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AHA SCIENTIFIC STATEMENT

# Assessing and Addressing Cardiovascular Health in LGBTQ Adults

## A Scientific Statement From the American Heart Association

*Endorsed by the American Academy of Physician Assistants*

*The American Medical Association affirms the educational benefit of this document.*

**ABSTRACT:** There is mounting evidence that lesbian, gay, bisexual, transgender, and queer or questioning (LGBTQ) adults experience disparities across several cardiovascular risk factors compared with their cisgender heterosexual peers. These disparities are posited to be driven primarily by exposure to psychosocial stressors across the life span. This American Heart Association scientific statement reviews the extant literature on the cardiovascular health of LGBTQ adults. Informed by the minority stress and social ecological models, the objectives of this statement were (1) to present a conceptual model to elucidate potential mechanisms underlying cardiovascular health disparities in LGBTQ adults, (2) to identify research gaps, and (3) to provide suggestions for improving cardiovascular research and care of LGBTQ people. Despite the identified methodological limitations, there is evidence that LGBTQ adults (particularly lesbian, bisexual, and transgender women) experience disparities across several cardiovascular health metrics. These disparities vary by race, sex, sexual orientation, and gender identity. Future research in this area should incorporate longitudinal designs, elucidate physiological mechanisms, assess social and clinical determinants of cardiovascular health, and identify potential targets for behavioral interventions. There is a need to develop and test interventions that address multilevel stressors that affect the cardiovascular health of LGBTQ adults. Content on LGBTQ health should be integrated into health professions curricula and continuing education for practicing clinicians. Advancing the cardiovascular health of LGBTQ adults requires a multifaceted approach that includes stakeholders from multiple sectors to integrate best practices into health promotion and cardiovascular care of this population.

**Billy A. Caceres, PhD, RN, FAHA, Chair**
**Carl G. Streed Jr, MD, MPH, Vice Chair**
**Heather L. Corliss, MPH, PhD**
**Donald M. Lloyd-Jones, MD, ScM, FAHA**
**Phoenix A. Matthews, PhD**
**Monica Mukherjee, MD, MPH**
**Tonia Poteat, PhD, PA-C, MPH**
**Nicole Rosendale, MD**
**Leanna M. Ross, PhD**
**On behalf of the American Heart Association Council on Cardiovascular and Stroke Nursing; Council on Hypertension; Council on Lifestyle and Cardiometabolic Health; Council on Peripheral Vascular Disease; and Stroke Council**

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The ≈11 million lesbian, gay, bisexual, transgender, and queer or questioning (LGBTQ) adults in the United States remain a marginalized group with significant health disparities compared with their heterosexual and cisgender (individuals with a gender identity that matches their sex assigned at birth) counterparts (see Table 1 for glossary of terms).[1] As described in the 2011 National Academy of Medicine report on LGBTQ health, LGBTQ adults face psychosocial stressors (eg, discrimination and bias-motivated violence) that negatively affect their health and well-being.[2] Recognizing the need for increased research on LGBTQ populations, the National Institutes of Health established the Sexual & Gender Minority Research Office in 2015 and designated LGBTQ people as a health disparity population in 2016. Despite growing attention to LGBTQ health in the past decade, knowledge gaps remain about the health disparities that affect this population.

Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality worldwide. Despite declining rates of CVD mortality in the United States, significant disparities (eg, sex, race, and income) persist.[3] There is growing evidence that LGBTQ adults experience worse cardiovascular health (CVH) relative to their cisgender heterosexual peers.[4,5] However, CVH has received limited attention relative to other health topics (eg, HIV/AIDS and substance use) in this population. Only 4.0% of all National Institutes of Health–funded studies on LGBTQ health between 1989 and 2011 focused on CVD or CVD risk factors (eg, diet, diabetes, and obesity).[6] Therefore, in 2011, the National Academy of Medicine recommended increased research on CVD in LGBTQ adults.[2]

The inclusion of sexual orientation and gender identity (SOGI) measures in population-based surveys has provided nationally representative data on the CVH of LGBTQ adults in the United States. Analyses of population-based data have found a higher prevalence of CVD risk factors among sexual minority (eg, gay, lesbian, bisexual, and other nonheterosexual) adults compared with their heterosexual counterparts (eg, tobacco use,[7–10] elevated body mass index [BMI],[4] and diabetes[8,11]). Analyses of BRFSS (Behavioral Risk Factor Surveillance System) data, the only national health survey that assesses gender identity, have documented a higher prevalence of self-reported tobacco use[10] and CVD diagnoses[12] in gender minority (ie, transgender and gender-diverse populations) adults relative to cisgender people. Although LGBTQ people are often grouped together, subgroups within this population have distinct health risks and exposures; multiple studies have identified variations in CVD risk by sex assigned at birth, gender identity, sexual orientation, and race.[12–15]

