Health Outcomes of Sexual and Gender Minorities After Cancer: A Scoping Review

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Abstract

Purpose: Cancer research on sexual and gender minority (SGM) populations is gaining momentum. However, literature on patient-reported health outcomes for SGM people with a history of cancer is limited. The purpose of this review was to examine the nature and extent of research regarding patient-reported health outcomes after cancer treatment among SGM populations.

Methods: A systematic search of key words, titles, abstracts, and/or major subjects was conducted in PubMed, Scopus, and CINAHL in September 2019 and in EMBASE in February 2020. Included studies investigated at least one physical, psychosocial, emotional, or functional patient-reported outcome related to cancer diagnosis and/or treatment. Articles that met inclusion criteria were reviewed in their entirety, charted in a Word Table, assessed for quality, and trends within and across studies were reported in addition to each study's results.

Results: Fifty-two studies were included in the final analysis; most were quantitative and focused on people with a history of breast and prostate cancer. Most studies were secondary analyses or cross-sectional studies of convenience samples, limiting generalizability.

Conclusions: A growing literature describes the patient-reported health outcomes of SGM people with a history of cancer. This study summarizes important between-group differences among SGM and heterosexual, cisgender counterparts that are critical for clinicians to consider when providing care. **Implications for cancer survivors:** Sexual orientation and gender identity are relevant to cancer survivors' health outcomes. Clinicians and researchers can build an evidence base to inform care improvements by collecting data on anatomy, sexual orientation, and gender identity in Electronic Health Records and population-based surveys.

Background

Lesbian, gay, bisexual, transgender, queer, and/or intersex (LGBTQI) populations, also known as sexual and gender minorities (SGM), have been largely ignored in research until recently. While it is likely that these populations have been included in previous research, lack of data collection about sexual orientation and gender identity and lack of prioritizing the health of these populations has led to limited knowledge of their specific needs. Before the National Academies of Sciences 2011 report, *The Health of Lesbian, Gay, Bisexual, and Transgender (LGBT) People: Building a Foundation for Better Understanding*, few studies investigated disparities in cancer-related health outcomes based on sexual orientation and no studies investigated the outcomes of gender minority people [1]. In 2016, the National Institutes of Health (NIH) opened a new office dedicated to SGM health research, designating SGM people as a minority population [2]. In 2017, the American Society of Clinical Oncology issued a call to action to reduce cancer health disparities for SGM populations [3].

However, most oncology practitioners have not been trained to address the needs of SGM people, and most cancer centers have yet to institute explicit policies or routine practices to collect sexual orientation and gender-identity data in the electronic medical record, use gender-neutral language on forms, provide SGM-specific support services, and/or require SGM cultural humility training for all staff [4]. Lack of training on the clinical and psychosocial needs of SGM patients perpetuates a system in which patients have to teach their clinicians about how to care for them, resulting in suboptimal care and potentially perpetuating stigmatizing behaviors of clinicians [5, 6]. Fortunately, cancer research on SGM patients has started to gain momentum. This review aimed to synthesize what is currently known about patient-reported health outcomes of SGM people after definitive cancer treatment to inform clinical practice and identify gaps in the literature to guide future research. A scoping review was selected rather than a systematic review in order to identify a broad range of relevant literature regardless of study design [7].

Notes on terminology: In this manuscript and in the review conducted we used "SGM" as a term meant to encompass diverse people whose gender differs from their sex assigned at birth and/or are not heterosexual. While "SGM" is not a term typically used by LGBTQI people to describe themselves, the authors use this acronym, which has been adopted by the NIH, to be inclusive of a wide range of people, including people who do not identify with the words represented in the acronym "LGBTQI". If a study is focused on a subgroup within the SGM umbrella, the specific subgroup is referred to rather than the broader term "SGM." Furthermore, the authors acknowledge that the term "survivor" is not universally embraced. Our use of the term is for the sake of efficiency of wording. We attempt to, whenever is reasonably efficient, refer to people with a history of cancer rather than a cancer "survivor."

Methods

Protocol

No previous protocol for this study has been published. The Arksey and O'Malley [7] five-stage framework for scoping reviews guided this study. The five stages include: identifying the research question; identifying relevant studies; selecting studies; charting the data; and collating, summarizing, and reporting the results (see Figure 1). The search strategy intentionally aimed to cast a wide net before selecting eligible studies for full review. Data was reported following the PRISMA-ScR guidelines [8].

Data sources and search strategy

A systematic search of key words, titles, abstracts, and/or major subjects was conducted in PubMed, Scopus, and CINAHL in September 2019. The PubMed search required the following key words to be in the title or abstract: (cancer or oncology) and (survivor* or patient) and (homosexual or nonheterosexual or LGBT* or GLBT* or lesbian or gay or bisexual or transgender or transsexual or transexual or "gender queer" or genderqueer or non-binary gender or queer or pansexual or intersex or DSD or "disorders of sex development" or "differences of sex development" or SGM or "sexual and gender minorit*"). Searches in Scopus and CINAHL were similar in approach; however, the Scopus search focused on key words and the CINAHL search used major subject terms (e.g., "GLBT or Queer" and "cancer"). After combining all references, duplicates were manually removed. A hand search of reference lists from review articles was also conducted to ensure all eligible studies included in those reviews were not missed. In February 2020, a fourth search using the PICO builder on EMBASE was conducted using index terms and truncated key words for cancer and survivorship topics plus the search strategy included in the Appendix to identify SGM-relevant studies. The EMBASE search identified entries published through February 21, 2020. Review articles were reviewed in full to identify any studies not found via the systematic searches, and relevant studies were considered for inclusion.

Eligibility criteria

Studies were limited to articles published in English in the last ten years that were focused on SGM people with a history of a cancer diagnosis. The search was limited to the last decade because very few studies were available on the health outcomes of SGM people after cancer diagnosis and treatment prior to 2010. Furthermore, the attitudes and methods of researchers and clinicians were significantly different a decade ago and we felt this would result in the inclusion of stigmatizing or dyssynchronous work. To be included in the review, studies had to investigate at least one psychosocial, emotional, physical, or functional health-related patient-reported outcome resulting from cancer diagnosis and/or treatment. Commentaries, case studies, abstracts, reviews, provider-focused trainings and interventions, protocol articles without results, and studies conducted prior to the beginning of cancer therapy were excluded. Studies focusing on risks or prevalence of cancer among SGM, care experiences or satisfaction with care, patient disclosure of SGM status, communication with providers, or social support needs were excluded unless the study also reported a physical, psychosocial, emotional, or functional patient-reported health outcome, as well. Studies of differential survival or progression-free survival comparing SGM to heterosexual populations were not excluded: there simply were no studies to reference in this review.

Results

Study selection

Database searches for peer-reviewed articles focused on health outcomes among SGM after definitive treatment for cancer yielded 242 entries in PubMed, 340 in Scopus, 46 in CINAHL, and 115 in EMBASE. All included articles were required to have SGM people with a history of cancer as a primary focus of the study. Author MPC conducted a review of titles in Excel for these 743 entries. A manual review of reference lists of review articles was conducted to ensure no studies were missed in systematic searches, adding additional articles for abstract review (n=23). Duplicates (n=196) and articles that did not meet eligibility criteria were removed (n=365 during title review; n=140 during abstract review). Full text articles (n=65) were reviewed for compliance with the inclusion criteria; reasons for exclusion after full-text review are provided in Figure 2. The full-text articles included in this study were n=52.

Study characteristics

Most studies were studies of people with a history of breast or prostate cancer and were focused on disparities based on sexual orientation. One study focused on people who were diagnosed with cancer during adolescence and young adulthood (AYA) and one on people with a history of colorectal cancer. Most studies were conducted in the U.S., Australia, and Canada. See Table 1 for general characteristics of included studies.

Table 1
Characteristics of included studies (n=52)

Country where study takes place*	Number of studies
Australia	6
Canada	9
Ireland	1
New Zealand	1
Romania	1
United States	41
United Kingdom	2
Reports outcomes of	
AYA SGM	1
SGM broadly	9
MSM	20
WSW	23
Transgender people	4
Intersex people	0
Study design	
Mixed methods	2
Qualitative	10
Quantitative	39
Cancer focus*	
AYA	1
Breast	22
Colorectal	1
Prostate	19
Various cancers	8
*Not mutually exclusive	

Data charting: Summary of studies

Table 2 was used as a template for data charting. Studies were sorted by the following demographic groups: adolescent and young adults and studies focused on those diagnosed with breast, prostate, or multiple cancers, respectively. Lead author and year, location, population of interest including any comparison group(s) when relevant, type of study, design, outcomes, and critical appraisal of each study are reported in Table 2. Critical appraisal consisted of a review of sample recruitment strategy, diversity of the sample (generalizability), study design, use of validated tools (for quantitative studies), innovation, and significance. All authors participated in data abstraction and table review for consistency.

