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Cancer screening attendance rates in transgender and gender-diverse patients: a systematic review and meta-analysis

Alvina Chan ,[1] Charlotte Jamieson,[1] Hannah Draper,[1] Stewart O'Callaghan ,[2] Barbara-ann Guinn [3]

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[1]Hull York Medical School Centre for Biomedical Research, Hull, UK
[2]CEO, OUTpatients, London, UK
[3]Centre for Biomedicine, University of Hull, Hull, UK

Correspondence to:
Dr Barbara-ann Guinn, Centre for Biomedicine, University of Hull, Hull, East Riding of Hull, UK; barbara.guinn@hyms.ac.uk

AC and CJ contributed equally.

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ABSTRACT

Objectives To examine disparities in attendance rates at cancer screening services between transgender and gender-diverse (TGD) people in comparison with their cisgender (CG) counterparts, and to determine whether these differences were based on the anatomical organ screened.

Design Systematic review and meta-analysis.

Data sources PubMed, EMBASE (via Ovid), CINAHL Complete (via EBSCO) and Cochrane Library from inception to 30 September 2023.

Methods Studies for inclusion were case-control or cross-sectional studies with quantitative data that investigated TGD adults attending any cancer screening service. Exclusion criteria were studies with participants who were ineligible for cancer screening or without samples from TGD individuals, qualitative data and a cancer diagnosis from symptomatic presentation or incidental findings. A modified Newcastle-Ottawa Scale was used to assess risk of bias, during which seven reports were found incompatible with the inclusion criteria and excluded. Results were synthesised through random-effects meta-analysis and narrative synthesis.

Results We identified 25 eligible records, of which 18 were included in the analysis. These were cross-sectional studies, including retrospective chart reviews and survey analyses, and encompassed over 14.8 million participants. The main outcomes measured were up-to-date (UTD) and lifetime (LT) attendance. Meta-analysis found differences for UTD cervical (OR 0.37, 95% CI 0.23 to 0.60, p<0.0001) and mammography (OR 0.41, 95% CI 0.20 to 0.87, p=0.02) but not for prostate or colorectal screening. There were no meaningful differences seen in LT attendance based on quantitative synthesis. Narrative synthesis of the seven remaining articles mostly supported the meta-analysis. Reduced rates of screening engagement in TGD participants were found for UTD cervical and mammography screening, alongside LT mammography screening.

Conclusions Compared with their CG counterparts, TGD individuals had lower rates of using cervical and mammography screening at the recommended frequencies but displayed similar prevalences of LT attendance. The greatest disparity was seen in UTD cervical screening. Limitations of this review included high risk of bias within studies, high heterogeneity and a lack of resources for further statistical testing. Bridging gaps in healthcare to improve cancer screening experiences and outcomes will require consolidated efforts including working with the TGD community.

PROSPERO registration number CRD42022368911.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Many transgender and gender-diverse (TGD) people experience difficulties accessing cancer screening and so face potentially increased risks in morbidity and mortality.

WHAT THIS STUDY ADDS

⇒ This systematic review and meta-analysis investigated differences in attendance of cancer screening services between TGD and cisgender people and explored reasons underpinning present disparities.

⇒ TGD individuals have a lower prevalence of being up-to-date with breast and cervical cancer screening.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OF POLICY

⇒ To reduce inequities, individual and institutional barriers must be addressed through research, technological innovation, reviews of current structural design and improved education.

⇒ It is vital that future interventions for TGD people are jointly produced *with* the community to improve both cancer screening experience and outcomes.

Introduction

An estimated 0.3%–0.8% of UK and US people are transgender compared with a worldwide frequency of 0.8%–2%.[1–3] Individuals from transgender and gender-diverse (TGD) communities commonly experience inequalities in healthcare. Notably, 23% of TGD individuals in the USA stated they avoided seeking necessary medical care in the past year due to discrimination and stigma.[4] This is

reflected in cancer screening rates where disparities between TGD and cisgender (CG) individuals are evident. For instance, multiple studies have found that TGD adults have lower prevalences of attending cancer screening at recommended intervals.[5–11]

Moreover, national cancer screening guidelines that are currently available for TGD people are derived from research on CG participants and are only informed by a limited number of studies specific to TGD populations.[12] Many TGD patients have also encountered negative experiences, like harassment or clinicians displaying inadequate knowledge of their management, leading to decreased trust and utilisation of services.[12 13]

Prejudice and discrimination on systemic, structural and individual levels[14] disproportionately impact the well-being of marginalised groups like TGD populations. Disparities in utilisation of cancer screening services may have implications on the morbidity and mortality of TGD individuals.[15] For instance, due to avoiding distress and dysphoria caused by medical procedures involving more 'gendered' anatomical structures, TGD people may be at higher risk of breast, cervical or prostate cancers.[16]

It is important to note that TGD people experience gender dysphoria at different levels—some may not experience any at all. Alongside this, avoidance of procedures varies depending on the individual. Levels of dysphoria may not directly correlate with whether a TGD person avoids a cancer screening procedure as causes are multifactorial.