To improve the CVH of LGBTQ adults, a greater understanding of existing evidence is needed. The objective of this scientific statement was to examine research on the CVH of LGBTQ adults to develop a conceptual model that elucidates potential mechanisms underlying CVH disparities in LGBTQ adults, to identify research gaps, and to provide suggestions for improving CVH research and care of LGBTQ people. The American Heart Association's My Life Check–Life's Simple 7 was used to organize findings for tobacco use, physical activity, diet, BMI, blood pressure, glycemic status, and lipids.[16]

## CONCEPTUAL MODEL

Our review of the literature was guided by the conceptual model (Figure) that describes potential mechanisms by which LGBTQ adults experience poor CVH. This conceptual model was informed by existing frameworks used to study LGBTQ health (ie, the minority stress[17,18] and social ecological models)[19] and is intended to guide CVH research with LGBTQ adults. Exposure to stress is posited as the main driver of LGBTQ health disparities.[17,18] The predominant theory to explain LGBTQ health disparities is the minority stress model, which describes how, in addition to general life stressors, LGBTQ people are exposed to multilevel minority stressors (ie, intrapersonal, interpersonal, and structural) that contribute to health disparities.[17,18] Originally developed to study mental health disparities in sexual minorities, the minority stress model was later adapted for gender minority health.[20] There are no existing adaptations of the minority stress model tailored for the study of CVH disparities in LGBTQ adults. In addition, the social ecological model recognizes how an individual's health is influenced by factors in the social environment, including family, interpersonal, community, and societal factors.[19]

### Minority Stressors

LGBTQ adults face unique individual/intrapersonal stressors because of their SOGI (eg, self-stigma, expectations of rejection, and concealment of SOGI).[17,18] Furthermore, LGBTQ individuals experience a high number of interpersonal stressors (ie, discrimination, family rejection, and violence)[2] that are associated with higher rates of substance use,[21,22] poor mental health,[22] and cardiometabolic risk across the life span.[23,24] Despite limited evidence, structural stressors might also compromise the health of LGBTQ adults. In 2018, <50% of LGBTQ people lived in states that had employment or public accommodation (eg, hospitals and schools) nondiscrimination laws.[25] There are also laws that explicitly codify discrimination such as those preventing transgender people from using public restrooms that align with their gender identity.

Expanding mechanistic knowledge on how LGBTQ-specific minority stressors affect the CVH of LGBTQ adults is crucial to developing and tailoring multilevel CVH interventions for this population. There is extensive



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**Table 1. Glossary of Terms for LGBTQ Health**

| | |
|---|---|
| Bisexual | People who experience sexual, romantic, physical, or spiritual attraction to people of their own gender and toward another gender (sometimes shortened to bi). |
| Cisgender | A term used to describe people whose gender identity is congruent with what is traditionally expected on the basis of their sex assigned at birth. |
| Gay | A term used to describe boys/men who are attracted to boys/men but often used and embraced by people with other gender identities to describe their same-gender attractions and relationships. Often referred to as homosexual, although this term is no longer used by the majority of people with same-gender attractions. |
| Gender expression | The ways in which a person communicates femininity, masculinity, androgyny, or other aspects of gender, often through speech, mannerisms, gait, or style of dress. All people have ways in which they express their gender. |
| Gender identity | A person's inner sense of being a girl/woman, a boy/man, a combination of girl/woman and boy/man, or something else, or having no gender at all. Everyone has a gender identity. |
| Gender minority | A broad diversity of people who experience an incongruence between their gender identity and what is traditionally expected on the basis of their sex assigned at birth, such as transgender and gender nonbinary people. |
| Gender nonbinary | A term used by some people who identify as a combination of girl/woman and boy/man, as something else, or as having no gender. Often used interchangeably with gender nonconforming. |
| Lesbian | Used to describe girls/women who are attracted to girls/women; applies for cisgender and transgender girls/women. Often referred to as homosexual, although this term is no longer used by the majority of women with same-gender attractions. |
| Queer | Historically a derogatory term used against LGBTQ people, it has been embraced and reclaimed by LGBTQ communities. Queer is often used to represent all individuals who identify outside of other categories of sexual and gender identity. Queer may also be used by individuals who feel as though other sexual or gender identity labels do not adequately describe their experience. |
| Sex assigned at birth | Usually based on phenotypic presentation (ie, genitals) of an infant and categorized as female or male; distinct from gender identity. |
| Sex | Biological sex characteristics (chromosomes, gonads, sex hormones, or genitals); male, female, intersex. Synonymous with sex assigned at birth. |
| Sexual minority | A broad diversity of people who have a sexual orientation that is anything other than heterosexual/straight and typically includes gay, bisexual, lesbian, queer, or something else. |
| Sexual orientation | A person's physical, emotional, and romantic attachments in relation to gender. Conceptually separate from gender identity and gender expression. Everyone has a sexual orientation. |
| Straight | Boys/men or girls/women who are attracted to people of the other binary gender than themselves; can refer to cisgender and transgender individuals. Often referred to as heterosexual. |
| Transgender man | Someone who identifies as male but was assigned female sex at birth. |
| Transgender woman | Someone who identifies as female but was assigned male sex at birth. |

