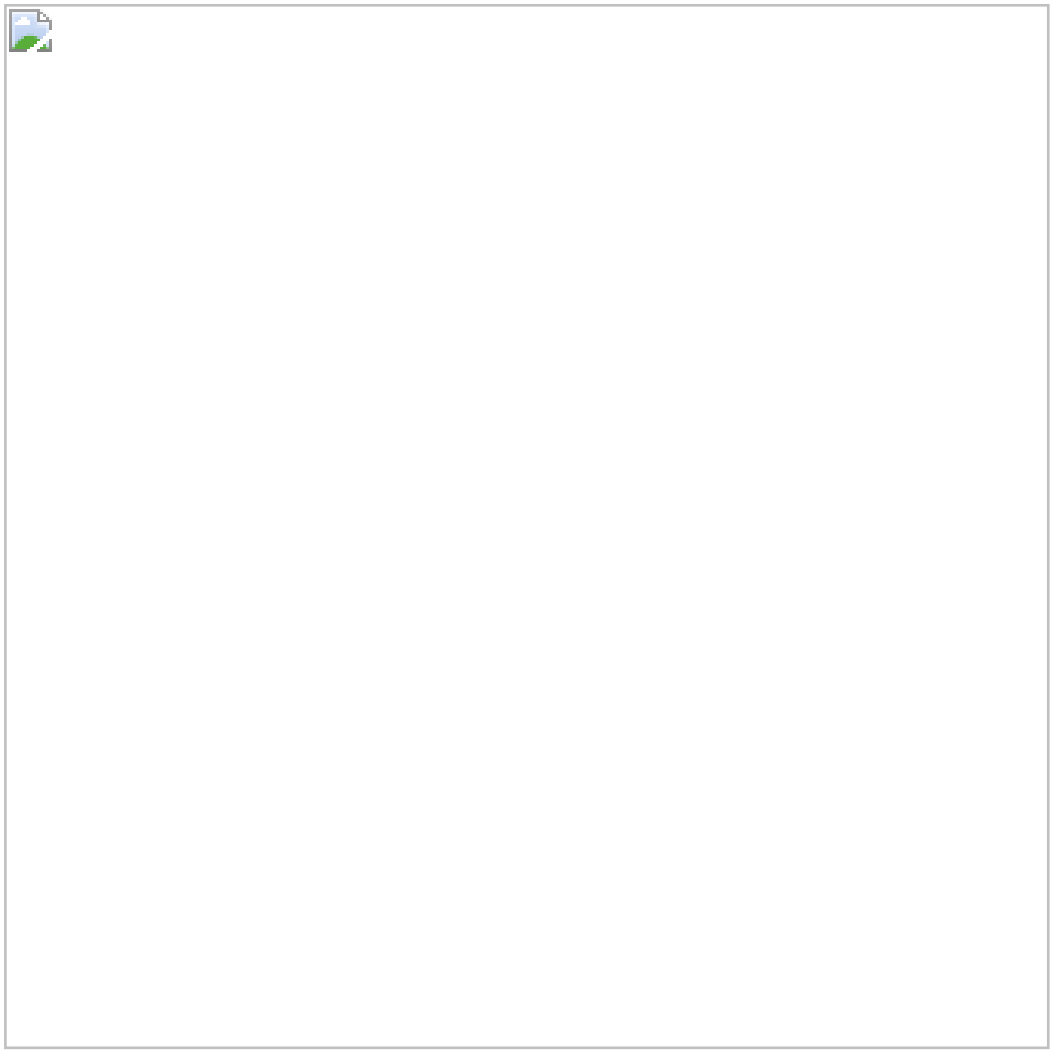

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Environmental Exposure Inequities Among Sexual and Gender Minority Populations in the United States: A Scoping Review

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ABSTRACT: Despite growing attention and guiding frameworks, we still know very little about how environmental exposures may be contributing to the health inequities experienced by sexual and gender minority (SGM) people, especially exposures beyond psycho-behavioral mechanisms that have traditionally been viewed as the pathways between minority stress and negative health outcomes. To address this gap in knowledge, we conducted a scoping review to determine the extent to which disparities in environmental exposures between SGM and non-SGM (ie, heterosexual and cisgender) populations have been measured in the United States. We searched PubMed for studies that were (1) peer-reviewed; (2) written in English; (3) quantitatively measured environmental exposures; (4) included 1 or more groups identifying as a sexual minority, gender minority, or both; (5) compared to the general population; (6) in the United States; and (7) published on or after January 1, 2011. Our scoping review identified very few studies that examined and documented environmental exposure disparities between SGM and non-SGM populations in the United States. These studies focused mostly on cigarette smoke exposures. None examined environmental exposure disparities between gender minority and cisgender populations. To address this critical gap in environmental health research for SGM populations in the short term, researchers can merge existing environmental data (eg, data from the Environmental Protection Agency) with SGM population data. Longer-term solutions require systematically including validated sexual orientation and gender identity measures across federal, state, and local datasets, as well as increased funding for original research that explores diverse environmental exposures. Taken together, these efforts can significantly advance our ability to identify and address environmental health inequities experienced by SGM people.

