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A systematic review of the aetiology of tobacco disparities for sexual minorities

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Abstract

Objective—To conduct a systematic review of the literature examining risk factors/correlates of cigarette smoking among lesbian, gay and bisexual (ie, sexual minority) populations.

Methods—Sets of terms relevant to sexual minority populations and cigarette smoking were used in a simultaneous search of 10 databases through EBSCOhost. The search was limited to the peer-reviewed literature up to January 2011, using no geographic or language limits. For inclusion, the paper was required to: (1) have been written in English, (2) have sexual minorities (defined by either attraction, behaviour, or identity) included in the study population and (3) have examined some form of magnitude of association for risk factors/correlates of any definition of cigarette smoking. A total of 386 abstracts were reviewed independently, with 26 papers meeting all inclusion criteria. Abstracts were reviewed and coded independently by authors JB and JGLL using nine codes derived from the inclusion/exclusion criteria.

Results—Studies used various measures of sexual orientation and of smoking. Risk factors that could be considered unique to sexual minorities included internalised homophobia and reactions to disclosure of sexual orientation. Some studies also indicated common smoking risk factors experienced at higher rates among sexual minorities, including stress, depression, alcohol use and victimisation.

Conclusions—This review identified risks that were associated with sexual minority status and common to the general population but experienced at potentially higher rates by sexual minorities. Government and foundation funds should be directed towards research on the origins of this disparity.

INTRODUCTION

Cigarette smoking remains a major public health priority, contributing to over 10 million premature deaths since the US Surgeon General first published the hazards of smoking over 50 years ago.[1] Additionally, the costs from smoking due to healthcare expenditures and productivity losses reach nearly US$200 billion annually.[2] Evidence is unequivocal that the

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burden of tobacco-related morbidity and mortality is not shared equally across different population groups. These include changes in risk for smoking by geography, gender, poverty and racial/ethnic identity. Recently, evidence has emerged that there are also significant disparities by sexual orientation, at least in the USA.[3] The risk factors driving this disparity among sexual minorities remain largely unknown.

Although studies on smoking among lesbian, gay and bisexual (ie, sexual minority) populations first identified inequalities in smoking prevalence through convenience samples,[4-12] a growing number of probability-based studies confirm the disparity.[13-24] These inequalities appear to exist internationally, albeit with limited research, with studies from around the world, including Australia,[25] Mexico,[26] Switzerland,[27] Taiwan,[28] Canada,[2930] and China.[31] Some Irish[32] and Canadian[33] studies, however, show no evidence of an inequality in smoking prevalence, suggesting the need for confirmatory studies and additional efforts to identify the causes of health equality. Nonetheless, these studies construct a narrative through various methodologies and geography across time to show that sexual minority populations have 1.5 to 2 times the odds of smoking as their heterosexual peers.[3]

While the ability to gauge the damage of cigarette smoking to sexual minority health is hampered by the paucity of morbidity and mortality data containing sexual minority measures, a few studies have found that disproportionate prevalence of smoking is associated with correspondingly disproportionate odds of illness. Blosnich and colleagues found that a sample of sexual minority college students had higher prevalence of acute respiratory illnesses (eg, bronchitis, sinus infection, strep throat) than their heterosexual peers, and that smoking mediated some of the association between sexual orientation and respiratory outcomes.[34] Using data from the National Health Interview Survey, Heck and Jacobson found that respondents in same-sex relationships had significantly higher prevalence of current smoking, men in same-sex relationships had increased odds of ever having a diagnosis of asthma and women in same-sex relationships had increased odds of current asthma diagnoses.[35] Additionally, Case *et al* suggested that lesbians may have increased risk of cardiovascular disease due to a constellation of elevated risk factors, including smoking.[6]

The demonstration of high smoking prevalence and the potential concomitant health effects has led to burgeoning efforts to address this disparity. Most recently, the Institute of Medicine issued a consensus report confirming deficits in knowledge about sexual minority health and urging sexual and gender minority demographics be collected in federally-funded surveillance.[36] Specific to tobacco use, the American Lung Association published a special lesbian, gay, bisexual and transgender (LGBT) report in their *Disparities in Lung Health Series*, recommending targeted anti-smoking messages as well as interventions sensitive to sexual minority populations.[37] However, interventions with sexual minorities remain relatively scant,[3839] and the reasons for the disparity are not fully understood.