LGBTQ indicates lesbian, gay, bisexual, transgender, and queer or questioning.

evidence that stress exposure related to discrimination and stigma can lead to unhealthy coping behaviors and arouse psychological and physiological stress reactions that negatively affect the health of stigmatized people.[26] However, testing of these mechanisms in LGBTQ adults has been limited.[27] Research on the link between stress and CVH in other stigmatized populations (eg, racial and ethnic minorities) can help inform CVH research in LGBTQ adults. Recent systematic reviews have documented the link between discrimination and CVH health indexes (eg, tobacco use and elevated blood pressure and weight) in stigmatized populations.[27,28]

## General Stressors

Consistent with the minority stress and social ecological models, we hypothesize that complex interactions between LGBTQ-specific minority stressors and general life stressors across multiple levels contribute to CVH disparities in LGBTQ adults. There is mounting evidence that LGBTQ populations experience significant general stressors (eg, life adversity and financial stress) across multiple levels that negatively influence their health across the life span. At the interpersonal level, LGBTQ adults are more likely than non-LGBTQ peers to report physical and sexual abuse in childhood,[29] as well as a higher prevalence of interpersonal violence in adulthood.[23,30] There is limited evidence of structural-level determinants of health among LGBTQ adults. However, analyses of BRFSS data from 35 states indicate that LGBTQ adults have higher rates of poverty than cisgender heterosexual people (21.6% versus 15.7%). Poverty rates are highest among bisexual men (19.5%) and women (29.4%), transgender people (29.4%), and LGBTQ people living in rural areas.[31] Within the LGBTQ population, Latinx (37.3%), Black (30.8%), and American Indian/Native Alaskan (32.4%) adults are more likely to live in poverty compared with their White peers (15.4%).[31] In many circumstances, general stressors are best understood within the context of minority stress. For instance, economic disparities among LGBTQ adults might be driven by structural-level minority stressors;

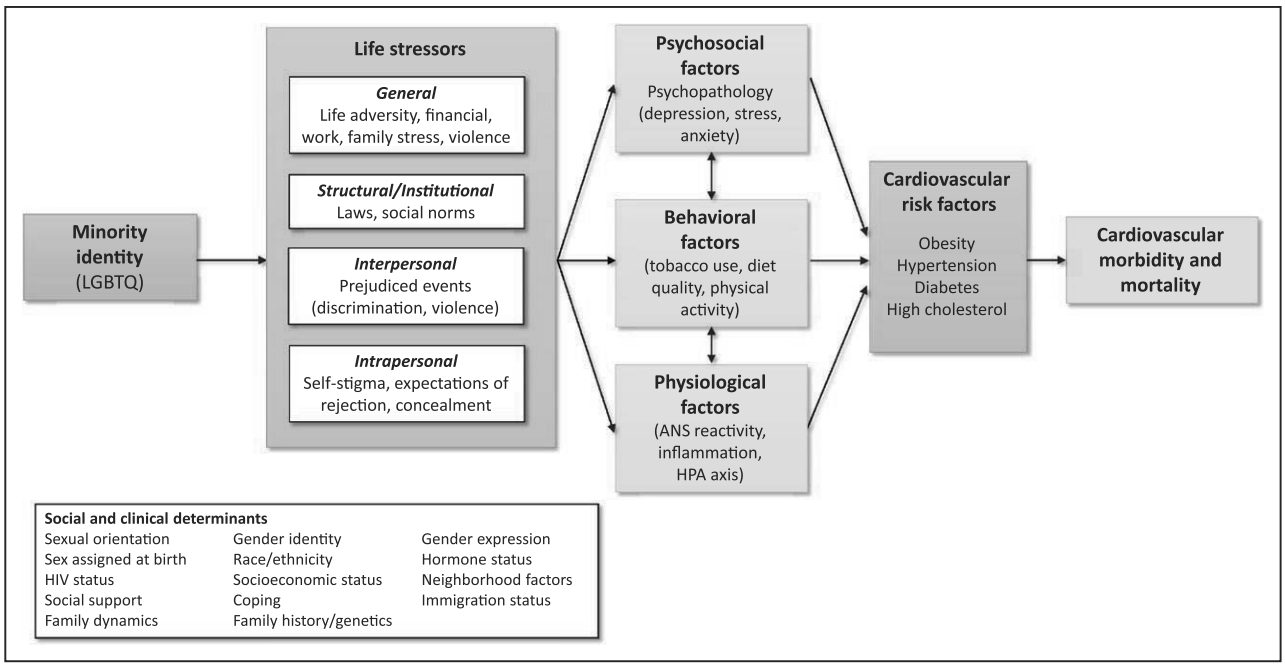


**Figure. Conceptual model of cardiovascular health in lesbian, gay, bisexual, transgender, and queer or questioning (LGBTQ) adults.**

poverty rates are more pronounced among LGBTQ people living in southwestern states that, until the Supreme Court's decision in June 2020, provided them with no legal protection against employment discrimination.[31] Therefore, multilevel minority and general stressors can interact across levels to impair the health of LGBTQ adults by limiting opportunities for proper employment, housing, and access to health care.[26]