On a broader scale, social stigma negatively impacts the health of TGD people through minority stress, alongside violence and victimisation. Factors known to be associated with cancer risk[17 18] are more common in TGD compared with CG people, potentially due to minority stress. As demonstrated in a UK-based study of 260 000 CG and 7000 TGD participants,[19] transmasculine (TM) people had the highest prevalence of obesity (27.5%) as well as current and 'ever smoking' (33.7% and 60.2%, respectively), while transfeminine (TF) people had the highest prevalence of dyslipidaemia (15.1%), diabetes (5.4%), hepatitis C (0.7%) and hepatitis B (0.4%). HIV infection was higher in TM and TF people (0.5% and 0.8%, respectively) compared with CG men (0.2%) and women (0.1%).

Furthermore, physical and sexual violence are unfortunately common experiences,[20] especially for transgender women, and 'structural violence such as barriers to gender-affirming (care)' increase the risk of TGD people of developing physical and mental health disorders.[21] For reference, gender-affirming care refers to any interventions that help a TGD person transition to present congruently with their gender identity, which may commonly include hormone therapy and surgical procedures.

To determine whether cancer screening uptake in TGD populations is disparate, we performed a systematic review analysing attendance rates for screening of all cancers with available data. We collated quantitative data on cancer screening attendance within TGD groups to build on previously published qualitative reviews on the same topic. Some have addressed the gaps in the existing literature, noting the lack of culturally competent interventions to reduce healthcare disparities.[22] This review has the potential to quantitate the degree of inequity experienced by TGD patients from the current literature and provide insights from qualitative studies on how the inequalities created by our current healthcare systems could be addressed.

Objectives

This systematic review and meta-analysis compares attendance rates for cancer screening between TGD and CG people. The primary aim is to determine whether there are differences in service utilisation, and the secondary aim is to investigate whether uptake changes based on the anatomical organ are being screened.

Language use

This review acknowledges that codifying gender identities into strict categories may overlook complexities surrounding the topic. Hence, we opted to use terms that encapsulate a broader range of identities while still maintaining structure for analysis.

We chose the terms TM, TF and 'gender non-conforming' (GNC) to categorise TGD identities in data extraction and analysis. In this scenario, we define TM as people who were assigned female at birth but identify with masculine identities. TF is defined as people assigned male at birth who identify with feminine identities. GNC includes people who do not strictly identify with either masculine or feminine identities. These decisions accommodate variations in language and reflect our current understanding of its influence on attitudes towards lesbian, gay, bisexual, transgender, queer or questioning, intersex, asexual, and more (LGBTQ+) communities.[23]

Methods

This systematic review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines[24] and included the development of a protocol[25] and prospective registration with PROSPERO (CRD42022368911).[26]

Eligibility criteria

Eligible studies were required to be cross-sectional or case-control in design and had to include quantitative data relevant to the following PECO framework[25 27]:

- Participants: adults eligible for cancer screening services.
- Exposure: TGD identity—where living as TGD within current societal systems may affect the outcome.
- Comparator: CG identity—where gender congruence is the social norm so theoretically will not affect the outcome.
- Outcome: attendance of cancer screening procedures in percentages or ORs.

All types of cancer screening for different anatomical parts were included in the eligibility for the outcome component—this is for later comparison at the stage of synthesis. Studies without data or only qualitative data on the outcome of interest were excluded (table 1). Further exclusions included data on cancer diagnosis either on symptomatic presentation or as incidental findings. There were no limits imposed on study settings due to paucity of available papers.

Table 1 Inclusion and exclusion criteria

Inclusion	Exclusion
Human studies	Animal studies
Adult participants (aged ≥18 years)	Participants aged under 18 years or not eligible for cancer screening
Transgender or gender-diverse patients (with data gathered from cisgender patients as controls)	Patient gender is not identified or only cisgender patients studied
Cross-sectional or case-control studies	Conference abstracts and posters, unpublished work and review articles
Quantitative data on patient attendance of cancer screening services	Qualitative data
All cancer screening services offered to patients (eg, cervical, breast, colon)	Cancer diagnosis from symptomatic presentation or unintentional findings

Regarding report characteristics, there were no limits on the year of dissemination, but studies needed to be written in or translated to English. We excluded conference abstracts and posters, unpublished work and review articles.