While this systematic review focuses on the synthesis of empirical results and not a synthesis of theories, frameworks, or models applied to sexual minority smoking, there is a common theoretical underpinning to much of sexual minority health disparities research. The minority stress model, prominently used as a guiding conceptual framework for the Institute of Medicine report,[36] posits that negative experiences (eg, discrimination, stigma, violence victimisation) and hegemonic devaluation endured by a minority group contributes to poor mental health.[4041] More specifically, minority stressors differ from general stressors, in three principal ways: (1) they are unique in that they increase stress above general, common stressors experienced by the average person; (2) they are chronic in that they stem from cultural and social paradigms that largely stay intact, even in spite of advancements of

minorities (eg, the Civil Rights Act was passed in 1964, yet racism persists); and (3) they are socially based since they are rooted in culturally constructed conventions, as opposed to other stressors that are at the personal level (eg, biological or genetic stressors).[42] In addition to associations between minority stress and mental health outcomes such as distress,[41] depression,[43] anxiety,[44] studies document relationships between minority stress and increased health risk behaviours, including smoking.[264546]

In addition to theoretical frameworks of enhanced individual-level risk, sexual minority persons may experience community-level risk factors in the forms of targeted tobacco industry advertising and the reliance on gay bars as safe spaces for socialising. There is robust evidence, through independent research[47-49] and tobacco industry-authored documents,[5051] that sexual minority populations have been specifically marketed to by tobacco companies. Additionally, gay bars are steeped in LGBT history as places of advocacy and socialisation within a safe space.[52] Unfortunately, the positive aspects of the gay bar as an institution also come with some risks inherent to many bar settings, such as smoking and exposure to environmental tobacco smoke. It is unclear whether there is empirical evidence examining if either socialisation at bars or targeted marketing bear significantly on the epidemic of tobacco use among sexual minority populations.

Understanding of mutable risk factors that drive health disparities provides critical information for the design and implementation of interventions. This is especially the case when there are smoking risk factors that are either (1) unique to sexual minority populations (eg, internalised homophobia) or (2) common among the general population but experienced at disparately higher rates among sexual minorities (eg, depression). More generally, although prevalence studies of smoking are numerous,[35354] the breadth of research about potential reasons for elevated smoking among sexual minorities lacks summary and synthesis. The purpose of this paper was to conduct a systematic review of the peer-reviewed literature, summarising current knowledge about determinants of smoking among sexual minority populations in order to answer the following research question: ‘In the face of demonstrated disparity, what are known, empirically-tested risk factors for smoking among sexual minority persons?’

METHODS

Systematic reviews have gained prominence across disciplines as a helpful—if not vital—methodology in assessing what is known about specific topics. Pettigrew and Roberts explain that the systematic review differs from a normal literature review in that it ‘strives to comprehensively identify, appraise and synthesise all the relevant studies on a given topic’.[55] Specifically, the rigour of systematic reviews make large sums of studies intelligible; summarise consistencies and inconsistencies among studies; and are transparent, comparable and replicable—aspects not typical of ordinary literature reviews. Systematic reviews typically take one of two forms: (1) a narrative approach in summarising the extant literature (eg, research design, findings, biases), or (2) a statistical approach of combination and reanalysis of study findings (ie, meta-analysis).[56]

The overall process for this project aligned with general guidelines and suggestions from Petticrew and Roberts for a narrative systematic review,[55] which was chosen over a meta-analysis for two principle reasons. First, research with sexual minorities differs substantially from that of different minority groups given the variable ways in which researchers measure sexual minority status: behaviour, attraction and/or identity.[57] For instance, a respondent may indicate that she is attracted to women, had a sexual experience with a woman, but does not identify as a lesbian. At best, a researcher who measures all three components of sexual orientation must navigate disparate responses across each category, and at worst, a

researcher risks selection bias by measuring only one category. Thus, the variability in operationalising sexual minority status decreases the probability of having enough study samples similarly defined in a way to justify combining them. Second, research with sexual minority populations remains challenged by the limited number of studies available and by wide variations in quality.[36] Much of the sexual minority literature has depended on convenience samples,[58] and, compared to gender and racial/ethnic minority status, data collection about sexual minority status on population-based studies is limited due to lack of inclusion of sexual orientation measures in all but approximately 12 statewide surveillance systems.[59]