From the existing evidence, we posit that demographic, social, and clinical factors moderate the associations of multilevel LGBTQ-specific and general stressors with CVH outcomes in LGBTQ adults (Figure). LGBTQ-specific minority stressors can operate synergistically with general stressors and stress related to other stigmatized identities across multiple levels to confer excess CVD risk through psychosocial, behavioral, and physiological pathways. For instance, a Black bisexual woman may experience stress related to her racial and sexual minority identity, as well as being female and low income, that might be distinct from the stress that other LGBTQ adults experience. Thus, the potential influence of intersecting stigmatized identities on the CVH of LGBTQ adults is recognized.

### Additional Risk Factors

Transgender women and sexual minority men bear a disproportionate burden of HIV compared with non-LGBTQ people.[32] HIV is associated with increased risk for CVD as a result of a high prevalence of CVD risk behaviors among people with HIV, dyslipidemia and other cardiometabolic changes associated with certain HIV treatments, and the physiological effects of HIV disease itself.[33]

Moreover, the use of gender-affirming hormone therapy has been identified as a potential contributor to poor CVH in transgender people because of the potential cardiovascular effects of these treatments.[5,34–36] Although studies have identified an increased risk for venous thromboembolism among transgender women taking estrogen,[5,35] data on other CVD outcomes and their causes are limited. Evidence of elevated CVD risk in transgender men remains limited and is generally inconsistent.[5,34,35]

## STATE OF THE SCIENCE ON CVH IN LGBTQ ADULTS

We use Life's Simple 7 to organize findings by CVH metrics and to summarize evidence on CVD diagnoses in LGBTQ adults. This statement does not include data on several populations that are part of the LGBTQ community (eg, queer and questioning people) because of limited evidence to provide a reliable report of CVH disparities in these groups. However, we use the term LGBTQ throughout this statement because the conceptual model, limitations, and suggestions for future research and clinical practice also apply to queer and questioning individuals.

### Tobacco Use

LGBTQ adults are more likely to report current and lifetime tobacco use than their cisgender heterosexual peers.[4,7–10] Sexual minority women are more likely to

use tobacco than heterosexual women and men and sexual minority men.[7] Despite limited evidence on tobacco use among transgender people, a recent analysis of BRFSS data found a higher prevalence of cigarette and smokeless tobacco use in transgender adults compared with their cisgender counterparts.[10] Research on social determinants of tobacco use in LGBTQ populations is scarce but growing. Most notably, analyses of population-based data indicate that past-year sexual orientation discrimination is a predictor of past-year cigarette smoking in sexual minority adults.[21]

## Physical Activity

Findings on physical activity in LGBTQ populations are mixed. A systematic review of 35 studies found that sexual minority men reported higher levels of physical activity than heterosexual men.[37] The authors posited that these findings appear to be driven, in part, by social norms, including a desire to conform to body ideals (ie, thinness and muscularity) among sexual minority men, which might influence physical activity.[37] Data on sexual minority women are conflicting, with some studies reporting lower levels of physical activity than for heterosexual women,[37] whereas other studies have found higher levels.[9,38] Analyses of the Nurses' Health Study II data indicate that although sexual minority women report higher levels of aerobic physical activity, they also have higher levels of sedentary behaviors relative to heterosexual women.[38] Moreover, a systematic review found that transgender adults had lower physical activity levels than their cisgender counterparts.[39] A recent study found that transgender individuals taking gender-affirming hormones had greater body satisfaction, which was associated with higher physical activity.[40] This suggests that gender-affirming care might play a role in promoting physical activity among transgender people.

## Diet

The majority of studies have identified no differences in diet quality between LGBTQ individuals and their heterosexual and cisgender peers,[4] whereas some suggest differences with variable directionality.[41,42] Compared with their heterosexual peers, gay men and sexual minority women report worse diet quality (eg, lower fruit/vegetable consumption) and less favorable eating environments.[41] In contrast, prospective data from the Nurses' Health Study II indicate that, between 26 and 67 years of age, sexual minority women have better diet quality and diets lower in glycemic index than heterosexual women.[42] Thus far, there is limited research on diet quality in transgender people.