Table 2
Summary of Studies of Patient Reported Outcomes from SGM People Diagnosed with Cancer

Study	Location	Population	Type of study	Study design	Outcomes reported	Critical appraisal
<u>AYA cancers</u>						
Russell et al. (2016) [9]	U.S.	Adolescent and young adult (AYA) cancer survivors (n=56) including SGM (n=22) and heterosexual (n=34) survivors	Qualitative	AYA survivors were interviewed by telephone; asked about pre- and post-diagnosis thoughts regarding relationships, parenthood, fertility, and how/ if fertility risks were conveyed to them during treatment.	Both SGM and heterosexual survivors reported post-diagnosis dating challenges. Straight survivors had greater fertility concerns ($p<.05$). SGM survivors were more likely to be open to raising a non-biological child or never parenting. Straight survivors were more likely to be unsatisfied with information provided about fertility, but SGM survivors were just as likely to not be informed about potential infertility risks.	Strengths: Only AYA cancer survivorship study known to date that examines differences by sexual orientation; diversity of types of cancer and treatment modalities. Limitations: Small sample size limits subgroup analyses; mostly white sample.
<u>Breast cancer</u>						
Bazzi et al. (2018) [10]	U.S.	Breast cancer survivors: (n=339 heterosexual women, n=201 WSW)	Quantitative	Cross-sectional national survey recruited from Army of Women using multivariable regression with primary outcome as resilience.	Sexual orientation was not associated with resilience, but WSW who were unemployed had less resilience than employed counterparts whereas heterosexual women had no differences based on employment status.	Strengths: Large sample diverse in socioeconomic status, cancer stage, and type of treatment; use of validated scales (ISEL-6, Mini-MAC, RS-14). Limitations: Sample is partially one of convenience, mostly white, and highly educated; self-report data; cross-sectional design.
Boehmer et al. (2011) [11]	U.S. (Massachusetts Cancer Registry)	Nonmetastatic breast cancer survivors (n=257 heterosexual women, n=69 WSW)	Quantitative	Multinomial regression with weighting of subpopulations; primary outcome was weight.*	While WSW in the general population were more likely to be overweight and obese, WSW cancer survivors were not statistically more likely to be overweight/ obese than heterosexual counterparts. This finding suggests that WSW may be motivated by cancer to reduce overweight.	Strengths: Recruitment from a population-based registry; diversity of education, socioeconomic status, cancer stage, and treatment modality. Limitations: Data reported from one state; self-report data; potential bias in reporting weight; cross-sectional design.

Boehmer et al. (2012) [12]	U.S. (Massachusetts Cancer Registry + national convenience sample)	Nonmetastatic breast cancer survivors (n=257 heterosexual women, n=181 WSW)	Quantitative	Least square regression separately run for physical component and mental component summary scales of the SF-12 on each demographic and clinical characteristic, controlling for sexual orientation.*	Overall, WSW and heterosexual women were comparable in QOL. WSW from the registry were more likely to be white, educated, and employed. Only WSW with low/ middle income had worse physical health than heterosexual counterparts. WSW who experienced more discrimination reported worse physical health.	Strengths: Use of validated scale (SF-12). Limitations: Sample is partially one of convenience, mostly white, and highly educated; self-report data; cross-sectional design.
Boehmer et al. (2012) [13]	U.S.	Nonmetastatic breast cancer survivors (n=257 heterosexual women, n=181 WSW)	Quantitative	Least square regression was used for each demographic and clinical characteristic, controlling for sexual orientation.*	WSW appeared more resilient than heterosexual counterparts with some exceptions: unemployed WSW experienced greater anxiety than heterosexual women, and WSW who underwent radiation therapy were more depressed than heterosexual counterparts. WSW reported higher rates of discrimination, which was associated with more depression.	Strengths: Use of a validated measure (HADS); sample size. Limitations: Sample is partially one of convenience, mostly white, and highly educated; self-report data; cross-sectional design; low percentage of variance explained by models.
Boehmer et al. (2012) [14]	U.S.	Nonmetastatic WSW breast cancer survivors without recurrence (n=22)	Qualitative	Semi-structured telephone interviews ranging from 30-150 minutes; coding based on grounded theory.	Themes included: 1) Breast cancer is a women's, not a lesbian, issue; 2) I can manage my identity in the context of breast cancer; 3) I am better off than my heterosexual counterparts (e.g., less emphasis on body image, empathic female partners)	Strengths: Adaptations to interview guide to maximize neutrality. Limitations: Convenience sample, mostly white, and highly educated; self-report data.
Boehmer et al. (2012) [15]	U.S.	Nonmetastatic WSW breast cancer cases and heterosexual controls (n=85 cases, n=85 controls)	Quantitative	Using a conceptual framework for heterosexual breast cancer survivors, generalized estimating equations identified explanatory factors of sexual function between	Sexual function was predicted by self-perception of sexual attraction and urogenital symptoms for both WSW and heterosexual women; for partnered women, postmenopausal status and dyadic cohesion was	Strengths: Case-control design; use of validated scale (SF-12); amount of variance explained by models (nearly half). Limitations: Convenience sample, mostly white, and highly educated; self-report data; use of a sexual measure

				cases and controls.*	predictive of sexual function; HRQOL was less explanatory for WSW's sexual function compared to heterosexual women.	designed for heterosexual women (FSFI); cross-sectional design.
Boehmer et al. (2013) [16]	U.S. (Massachusetts Cancer Registry + national convenience sample)	Nonmetastatic breast cancer survivors (n=257 heterosexual women, n=181 WSW)	Quantitative	Multiple regression models with stepwise variable selection (p=.10); model fit reported with R ² statistics.*	WSW had less cognitive avoidance coping than heterosexual peers. Social support and having a partner were more strongly associated with better mental and physical health, respectively, for WSW v. heterosexual counterparts.	Strengths: Use of validated scales (TPS, ISEL-6, Mini-MAC, BFS); large amount of variance explained in models. Limitations: Sample partially one of convenience, mostly white, and highly educated; cross-sectional design; self-report data.
Boehmer et al. (2013) [17]	U.S. (Massachusetts Cancer Registry + national convenience sample)	Nonmetastatic WSW breast cancer survivors (n=161 lesbians, n=19 bisexual women)	Quantitative	Multiple regression models with stepwise variable selection (p=.10); fit reported with R ² statistics.*	Lesbian and bisexual women did not differ in physical or mental health; however, women with female partners fared better than women who were with male partners or unpartnered.	Strengths: Use of validated scales (TPS, Mini-MAC, QLQ-BR23, SF-12); large amount of variance explained in models. Limitations: Small bisexual sample (n=19); sample partially one of convenience, mostly white, and highly educated; cross-sectional design; self-report data.
Boehmer et al. (2013) [18]	U.S. (Massachusetts Cancer Registry + national convenience sample)	Nonmetastatic breast cancer survivors (n=257 heterosexual women, n=181 WSW)	Quantitative	Multiple regression (for linear variables) and logistic regression (for dichotomous variables) models with stepwise variable selection (p=.10); fit reported with R ² statistics or pseudo-R ² statistics.*	WSW generally had lower blood pressure and fewer comorbidities than heterosexual counterparts. However, the impact of mastectomy and radiation in worsening arm symptoms was twice as strong for WSW compared to heterosexual peers. Having health insurance was associated with fewer side effects, an effect three times stronger for WSW v. heterosexual peers.	Strengths: Use of validated scale (QLQ-BR23). Limitations: Sample partially one of convenience, mostly white, and highly educated; cross-sectional design; self-report data.