The main groups used in the synthesis will be the different anatomical parts for each type of cancer screening; the subgroups will be broad TGD identities (ie, TM, TF and GNC) to allow inter-population comparison.

Information sources

We conducted searches using four online databases (PubMed, EMBASE (via Ovid), CINAHL Complete (via EBSCO) and the Cochrane Library). A further 'backward snowballing' step was used to extend the capture of literature to the systematic review.[28] This involved performing the screening process on citations identified within review articles that were excluded as part of the systematic review process.

Search strategy

Development of the search strategy[25] was based on index terms found in three to six sentinel articles that an initial PubMed screen of the literature identified. The full search strategy used the above PECO framework to provide structure for the search. Reviewers used the following Medical Subject Headings terms and variations thereof: cancer, screening, transgender and attendance. As per the eligibility criteria, we identified manuscripts from their inception until 30 September 2023 and did not set limits on language or location.

Selection process

The screening process used Microsoft Excel, where search results were exported, and duplicates removed. Two reviewers (AC and CJ) screened articles based on title and abstract and both performed the backward snowballing step. Manuscripts chosen for further assessment were retrieved and read fully.

Reviewers followed the prespecified inclusion and exclusion criteria but were blinded to each other's decisions until screening was complete. Where there were differences in chosen articles, AC and CJ undertook discussions, each presenting the title and content of their articles and comparing in detail with the eligibility criteria. A third reviewer (BG) resolved any remaining disagreements.

Risk of bias assessment

Quality assessment of the selected studies followed the Newcastle-Ottawa Scale (NOS) for assessing the quality of non-randomised studies in meta-analysis.[29] Assessed characteristics were selection, comparability and outcome. The original NOS criteria were only specific to cohort and case-control studies, so these were modified to suit cross-sectional studies and the needs of the review using existing publications as reference. Papers received ratings of good, fair or poor for risk of bias using previously published thresholds for converting NOS scores to Agency for Healthcare Research and Quality standards.[30]

Data collection process

All reviewers piloted a data extraction form on Microsoft Excel using several manuscripts. Extracted data included information such as publication information (ie, title, authors, publication year, DOI, location), study type, type of cancer screening involved, number of participants involved, participant demographics, results on rates of attendance and more. CJ independently extracted data from studies rated good to fair during risk of bias assessment and resolved any queries via open discussion with AC and BG. Where there was missing data, CJ reached out to relevant authors via email with variable responses.

Data synthesis

We undertook meta-analysis and narrative synthesis using quantitative data on rates of cancer screening attendance among TGD participants. Measured outcomes included up-to-date attendance (UTD) and lifetime attendance (LT) of cancer screening involving varying anatomical locations.

UTD is the proportion of participants attending screening within recommended recall timeframes—this is dependent on the type of cancer screening and the guidelines used by each study as reference. LT refers to whether participants had ever attended one of the screening services that were the focus of our analysis (ie, cervical, breast, prostate or colorectal) at least once in their life.

These data were collected as crude attendance rates in percentages and unadjusted odds ratio (uOR). UOR were permitted for inclusion if the latter was not reported. The review presents the meta-analysed results as forest plots using uOR, representing the odds of a TGD person attending cancer screening in comparison with a CG person.

All articles with full text that were rated good or fair through the modified NOS were deemed eligible for synthesis (table 2). Those rated poor were further inspected, where incompatibilities with our inclusion criteria were noticed (table 1). These papers were hence excluded from data collection and analysis to reduce their influence on risk of bias (table 3). This choice was made as we recognised the greater probability of high risk of bias in our obtained studies—these were observational and often retrospective in nature.

Prior to synthesis, the data were organised on Excel by screened organ, categorised into UTD or LT, and gender identity. Estimates and their SEs were entered directly into RevMan under the 'generic inverse variance' outcome. The software determined random-effects meta-analysis using the DerSimonian and Laird model,[31] along with assessments of heterogeneity. Random-effects analysis was chosen because many variables differed between studies, for example, within participant characteristics or study design. χ^2 and I^2 tests measured the presence and extent of heterogeneity, giving an estimate of how much studies varied. This allows some indication of how reliably results could be interpreted. Further explorations of heterogeneity and publication bias were not possible due to the limited data available.

Meta-analysis used at least three studies per organ screened, as that was the minimum number of datasets available to us for each comparison. Syntheses were performed separately for UTD and LT data. The forest plots included subgroups by gender identity to visualise the distribution of results within TGD populations.