## Body Mass Index

Most research has shown that sexual minority women have a higher prevalence of subjectively and objectively measured obesity than heterosexual women.[4] Racial and ethnic differences in BMI exist among sexual minority women, with Black women more likely to be obese than White women.[43] Gay men have a similar or lower prevalence of obesity compared with heterosexual men.[4] Recent analyses of objective data from the NHANES (National Health and Nutrition Examination Survey) suggest that bisexual men have a 69% higher odds of obesity than heterosexual men.[13] Data examining elevated BMI in transgender people are limited with mixed results. These studies have generally focused on changes in BMI among transgender men after the initiation of gender-affirming hormone therapy.[5]

## Blood Pressure

A systematic review of 31 studies published between 1985 and 2015 found no evidence that sexual minority adults have a higher prevalence of elevated blood pressure relative to their heterosexual counterparts.[4] More recent evidence suggests that sexual minority men are more likely to have elevated blood pressure than heterosexual men.[13,44] Analyses of data from Add Health (National Longitudinal Study of Adolescent to Adult Health) have identified higher diastolic blood pressure in gay men relative to heterosexual men.[45] Bisexual men in NHANES have 2 times higher odds of hypertension than heterosexual men[13]; in particular, Black bisexual men have higher diastolic blood pressure than White heterosexual men.[14]

Overall, studies examining blood pressure in transgender adults are limited.[5] Some data suggest that transgender women have minimal increases in blood pressure after the initiation of feminizing hormones. Similarly, testosterone use has been associated with slight increases in systolic blood pressure in transgender men.[5,35] Although these changes in blood pressure were statistically significant, they had small effect sizes and are of questionable clinical significance.

## Glycemic Status

Although a systematic review identified few differences in diabetes by sexual orientation,[4] the included studies had methodological limitations (eg, cross-sectional designs and reliance on self-reported data). Analyses of longitudinal data from the Nurses' Health Study II and Add Health found that sexual minority women had a greater incidence of diabetes than heterosexual women.[11,46] These differences were accentuated in younger women (24–39 years of age) and largely explained by elevated BMI.[46] Similarly, analyses of cross-sectional

NHANES data found that sexual minority women had a 56% greater prevalence of prediabetes compared with heterosexual women.[8] Although most studies indicate that there are few sexual orientation differences in diabetes among men,[4] data from NHANES suggest that bisexual men have 3 times higher odds of diabetes compared with heterosexual men.[13] In addition, a recent analysis of NHANES found that Black sexual minority men have higher glycosylated hemoglobin than their White heterosexual peers.[14]

Most studies have found few differences in diabetes between transgender and cisgender adults.[5] However, 2 studies analyzing health record data found that transgender men and women had a higher prevalence of diabetes compared with cisgender people.[47,48] Wierckx and colleagues[47] found that transgender women were 2 and 6 times more likely to have diabetes than cisgender women and men, respectively.

### Total Cholesterol and Lipids

Studies assessing total cholesterol and lipids in LGBTQ adults, particularly objective measures, are limited.[4] It appears that there are no differences in total cholesterol or lipids between sexual minority and heterosexual adults.[4] In transgender individuals, changes in lipid profiles have been linked to the use of gender-affirming hormones. A systematic review of 29 studies found higher triglyceride levels in transgender women taking feminizing hormones but no change in other lipids. In addition, this review found that masculinizing hormone therapy for transgender men was associated with lower high-density lipoproteins and higher triglycerides and low-density lipoproteins.[36] In contrast, a more recent review concluded that there is no convincing evidence of lipid abnormalities among transgender men.[35] The significance of lipid changes on CVD outcomes (eg, myocardial infarction, stroke) in transgender people requires further investigation.

### Additional Risk Factors

This statement focuses on CVH metrics included in Life's Simple 7. However, additional risk factors such as heavy alcohol use[16] are elevated in LGBTQ adults. Sexual minority women are more likely to report heavy drinking than heterosexual women.[4,8,9,44] Transgender women and gender nonbinary individuals are more likely to binge drink relative to cisgender women.[10] However, there is limited research on the cardiovascular effects of heavy drinking in LGBTQ adults.

Inadequate sleep duration and poor sleep quality have been identified as risk factors for incident hypertension, diabetes, and CVD.[49] A review of 31 studies identified that short sleep duration was higher among sexual minority women compared with heterosexual women. Findings for sexual minority men were mixed, and only 4 studies were identified that examined sleep duration in transgender people.[50] Other dimensions of sleep health (eg, sleep quality, sleep apnea, and insomnia) remain understudied in LGBTQ adults.[50] The study of sleep health in LGBTQ adults is a nascent area that has important implications for understanding their CVH.