Boehmer et al. (2014) [19]	U.S.	Convenience sample of WSW (n=85 with history of cancer, n=85 never-diagnosed)	Quantitative	Case control study examining sexual frequency, desire, ability to reach orgasm and pain using multiple general linear models or logistic regression for categorical variables.*	Groups did not differ in risk of sexual dysfunction or overall functioning, but cases had lower sexual frequency, less desire and ability to reach orgasm, and more pain during sex.	Strengths: Case-control design. Limitations: Use of a sexual measure designed for heterosexual women (FSFI); cross-sectional design.
Boehmer et al. (2015) [20]	U.S.	Convenience sample of WSW (n=85 with history of cancer, n=85 never-diagnosed)	Quantitative	Case control study assessing self-reported physical activity, fruit and vegetable intake, weight, QOL, anxiety and depression using multiple general linear models or logistic regression for categorical variables.*	Groups did not differ in health behaviors, BMI, QOL, anxiety, and depression. Both groups were a majority overweight or obese, around 13-15% reporting depression and 37-45% reporting anxiety. More physical activity correlated with lower weight, less depression, and better mental health in both WSW groups.	Strengths: Case-control design; use of validated scales (HADS, SF-12). Limitations: Cross-sectional design.
Boehmer et al. (2016) [21]	U.S.	Sample recruited from prior registry-based study plus a sample drawn from the Army of Women (n=167 matched breast cancer survivor/caregiver dyads)	Quantitative	Multiple logistic regression on fear of recurrence (FOR) using propensity score matching (p<.10). Simultaneous equation models were used to avoid endogeneity, since primary outcomes were patient and caregiver influence on each others' FOR.	Survivor FOR was explained by years since diagnosis, co-residence with partner, caregiver receiving counseling, survivor ISEL scores, receipt of chemotherapy, and sexual orientation. Caregiver FOR was explained by years since survivor's diagnosis, caregiver's discrimination score, caregiver's social support, survivor's anti-estrogen therapy, survivor's comorbidities, and sexual orientation. For both groups, caregiver FOR influenced survivor FOR, but not vice versa. Between groups, WSW survivors and caregivers had less FOR than heterosexual survivors and caregivers.	Strengths: Study design allowed for modeling of causal relationships for FOR. Limitations: Caregiver gender and sexual orientation were not considered; sample lacked racial diversity.

Boehmer et al. (2018) [22]	U.S.	Sample recruited from prior registry-based study plus a sample drawn from the Army of Women (n=167 matched breast cancer survivor/caregiver dyads)	Quantitative	Multiple logistic regression on stress using propensity score matching (p<.10). Simultaneous equation models were used to avoid endogeneity, since primary outcomes were patient and caregiver influence on each others' stress.	WSW survivor and caregiver stress were similar to heterosexual peers; however, WSW dyads showed interdependent stress associations where heterosexual dyads did not.	Strengths: Use of validated scales (ISEL, MSPS, DAS). Limitations: Cross-sectional design.
Boehmer et al. (2019) [23]	U.S.	BRFSS respondents who had a past diagnosis of cancer (n=68,593 heterosexual women, n= 1,931 WSW)	Quantitative	Secondary data analysis of 2014-2017 years of BRFSS data. Survivors were categorized with an access deficit if any one of the following were true: no health insurance, delaying care, avoiding care due to cost, and lacking a trusted physician. Weighted analysis computed odds ratios and 95% confidence intervals using cumulative logit models and logistic regression, taking into account confounders.	WSW reported more access to care deficits—including lack of health care coverage, having no personal physician, avoiding care due to cost, and being without an annual visit—compared to heterosexual peers (p<.0001). WSW with deficits had poorer physical and mental QOL and trouble concentrating compared to heterosexual peers.	Strengths: Use of a large, population-based sample. Limitations: Small WSW sample sizes prevented subanalyses.
Boehmer et al. (2020) [24]	U.S.	Non-metastatic, non-recurrent breast cancer survivors of various sexual orientations (n=167)	Quantitative	Breast cancer survivors surveyed by telephone were assessed for QOL; propensity score weighting accounted for differences by sexual orientation in age and length of dyadic relationships; simultaneous equation models assessed dyads.	There were no differences in QOL by sexual orientation 6-7 years post-diagnosis; sexual minority dyads showed greater dependence on partner QOL scores than heterosexual dyads	Strengths: Propensity score weighting; use of simultaneous equation modeling; dyadic assessment; use of validated measures (SF-12, ISEL-SF, MSPSS). Limitations: Cross-sectional design; small comparative heterosexual group.
Brown & McElroy (2018) [25]	U.S./	SGM breast cancer survivors (n=68) ages 18-75	Mixed methods	Purposive and referral sampling were used to recruit SM breast cancer survivors to complete an online survey. Bivariate analyses were conducted using cross-tabulations and chi-square tests to determine	25% of the sample elected to "go flat" or not receive breast reconstruction. "Flattopers" were more likely to identify as genderqueer, be out to their providers, and participate in SGM support groups	Strengths: This is one of only 2 known studies to report transgender/genderqueer outcomes of breast cancer in their own words; use of a previously developed scale (BITS). Limitations: Cross-

				<p>differences between those electing to choose bilateral mastectomy without reconstruction versus those who did not. NVIVO was used for thematic analysis of open-text questions.</p>	<p>compared to the rest of the sample. There were not significant between-group differences for the BITS. Qualitative themes from open-text responses included reasons for "going flat," interactions with health care providers, gender policing/heterosexism during treatment, and mixed physical and emotional outcomes of treatment choices.</p>	<p>sectional design; predominantly white sample.</p>
Jabson, Donatelle, & Bowen (2011) [26]	U.S.	SM breast cancer survivors (n=68)	Quantitative	<p>Purposive sampling via known WSW gathering places recruited WSW breast cancer survivors to participate in an online survey focused on perceived discrimination, social support, stress, and QOL; regression models examined predictive value of independent variables (perceived discrimination, support, stress) on QOL.</p>	<p>Most WSW (92%) reported being treated similar to heterosexual peers. Thirty-nine percent of participants indicated they were perceived as heterosexual by their health care team. Perceived social support and perceived discrimination were statistically significant predictors of better QOL, because perceived heterosexuality was a construct of the discrimination scale and associated with better QOL.</p>	<p>Strengths: use of validated scales (BSS, QOL-CSV, PSS) and adaptation of previous discrimination scale that showed strong reliability ($\alpha=.75$). Limitations: Predominantly white, educated, insured, partnered, economically stable convenience sample; missing data may skew results toward the null.</p>
Jabson et al., (2011) [27]	U.S.	Breast cancer survivors (n=143 heterosexual, n=61 WSW women)	Quantitative	<p>Convenience sample of 204 breast cancer survivors were recruited to an online survey. Means and standard deviations of global QOL and four subscales (physical, psychological, social, and spiritual well-being) were compared by sexual orientation (heterosexual v. WSW).</p>	<p>Overall QOL as well as subscales of QOL did not statistically differ between groups.</p>	<p>Strength: Use of validated scale (QOL-CSV). Limitation: Predominantly white, educated, insured, partnered, economically stable convenience sample; missing data may skew results toward the null.</p>
Jabson &	U.S.	Breast cancer	Quantitative	Convenience	WSW had higher	Strength: Use of

Bowen (2014) [28]		survivors (n=143 heterosexual women, n=68 WSW)		sample of 211 breast cancer survivors were recruited to an online survey. Means and standard deviations of perceived stress were compared by sexual orientation.	perceived stress than heterosexual peers in regression modeling.	validated PSS. Limitation: Predominantly white, educated, insured, partnered, economically stable convenience sample; missing data may skew results toward the null.
Jabson, Farmer, & Bowen (2015) [29]	U.S.	Cancer survivors participating in the NHANES from 2001-2010 (n=576 heterosexual women, n=26 WSW).	Quantitative	NHANES data from 2001-2010 were pooled and 602 cancer survivors were identified. Between group (WSW v. heterosexual) characteristics, health behaviors, and self-reported health were compared using chi-square and t-tests; logistic regression was used to compare WSW v. heterosexual aORs; propensity score adjustment used for sociodemographic variables.	4.3% of the sample self-identified as WSW. WSW were 2.5 times more likely to report past illicit drug use and 60% less likely to report current health as good compared to heterosexual peers.	Strengths: Population-based sample. Limitations: Small sample of sexual minority cancer survivors in NHANES data due to lack of data collection of sexual orientation from 2001-2006 limited the power of the study.
Kamen et al. (2017) [30]	U.S.	SM breast cancer survivors (n=201) recruited through the Army of Women (n=172 lesbian, n=29 bisexual women).	Quantitative	SM women with stage 0-III breast cancer completed surveys capturing demographic and clinical factors, minority stress factors, psychosocial resources, and psychological distress factors; linear regression used to examine associations between demographic and clinical characteristics and distress; associations between minority stress, psychological resources, and psychological distress assessed using partial correlations and controlling for demographic and clinical factors associated with distress; structural equation modeling tested direct and indirect	Discrimination, resilience, and social support were significantly associated with depression after controlling for age, education, income, employment and past chemotherapy. Discrimination, negative identity, resilience, and social support were significantly associated with anxiety. Depression and anxiety were correlated (r=.48). Outness and negative identity were significantly positively associated with distress. Resilience and social support were negatively associated with distress. Discrimination had an indirect association with	Strengths: First study to demonstrate resilience as a positive resource for WSW to buffer the effects of discrimination on distress; use of validated scales (LGB Identity Scale [31], RS-14, ISEL-SF, HADS). Limitations: Self-report, cross-sectional nature of study; lack of sociodemographic diversity in sample.