PLAIN LANGUAGE SUMMARY: This review looks at how different environmental factors affect the health of sexual and gender minority (SGM) communities, which include people who identify as LGBTQ+. The study found that there is not much research available on this topic, and what exists focuses mostly on cigarette smoke exposure. The review suggests that more research is needed to understand these health disparities and to develop policies that can help protect the health of LGBTQ+ communities.

KEYWORDS: Sexual minority, gender minority, SGM, LGBT, scoping review

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Introduction

As awareness of environmental health inequities grows, a question remains as to whether vulnerable groups have been systematically excluded from the evidence base. Increasingly, researchers are raising concerns about environmental health issues that may disproportionately affect sexual and gender minority (SGM; generally including lesbian, gay, bisexual, transgender, and queer) populations. In 2022, the American Journal of Public Health published a special section on environmental justice that included 4 articles that explored intersections with SGM health.[1-4] Among those articles, Goldsmith and Bell proposed a conceptual framework to guide future environmental health research for SGM populations.[2] More recently, Bucher and colleagues highlighted how an intersectional approach to exposomics research could provide a framework for evaluating how environmental exposures interact with biological sex and gender identity to influence health.[5] Additionally, several recent reviews have explored the impact of natural hazards[6] and climate change[7,8] on SGM populations.

Despite growing attention and guiding frameworks, we still know very little about how environmental exposures may be contributing to the health inequities experienced by SGM people, especially exposures beyond psycho-behavioral mechanisms that have traditionally been viewed as the pathways between minority stress and negative health outcomes. While disparities related to psycho-behavioral mechanisms (eg, cigarette smoke) are well established in the existing literature, other environmental exposures likely also contribute to health inequities among SGM populations. To understand and effectively address these other exposures, we conducted a scoping review to determine the extent to which disparities in environmental exposures between SGM and non-SGM (ie, heterosexual and

Table 1. PECO statement.

PECO ELEMENT	EVIDENCE
Population	Gender and sexual minority populations in the United States
Exposure	Chemical, biological, or physical substances found in air, water, food, or soil that may have a harmful effect on a person's health
Comparators	General (ie, heterosexual and cisgender) populations in the United States
Outcomes	N/A

Abbreviation: PECO, populations, exposures, comparators, outcomes.

cisgender) populations have been measured in the United States. Establishing this empirical base of evidence is crucial to setting research agendas, equitably allocating funding and other resources, and advancing evidence-based policies and programs that promote environmental health equity for these populations.

Methods

We conducted a scoping review to identify available literature instead of a traditional systematic review to assess the quality of work conducted for several reasons. A scoping review is a relatively new approach designed to provide an overview of available evidence in response to a broad research question. Such a review is best suited when there is minimal research in an area; the review can begin to build the required knowledge base. Our goal was to identify the range of information available and to determine the extent to which disparities in environmental exposures have been measured between SGM and non-SGM populations in the United States. A protocol for conducting this review was prepared a priori based on the framework created by the Arksey and O'Malley[9] and further refined based on guidance from the Joanna Briggs Institute.[10] To ensure high rigor and replicability of our results, we adhered to the Preferred Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) guidelines.[11]

Search strategy

The study team worked in collaboration with a professional reference librarian to develop a search strategy to address relevant populations, exposures, and comparisons (3 of the 4 components of a PECO statement; Table 1); there were no restrictions on outcomes. The search terms included a combination of medical subject headings and free text words related to the following core concepts: gender and sexuality, environmental exposures, and United States.

We focused our search on environmental exposures, defined by the National Cancer Institute as "chemical, biological, or physical substances found in air, water, food, or soil that may have a harmful effect on a person's health."[12] As our primary objective was to identify evidence of environmental exposures beyond the established psycho-behavioral mechanisms (eg, smoking), we neither included nor excluded any specific exposure types in our search terms. This approach enabled us to maintain a focus on environmental exposures broadly while still capturing studies on psycho-behavioral mechanisms when those mechanisms were framed as environmental health issues.

We further focused our search on environmental exposures within the United States. While there is value in having a global perspective with regards to environmental health issues, our objective was to establish an empirical evidence base that can galvanize domestic policymakers, public health officials, and funders to address the environmental health injustices experienced by SGM populations in the United States.

Finally, we focused our search on peer-reviewed articles published since January 1, 2011, the year that the Institute of Medicine published a comprehensive report summarizing the range of pervasive health disparities experienced by SGM individuals.[13] This report served as a catalyst for funding and research to document the ways in which SGM people are disproportionately impacted by a range of negative health outcomes.

We concluded our search on September 4, 2024. We utilized PubMed, a database containing more than 37 million citations and abstracts of biomedical and life sciences literature. PubMed is maintained by the National Center for Biotechnology Information at the U.S. National Library of Medicine located at the National Institutes of Health. The final search terms are presented in their entirety in Supplemental Table S1.