Narrative synthesis substituted meta-analysis for studies not suitable for the method of grouping used. For this same reason, we were unable to conduct Synthesis Without Meta-analysis[32] in lieu of traditional narrative synthesis[33] as originally planned. Relevant report findings noted by the authors after thorough appraisal of each paper were summarised.

Results

Study selection, quality assessment and study characteristics

The searches amassed 2425(AC)/1833(CJ) manuscripts, of which 277/208 were duplicates (figure 1). We identified 25 eligible studies (online supplemental data II),[25] of which 18 were included in the analysis. Seven reports were excluded following closer inspection

Table 2 Risk of bias and quality analysis (NOS)

Study	Selection (/4)	Comparability(/2)	Outcomes (/3)	Decision/Quality
Agénor *et al*[61]	*	**	*	Excluded
Bazzi *et al*[34]	****	**	**	Good
Berner *et al*[13]	*	**	**	Excluded
Charkhchi *et al*[35]	***	**	**	Good
Fein *et al*[62]	*	*	*	Excluded
Gilbert *et al*[36]	**	*	**	Fair
Goldstein *et al*[39]	***	**	**	Good
Goldstein *et al*[40]	***	**	**	Good
Grasso *et al*[42]	****	**	***	Good
Hoy-Ellis *et al*[7]	***	**	**	Good
Kerr *et al*[63]	*	*	*	Excluded
Kiran *et al*[6]	****	*	***	Good
Luehmann *et al*[43]	**	**	**	Fair
Ma *et al*[9]	****	*	**	Good
Pratt-Chapman and Ward[64]	*	**	*	Excluded
Narayen *et al*[44]	**	**	**	Fair
Oladeru *et al*[8]	****	**	**	Good
Peitzmeier *et al*[11]	****	**	**	Good
Premo *et al*[10]	***	*	**	Good
Rahman *et al*[41]	***	*	**	Good
Reisner *et al*[65]	*	**	*	Excluded
Stewart *et al*[37]	***	**	***	Good
Stowell *et al*[45]	***	**	**	Fair
Tabaac *et al*[38]	****	**	**	Good
Woodland *et al*[66]	***	*	*	Excluded

The thresholds for converting the NOS to the AHRQ standards of good, fair or poor[30] were applied as follows: good quality—three-to-four stars in selection domain AND one-to-two stars in comparability domain AND two-to-three stars in outcome domain; fair quality—two stars in selection domain AND one-to-two stars in comparability domain AND two-to-three stars in outcome domain; poor quality—zero-to-one star in selection domain OR zero star in comparability domain OR 0/1 star in outcome domain.

NOS, Newcastle-Ottawa Scale.

during the risk of bias and quality assessment using a modified NOS template (tables 2 and 3; online supplemental data III).[25]

17 selected papers were from the USA, and 1 was from Canada. Publication years ranged from 2015 to 2023. Papers accepted for data extraction were cross-sectional studies, including retrospective chart reviews and survey analyses (online supplemental data IV).[25] The data represented cancer screening for four different anatomical parts. Eight studies described breast cancer,[6–8 34–38] 10 described cervical cancer,[6–8 11 35 37–41] 4 described prostate cancer[7 9 10 38] and 3 described colorectal cancer.[6 35 38] Six articles reported results on multiple organs,[6–8 35 37 38] therefore increasing the pool of data available for analysis.

Meta-analysis for UTD versus LT was performed separately for each of the four cancer screening categories to maximise data capture, that is, breast, cervix, prostate and colorectal. Eleven of 18 studies were added to our meta-analysis.[6–11 34 35 38 39 41] Seven of 18 studies[36 37 40 42–45] could not be included in the quantitative synthesis due to missing data prohibiting the calculation of OR. For instance, some papers did not have CIs, and some used secondary data from national censuses for their CG comparators. We contacted the corresponding authors of these articles for additional information or raw data but did not receive the necessary details required for meta-analysis.

Up-to-date attendance

Meta-analysis identified that the discrepancies for UTD cervical screening (figure 2A(i)) in TGD people were OR 0.37 (95% CI 0.23 to 0.60, p<0.0001). There was no TF subgroup due to the requirement of a cervix. UTD mammography screening (figure 2B(i)) also showed discrepancies overall (OR 0.41, 95% CI 0.20 to 0.87, p=0.02). UTD results for prostate and colorectal screening were not meaningfully different to CG attendance (figure 2C(i) and D).