To begin, a set of search terms was developed to capture studies relevant to the research question, using Boolean operators, truncation and exact match search criteria. The search term consisted of the following: ((homosexual* OR gay OR 'sexual minority' OR 'sexual minorities' OR lesbian* OR bisexual* OR queer OR 'sexual orientation' OR 'men who have sex with men' OR MSM OR 'women who have sex with women' OR WSW) AND (tobacco OR smok* OR cigarette OR nicotine)). Using EBSCOhost, a simultaneous search of 10 databases was conducted (Academic Search Elite, Alt HealthWatch, CAB Abstracts 1990–Present, CINAHL with Full Text, Health Source—Consumer Edition, Health Source: Nursing/Academic Edition, MEDLINE, PsycARTICLES, PsycINFO and Social Work Abstracts). Specific search parameters included reviewing only the peer-reviewed literature for articles up to January 2011. No geographic or language limits were used.

The search results were downloaded to a reference managing software, which facilitated ease of screening for duplicate abstracts and organisation of the final set of abstracts (n=369). Additionally, 17 abstracts that were not in the search results, but potentially met the inclusion criteria were identified by the authors through citations, resulting in a total of 386 abstracts for review.

For inclusion, the paper must have: (1) been written in English, (2) had sexual minorities (defined by either attraction, behaviour, or identity) as the entire study population or a component of the study population and (3) examined some form of magnitude of association for risk factors/correlates of any definition of cigarette smoking behaviours. Studies were excluded if they only reported differences in smoking prevalence or only discussed theoretical risk factors (ie, did not empirically investigate relationships among variables). Each abstract was reviewed and coded independently by authors JB and JGLL using nine codes derived from the inclusion/exclusion criteria. We also coded for related qualitative work, related commentaries and other reviews or systematic reviews for background information. When codes did not match, coders discussed each abstract to reach agreement of inclusion/exclusion. See figure 1 for results of initial abstract review.

Initially, 27 studies were flagged for inclusion, and each of the articles was reviewed with a data extraction form to pull key elements of information from the study (eg, measure of sexual minority status, measurement of smoking behaviour, key findings) by a single author (JB). Upon reviewing all of the initial 27 studies, 1 paper focused solely about prevalence differences[60] and was excluded (ie, placed in the 'no magnitude of association' category), leaving a final analytic sample of 26 studies.

RESULTS

The majority of the 26 included studies (61%) used non-probability samples, with fewer (31%) using probability-based sampling (see online table 1). One study used a combined sample that employed probability and non-probability methods,[14] and one study used respondent-driven sampling methods involving complex network analysis that

mathematically models probability of selection from an initial non-probability sample.[61] Of the eight studies that used probability-sampling methods, two of them were based outside the US (Australia[25] and Mexico[26]).

Sexual orientation is most often conceptualised as having three domains: attraction (to whom a person feels physically/romantically attracted), behaviour (with whom a person engages with sexual activities) and identity (how a person affiliates with a wider community).[57] There were variable uses of these measures across the included papers. Only one study measured all three domains, seven measured two domains and the remaining ascertained only one domain (see online table 1). The most used method of defining sexual orientation involved identity (73%), followed by behaviour (42%) and attraction (19%).