Study selection

The study team used a double-screening process for article selection. For the first stage of screening, we assessed all article titles and abstracts for potential inclusion. Articles that appeared relevant at this stage were advanced to the second stage of screening, as were any articles where relevance could not be determined by title and abstract alone. For the second stage of screening, we obtained and reviewed the full texts of all potentially relevant articles for final inclusion. Both the first and second stages of screening were performed by 2 reviewers working independently of each other. We resolved disagreements on article selection by consensus and discussion with other reviewers, when needed. We used Covidence to manage data and document decision-making.[14]

The review included studies that met the following criteria: (1) peer-reviewed; (2) original research; (2) written in English; (3) quantitatively measuring environmental exposures; (4) including 1 or more groups identifying as a sexual minority, gender minority, or both; (5) compared to the general population; (6) in the United States; and (7) published on or after January 1, 2011. Given that this review sought to aggregate empirical evidence of disparities in environmental exposures between SGM and non-SGM populations, we excluded studies that used strictly qualitative research designs. We excluded

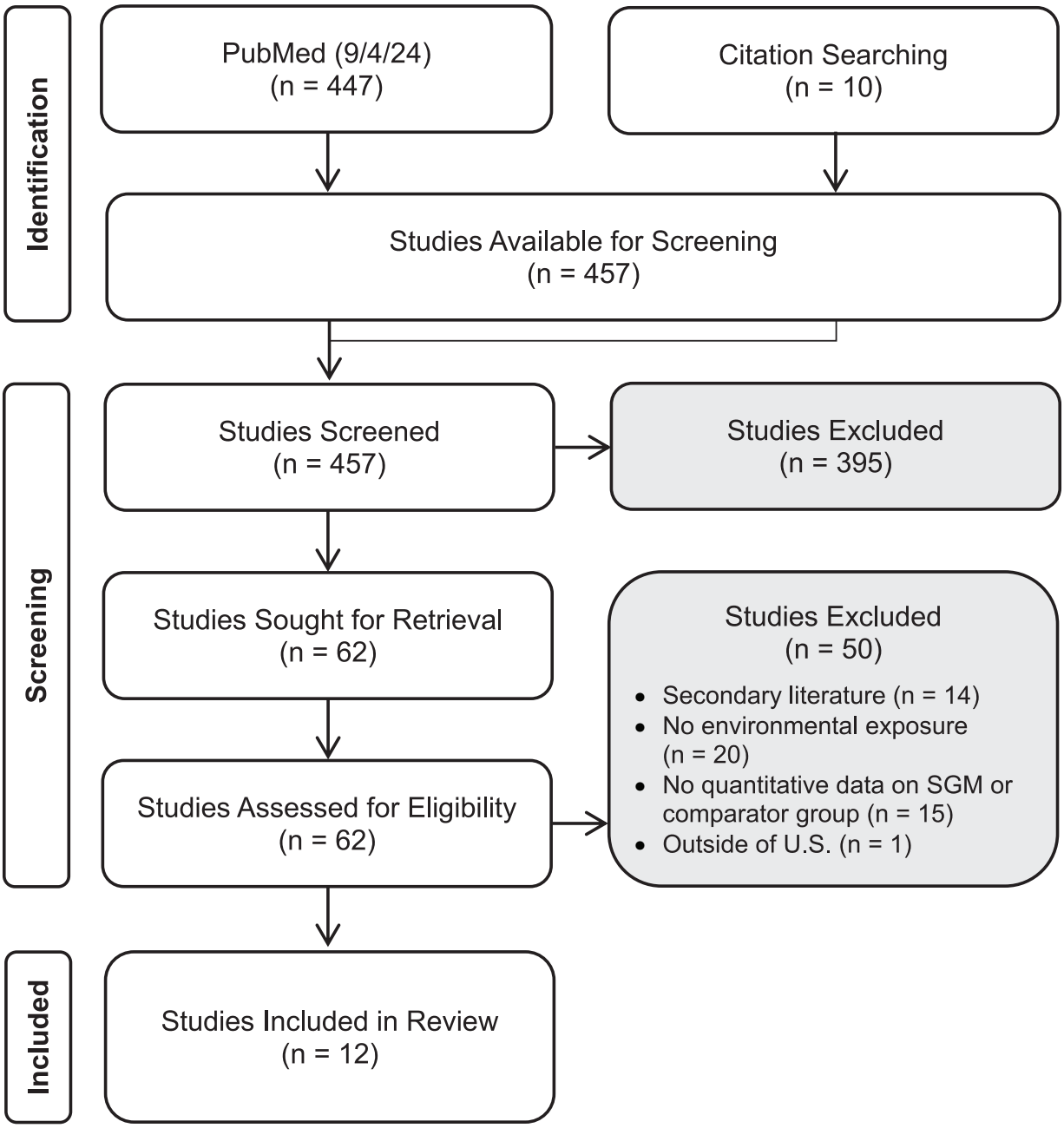

Figure 1. Flowchart of studies through the review process.

secondary literature (eg, commentaries, perspectives, opinions), non-peer-reviewed articles, and articles that explored environmental health policies or attitudes without examining actual environmental exposures. We also excluded studies about populations solely outside of the United States.