				effects on distress; statistically significant indirect effects interpreted as mediation.	distress mediated by resilience.	
Wheldon, Roberts, & Boehmer (2019) [32]	U.S.	Female breast cancer survivors stage 0-III (n=330 lesbian, n=525 heterosexual)	Quantitative	Tested a theoretical framework to explain differences in coping between lesbian and heterosexual breast cancer survivors; five subscales from the Mini-MAC Scale used to measure coping with breast cancer among women post-treatment; mediation analysis used to examine the explanatory power of life course factors (e.g., parenting and education) in explicating the association between sexual identity and coping responses.	Lesbian women had less avoidant coping strategies and lower levels of anxious preoccupation than heterosexual counterparts.	Strengths: Replicates other literature indicating resilience among lesbian breast cancer survivors. Limitations: Cross-sectional study with a non-random sample that is mostly white.
<i>Colorectal cancer (CRC)</i>						
Baughman et al. (2017) [33]	U.S.	Queer survivors with a diagnosis of stage III CRC (n=8)	Qualitative	Semi-structured telephone interviews	Participants reported economic challenges associated with insurance coverage, employment, and housing as well as social isolation.	Strengths: This is the only known study focusing on queer CRC survivors; Sample was diverse in sex, sexual orientation, and socioeconomic status. Limitations: Lack of racial/ethnic diversity in sample; lack of staging in CRC respondents.
<i>Prostate cancer (PrC)</i>						
Allensworth-Davies et al. (2016) [34]	U.S.	Gay men age 50+ with a diagnosis of PrC (n=111)	Quantitative	Cross-sectional national survey using multivariate generalized linear modeling with primary outcome as masculine self-esteem.	Men who were comfortable disclosing their sexual orientation to their doctor had higher masculine self-esteem scores. Mental health was positively correlated with masculine self-esteem. This study distinguished experiences of gay PrC survivors from heterosexual	Strengths: use of several validated scales (SF-12, EIPC, PDRQ-9); control of confounding variables; diversity of the study population in terms of age, insurance type, employment status, and treatment protocol. Limitations: convenience sample; lack of

					counterparts in terms of stigma and resilience.	racial/ethnic diversity of participants.
Capistrant et al. (2016) [35]	U.S.	Gay and bisexual men who had been diagnosed with PrC recruited from a national cancer support group network (n=30)	Qualitative	One-on-one interviews probed for experiences with providers; health; sexual functioning; relationships; and informational, instrumental, and emotional support throughout prostate cancer.	Single men in the study reported a need for independence; partnered men indicated varying levels of dependence on partners for support; many participants wished for more support options tailored for gay and bisexual men. In contrast to literature describing heterosexual prostate cancer survivors, most support for gay and bisexual men came from family and friends rather than partners.	Strengths: One of few studies of gay and bisexual prostate cancer survivors. Limitations: The sample was not very diverse: almost all participants were white, gay, and HIV-. There was not clear theoretical basis for the analysis.
Crangle, Latini, & Hart (2017) [36]	U.S. and Canada	MSM who had been diagnosed with PrC within the last 4 years (n=92)	Quantitative	Convenience sample of MSM recruited through a variety of methods; demographic, medical information, and measures of attachment and illness intrusiveness were collected; mediation models were tested using bootstrapping to examine each attachment dimension on subscales of IIRS, controlling for age and days since diagnosis.	Younger age and greater anxious attachment were associated with greater illness intrusiveness. Greater anxious attachment was associated with less comfort with outness. Less comfort with being out to one's provider mediated the association between greater anxious attachment and more illness intrusiveness. This means that comfort with outness could reduce illness intrusiveness for MSM with anxious attachment styles.	Strengths: use of previously developed scales (RQ; IIRS) and a newly developed Outness Inventory that demonstrated strong reliability (subscales a ³ .86). Limitations: Cross-sectional design; self-report data; predominantly white, highly educated sample; variable internal reliability of the RQ.
Hart et al. (2014) [37]	U.S. and Canada	SM who had been diagnosed with PrC within the last 4 years (n=92)	Quantitative	Convenience sample of MSM recruited through a variety of methods; Demographic, medical information, and measures of QOL, HRWOL, change in sexual activity, sexual side effects,	MSM reported significantly worse urinary and bowel function, greater bother of lack of ejaculation than heterosexual peers from other published studies, lower satisfaction with PrC care—but overall health status was	Strengths: Use of validated scales (EPIC; SF-36; MSHQ; CapSURE; ILLS) and a newly developed Outness Inventory that demonstrated strong reliability. Limitations: Predominantly white, educated, and “out” self-

				satisfaction with care, self-efficacy for symptom management, disease-specific anxiety, illness intrusiveness, and "outness level" collected; mean scores were calculated and compared to published population means in studies using the same scale, where possible; open-text responses reported descriptively.	similar. MSM reported significantly worse mental but not worse physical health functioning than heterosexual peers. Nearly half (49%) of MSM reported changes to erectile function and 40.2% indicated less frequency of sexual activity. MSM reported painful erections, climacturia, low libido, changes in self-image, partner struggling with relationship changes, and significant changes in sexual experiences due to lack of ejaculation.	selected sample; cross-sectional design; variation in study design of comparison groups.
Hartman et al. (2013) [38]	Canada	Homosexual couples following one partner's radical prostatectomy due to PrC (n=6; i.e., three couples)	Qualitative	Interpretative phenomenological analysis using inductive coding.	Major themes included acknowledging, accommodating, and accepting sexual changes. Unlike research on heterosexuals, the role of open relationships was helpful in 2 of the 3 partners studied. These couples also benefited from communication (similar to heterosexual couples). For the third couple, sexual dysfunction was so significant that communication did not feel beneficial in helping with sexual health.	Strengths: This study provides a counternarrative to the dominant heterosexual assumptions about sexual health following radical prostatectomy. Limitations: The study was exploratory with a small sample.
Lee, Breau, & Eapen (2013) [39]	Canada	MSM with PCa (n=15)	Quantitative	Pilot study comparing post-treatment QOL in MSM who had surgery to MSM who had radiation for treatment of PCa.	While the sample size precluded statistical comparisons, the radiation group appeared to have fewer sexual side effects post-treatment in terms of retained ability for penetrative and receptive intercourse.	Strengths: Use of validated scales (EPIC, MSHQ). Limitations: Pilot study with small sample prevented statistical analysis; researcher-created sexual function survey not validated.
Lee et al. (2015) [40]	Canada	MSM with PCa (n=16)	Qualitative	MSM were interviewed face-	Themes from semi-structured	Strengths: The first qualitative