Even more varied than the measures of sexual orientation were the outcome measures of smoking behaviours, which ranged from indicators of lifetime use, to the average number of cigarettes smoked per day, to smoking before age 14, to one study in which the authors did not define how smoking was assessed.[62] Moreover, there were many terms and definitions used to discuss smoking status (eg, former smoker, ever smoker, current smoker, early onset of smoking, daily smoker), intensity (eg, number of cigarettes smoked in the past week, number of cigarettes per day in the past 3 months) and frequency (eg, smoking at all in the past 30 days, ever used cigarettes in the past year, smoked at least weekly). Only 1 study[21] employed the federal definition of current smoker (ie, smoked at least 100 cigarettes in lifetime and currently smoke everyday or on some days).[63]

Sociodemographic and common factors

Several studies found associations between demographic correlates of smoking that are similar to characteristics identified in the general population, including younger age[306465] and lower educational attainment.[814213165-67] Other common correlates with smoking were alcohol use[14316568] and depression/depressive symptoms.[306569] One small study using a convenience sample found no associations between income and age with smoking.[67]

Victimisation and discrimination factors

Victimisation and discrimination have been posited to play a role in driving health disparities among sexual minority populations, often as part of the minority stress model. While these negative experiences have been linked to poor mental health outcomes,[4170] the evidence regarding smoking is inconclusive. The most consistent findings seem to be with adolescents. Among sexual minority adolescents, Bontempo and D'Augelli found that higher levels of victimisation are associated with smoking intensity.[45] While Jun *et al* reported that exposure to physical or sexual childhood abuse mediated the associations between early onset adolescent smoking and smoking intensity with sexual orientation,[71] another study found no association between childhood sexual abuse and cigarette use.[72] Findings from a sample of Mexican adolescents showed that victimisation and discrimination mediated the relationships between some smoking behaviours and domains of sexual orientation.[26] Finally, Willoughby and colleagues found a direct relationship between victimisation and harassment with smoking intensity.[73]

Among adult samples, the evidence for victimisation and discrimination was less clear. Among a representative sample of Minnesotans, discrimination was associated with smoking, but it did not mediate the relationships between sexual orientation and smoking.[16] In one sample of men who have sex with men (MSM), men experiencing intimate partner violence were not more likely to smoke than men who did not.[74] Interestingly, this finding contrasts with studies showing an association between intimate partner violence

victimisation and elevated rates of smoking, however this association has primarily been explored among heterosexual women victims.[75-77]

Other factors

Many studies examined risk factors that are unique to sexual minorities with inconclusive findings. Variables related to internalised homophobia (ie, having a negative self-concept by accepting negative societal beliefs about homosexuality)[78] showed that less comfort with one's sexual identity (ie, higher levels of internalised homophobia) was associated with smoking,[3146] although one study found no association between them.[73] Rosario *et al* did not find an association between gay-related stress and smoking,[72] however, among the same sample, more negative reactions to disclosure of sexual orientation were associated with smoking.[64] In contradiction with those findings, Willoughby and colleagues did not find an association between smoking and family rejection.[73] An array of risks were examined, from religiosity being protective against smoking among heterosexual adolescents but not sexual minority adolescents,[79] to bisexual women having greater odds of smoking for weight control than lesbian women,[25] to differential associations of smoking among subcultures of sexual minority populations.[6780]

Qualitative, case study and tobacco-document evidence

Though our criteria limited inclusion of studies to those using empirical analysis to test association/correlation, our systematic review flagged studies using alternative methodologies to explore reasons for smoking or to generate hypotheses about elevated smoking prevalence. These included case studies, tobacco industry document analyses on marketing and qualitative research. Based on interview data with adult lesbians, Gruskin and colleagues reported that major themes of affect, or emotional regulation and stress reduction surfaced and seemed to stem from minority stress and stigma.[81] An additional theme of the social aspects of smoking (eg, bonding, ice breaker) also arose from the data. Remafedi interviewed a sample of sexual minority youth and adults who interacted with sexual minority youth, finding somewhat similar themes of stress and social relationships in addition to peer pressure, the need to fit in, having friends who smoked and going to venues where smoking was permitted.[82]

Using tobacco industry documents, a number of researchers have identified targeted marketing by the tobacco industry.[49-5183] Surveys of the sexual minority press show high visibility of tobacco advertising and positive tobacco-related imagery.[4784] Such marketing is likely successful through increased exposure and receptivity to marketing.[85] Offen and colleagues used qualitative interviews of sexual minority community leaders, identifying an ambivalence towards the tobacco epidemic.[86] Smith and colleagues found similar themes in community focus groups and identified themes of appreciation for industry marketing as it recognises the existence of sexual minority communities.[48]

DISCUSSION

Research examining risk factors and correlates for smoking among sexual minority populations is relatively new with the earliest included study from 1994. Although prevalence studies demonstrate higher rates of smoking among sexual minorities,[3] the literature examining the potential reasons for smoking disparities appears discordant and somewhat fragmented in sampling, measuring sexual orientation and smoking, and selection of risk factors. Consequently, the current evidence base constructs an incomplete and challenging glimpse into the aetiology of smoking disparities among sexual minorities.