Data charting and collation

A data-charting form was jointly developed by all authors to determine which variables to extract. Two reviewers independently charted the data in Covidence, discussed the results, and continuously updated the data-charting form in an iterative process. The following data were extracted from each eligible study: title, author(s), publication year, study location, number and type of participants, study design, exposure type, funding sources, key measures and outcomes, recommendations, and other key considerations.

Results

The PubMed search generated a total 447 articles for title and abstract screening. Of the 447 articles identified, 395 articles were excluded based on title and abstract screening, leaving 52 articles for full-text review. Hand screening the bibliographies of these references resulted in an additional 10 articles to screen. In total, 62 articles were considered potentially relevant after title and abstract screening. After full-text review of all 62 articles, 12 articles remained for data extraction. This process is summarized in the PRISMA flowchart in Figure 1. An overview of extracted studies is presented in Table 2.

Table 2. Overview of studies examining differences in environmental exposures between SGM and non-SGM populations in the United States.

REFERENCE (YEAR)	DATA SOURCE (YEARS)	SAMPLE SIZE	SAMPLE DEMOGRAPHICS	FUNDERS	STUDY DESIGN	EXPOSURE TYPE	KEY FINDINGS
Hazardous Air Pollutants							
Collins et al[15] (2017)	National Air Toxics Assessment (2011) Decennial Census (2010) American Community Survey (2008-2012)	n=1023	Greater Houston, Texas, census tracts with at least 500 people, 200 households, and complete data for all analysis variables	National Institute on General Medical Sciences*	Cross-sectional	Hazardous air pollutants (HAPs)	Increased risk from HAPs are significantly associated with neighborhoods having relatively high concentrations of same-sex partner households, especially among neighborhoods with high proportions of same-sex male households.
Collins et al[16] (2017)	National Air Toxics Assessment (2011) Decennial Census (2010) American Community Survey (2008-2012)	n=71 207	US census tracts with at least 500 people, 200 households, and complete data for all analysis variables	National Science Foundation; National Institute of General Medical Sciences*	Cross-sectional	Hazardous air pollutants (HAPs)	Mean cancer and respiratory risks from HAPs for same-sex partners were 12.3% and 23.8% greater, respectively, compared to heterosexual partners.
Cigarette (including Electronic Cigarettes) Smoke							
Cochran et al[17] (2013)	National Health and Nutrition Examination Survey (2003-2010)	n=11 744	US adults aged 20 to 59y	National Institute on Drug Abuse*; National Institute on Minority Health and Health Disparities*; National Cancer Institute*	Cross-sectional	Primary smoking, secondhand smoke (SHS)	Lesbian and bisexual women evidenced higher rates of tobacco use than heterosexual women. Nonsmoking sexual minority women were more likely to be exposed to SHS than nonsmoking heterosexual women. Identical comparisons among men were not significant except for lower workplace exposure among nonsmoking gay men than among heterosexual men.
Kelly et al[18] (2009)	Primary data from dance clubs in Manhattan (2004-2005)	n=618	New York City, New York, young adults aged 18 to 29y	National Institute on Drug Abuse*	Cross-sectional	Primary smoking	LGB young adults (49.4%) were significantly more likely to smoke than were heterosexual participants (39.4%)
King et al[19] (2014)	National Adult Tobacco Survey (2009-2010)	n=118 581	US adults aged 18y or older	Written by US government employee(s)	Cross-sectional	Secondhand smoke (SHS)	No significant differences in SHS exposure between heterosexual and LGBT respondents.

(Continued)

Table 2. (Continued)

REFERENCE (YEAR)	DATA SOURCE (YEARS)	SAMPLE SIZE	SAMPLE DEMOGRAPHICS	FUNDERS	STUDY DESIGN	EXPOSURE TYPE	KEY FINDINGS
Jordan et al[20] (2014)	Missouri Youth Tobacco Survey (2011) Out, Proud and Healthy Survey (2012)	n = 1547 n = 410	Missouri youth aged 14 to 18 y	Missouri Tobacco Control Program through a cooperative agreement with the Centers for Disease Control and Prevention Office on Smoking and Health	Cross-sectional	Primary smoking, secondhand smoke (SHS)	General population youth initiated smoking at a younger age, but by age 18 the percentage of current smokers among LGBQ youth (47.7%) nearly doubled that of general population youth (24.2%). LGBQ youth were more likely to use cigars/cigarillos, be poly-tobacco users, and be exposed to SHS in a vehicle (for never smokers)
Max et al[21] (2016)	California Health Interview Surveys (2003-2013)	n = 198637	California adults aged 18 to 70 y	None disclosed	Cross-sectional	Primary smoking, secondhand smoke (SHS)	Sexual minority men and women smoke at higher rates than heterosexual men and women and were more likely to be exposed to SHS at home compared to heterosexuals, although SHS exposure has fallen among sexual minorities.
Puvanesarajah et al[22] (2022)	National Youth Tobacco Survey (2020)	n = 14531	US students in grades 6 to 12	Written by US government employee(s)	Cross-sectional	Secondhand smoke (SHS), secondhand aerosol (SHA)	Sexual minority students were more likely to report exposure to indoor SHS (APR = 1.10, 95% CI = 1.02, 1.19) and outdoor SHS (APR-1.11, 95% CI = 1.05, 1.17) than heterosexual students.
Ridner et al[23] (2018)	Primary data from university in the southeastern US	n = 1132	Southeastern university students aged 18 to 26 y	National Heart, Lung, and Blood Institute*; FDA Center for Tobacco Products; University of Louisville School of Nursing and Campus Health Services Office of Health Promotion	Cross-sectional	Primary smoking	LGB students are more likely than heterosexual students to use traditional cigarettes, either solo or in combination with e-cigarettes ($\chi^2 = 32.9$, $P < .01$).
Talluri et al[24] (2023)	National Youth Tobacco Survey (2020)	n = 9912	US students in grades 6 to 12	National Cancer Institute*; Cancer Prevention and Research Institute of Texas; Duncan Family Institute for Cancer Prevention and Risk Assessment; Betty B. Marcus Chair in Cancer Prevention	Cross-sectional	Secondhand smoke (SHS)	Bisexual females had twofold increased odds of severe SHS exposure in homes [OR = 2.0 (1.2-3.4), $P = 0.01$].