				to-face or via video conferencing and asked about sexual QOL after PCa. Interviews were recorded, transcribed, and analyzed.	interviews included sexual dysfunction (e.g. erectile, urinary, ejaculation, and orgasmic), intimacy challenges, and lack of support for cancer and psychosocial needs. Sexual QOL and relationship confidence were lower for those with greater sexual dysfunction. Coping was challenged by lack of support.	study exploring the impact of PCa on MSM survivors' sexual experiences; rich data to develop a new QOL instrument specific to MSM PCa survivors. Limitations: Sociodemographic diversity not discussed.
Hoyt et al. (2020) [41]	U.S.	Gay men who had been diagnosed with PrC (n=11)	Qualitative	Focus groups (n=3) with gay prostate cancer survivors (n=11) using conventional content analysis.	Major challenges for participants included minority stress, intimacy/sexuality concerns, impact on life outlook, healthcare experiences, social support and the gay community, and intersectional identities.	Strengths: 2-3-hour time for focus groups allowed for participant directed discussion; racial diversity in sample. Limitations: Small sample size.
McConkey & Holborn (2018) [42]	Ireland	Gay men with PCa (n=8)	Qualitative	In-depth interviews based on phenomenology were conducted with gay PCa survivors; interviews were recorded and transcribed; data was divided into "meaning units"; credibility and trustworthiness were bolstered by reflexivity, memoing, field notes of interviewee behaviors, and peer review of thematic descriptions from the data.	Three major themes that emerged included: 1) the experience of diagnosis and treatment, marked by shock at diagnosis, overwhelm during decision-making, sexual impacts of treatment; and degree of access to a nurse specialist; 2) experiences of health care service, including disclosure and communication with the care team; and 3) sources of support (e.g., family, friends), heteronormativity of support groups, and lack of gay community resources.	Strengths: First known study to explore gay PCa survivor experiences in Ireland. Limitations: Lack of racial, national, and educational diversity in sample (important since 14-23% of the gay population in Ireland is foreign born).
Motofei et al. (2011) [43]	Romania	Romanian PCa survivors (n=17 heterosexual men, n=12 gay men)	Quantitative	Gay and heterosexual PCa survivors were asked about	Mean IIEF scores were lower after bicalutamide exposure for the	Strength: First known study of gay PCa cancer survivors in

				sexual functioning prior to and after starting bicalutamide monotherapy. A 2x2 factorial ANOVA compared heterosexual v. gay and pre- v. post-exposure to bicalutamide.	full group ($p<.001$) with greater reductions in scores for gay v. heterosexual survivors after exposure.	Romania; only study found to examine sexual impact of a drug by sexual orientation; use of validated scale (IIEF). Limitations: Small sample size; potential for recall bias; binary design does not account for bisexuality.
Polter et al. (2019) [44]	U.S.	PCa survivors who participated in the RESTORE study (n=191) including HIV+ (n=24) and HIV- (n=167) MSM	Quantitative	Cross-sectional, online survey of MSM treated for PCa examined sexual function, bother, and HRQOL using MANOVA and multivariate linear regression to evaluate association of HIV status and HRQOL after controlling for demographic and sexual characteristics.	HIV+ status was associated with lower mean urinary, sexual, and bowel scores on the EPIC after controlling for demographic and sexual characteristics. HRQOL did not differ by HIV status.	Strengths: Use of validated scales (EPIC, SF-12). Limitations: Small number of HIV+ men in the sample; cross-sectional design; evidence of fraudulent responses (procedure used to omit 200 responses was not described).
Rosser et al. (2016) [45]	U.S.	Gay and bisexual men (n=19)	Qualitative	In-depth telephone interviews with gay and bisexual men who had radical prostatectomies.	Themes included shock at diagnosis; depression; anxiety, grief, loss of sexual confidence; changes in sense of "maleness," gay/bisexual identity, sex-role identity; sex interest and partners; disclosure of cancer survivorship status; and changes to relationships including renegotiation of exclusivity with partners.	Strengths: One of few studies focused on gay and bisexual prostate cancer survivors. Limitations: Small sample size.
Thomas et al. (2013) [46]	Australia	Australian MSM with a PCa diagnosis within the last 7 years (n=10)	Qualitative	An asynchronous, online focus group was hosted over 4 weeks with MSM PCa survivors discussing impact of PCa on their lives.	Respondents mentioned accessing support, the challenges of incontinence and sexual changes, changes to sexual relationships, and divergent emotional responses (resilience v. negative outcomes). Respondents also	Strengths: Leveraging online technology to conduct qualitative work is innovative. Limitations: Recall and self-selection bias; all-white sample prevents exploration of diverse MSM outcomes.

					indicated that general practitioners were more empathic than their urologists, and felt their emotional needs were not adequately addressed and that interactions with urologists were often distressing.	
Thomas et al. (2018) [47]	Australia	Australian PCa survivors (n=813)	Quantitative	An online survey asked respondents about demographics, treatment modality for PCa, body image, self-esteem, sexual function and urinary function; a 2x2 ANCOVA was conducted to examine the main effect of two factors: sexual orientation and PCa diagnosis over six outcomes: self-esteem, urinary function, sexual function, appearance evaluation, health evaluation, and health orientation; differences in age and Gleason score were also examined.	Never-diagnosed respondents were statistically significantly younger than cancer survivors. Overall, gay respondents had statistically significantly higher age-adjusted self-esteem scores compared to heterosexual peers. PCa survivors had statistically significantly worse urinary and sexual function and health orientation than never-diagnosed peers. No statistically significant differences in outcomes were found between gay and heterosexual PCa survivors, although urinary function differences only narrowly failed to meet statistical significance (p=.054).	Strengths: Use of validated measures (EPIC, MBSRQ). Limitations: Cross-sectional design; small sample size of gay men with PCa; potential for self-selection (via social media recruitment) and self-report bias.
Torbit et al. (2015) [48]	U.S. and Canada	MSM who received a PCa diagnosis within the prior 4 years (n=92)	Quantitative	A multiple mediation design was used to test both self-efficacy and satisfaction with care on the relationship between physical symptom severity and FOR for PCa survivors.	Worse physical symptoms were associated with greater FOR. Self-efficacy and satisfaction of care mediated the statistically significant relationship between worse bowl function, worse hormone function, and worse sexual function with FOR, respectively. Self-efficacy and satisfaction did	Strengths: Use of a validated tool (EPIC) and tools from prior studies to measure self-efficacy and satisfaction with care. Limitations: Mostly white, educated, partnered sample; cross-sectional design; self-report data.

					not mediate worse urinary function and FOR, but did explain 61% of the variance in the sample for that outcome.	
Ussher et al. (2016) [49]	Australia	Australian PCa survivors (n=124 MSM, n=225 heterosexual men)	Quantitative	Participants were recruited through urology and primary care practices, support groups, SGM community groups, social media, and cancer research volunteer databases; multiple regression and independent samples t-tests assessed group differences; Pearson's correlations assessed associations between MSM and heterosexual samples; multiple linear regression was used to identify meaningful predictor variables for HRQOL.	MSM were younger, less likely to be partnered, and more likely to have casual sex than heterosexual peers in the sample. MSM reported worse HRQOL, worse masculine self-esteem, lower satisfaction with care, higher psychological and cancer-related distress, greater ejaculation concerns, higher sexual functioning, and more sexual confidence at statistically significant levels compared to heterosexual peers.	Strengths: Use of validated tools (FACT-P, BSI-18, CSFQ-M, DSC, EPIC, MAX-PC, PCaQOL). Limitations: Differences between MSM and heterosexual samples (e.g., age, ethnicity, employment status, relationship status, and treatments received).
Ussher et al. (2017) [50]	Australia, New Zealand, U.K., U.S.	Australian MSM PCa survivors (n=124) and their partners (n=21); subset interviewed (n=46 survivors, n=7 partners)	Mixed Methods	An online survey of MSM PCa survivors (n=124) and their male partners (n=21) explored sexual experiences, relationships, and psychological wellbeing after treatment; a subset of this sample opted to also be interviewed (n=46 survivors and n=7 partners); descriptive statistics from the survey and themes from the interviews were reported.	Survivors reported erectile dysfunction, emotional distress, feelings of sexual disqualification, both negative and adaptive impacts on gay identity, loss of libido, climacturia, pain during anal sex, lack of ejaculation, and penile shortening.	Strengths: Use of validated measures (EPIC-Sexual Domain, CSFQ-M, FACT-P); mixed methods design.
Wassersug et al. (2013) [51]	International: Primarily U.S., Australia, Canada, and U.K.	Men (n=556) from 17 countries with a diagnosis of PCa (n=460 heterosexual men and n=96 MSM)	Quantitative	Logistic regression and Wald tests assessed outcomes including sexual health, urinary incontinence, and depression.	No between group differences were found for urinary incontinence or erectile dysfunction; however, MSM were more bothered by	Strengths: International reach, adaptation of validated scale (EPIC). Limitations: Sample is largely affluent with