However, this systematic review provides the most comprehensive look at the aetiology of such disparities to date and begins to show the outlines of patterns indicating two general sources of the disparity: (1) smoking risk factors unique to sexual minority populations or (2) common smoking risk factors experienced at higher rates among sexual minority populations. Risk factors identified in this review that could be considered unique to sexual minorities include internalised homophobia,[46] reactions to disclosure of sexual orientation,[87] and identity within sexual minority communities (eg, 'goth' identity or presentation of masculinity/femininity).[6780] Research conducted after the search time for the present review indicates some evidence for smoking risk based on presentation of masculinity or femininity,[88] which is compatible with historical scholarship.[89] The included studies also indicate common smoking risk factors experienced at higher rates among sexual minorities, including stress,[6472] depression,[65] alcohol use,[65] victimisation,[264571] and low socioeconomic status.[3165-67]

The findings of this review suggest that the minority stress model provides a compelling way of understanding the disparity. However, the aetiology of the disparity in smoking is not fully explained by the minority stress model. Certainly, a number of predictor variables (eg, negative reaction to disclosure of sexual orientation, victimisation and less accepting communities) are fully compatible with the minority stress model. Other theories may be needed to fully account for potential protective effects and other factors. While a full review of alternative theoretical approaches is outside the scope of this review, several examples can illustrate, in very general terms, the potential of other theoretical approaches for new directions in aetiological investigations. Social cognitive theory looks at behaviours learnt from the social environment and their intrapersonal processing[90] and is thus relevant for investigating the ways smoking norms are reified and processed in sexual minority communities. Protection motivation theory posits that behaviour change is influenced by appraisals of the health threat, countermeasures and efficacy[91]; how these are influenced by competing health issues (eg, HIV) and by the accessibility of cessation services remains under-investigated. These examples and other theoretical approaches to examining the aetiology of the disparity may provide new avenues and previously unmeasured constructs for advancing the field.

Limited research on resiliency and protective factors

It is important to note that while the preponderance of literature focused on risk, some findings noted protective characteristics. Several studies from the Add Health study have found that 'exclusively' homosexual youth are less likely to smoke than heterosexual youth.[189293] Our review identified very few studies addressing protective factors. Eisenberg and Wechsler reported that the availability of sexual minority resources was associated with less smoking among sexual minority women on college campuses.[94] Stall and colleagues noted that healthy behaviours (eg, nutrition and exercise) were protective against smoking among a sample of urban men who have sex with men.[14] A study published after our search found that community characteristics such as school-based gay straight alliance student organisations and the political environment are associated with a protective effect.[95]

Addressing risks specific to sexual minority communities

In terms of interventions specific to sexual minority communities, there is currently very little research of sexual minority-specific efforts in the literature.[3839] Burkhalter and colleagues reported that intentions to quit among a sample of LGBT smokers were fairly similar to those expressed among smokers in general, and that LGBT-specific stressors (eg, stigma) were not associated with intent to quit,[96] although one study found that sexual minority smokers have significantly lower intentions of ever using quitline services.[97] Despite a lack of published efficacy trials of tailored programmes, there is some evidence

that shows support within the sexual minority community for tailored or culturally sensitive programmes.[379899]

Addressing common tobacco-related risk factors experienced at higher rates by sexual minorities

Regarding interventions, we are unaware of evidence that population-wide efforts to address smoking are more or less effective among sexual minorities. However, evidence is growing that policies protecting and/or affirming sexual minorities have a protective impact on mental health[44] and, in a paper published after our search, are associated with reduced adolescent tobacco initiation among sexual minorities.[95] Evidence-based strategies such as tobacco tax increases, advertising limits, integrated mass-media campaigns, point of sale restrictions and tobacco-free places and spaces continue to be important areas of intervention for researchers, practitioners and community leaders to consider. In fact, limited evidence from one study among HIV positive gay men in France suggests tobacco taxes may be more effective for gay men than for other HIV positive groups.[62] Caution is necessary, however, as population-wide interventions when implemented without attention to inequality can exacerbate disparities even while improving the health of the population.[100]