(Continued)

Table 2. (Continued)

REFERENCE (YEAR)	DATA SOURCE (YEARS)	SAMPLE SIZE	SAMPLE DEMOGRAPHICS	FUNDERS	STUDY DESIGN	EXPOSURE TYPE	KEY FINDINGS
UV Radiation							
Blashill[25] (2017)	Youth Risk Behavior Survey (2015)	n = 10 644	US students (public and private) in grades 9 to 12	National Institute of Mental Health*	Cross-sectional	UV radiation	Sexual minority status was a risk factor within males (OR, 3.17; 95% CI, 1.31-7.66, P = .001), and a buffer variable within females (OR, 0.41; 95% CI, 0.24-0.73; $P < .001$).
Gao et al[26] (2018)	National Health Interview Survey (2015)	n = 13 698	US adult men	National Institute on Aging*; National Cancer Institute*; and University of California, San Francisco Helen Diller Impact Grant Award	Cross-sectional	UV radiation	Sexual minority men, compared to heterosexual men, had increased odds of reporting indoor tanning (both every and in the last year), sunless tanning, and sun avoidance.

*Institute or Center of the National Insitutes of Health (NIH).

Only 2 studies from our review examined disparities in environmental exposures beyond psycho-behavioral mechanisms.[15,16] These studies, both by Collins and colleagues, drew on data from the U.S. Census, the American Community Survey, and the Environmental Protection Agency to examine the spatial relationships between same-sex partner households and cumulative cancer risk from exposure to hazardous air pollutants (HAPs). In 2016, Collins et al found that neighborhoods across Houston, Texas, with relatively high proportions of same-sex male partner households were associated with significantly greater exposure to cancer-causing HAPs; those with high proportions of same-sex female partner households were associated with less exposure.[15] In a national study of HAPs the following year, the same authors found that, compared to their heterosexual peers, same-sex male and female couples had 12.3% and 23.8% higher cancer and respiratory risks, respectively.[16]

Of the remaining 10 articles eligible for data extraction, 8 examined disparities related to cigarette smoke exposure, including electronic cigarettes, between sexual minority and heterosexual populations.[17-24] In general, studies found that sexual minority people, including sexual minority youth, were more likely to smoke tobacco than their heterosexual counterparts.[17,18,20,21,23] Compared to heterosexuals, sexual minority people also were more likely to be exposed to secondhand smoke (SHS) across various settings, including at home,[21] in cars,[20] and outdoors.[22] Note, disparities in smoking and SHS exposure were not universal across all settings or for all subgroups. For instance, King et al (2014) observed no significant differences between heterosexual and sexual minority respondents in the workplace.[19]

The remaining 2 studies from our review examined differences in UV radiation exposure between sexual minority and heterosexual populations.[25,26] Both studies found that sexual minority men were at higher risk for (exposure to UV radiation) compared to heterosexual men. In contrast, sexual minority status was a moderating variable for women.[25]

Discussion

Our scoping review identified very few studies that have examined and documented environmental exposure disparities between SGM and non-SGM populations in the United States. These studies focused mostly on cigarette smoke exposures. None examined environmental exposure disparities between gender minority and cisgender populations.

Several factors likely contribute to limited number and scope of identified studies. First is a problem endemic to research with any relatively small population—obtaining a sample that can be generalized with confidence requires considerably more resources than are required for sampling the general population.[13] The present review identified only 2 studies that collected primary data—one using time-space sampling to generate a sample of club-going adults (n = 618) in New York City, New York,[18] and the other randomly sampling

students (n = 1132) from a university in the southeastern United States.[23] Given the sample sizes and geographic concentrations of these studies, neither is likely to be generalizable to a broader context.

To address concerns about generalizability and statistical power, especially given scarce resources, researchers often conduct secondary analyses of existing health data collected from surveys of large state or national samples. Increasingly, state and federal surveys are collecting sexual orientation and gender identity data, including 11 surveys within the federal statistical system.[27] Despite progress toward the inclusion of these questions, we could not identify any nationally representative environmental health survey that included sexual orientation or gender identity questions.