					sexual impacts of PCa than heterosexual peers.	access to the internet.
Wright et al. (2019) [52]	U.S. and Canada	MSM (n=189) with a diagnosis of PCa recruited from Malecare, an online cancer support organization	Quantitative	Linear regression was used to compare participants with cats only, dogs only, both cats and dogs, or no pets on SF-12 mental and physical component scores.	Participants with pets had lower mental health scores than non-pet owners. Cat owners had better physical health than other groups.	Strengths: First study to look at companion animal ownership association with mental and physical wellbeing; use of validated scale (SF-12). Limitations: Convenience sample; cross-sectional design; inability to determine directionality of association; no heterosexual control group.
<u>Multiple cancers</u>						
Boehmer et al. (2011) [53]	U.S. (California)	CHIS respondents ages 18-70 (n=122,345 CHIS respondents, n=10,942 survivors)	Quantitative	Pooled data from CHIS 2001, 2003, 2005 using logistic regression; primary outcomes were prevalence of cancer and self-reported health.*	WSW had ≈ 2.0 odds of fair/poor health compared to heterosexual counterparts with greater risk for racial minorities and older women; greater prevalence and younger diagnosis of cancer were reported by MSM compared to heterosexual counterparts but self-reported health was not different for MSM.	Strengths: Large, population-based sample (CHIS); first known study to report prevalence of cancer and self-reported health of cancer survivors by sexual orientation. Limitations: Data collected only from one state; self-reported nature of the data.
Bryson et al. (2018) [54]	Canada	SGM breast and gynecological cancer survivors (n=81)	Qualitative	Purposive sampling used to recruit diverse sample of SGM breast cancer survivors across Canada; semi-structured interviews conducted to explore patient experiences of care, health outcomes and decision-making.	This study reported on perceptions of how intersectional identity influenced feelings of safety and interactions with health care providers. It provides evidence that cisnormative systems negatively shaped care experiences for genderqueer people. Relevant to the present review outcomes reported were: physical impacts of cancer treatment that resulted in altered experiences of gender in society; lack of preparation or hormonal	Strengths: Diversity of sample; rich exploration of narratives; large sample; one of two known studies of genderqueer cancer survivors sharing their experiences in their own words. Limitations: No notable limitations.

					treatment for surgery-induced menopause; and mental health effects associated with lack of hormonal treatment.	
Kamen et al. (2014) [55]	U.S.	Men who reported sexual orientation in the BRFSS in 2009 from Arizona, California, Massachusetts, Ohio, and Wisconsin (n=14,354)	Quantitative	The complex sampling procedure in SPSS (v. 20.0) weighted the sample based on demographic variables and state of residence; statistically significant between-group differences were used as co-variables for a logistic regression and t-tests examining outcomes.*	Gay men were 82% more likely to report a cancer diagnosis ($p<.05$) and were more likely to report less exercise, more distress, and greater alcohol and/or tobacco use. These health behaviors were shown to continue after a cancer diagnosis for gay men.	Strengths: Population-based sample from five states; first study to examine cancer disparities among gay men. Limitations: Cross-sectional design of BRFSS; potential lack of disclosure of sexual orientation among respondents.
Kamen et al. (2015) [56]	U.S.	LiveStrong survey respondents: n=207 SGM, n=4899 heterosexual cancer survivors in 2010	Quantitative	Propensity matched cancer survivors (n=621 heterosexual v. 207 LGBT survivors) assessed for distressed, difficulties with social relationships, fatigue and energy; symptoms assessed through dichotomous yes/no items and analyzed using Poisson regression; subgroup analyses by sex conducted.	SGM men reported greater depression and more relationship difficulties compared to heterosexual counterparts. SGM women did not have differences compared to heterosexual peers.	Strengths: First-known study to examine psychological distress of sexual minority cancer survivors. Limitations: Cross-sectional design of the study.
Kamen et al. (2015) [57]	U.S.	291 SGM cancer survivors (n=159 MSM, n=123 WSW, n=7 transgender men, n=2 transgender women)	Quantitative	Participant demographics, cancer diagnosis, experiences of care, support-related factors, and self-rated health were assessed through a researcher-developed survey; descriptive data reported; logistic regression used to compare outcomes.	Parental support was the strongest single factor associated with good health followed by having a partner present during cancer diagnosis.	Strength: One of the largest studies of SGM cancer survivors at the time of publication. Limitations: Researcher-created survey that has not been validated; self-report data; cross-sectional design; self-selection bias; recall bias of support and comparison of support at diagnosis with present self-reported health.

Kamen et al. (2016) [58]	U.S.	Queer (n=10) and heterosexual (n=12) cancer survivors	Quantitative	Randomized controlled trial of a 6-week exercise intervention comparing survivor-only v. survivor-caregiver dyad using independent samples t-tests.	At baseline, queer survivors reported greater depression ($p=.01$) and fewer steps walked ($p=.03$) compared to heterosexual counterparts. Post-intervention, there were no differences between queer v. heterosexual survivors, but survivors with partner support had a significantly greater reduction in depressive symptoms compared to the survivor-only group.	Strengths: One of very few interventional studies to improve QOL of queer cancer survivors; use of validated scales (CES-D, STAI, DSQ). Limitations: Small sample size.
Lisy et al. (2019) [59]	Australia	Australian cancer survivors (n=2115)	Quantitative	Cancer survivors diagnosed between 2009-2013 were identified through the Victorian Cancer Registry and asked to complete a survey about demographics, QOL, social difficulties, and information needs; descriptive data reported as well as between-group differences (SGM v. heterosexual).	Of the 2115 Australian cancer survivors who responded to the survey, 33 (1.6%) disclosed SGM status. SGM survivors had significantly fewer financial, support, and communication challenges post-treatment but greater challenges with diet and lifestyle than heterosexual peers. SGM survivors were more likely to report anxiety/depression and body image challenges, but not at a statistically significant level.	Strengths: First population-based survey of SGM cancer survivors in Australia; use of some (unspecified) validated measures. Limitations: Questionnaires were not validated; small SGM sample; sexual orientation was not decoupled from gender identity.
Matthews et al. (2016) [60]	U.S.	SGM cancer survivors (n=175)	Quantitative	Cancer survivors were recruited through SGM-serving organizations to take an 82-item online survey asking about demographics, cancer type, comorbid conditions, health behaviors, and QOL; descriptive statistics summarized demographics; multivariable models were created to explore associations with physical and	Lower physical QOL scores were associated with older age at diagnosis, breast or gynecological cancer, medical co-morbidities, overweight or obesity, and cancer recurrence ($p<.05$). Lower mental QOL scores were associated with younger age at diagnosis, lack of physical activity, FOR, lower levels of social and emotional support, and	Strengths: Use of a validated QOL measure (SF-12); diversity of type and stage of cancer as well as geography distribution across U.S. Limitations: Cross-sectional, convenience sample; limited racial/ethnic diversity in sample; no comparison group.

Abbreviations: aOR=adjusted Odds Ratio; DCIS=Ductal Carcinoma In Situ, BrC=Breast Cancer, CRC=Colorectal Cancer, FOR=Fear of Recurrence, PrC=Prostate Cancer, HRQOL=Health Related Quality of Life, MSM=Men who have Sex with Men, SGM=Sexual and Gender Minorities, QOL=Quality of Life, WSW=Sexual Minority Women

*Appropriate tests were conducted to compare demographic and clinical characteristics between groups.

Breast cancer survivorship

The majority of studies found on SGM people with a history of cancer focused on breast cancer survivors, mostly comparing lesbian survivors to heterosexual counterparts. Half of the studies on breast cancer were quantitative and analyzed a variety of outcomes from the same two cohorts or subsets of those cohorts [11-13,15-18,21] and [15,19,20,22,24]. Given that half of the analyses were conducted in the same two samples of women, extrapolating findings from these studies on SGM with a history of breast cancer should be done with caution. Nevertheless, studies from these two cohorts combined with additional qualitative studies and one mixed methods study yielded important insights.

Participants studied were mostly white, educated, and employed. Women who have sex with women (WSW, a term used to be inclusive of lesbian, bisexual, and queer women and women who do not identify in these ways but partner with women) and heterosexual peers had similar quality of life (QOL) [12,27] with a few exceptions. WSW with less financial means and those who experienced greater discrimination were more likely to have poorer physical health and increased anxiety and depression [12,13]. WSW also reported greater stress [28]. In one study, discrimination was associated with anxiety, but resilience and social support buffered this association [30]. WSW in these studies and their caregivers also showed greater dyadic effects on quality of life compared to heterosexual couples [24].