Although the literature contains many mentions of tobacco industry targeted marketing to LGBT populations,[518486] we did not find any empirical investigations that specifically tested whether targeted marketing explained smoking among sexual minority populations. That said, some studies report that sexual minorities have increased odds of being marketed to[85] and exhibiting more receptivity to marketing,[4885] both of which have been linked to smoking uptake among adolescents.[101]

There was little examination of differential exposure to social spaces where tobacco use may be normative, such as the gay or lesbian bar. Stall and colleagues found that MSM who attend gay bars more frequently had about 60% greater odds in being smokers,[14] but Trocki *et al* noted that bar attendance (and a measure of sensation seeking) mediated the association between sexual minority status and smoking only among women in their sample.[102] Qualitative and historical work suggests that the lesbian or gay bar, which has an important historical role in the LGBT civil rights movement,[52] may promote smoking as a normative value.[103] This also raises questions of whether sexual minorities may experience higher burdens of environmental tobacco smoke exposure and whether clean indoor air regulations may be a particularly effective intervention in limiting exposure to and use of cigarettes among sexual minority populations.

Recommendations for future research

In terms of statistical methods, mediating and moderating analyses are two strategies to help demonstrate how other factors explain the relationship between two variables.[104] Even though some selected correlates were found to associate with smoking and mediate the relationship between sexual orientation and smoking,[267180] it is noteworthy that, of the studies that used a mediating approach, various other correlates of smoking (eg, familial smoking, sensation seeking, bar attendance) still did not explain the association between sexual orientation and smoking. For instance, while McKirnan and colleagues found that depression mediated smoking among a sample of MSM,[65] a different study with a sample of adolescents found that depressive symptoms did not mediate smoking and sexual minority status.[69] This discordance could be from artefacts of sampling bias, random chance, measurement error, or use of different survey measures. Regardless, further enquiry needs to replicate and build upon these findings in order to fully identify key factors in the aetiology

of smoking disparity. Additionally, lack of significant mediation could stem from omitted variable bias, in that key mediating variables were not included in the model.

Additionally, there is a need for research using statistical methods that can establish association between correlates and smoking among sexual minorities (eg, mediation, moderation, path analysis, hierarchical linear modelling and stratification by sexual orientation). For analyses that use sexual orientation to explain smoking (ie, use sexual orientation as an independent variable in a mediating/moderating model), there is caution in interpreting results, particularly when mediation or moderation is not achieved. In terms of the science, when mediation/moderation is not established, sexual orientation remains associated with smoking. In terms of the art, we are aware of no theoretical basis for sexual orientation, itself, to cause or confer risk of smoking. Rather, it is likely social environmental variables such as stress and victimisation, which some of the reviewed studies identified, that drive the disparity.

Furthermore, we suggest several topics requiring future study to assess the issue of smoking among sexual minorities. First, the field is in need of investigations that explicitly test association between marketing exposure and receptivity with smoking behaviours among sexual minorities. Second, there may be cohort effects in prevalence and aetiology of smoking among sexual minorities. Ideally, longitudinal studies are strongly suited to gain evidence of causation, however only two studies used longitudinal data. Third, resiliency (eg, supportive family environment) and protective factors are understudied areas of sexual minority research and may be of key importance since, even though sexual minorities have higher smoking prevalence than heterosexuals, the majority of sexual minority persons do not smoke.[95105] Fourth, additional theoretical approaches beyond minority stress may yield new insights. Fifth, limited research shows that racial/ethnic smoking disparities exist within sexual minority populations,[106] and additional efforts are needed to explore heterogeneity within sexual minority populations.