In the absence of a nationally representative environmental health survey with sexual orientation and gender identity data, researchers have relied on surveys about general health behaviors and outcomes (eg, National Health Interview Survey, National Adult Tobacco Survey, Youth Risk Behavior Survey, National Health and Nutrition Examination Survey). As a result, studies on environmental exposures related to psycho-behavioral mechanisms (eg, cigarette smoke) are overrepresented in the literature. While the prevalence of tobacco use is significantly higher among SGM adults compared to their heterosexual counterparts,[28] the disproportionate focus on smoking and SHS exposure ignores other exposures and vulnerabilities likely to contribute to environmental injustices impacting this population.

In the short term, there are ways to grow the empirical evidence base at the intersection of environmental exposures and SGM health through secondary data analyses by advancing current study designs and measurement. For example, merging environmental data with other existing SGM population data can be an effective alternative for researchers struggling with underpowered analyses caused by low engagement with SGM individuals in cohort studies. Here, the methods employed by Collins et al can be useful.[15,16] By overlaying U.S. Census data with data from the Environmental Protection Agency, we can more immediately identify SGM inequities. We acknowledge this method likely will result in dramatic underestimates until the American Community Survey (ACS) expands beyond same-sex household data and begins collecting data on the sexual orientation and gender identity of respondents. The U.S. Census Bureau plans to test questions about sexual orientation and gender identity on the ACS this year.[29]

Longer-term solutions require systematically including validated sexual orientation and gender identity measures across federal, state, and local datasets. Including these measures is essential for large-scale analysis of the environmental health issues that may disproportionately affect sexual and gender minority populations. These datasets should carefully capture nuanced aspects of 3 distinct concepts—sex, gender, and sexual orientation.[30] While current datasets capturing sexual orientation and gender identity data show that respondents are unlikely to skip questions related to these concepts, especially compared to other sensitive data items, researchers should utilize survey design elements (eg, emphasizing confidentiality and/or anonymity, leading up to sensitive questions, providing context) to reduce item nonresponse and minimize survey breakoffs.[31] These datasets also should include measures that can be used to assess environmental exposures and intersectionality of risk.[2]

Note, researchers who rely upon federal, state, and local datasets that include sexual orientation and gender identity data must exercise caution when conducting secondary analysis. Even as these datasets expand, they likely will continue to strike a balance between providing response options that capture the full spectrum of sexual orientation and gender identity while also maintaining brevity and avoiding confusion among general populations. One common compromise has been to include "something else" and "don't know" response options, as done on at least 8 federal surveys.[32] More and more people, especially younger adults, are using diverse labels (eg, pansexual, queer) to describe their sexual orientation and gender identity.[33-35] Others are rejecting labels altogether.[36-38] Since corresponding response options are often unavailable on large population surveys, people are increasingly selecting "something else" or "don't know."[39] Attempting to identify and document disparities in environmental exposures without properly classifying these respondents likely impedes our ability to understand the magnitude and nature of health inequities among SGM populations.

Longer-term solutions also require additional resources to reduce reliance on existing datasets and enable researchers to collect their own data. The federal government is an obvious potential source for these resources, as all the studies in this review were supported, in whole or in part, with federal funding. Most of this funding was provided through a broad array of Institutes within the National Institutes of Health (NIH); however, no study from our review was funded by the National Institute for Environmental Health Sciences, the Institute responsible for discovering how the environment affects people in order to promote healthier lives. NIH and other federal funders should issue notices of special interest and requests for applications to stimulate research measuring and addressing environmental health inequities among SGM populations. Further, in addition to increased federal funding, promoting environmental health equity for SGM populations also will require investments from state and local governments as well as the private sector. Notably, the 2 studies that collected primary data also leveraged additional state or local funding.[18,23]

Even with additional funding to identify and address the environmental health issues that may disproportionately affect SGM populations, resources will likely remain scarce. Consequently, researchers who are interested in this area, especially those who intend to generate primary data, must carefully design their studies to fully optimize research funding. When collecting sexual orientation and gender identity data,

researchers must understand that these concepts are interrelated but conceptually distinct. Researchers should strive to fully understand nuanced aspects of sexual orientation, including identity, attraction, and behavior. This more comprehensive framing of sexual orientation can help identify people who may not identify as sexual minority but who may be attracted to or have sex with people of the same sex.[2] Likewise, researchers should consider capturing various dimensions of sex and gender (eg, sex assigned at birth, sex phenotype at birth, current gender identity, internalized gender roles, and externalized gender expressions) that may influence environmental exposures.[40]

Additionally, studies designed for primary data collection should apply community-based participatory research approaches—whereby the affected community is meaningfully included at all stages of the research process—which has been shown to generate better science.[41] Since SGM people often belong to other marginalized groups that are also particularly vulnerable to environmental injustices, these studies should incorporate intersectional approaches to examining disparities in environmental exposures.