WSW reported more adaptive coping and improved health behaviors in response to a cancer diagnosis. After cancer diagnoses, WSW with BMI greater than 25 were more likely to lose weight compared with heterosexual counterparts, eliminating a statistically significant pre-diagnosis difference [11]. WSW reported less avoidant coping and anxious preoccupation than heterosexual peers [16,32]. For WSW, having a partner was associated with better sexual function, greater sexual desire, better mental and physical health, and less fear of recurrence compared to heterosexual counterparts [15-17,19,21]. In addition, WSW reported being less focused on body image, suffered fewer identity issues due to breast cancer and chose not to have reconstruction more often than heterosexual peers [14,25,54]. However, WSW reported more challenges with access to care [23] and experienced more physical complications related to mastectomy and radiation than heterosexual peers [18]. Counter to other studies, one study demonstrated an association between degree of “outness” (defined in the study as the number of relationships in which people were open about their identity) and higher distress [30], which may suggest increased experiences of stigmatization when people were open about their identities. While WSW did not perceive they were treated differently based on sexual orientation, 39% of WSW in one study said they were assumed to be heterosexual by their health care team [26]. Whether level of outness is linked to discriminatory experiences has not been explored. Overall, WSW displayed more resilient behaviors than heterosexual peers, though one study indicated there were no between-group differences in resilience based on sexual practices (WSW vs. heterosexual women) [10].

Prostate cancer survivorship

Studies on people with a history of prostate cancer primarily focused on genitourinary and relationship changes for men who have sex with men (MSM). MSM reported more genitourinary challenges than heterosexual peers, including worse urinary and bowel function, lack of ejaculation, changes to erectile function, climacturia, pain during anal sex, penile shortening, loss of libido, and less frequency of sexual activity [37,50,51]. MSM with HIV reported more significant detrimental effects of treatment than MSM without HIV [44]. One study showed that MSM had greater sexual dysfunction after bicalutamide monotherapy compared to heterosexual peers [43].

In qualitative studies, people with a history of prostate cancer reported fearing rejection and sexual abstinence after treatment: “Afterward I felt like I would never find another partner again and there was a depression” [35]. Among MSM who were dating or seeking casual sex,

disclosure was seen as a challenge: “A lot of people hit on me, but I just dread that part in the conversation where I have to go, ‘Well, just so you know, I’m a survivor of prostate cancer and there’s never going to be any cum” [45]. Erectile dysfunction led to break-ups in some cases: “For a month or so it was going really nicely, but about a month in he stopped in the middle of sex one night and he said, ‘I’m sorry, you’re just not hard enough for me.’ I was really upset because I was developing feelings for him” [45]. Loss of spontaneity was another noted adjustment:

Everything has to be planned ahead of time. How much are you drinking? How much salt did you take? Did you take Cialis? If you’re on a date, you may want to have 100 milligram Viagra in your pocket. If you have any chance of going home with somebody, if you want to leave and do that, you can’t drink a lot beforehand because you don’t want to pee in the guy’s bed. All the stuff I never used to think of, ever. It was just wham, bam, thank you, man. You were much more free. Now, all the spontaneity is gone, which is a shame [45].

Several studies reported changes to MSM survivors’ sense of identity as gay men, resulting in changes to relationships and worse mental health [37,40,45,50]. In one qualitative study, MSM describe erectile dysfunction as a persistent problem that is paramount to being “sexually inferior” or “leading to a sense of ‘disqualification’ of the sexual experience” [50]. Sexual changes were reported to adversely affect the mental health and identities of MSM. In Ussher et al.’s [50] study, a gay interviewee reported that erectile dysfunction was “the most horrific thing that I’ve ever been through psychologically.” Another respondent indicated decisional regret, preferring to “take my risks with the cancer” if he could go back in time. One MSM interviewee explained his loss of libido as “a profound change in identity” and another said he felt “outside the sexual community” after the change in his sexual function [50]. Two qualitative studies found that renegotiation of exclusivity was one strategy that couples used to cope with physical symptoms and reduced sexual interest of the survivor. Specifically, survivors in this study encouraged partners to obtain sexual satisfaction outside of their relationship [38,45]. In contrast, some MSM reported more profound intimacy with their partner [45,50] after cancer diagnosis and treatment.

Several studies demonstrated benefits of MSM’s disclosure of sexual identity to their providers. In one study, MSM who were comfortable disclosing their sexual orientation had greater masculine self-esteem scores, which was linked to greater mental health [34]. Another study demonstrated reduced anxiety and less illness intrusiveness for MSM who had shared their sexual orientation with providers [36].

Studies also highlighted lack of resources and support tailored for MSM [42,46]. In Ussher et al.’s qualitative study [50], one MSM respondent summarized the issue like this: “Most health care professionals and others working in the prostate cancer field have no understanding of the different ways that prostate cancer can affect gay and bisexual men. Not just sexually, but in the non-sexual side of relationships. It’s as though we’re invisible.” Other MSM described discomfort with a support group that was mostly attended by heterosexual people: “It’s horrifying because there’s this old man talking about sex with the wife. They don’t want to hear about my problem. I didn’t want to hear about theirs. It didn’t work for me” [35]. In the same study, single MSM expressed the need to be extremely independent and not seek out support: “I was alone to recover... I didn’t really want a lot of company. I mean, I’m walking around the house with a catheter tube sticking out of me, it wasn’t really the time” [35]. Other participants noted that they did not want to bother their friends or chose to hire staff to help them rather than seek help from their friends [35].

Transgender cancer survivorship

Only four studies included transgender and/or genderqueer respondents [25,54,57,59]. Bryson et al. [54] found that intersectional identities impacted the experiences of transgender cancer survivors. Brown and McElroy [25] described health care providers “gender policing” when genderqueer patients made the decision to “go flat” and declined breast reconstruction. These experiences and treatment choices were associated with mixed physical and emotional outcomes. Participants reported being unprepared for early menopause and mental health impacts of hysterectomy. Kamen et al. [57] and Lisy et al. [59] included transgender respondents in their study, but the former did not stratify outcomes specific to transgender respondents, and the latter did not decouple gender identity from sexual orientation.

Critical appraisal

Most studies were either 1) secondary analyses of state-level data where data were available on sexual orientation and gender identity in population surveys or 2) cross-sectional surveys of survivors that could be subject to recall, self-selection, and social desirability bias. Only one study assessed the impact of a therapeutic drug on survivor outcomes [43]. The study was based on binary assumptions about sex and sexual orientation. However, it is singular in demonstrating hormone-based differences in response to cancer pharmacotherapies. A strength among many studies was use of validated measures, although sometimes these had to be adapted to be responsive to the experiences of SGM people. Table 3 catalogs measures used in the included studies.

Table 3
Summary of Validated Scales used in SGM Survivorship Research.

<u>Abbreviation</u>	<u>Scale</u>	<u>Reference</u>
-		
BFS	Benefit Finding Scale	Antoni et al. (2001) [61]
BITS	Breast Impact of Treatment Scale	Frierson, Thiel, & Anderson (2006) [62]
	Brief Symptom Inventory-18	Derogatis & Melisaratos (1983) [63]
BSS	Berlin Social Support Scale Key	Schulz & Schwarzer (2003) [64]
CapSURE	Cancer of the Prostate Strategic Urologic Research Endeavor	Lubeck et al. (1996) [65]
CES-D	Center for Epidemiological Studies Depression Scale	Radloff (1977) [66]
CHIS	California Health Interview Survey	UCLA Center for Health Policy Research (2012) [67]
		Keller, McGarvey, & Clayton (2006) [68]
DAS	Dyadic Assessment Scale	Spanier (1976) [69]
		Clark et al. (2003) [70]
DSQ	Dyadic Support Questionnaire	Vinokur & Vanryn (1993) [71]
EPIC	Expanded Prostate Cancer Index Composite	Wei et al., (2000) [72]
FSFI	Female Sexual Function Index	Rosen et al., (2000) [74]
HADS	Hospital Anxiety and Depression Scale	Zigmond & Snaith (1983) [75]
IIEF	International Index of Erectile Function	Rosen et al. (1997) [76]
IIRS	Illness Intrusiveness Ratings Scale	Devins et al. (2001) [77]
ISEL-SF	Interpersonal Support Evaluation List	Cohen et al. (1983) [78]
Mini-MAC	Mini-Mental Adjustment to Cancer Scale	Watson et al. (1994) [79]
QLQ-BR23	EORTC Quality of Life Scale	Aaronson et al. (1993) [80]
	Memorial Anxiety Scale for Prostate Cancer	Roth et al. (2003) [81]

