media campaigns have detrimental effects on disadvantaged populations, however. For example, the CRUSH campaign operated in bars and nightclubs

with a predominately Latino LGBT clientele and saw a reduction in smoking rates over the course of the campaign. Rather, some groups benefit more from general media campaigns than others, which can result in increased disparities.[49] This can happen for a variety of reasons, with access to the campaign (locations of billboards, access to television or internet, etc.), language barriers, and receptivity to a general message being some possibilities.

One potential way to increase the effect of media campaigns (aimed at Pre-contemplation and Contemplation) on a specific population whilst reaching a wide audience is through subtle culture-specific imagery. Gay-specific imagery in tobacco advertising (e.g., pink triangles) increased LGBT identification with the advertisement without decreasing non-LGBT identification.[75] Although their aim was to examine how cigarette marketing strategies affect people in light of targeted LGBT tobacco marketing, the findings are very relevant to anti-smoking and other media campaigns. As Ling et al. note, “In contrast to the tobacco companies’ efforts, most young adult health interventions take place in colleges or health centers rather than social environments. Bars and nightclub venues represent an opportunity to reach those at highest risk for long-term smoking morbidity and mortality.”[95] Similar to Ling et al.’s observation about venue, utilising the same marketing strategies that tobacco companies use represents an important avenue for anti-tobacco marketing.

[4.4] Culturally appropriate programs

Most studies were carried out in the United States. Meloche discusses the challenges that attempting to adapt American programs to other communities can bring.[30] For example, popular American programs used ‘coming out’ as a model for smoking cessation, that the same coping skills can be applied to both and thus the participant should draw on their experiences of coming out to help them quit smoking.[30] According to Meloche, being gay or lesbian is much more mainstream in Canada than the United Stated and often does not involve a ‘coming out’ process to the same extent, which is arguably true for many parts of the United States today as well.[30] Moreover, programs are generally not age-specific or specific to years since coming out. Such limitations call into question the ability of existing targeted programs focusing on coming out as a strategic resource to remain culturally appropriate not only with regard to location but with regard to changing societal and communal values and experiences.

The study space analysis revealed that evidential strategies, using LGBT facilitators, discussion of LGBT-specific triggers, and discussion of HRT and smoking may be the most effective cultural modifications. Lower effect of peripheral strategies such as images may be due to poor choices that serve to alienate rather than affirm the participants. For example, images of muscular, hairless young men may not resonate with all sub-groups, such as gay men who identify as 'bears' and lesbian women. Additionally, trans and intersex people may not identify as LGB and may not respond to gay imagery. Another common strategy of discussing HIV and smoking, does not appear to connect with participants generally. HIV-related health issues may not be relevant to HIV-negative people, so this may be seen as a waste of valuable class time for these participants. Content should be tailored to the people in the group and the group dynamics. Consider also HIV-specific smoking cessation groups so that they can freely discuss HIV-related issues and disclose HIV status comfortably.

[4.5] Behaviour change techniques

The study space analysis revealed several behaviour change techniques that appear likely to be beneficial in smoking cessation programs aimed at LGBT people. Most effective in our sample were identifying reasons for wanting and not wanting to stop smoking, assessing past quit attempts, assessing withdrawal symptoms, assessing current readiness and ability to quit, providing rewards contingent on successfully stopping smoking (usually in the form of a final session celebration), prompting commitment from the client there and then (usually in the form of setting a mandatory quit date), advising on/facilitating social support[4], giving options for additional and later support, explaining the purpose of CO monitoring, offering written materials, providing information on withdrawal, and providing reassurance. All of these elements have in common that they actively involve the participant in their own quit attempt, whether by having them think about barriers and facilitators to quitting, participating in an assessment, or making a commitment.

Although providing information on the consequences of smoking and smoking cessation, boosting motivation and self-efficacy (often in the form of 'how to say no to smoking', occasionally building negotiation skills for a smoke-free home), providing normative

[4] Among the highest completion rates in the sample were two interventions that used a small group 'team' quitting approach.[82,86]

information (a very common theme in the interventions), facilitating relapse prevention and coping, and explaining expectations regarding treatment were equal to or greater than that expected by chance, the results were not impressive. A common theme to these elements is that they make use of explicit pedagogy to accomplish the task, by, for example, instructing in relaxation or communication, telling participants facts and figures, or telling participants what is expected of them in the program. Taking a pedagogical approach such as this may push participants away; using more participatory methods or developing creative ways to involve participants in solving these problems themselves in the group may prove most effective.