Limitations

There are several limitations to be considered in light of these findings. Relevant abstracts may have been overlooked due to language bias since the inclusion criteria was limited to articles written in English. Publication bias may have impacted the search itself in that studies finding non-statistically significant associations among risk factors for smoking among sexual minorities may have downplayed, or not published, non-significant findings. We did not search the grey literature and thus may have missed technical reports that were not published. Nor did we rate studies by quality or identify if studies were adequately powered. We did not systematically assess the theoretical framework used by each study or its appropriateness. Finally, a meta-analytic approach would have provided different information (eg, new estimates of associations) in regards to how explanatory variables relate with smoking outcomes across studies, although we judged such an approach to be unfeasible at this time given the variability of study designs and measures.

CONCLUSIONS

While the burgeoning evidence on aetiology of smoking disparity provides suggestions and directions for further research, it does not provide conclusive evidence on the origins of the tobacco epidemic in sexual minority communities. Data limitations about the US sexual minority population continue to challenge researchers' abilities to better assess the breadth of health and wellness issues among this population.[36] The exclusion of sexual orientation and gender identity data in large national surveillance studies remains, in general, a major shortcoming in public health research and, more specifically, a massive impediment to tobacco prevention and control research. Integration into routine surveillance is especially

important given the cost of doing independent probability-based sampling to gather sexual minorities is prohibitively high.[107] As sexual minority and gender minority health inequity issues gain ground as national health imperatives,[108] a major step to address disparities is knowing where disparities exist; a clearly tautological statement, but one that perhaps bears repeating in order to substantiate inclusion of sexual and gender minority-specific information in national health surveillance.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What this paper adds

- This review suggests that risk factors contributing to smoking disparities among sexual minority populations can be conceptualised as risk factors uniquely associated with sexual minority status and risk factors common to the general population but experienced at higher rates among sexual minorities.
- Sexual minority status, itself, is not an independent risk factor for smoking, rather the mutable risk factors for smoking likely are tied to social environmental factors associated with sexual minority status (eg, homophobia).
- Collection of sexual orientation measures in national health surveillance projects are needed in order to further investigate potential causes for smoking disparities.

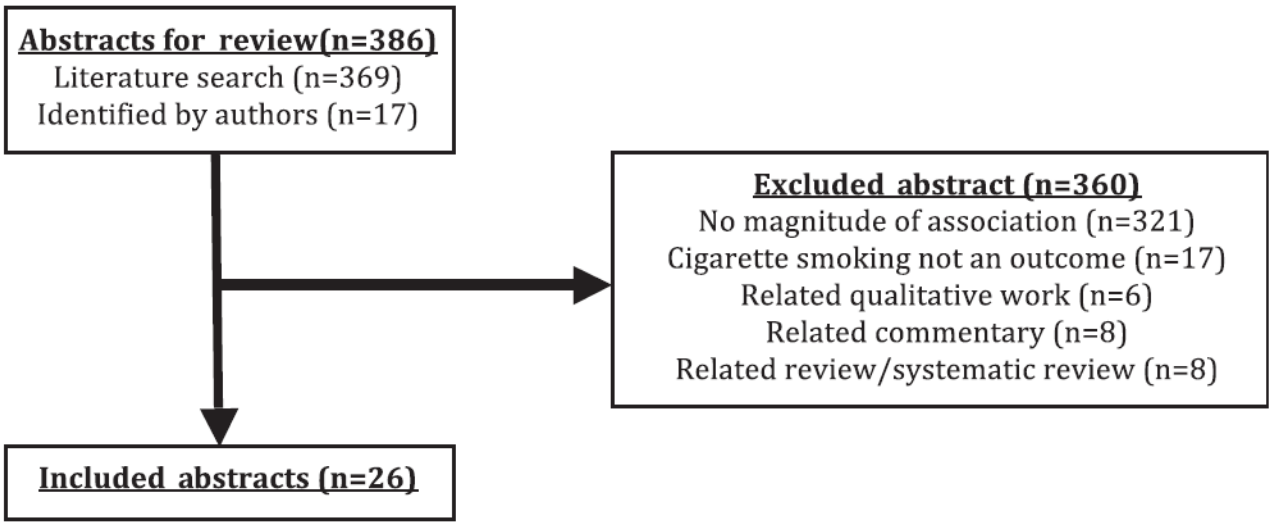

Figure 1.
Final inclusion/exclusion of abstracts.