### Cardiovascular Disease

Although sexual minority adults exhibit elevated risk for CVD compared with heterosexual adults, few differences in CVD diagnoses have been identified.[4] There is a notable discrepancy between observed CVD risk and CVD prevalence in sexual minorities. The higher prevalence of CVD among transgender women compared with cisgender adults found in the few studies that have used health records[34,51] suggests that this paradox in sexual minorities might be caused by a lack of appropriate measurement of CVD end points. Analyses of health record data indicate that transgender women on gender-affirming hormones have higher incident myocardial infarction,[51] venous thromboembolism,[51] ischemic stroke,[51] and cardiovascular mortality[34] than their cisgender peers. In addition, analyses of data from the BRFSS have found that transgender women have higher odds of self-reported CVD than cisgender people.[12,52] AQ10
Despite evidence of higher risk in transgender women, findings for CVH disparities among transgender men are inconsistent.[5,35] Furthermore, several reviews have concluded that evidence of higher cardiovascular morbidity and mortality in transgender people is limited by methodological issues, including the use of retrospective cohorts with short follow-up, cross-sectional designs, inadequate data on gender-affirming hormones, and a lack of inclusion of transgender older adults.[5,34,35]

## LIMITATIONS OF EXISTING RESEARCH

### Testing of Mechanisms

There is a lack of understanding about mechanisms that link LGBTQ-specific stressors with CVH in LGBTQ adults, which impedes the development of interventions to promote their CVH. Despite increased risk, there is a dearth of evidence-based interventions for CVD risk reduction in LGBTQ people. Longitudinal research is needed to elucidate potential psychosocial and behavioral targets for interventions to improve the CVH of LGBTQ adults. In particular, qualitative research to understand how attitudes and beliefs within LGBTQ subgroups influence their CVH is needed before interventions can be designed. For instance, a desire to conform to body ideals in their community may drive sexual minority men to engage in more compulsive exercising



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compared with heterosexual men.[25] On the contrary, among sexual minority women, a greater acceptance of diverse body types and rejection of heteronormative standards of female beauty may contribute to differences in physical activity and BMI.[37,53] Increasing knowledge about group-specific attitudes and beliefs on health behaviors is needed to enhance the acceptability of interventions designed to improve the CVH of LGBTQ adults. These interventions should account for the influence of interpersonal and structural drivers of CVH in LGBTQ adults.

## Lack of Existing Data

The methodological weaknesses of the existing literature limit our understanding of the causes of CVH disparities in LGBTQ adults. Most studies on CVH in LGBTQ adults analyze self-reported data from population-based surveys, which do not capture the sociocultural and clinical factors relevant to understand their CVH. There has generally been a focus on identifying differences in CVD risk factors between LGBTQ and non-LGBTQ adults with little examination of the causes of CVH disparities. Furthermore, the lack of objective measures limits the reliability of existing data. This is particularly important given that several studies have found that sexual minorities have higher odds of objectively measured hypertension and hyperglycemia relative to heterosexuals.[8,11,13,14,45]

To date, there are no published data on the CVH of sexual minority adults in the United States that use health record data. The inclusion of SOGI measures in electronic health records (EHRs) provides an opportunity to leverage these data to examine CVH in LGBTQ individuals, including healthcare use among those with CVD. Given the evidence that LGBTQ adults experience discrimination in healthcare settings,[54] EHRs can be used to examine potential variations in care delivery among LGBTQ adults living with CVD. In addition, the availability of data on social determinants (eg, interpersonal violence, poverty, and food insecurity) in EHRs could allow researchers and clinicians to obtain a more comprehensive understanding of social factors associated with CVH in LGBTQ adults. It is important to recognize that EHR data are biased toward LGBTQ adults who engage in health care and those who feel comfortable disclosing their SOGI to clinicians.

Data from population-based studies are based primarily on White cisgender samples of LGBTQ adults with relatively high educational attainment, limiting the ability to examine intersectional differences in CVH (eg, by SOGI, race, and socioeconomic status). There is growing evidence that Black and Latinx LGBTQ adults, particularly sexual minority women, have higher BMI, blood pressure, and glycosylated hemoglobin than their heterosexual peers.[14,15,43] A need exists to examine CVH in stigmatized groups within the LGBTQ population who may face additional structural barriers to achieving optimal CVH (eg, people of color). Additional CVH research on subgroups within the LGBTQ community who were not included in this statement (eg, queer and questioning individuals) is critically needed.

## Social and Clinical Determinants of LGBTQ CVH

Consistent with the minority stress and social ecological models, there is a need for research that examines multilevel social determinants of CVH in LGBTQ adults. There is evidence that sexual orientation discrimination contributes to higher odds of tobacco use in sexual minorities.[21,55] The strong evidence linking discrimination with poor CVH in racial and ethnic minorities warrants further examination of discrimination as a social determinant of CVH in LGBTQ adults.[27,28] Among sexual minority women, interpersonal violence is associated with higher odds of obesity, hypertension, and diabetes.[24] Furthermore, despite evidence of economic disparities in LGBTQ populations, only 1 study has assessed the influence of economic strain on the CVH of sexual minority adults (24–32 years of age).[56] Conducting an analysis of Add Health data, investigators found that the associations of economic strain with metabolic syndrome did not differ between sexual minority and heterosexual adults. Because the prevalence of metabolic syndrome increases with age, the null findings in that study might be explained by the young age of participants.[56] In addition, although findings from qualitative studies suggest that social support is associated with higher physical activity and diet quality in sexual minority adults,[53,57] there is limited research examining whether resilience factors (eg, social support and stress-related coping) can buffer the cardiovascular effects of life adversity in LGBTQ adults.