Limitations

Our scoping review has several limitations. First, we did not assess the quality of the included studies. We also used only one database, PubMed, to identify these studies. While PubMed is arguably more comprehensive than any other database, we may have missed relevant literature that is only indexed elsewhere. Our decision to focus on environmental exposures broadly rather than enumerate specific exposure types means that we likely understated the scope of evidence related to psycho-behavioral mechanisms, especially exposures related to cigarette smoke. Relatedly, our decision to limit our search to environmental exposures within the United States ignores potentially relevant literature from other countries. Finally, the subjective nature of decisions related to study selection, inclusion criteria, and data interpretation may have introduced reviewer bias, affecting the comprehensiveness and reliability of the review. To mitigate these limitations, the study team carefully planned an extensive, a priori search criteria to answer the study question and utilized software to document a review process where all decisions were made by at least 2 reviewers working independently of each other.

Conclusion

This scoping review revealed a dearth of research on how environmental exposures contribute to health inequities for SGM populations compared to heterosexual and cisgender people. The existing research primarily focuses on cigarette smoke exposure, while studies on other harmful environmental exposures remain sparse. These findings highlight a critical gap in environmental health research for SGM populations. One short-term solution to address this gap is to merge existing environmental data (eg, data from the Environmental Protection Agency) with SGM population data. In the longer term, more state and national datasets must systematically include sexual orientation and gender identity, allowing for more robust secondary analysis. Ultimately, increased federal, state, and local funding to support primary research that explores diverse environmental exposures is essential for advancing health equity for SGM populations in the United States. This research should prioritize community-based participatory research principles and intersectional approaches to fully capture the vulnerabilities of these populations. Taken together, these efforts can significantly advance our ability to identify and address environmental health inequities experienced by SGM people.

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None.

Author Contributions

NAC conceptualization, data curation, writing original draft. SMC conceptualization, writing , review, and editing, supervision. KB data curation, writing, review, and editing. JW: conceptualization, writing, review, and editing.

Ethical Considerations

There are no human participants in this article and informed consent is not required.

Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Data Availability

Not applicable.

Supplemental Material

Supplemental material for this article is available online.

REFERENCES

1. Collins TW, Grineski SE, Morales DX. We need environmental health justice research and action for LGBTQ+ people. *Am J Public Health*. 2022;112:54-56.
2. Goldsmith L, Bell ML. Queering environmental justice: unequal environmental health burden on the LGBTQ+ community. *Am J Public Health*. 2022; 112:79-87.
3. McDonald JA, Llanos AAM, Morton T, Zota AR. The environmental injustice of beauty products: toward clean and equitable beauty. *Am J Public Health*. 2022;112:50-53.
4. Gaard G. Queering environmental justice through an intersectional lens. *Am J Public Health*. 2022;112:57-58.
5. Bucher ML, Anderson FL, Lai Y, et al. Exposomics as a tool to investigate differences in health and disease by sex and gender. *Expo*. 2023;3:osad003.
6. Crawford T, Chang K-YJ, Nila F, et al. The intersectionality of gender, sexual identity, and disability in disaster risk reduction in OECD countries: a rapid scoping review. *Disabilities*. 2023;3:562-578.
7. Simmonds KE, Jenkins J, White B, Nicholas PK, Bell J. Health impacts of climate change on gender diverse populations: a scoping review. *J Nurs Scholarsh*. 2022;54:81-91.
8. Kilpatrick C, Higgins K, Atkin S, Dahl S. A rapid review of the impacts of climate change on the queer community. *Environ Justice*. 2024;17:306-315. Published online July 10, 2023. doi:10.1089/env.2023.0010

9. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8:19-32.
10. Peters MD, Godfrey CM, Khalil H, et al. Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc*. 2015;13:141-146.
11. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169:467-473.
12. NCI Dictionary of Cancer Terms. Comprhensive Cancer Information—NCI. Accessed September 15, 2024. https://www.cancer.gov/publications/dictionaries/cancer-terms/def/environmental-exposure
13. Institute of Medicine (US) Committee on Lesbian, Gay, Bisexual, Transgender Health Issues Research Gaps Opportunities. The health of lesbian, gay, bisexual, and transgender people: building a foundation for better understanding. Published onlilne 2011. doi:10.17226/13128
14. Covidence systematic review software. Veritas Health Innovation. Accessed September 15, 2024. https://www.covidence.org
15. Collins TW, Grineski SE, Morales DX. Sexual orientation, gender, and environmental injustice: unequal carcinogenic air pollution risks in Greater Houston. *Ann Am Assoc Geogr*. 2017;107:72-92.
16. Collins TW, Grineski SE, Morales DX. Environmental injustice and sexual minority health disparities: a national study of inequitable health risks from air pollution among same-sex partners. *Soc Sci Med*. 2017;191:38-47.
17. Cochran SD, Bandiera FC, Mays VM. Sexual orientation-related differences in tobacco use and secondhand smoke exposure among US adults aged 20 to 59 years: 2003-2010 National Health and Nutrition Examination Surveys. *Am J Public Health*. 2013;103:1837-1844.
18. Kelly BC, Weiser JD, Parsons JT. Smoking and attitudes on smoke-free air laws among club-going young adults. *Soc Work Public Health*. 2009;24:446-453.
19. King BA, Homa DM, Dube SR, Babb SD. Exposure to secondhand smoke and attitudes toward smoke-free workplaces among employed U.S. Adults: findings from the National Adult Tobacco Survey. *Nicotine Tob Res*. 2014;16:1307-1318.
20. Jordan JN, McElroy JA, Everett KD. Smoking initiation, tobacco product use, and secondhand smoke exposure among general population and Sexual Minority Youth, Missouri, 2011-2012. *Prev Chronic Dis*. 2014;11:E113.
21. Max WB, Stark B, Sung HY, Offen N. Sexual identity disparities in smoking and secondhand smoke exposure in California: 2003-2013. *Am J Public Health*. 2016;106:1136-1142.
22. Puvanesarajah S, Tsai J, Alexander DS, Tynan MA, Gentzke AS. Youth indoor and outdoor exposure to secondhand smoke and secondhand aerosol. *Am J Prev Med*. 2022;62:903-913.
23. Ridner SL, Keith RJ, Walker KL, et al. Differences in quality of life among college student electronic cigarette users. *AIMS Public Health*. 2018;5:454-462.
24. Talluri R, Shete SS, Shastri SS, Shete S. Secondhand tobacco smoke exposure in homes and vehicles in youth: disparities among racial, and sexual and gender minorities. *Front Public Health*. 2024;12:1370552.
25. Blashill AJ. Indoor tanning and skin cancer risk among diverse US youth: results from a national sample. *JAMA Dermatol*. 2017;153:344-345.
26. Gao Y, Arron ST, Linos E, Polcari I, Mansh MD. Indoor tanning, sunless tanning, and sun-protection behaviors among sexual minority men. *JAMA Dermatol*. 2018;154:477-479.
27. Holzberg J, Ellis R, Kaplan R, Virgile M, Edgar J. Can they and will they? Exploring proxy response of sexual orientation and gender identity in the current population survey. *J Off Stat*. 2019;35:885-911.
28. Office on Smoking and Health. Centers for Disease Control and Prevention. Accessed March 19, 2024. https://www.cdc.gov/tobacco/campaign/tips/groups/lgbt.html
29. Santos R. Hidden no longer: Expanding our knowledge on sexual orientation and gender identity. Census.gov. Accessed September 15, 2024. https://www.census.gov/newsroom/blogs/director/2024/06/sexual-orientation-gender-identity.html#:~:text=And%20we%20also%20engage%20a,Orientation%20and%20Gender%20Identity%20Test
30. Bates N, Chin M, Becker T, eds. *Measuring Sex, Gender Identity, and Sexual Orientation*. National Academics Press; 2022.
31. Office of the Chief Statistician of the United States. Recommendations on the best practices for the collection of sexual orientation and gender identity data on federal statistical surveys. Washington, DC; 2023. Accessed October 9, 2024. https://www.whitehouse.gov/wp-content/uploads/2023/01/SOGI-Best-Practices.pdf
32. Federal Committee on Statistical Methodology. *Current Measures of Sexual Orientation and Gender Identity in Federal Surveys*. Washington, DC: US Department of Education, National Center for Education Statistics; 2016. Accessed September 15, 2024. https://nces.ed.gov/FCSM/pdf.current_measures_20160812.pdf
33. Porta CM, Gower AL, Brown C, Wood B, Eisenberg ME. Perceptions of sexual orientation and gender identity minority adolescents about labels. *West J Nurs Res*. 2020;42:81-89.
34. Temkin D, Belford J, McDaniel T, Stratford B, Parris D. Improving measurment of sexual orientation and gender identity among middle and high school students. *Child Trends*. 2017;22:1-64. Accessed September 15, 2024. https://www.childtrends.org/publications/improving-measurement-sexual-orientation-gender-identity-among-middle-high-school-students
35. Morgan R, Dragon C, Daus G, et al. Updates on terminology of sexual orientation and gender identity survey measures. FCSM 20-03. Federal Committee on Statistical Methodology. Published online August 2020. Accessed September 15, 2024. https://nces.ed.gov/FCSM/pdf/FCSM_SOGI_Terminology_FY20_Report_FINAL.pdf
36. Elliott KO. Queering student perspectives: gender, sexuality and activism in school. *Sex Educ*. 2016;16:49-62.
37. Russell ST, Clarke TJ, Clary J. Are teens "post-gay"? Contemporary adolescents' sexual identity labels. *J Youth Adolesc*. 2009;38:884-890.
38. Wagaman MA. Self-definition as resistance: understanding identities among LGBTQ Emerging Adults. *J LGBT Youth*. 2016;13:207-230.
39. Carlisle NA, MacCarthy S, Elliott MN, Miller P, Pavela G. Refining United States sexual minority adult population estimates with the inclusion of "Something Else" and "Don't Know" Survey Responses. *LGBT Health*. 2023;10:639-643.
40. Kraus U, Jacke K, Dandolo L, et al. Operationalization of a multidimensional sex/gender concept for quantitative environmental health research and implementation in the KORA study: Results of the collaborative research project INGER. *Front Public Health*. 2023;11:1128918.
41. Duran B, Strelnick H. Beyond the manuscript: toward health equity: a national study of promising practices in community-based participatory research. *Prog Community Health Partnersh*. 2019;13:353-358.