Providing advice, focusing on smoking behaviours, focusing on ex-smoker identity, and measuring carbon monoxide (CO) appear to be ineffective. Expired CO during brief interventions leads to greater intention to quit smoking.[18] While it may appear to provide regular encouragement with lower and lower expired CO levels over time, we are unaware of any controlled studies evaluating the efficacy of regular measurement of expired CO on quit rates. Rather than simply providing encouragement, the process itself of doing test regularly, particularly in a group setting, may be a shaming experience for quitters. Similarly, focus on smoking behaviours and ex-smoker identity may be a source of shame such that participants may feel they cannot escape their smoking past. While they may provide useful information to participants, they should perhaps not be relied upon heavily in LGBT populations without further research. Using more participatory methods, getting participants to consider their own barriers and facilitators to quitting, assessing current readiness and ability to quit, and encouraging a commitment may be most effective.

[5] Conclusion

We have identified published and unpublished interventions to affect smoking among LGBT people (no interventions addressed intersex people) and analysed the participant demographics, overall efficacy, and features of the interventions. Such features include theoretical basis, cultural modifications, and behaviour change techniques. Overall efficacy of interventions aimed at LGBT people was high, and a study space analysis identified features associated with higher quit rates. These features may be suitable for specific research on the mechanism of complex smoking cessation interventions with LGBT people and should

be included in interventions. The study space analysis also identified features that are associated with lower quit rates, which may indicate that these have been done poorly and require special consideration of how or whether they apply to the populations to which interventions are aimed.

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Appendix A: Search Strategy

1. Population

Lesbian	Gay	Bisexual	Trans	Intersex	LGBTI
lesbian* [5]	**gay***	**bisexual***	**trans*ex***	**intersex***	**queer***
womyn*	**homosexual***	pansexual*	gender variant	sex divers*	**lgb***
wymyn*	**msm*** men who have sex with men	omnisexual*	gender divers*		**glb***
wsw* women who have sex with women	**ssa**		gender queer		**asexual*** **sexual orient***
butch*	**ssay***		gender identit*		sexual preference*
femme*	same gender		androgyn*		**sexual minorit***
dyke*	same sex		**transgender***		sexualit*
			cisgender*		
			cis*ex*		
			cross*dress*		
			gender divers*		
			two spirit		
			cross dress		
			sex change		
			transvest*		
			gender fluid*		
			gender minorit*		
			gender adj queer		

[5] Boldface indicates keyword retained in abbreviated searches

gender dysphori*
gender affirmation
gender transition
drag queen*
drag king*
non-binary gender*

MeSH

exp Homosexuality, Female	exp Homosexuality, Male	exp Bisexuality	exp Transgendered persons	exp urogenital abnormalities/ or exp female urogenital diseases/	
	exp Homosexuality		exp Transsexualism/ or exp Gender Identity/ or exp Sex Reassignment Surgery/		
			exp Transvestism		

PsycINFO

exp Lesbianism	exp Male Homosexuality	exp Bisexuality	exp Gender Identity	exp Congenital Disorders	exp Sexual Orientation
			exp Transsexualism	exp Hermaphroditism	exp Homosexuality
			exp Transgender	exp Genital Disorders	
			exp Sex Change		
			exp Gender Identity Disorder		

2. Intervention

giv* up smoking	giv* up tobacco	cigar* cessation
quit cigar*	giv* up cigar*	

quit tobacco	anti*smoking
quit smoking	anti smoking
tobacco reduc*	anti cigar*
reduc* smoking	anti*cigar*
stop smoking	smoking prevent*
smoking cessation	tobacco prevent*
tobacco control	tobacco cessation

MeSH

exp "Tobacco Use Cessation"

PsycINFO

exp Smoking Cessation

3. Comparator and Outcomes were not specified in the search strategy, as recording these was part of our research objective.