Researchers should examine the influence of multilevel social determinants of CVH in LGBTQ adults rather than examining solely 1 level. For instance, researchers could examine the associations of discriminatory policies (eg, antidiscrimination laws) with interpersonal discrimination (eg, experiences of discrimination) and intrapersonal stressors (eg, concealment of SOGI) to estimate their combined influence on CVH metrics in LGBTQ adults. This further supports the need for data sources that include SOGI and social determinants data and for research that combines multiple sources (eg, linking EHR data with state-level antidiscrimination policies) to examine CVH disparities in LGBTQ adults.

Research on the CVH of transgender adults is limited by the methodological weaknesses in the extant literature and should be interpreted with caution.[5,34,35] There is evidence that, despite their hypothesized cardiovascular effects, gender-affirming hormones might reduce

**Table 2. Suggestions for Research and Clinical Practice With LGBTQ Adults**

| Cardiovascular Research | Clinical Practice |
|---|---|
| Develop standardized sexual orientation and gender identity measures and integrate them into current and future NIH-funded cardiovascular prospective cohort studies to allow data harmonization | Ensure the collection of SOGI data in EHRs by providing clinicians with training on LGBTQ health disparities and the proper assessment of sexual orientation and gender identity in healthcare settings |
| Integrate biobehavioral measures into cardiovascular research with LGBTQ populations | Incorporate LGBTQ content into the curricula of health professions schools and postgraduate training |
| Leverage EHR data to increase understanding of LGBTQ cardiovascular health | Require continuing education on LGBTQ health for all practicing clinicians that includes content on cardiovascular health disparities |
| Partner with LGBTQ communities for measurement development, study design and conduct, and research dissemination to ensure that research reflects the needs of LGBTQ adults, especially stigmatized groups | |
| Develop and test multilevel interventions for cardiovascular risk reduction in LGBTQ adults | |
| Examine social and clinical determinants of cardiovascular health in LGBTQ adults | |
| Characterize the role of resilience in buffering the cardiovascular effects of stress in LGBTQ people | |

EHR indicates electronic health record; LGBTQ, lesbian, gay, bisexual, transgender, and queer or questioning; NIH, National Institutes of Health; and SOGI, sexual orientation and gender identity.

psychosocial and behavioral risk factors in transgender people.[40] Therefore, the potential cardiovascular effects of gender-affirming hormones should be evaluated against the benefits on their mental health and health behaviors. In addition, limited data examine CVH between transgender individuals taking gender-affirming hormones and those who are not. Overall, given the methodological limitations of studies on the CVH of transgender people,[5,34,35] rigorous research is needed to ascertain the potential cardiovascular effects of gender-affirming hormones.

## SUGGESTIONS FOR RESEARCH AND CLINICAL PRACTICE

Our suggestions for cardiovascular research and clinical practice with LGBTQ adults are presented in Table 2.

### Research Implications

The lack of SOGI data in existing studies limits the applicability and generalizability of research on CVH in LGBTQ adults. Despite calls to include SOGI data in ongoing CVH studies, a search in July 2020 of the National Heart, Lung, Blood Institute's Biological Specimen and Data Repository Information Coordinating Center revealed that 0 of 229 studies collected SOGI data.[58] Although population-based data have provided a greater understanding of the CVH of LGBTQ people,[8–12,44,45,59] they provide limited information on relevant social and clinical determinants for LGBTQ adults' health. Only 2 cardiovascular cohorts, the SOL (Hispanic Community Health Study/Study of Latinos) and CARDIA (Coronary Artery Risk Development in Young Adults), have plans to collect SOGI data. Current and future National Institutes of Health–funded cardiovascular cohort studies should include standardized SOGI measures that will permit data harmonization to achieve larger samples of understudied groups within the LGBTQ population.

Incorporating biobehavioral approaches into CVH research will help elucidate mechanisms by which minority stressors contribute to CVH disparities in LGBTQ adults. The proposed conceptual model is intended not only to inform future observational research but also to facilitate the development and testing of interventions that target modification of multilevel stressors.

Several steps should be taken to increase LGBTQ people's trust of the research community. This is particularly important for stigmatized groups within the LGBTQ community (eg, people of color and individuals with disabilities). Research teams conducting LGBTQ research should reflect the diversity that exists within the population. Researchers should also partner with LGBTQ communities during all stages of the scientific process to increase trust in their research.