MBSRQ	Multidimensional Body-Self Relations Questionnaire	Cash (2000) [82]
MSHQ	Male Sexual Health Questionnaire Short Form	Rosen et al. (2007) [83]
MSPSS	Multidimensional Scale of Perceived Social Support	Zimet et al., (1988) [84]
NHANES	National Health and Nutrition Examination Survey	Centers for Disease Control and Prevention (n.d.) [85]
PCaQOL	Prostate Cancer-Related Quality of Life Scales	Clark et al. (2003) [70]
PSS	Perceived Stress Scale	Cohen & Wills (1985) [86]
QOL-CSV	Quality of Life-Cancer Survivors	Ferrell, Hassey, & Dow (1997) [87]
RS-14	Resilience Scale	Wagnild & Young, (1993) [88]
RQ	Relationship Questionnaire	Bartholomew & Horowitz, (1991) [89]
SF-12	Medical Outcomes Short Form-12	Ware, Kosinski, & Keller (1996) [90]
SF-36	Medical Outcomes Short Form 36	Ware, Kosinski, & Keller (1994) [91]
STAI	State-Trait Anxiety Inventory	Spielberger, Gorsuch, & Lushene (1968) [92]
TPS	Trust in Physician Scale	Anderson & Dedrick (1990) [93]

Discussion

Differences among SGM populations

Several studies that synthesized outcomes for people with a history of various cancers indicated worse physical outcomes for SGM compared to heterosexual, cisgender counterparts [29]. However, studies identified no mental health differences between WSW with cancer compared to heterosexual peers. In contrast, a number of studies demonstrated poorer mental health and increased relationship difficulties for MSM with cancer compared to heterosexual peers [56]. In two separate studies, WSW reported lower fear of recurrence while MSM reported greater fear of recurrence compared to heterosexual counterparts [21,48]. In other studies, MSM were also less likely to be partnered than heterosexual people in contrast to WSW, who were more likely to be partnered [17,49]. Partner support appeared to buffer negative effects for WSW [14,16,21], and partner support was associated with greater reduction in depression [57,58]. This buffering effect of partnership was not necessarily true for MSM [37]. The heightened dyadic effect of patient-caregiver quality of life shown in [24] highlights the importance of providers including WSW caregivers in cancer treatment discussions.

Gaps in research

Since the National Academies 2011 report on SGM health, more studies have been published which examine patient-reported outcomes of SGM people with a history of breast and prostate cancers. However, studies exploring the needs and outcomes of sexual minorities with other cancers as well as studies documenting and addressing the needs of gender minorities are severely limited. Only one study focused on people with a history of colorectal cancer. This study reported financial challenges of queer colorectal cancer survivors; however, there was no comparison group and no other studies with which to compare the sample. A few studies examined outcomes of people diagnosed with multiple cancers, but overall, more research on people surviving a variety of types of cancer is needed to understand differences in health-related outcomes for SGM survivors.

A critical gap exists in studies focusing on transgender, genderqueer, gender diverse and intersex patient outcomes. Only four studies mentioned transgender patients [25,54,57,59]. Of these, one study mentioned the term “intersex,” yet no intersex people were actually included in the study; in addition, sexual orientation was not reported separately from gender identity, conflating multiple constructs [59]. Of note, intersex people often refer to themselves as female or male rather than intersex. Therefore, intersex individuals may be overlooked within some studies under binary sex categories when intersex status is not assessed.

Only one study was found that focused on AYA people with a history of cancer. This study found that SGM survivors were less concerned with the possibility of infertility and more open to being non-biological parents than heterosexual peers. However, this one qualitative study cannot be assumed to be generalizable. More work on AYA cancer survivorship that stratifies experiences and outcomes based on sexual orientation and gender identity is needed.

A strength of many of the studies was the use of validated measures. A list of measures is provided in Table 3 for reference. In some cases, measures used were constructed for heterosexual people and were not relevant to SGM populations. This was particularly true of measures focused on sexual function and outcomes. This major limitation of existing measures led researchers to sometimes create or adapt instruments for their studies. Validation of measures focused on SGM sexual outcomes is needed to ensure rigor and reliability of research and to allow for comparisons across studies of SGM survivors.

Finally, only one study was interventional. Kamen et al., [58] found a dyadic exercise intervention for partners to be more effective in reducing depression than a survivor-only intervention. Interventional research to address poorer physical health among lesbian breast cancer survivors and greater sexual challenges for MSM with prostate cancer are needed. Interventional research that provides early and clear information on fertility preservation is also needed for AYA and other survivors regardless of sexual orientation or gender identity.

Limitations and strengths of this study

This study was limited to articles published in English through February 2020 focused on SGM people with a history of cancer that reported a health-related outcome. The language limitation was due to lack of funding to translate non-English papers for the review. The study did not include studies that focused on experiences of care (such as patient satisfaction) or social support unless at least one health-related patient-reported outcome was an endpoint. By delimiting the literature in this way, important patient experiences are not summarized in this review. This study also did not include cancer prevention or screening studies or provider training interventions to address quality of care for SGM patients, since these studies do not focus on post-therapeutic health outcomes for patients. For a recent review that includes patient experiences and quality of care, see Kent et al. [94]. A major strength of this review is its comprehensiveness in summarizing SGM survivorship research to date due to the use of established scoping review methods [7,8] and systematic searches of four databases.

Conclusions

This study summarized important between-group differences among SGM and heterosexual, cisgender counterparts. This review found clear differences in perspectives and health outcomes between WSW and MSM. Thus, researchers should take care to not conflate WSW and MSM when conducting analyses. Gender minority people have been understudied and expanding research in this area will be important to the creation of interventions to improve post-treatment experiences of gender minority people with a history of cancer. Sexual orientation, gender identity, chromosomes, hormone balance, and physical anatomy are separate constructs that should not be conflated. Finally, attention to intersectionality within SGM populations is critical as people with multiple intersecting aspects of their identity may have drastically different needs, experiences, and outcomes than those of SGM people who identify with only one marginalized population.

It is paramount that anatomy (including intersex status), sexual orientation, and gender identity be documented in Electronic Health Records and population-based surveys. Until these important fields are systematically captured by clinicians and researchers, SGM research will continue to be restricted to small sample sizes that are not powered to detect subgroup differences. Studies focused on heterosexual, cisgender populations will need to be replicated in convenience samples of SGM patients, which is poor stewardship of

research funding dollars: Adding sexual orientation, gender identity, and intersex questions to all studies would be more efficient and provide more robust data to inform clinical care.

Finally, a shift to anatomy- and gender-based medicine that accounts for intersectionality is critical to effectively address the needs of SGM people with a cancer diagnosis. Clinicians must be trained on how to tailor medical management based on sexual orientation, gender identity, sexual practices, hormone levels, and physical anatomy rather than by monolithic, binary gender markers. Distinctions between sexual orientation and gender identity in research; structured data collection; and clinician training are critical for evidence-based, quality cancer care to improve health outcomes for SGM people. Furthermore, important cultural distinctions within groups that share sexual orientation, gender identity, and/or intersex categories may yield additional insights regarding within-group differences. Accounting for the diversity of lived experiences of SGM people in research design and analysis will help cancer care better address the needs of diverse populations. In sum, a growing literature describes patient-reported health outcomes of SGM people with a history of cancer, but without systematic registries and/or population-based data collection, data will continue to suffer substantial limitations, thereby reducing utility for clinical practice.

Abbreviations

AYA Adolescents and Young Adults

BMI Body Mass Index

HIV Human Immunodeficiency Virus

LGBTQI Lesbian, gay, bisexual, transgender, queer, and/or intersex

MSM Men who have sex with men

NIH National Institutes of Health

PICO Patient/Population/Problem, Intervention, Comparison, Outcome

SGM Sexual and gender minorities

QOL Quality of life

WSW Women who have sex with women

Declarations

Ethics approval and consent:

This article does not contain any studies with human participants or animals performed by any of the authors.

Consent for publication:

Not applicable.

Availability of data and materials:

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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MPC conceptualized and designed the study and wrote the majority of the manuscript. AA and CR-D provided feedback on methods and conclusions, reviewed articles from the EMBASE search, and contributed to manuscript revisions.

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Figures

Figure 1

Flow chart of Scoping Review Process

Figure 2

PRISMA Diagram of Study Selection

Supplementary Files

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- [PRISMAScRFillableChecklist.pdf](#)
- [Appendix.pdf](#)