### Clinical Implications

The ability to collect SOGI data in EHRs has been required since 2018 as part of the meaningful use of EHRs; however, this policy does not require clinicians to collect this information.[60] Nearly 56% of sexual minority and 70% of gender minority adults report having experienced some form of discrimination from clinicians (including the use of harsh/abusive language).[54] Perhaps most alarming is that ≈8% and 25% of sexual minority and transgender individuals, respectively, have been denied health care by clinicians.[54] It is important for practicing clinicians and health professions students to receive education on LGBTQ health and the proper assessment of SOGI in healthcare settings.

Although several organizations provide curricular recommendations about caring for LGBTQ adults,

substantial resources are needed to reduce LGBTQ health disparities. Whereas The Joint Commission and the US Department of Health and Human Services have comprehensive plans to improve LGBTQ health, the healthcare workforce remains unprepared to enact them. Accrediting bodies and organizations responsible for recommending curricular content such as the Accreditation Council on Graduate Medical Education, Accreditation Review Commission on Education for the Physician Assistant, American Nurses Credentialing Center, Association of American Medical Colleges, Liaison Committee on Medical Education, and Physician Assistant Education Association provide little to no requirements for LGBTQ health content in the curricula. Notably, although the Association of American Medical Colleges provided recommendations, but not requirements, for LGBTQ health content in 2013, the Accreditation Review Commission on Education for the Physician Assistant will begin requiring LGBTQ curricular content in 2020.

Although clinicians and public health professionals need competence in providing care for LGBTQ patients, there are limited efforts to include relevant content in health professions curricula.[61] With no LGBTQ-related accreditation or licensure requirements, health professions curricula (including for nurses,[62] physicians,[63] physician assistants,[64] and public health practitioners[65]) have minimal content on LGBTQ health. A 2018 online survey of students at 10 medical schools found that ≈80% of students felt not competent at treating transgender patients.[66] Furthermore, a recent study of >800 residents across 120 internal medicine residencies in the United States found no difference in baseline knowledge across postgraduate years (eg, postgraduate year 1 versus 2) related to LGBTQ health topics.[63] Although that study was limited to internal medicine residencies, these trends likely apply to clinicians across specialties. The knowledge of LGBTQ health and the preparation of clinicians specialized in cardiology are currently unknown. The lack of LGBTQ health content in health professions curricula may limit the quality of care that LGBTQ adults receive and further exacerbate existing disparities in CVH and other health outcomes.

## CONCLUSIONS

LGBTQ adults experience significant psychosocial stressors that compromise their CVH health across the life span. There is consistent evidence that LGBTQ adults are more likely to use tobacco than their cisgender heterosexual peers. Sexual minority women are more likely to have elevated BMI than heterosexual women. Differences in CVH metrics between sexual minority and heterosexual adults are more pronounced in studies that have used objective measures. Among transgender women, the use of gender-affirming hormones might be associated with cardiometabolic changes, but the strength of existing data is limited by methodological issues. Given the lack of evidence on CVH in queer and questioning individuals, this is a critical area for future work. To address knowledge gaps in the literature, longitudinal research that examines mechanisms that link social and clinical determinants with CVH in LGBTQ adults is needed. In addition, future research should use qualitative and mixed methods to identify and develop culturally appropriate interventions for CVD risk reduction in LGBTQ adults. LGBTQ health content should be incorporated into health professions curricula, and LGBTQ-related accreditation and licensure requirements are needed. There are opportunities for research, clinical, and public health efforts to better understand and reduce CVH disparities in the underserved population of LGBTQ adults.

## ARTICLE INFORMATION

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The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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## Disclosures

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|---|---|---|---|---|---|---|---|---|
| Billy A. Caceres | Columbia University School of Nursing | None | None | None | None | None | None | None |
| Carl G. Streed Jr. | Boston University School of Medicine, Center for Transgender Medicine and Surgery | American Heart Association (career development award)† | None | None | None | None | None | None |
| Heather L. Corliss | San Diego State University | None | None | None | None | None | None | None |
| Donald M. Lloyd-Jones | Northwestern University, Feinberg School of Medicine | None | None | None | None | None | None | None |
| Phoenix A. Matthews | University of Illinois, Chicago | None | None | None | None | None | None | None |
| Monica Mukherjee | Johns Hopkins University School of Medicine | None | None | None | None | None | None | None |
| Tonia Poteat | University of North Carolina, Chapel Hill | None | None | None | None | None | None | None |
| Nicole Rosendale | University of California, San Francisco | None | None | American Academy of Neurology Annual Meeting (speaking honorarium)* | None | None | None | None |
| Leanna M. Ross | Duke University School of Medicine, Duke Molecular Physiology Institute | None | None | None | None | None | None | None |

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*Modest.

†Significant.

**Reviewer Disclosures**

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|---|---|---|---|---|---|---|---|---|
| Elizabeth Brondolo | St. John's University | None | None | None | None | None | None | None |
| Madeline Deutsch | UCSF | None | None | None | None | None | None | None |
| Scott E. Moore | Case Western Reserve University | None | None | None | None | None | None | None |
| S. Raquel Ramos | New York University | None | None | None | None | None | None | None |

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