Common findings from studies not included in meta-analysis generally supported our results. TM individuals had lower prevalences of being UTD with cervical screening.[37 40 42] UTD rates for mammography screening were also reduced for TGD people, with no differences between TGD populations.[37 43]

In contrast, one paper found comparable attendance of mammography screening between TGD and CG participants within the most recent 2 years when analysing data from the 2014 Behavioural Risk Factor Surveillance System (BRFSS) survey.[44]

Lifetime attendance

All LT results in meta-analysis found similar rates of attendance between TGD and CG data (figure 2A(ii), B(ii), C(ii)). There was no LT data available for colorectal cancer screening. In narrative synthesis, no difference was found in LT rates for cervical screening between TGD and CG participants,[36] but lower LT rates were reported for mammography screening.[36 43]

Lung cancer screening

We found one study investigating lung cancer screening via analysis of the 2017 and 2018 BRFSS surveys. This was not a screening type included in the meta-analysis because unlike breast, cervical

Table 3 Articles removed following NOS with main conclusions and reasons for exclusion

Study	Main conclusions	Reason for exclusion
Agénor *et al*[61]	77.1% of 122 TM participants received a Pap test within the last 3 years. Binary-identified individuals underwent screening less than non-binary individuals with lower odds (71.3% vs 96.4%, p=0.004; OR 0.09 (95% CI 0.01 to 0.71)). This study's TM sample had a higher prevalence of Pap test use compared with the US national average for CG women in 2015 (69%), but represented a majority white, insured and college-educated population.	No CG control group—compared TM binary with TM non-binary instead of TGD versus CG.
Berner *et al*[13]	Results from surveying 137 UK-based TM and non-binary people assigned female at birth found many potential areas of improvement for their uptake and experience of cervical screening. Within 64 (47%) eligible participants, 37 (58%) had been screened. Participants reported barriers such as gender dysphoria, stigma and discrimination, issues with male gender markers on records, lack of both trans-specific resources and trans-inclusive approaches in general resources and more.	No CG control group.
Fein *et al*[62]	This survey of 79 TGD participants with potential risk factors for anal cancer suggested that this population had decreased awareness of anal cancer, its risk factors and screening methods due to a lack of trans-specific informational resources.	No CG control group.
Kerr *et al*[63]	This Australian study found within a national survey of 196 TGD participants that only 1/5 claimed to regularly attend cervical screening. Reasons for non-attendance included discomfort with healthcare providers. Healthcare provider recommendation was correlated with regular attendance.	No CG control group.
Pratt-Chapman and Ward *et al*[64]	Within a survey of 58 TGD participants in Washington DC, respondents were more likely to have undergone screening for breast, colorectal, prostate, lung and anal cancer if their healthcare provider had recommended these investigations regardless of current published guidelines.	No CG control group—examined effect of provider recommendation on TGD participants' screening attendance compared with attendance without recommendations.
Reisner *et al*[65]	Self-collected vaginal swabs from 131 TM participants were found to be 71.4% concordant with their provider-collected cervical swabs (15/21 cases of hrHPV identified). Most participants (>90%) reported a preference for the self-collected method, suggesting high acceptability.	No CG control group—measured performance and acceptability of self-collected versus provider-collected cervical swabs within TM participants instead.
Woodland *et al*[66]	Data gathered within this health centre's first year of establishing a comprehensive clinical programme for trans-specific gynaecological care suggested that TGD patients have similar reproductive healthcare needs to their CG patients.	Results represented improvements made within one institution instead of comparing TGD with CG access at baseline. This study explored visits for gynaecological screening within a newly established outreach service specifically for TGD patients.

CG, cisgender; hrHPV, high-risk human papillomavirus; NOS, Newcastle-Ottawa Scale; TGD, transgender and gender-diverse; TM, transmasculine.

or bowel cancer, very few countries have national screening programmes for lung cancer. For instance, the UK only announced the rollout of a targeted lung cancer screening programme in 2023.[46] The authors found that despite similar eligibility and smoking statuses within their TGD and CG groups, the former attended less than the latter at 2.3% and 17.2%, respectively.[45]

Discussion

TGD individuals had a lower prevalence of using breast and cervical cancer screening at suggested frequencies when compared with their CG counterparts. No meaningful differences were found in prostate and colorectal screening. The biggest disparity in attendance was seen specifically in UTD cervical screening.

Levels of discomfort and invasiveness could contribute to this distribution of results. Cervical screening uptake rates in CG women remain low worldwide, likely due to difficulties tolerating examination.[47] This effect is compounded by multiple factors in TGD people. For example, androgen therapy has been associated with increased odds of failure to obtain adequate cervical cytology samples[48] and increased technical difficulty in examination due to atrophic changes to vaginal and cervical tissue.[49] This may necessitate repeated examinations or cause increased discomfort, pain and gender dysphoria, contributing to avoidance of cervical screening.[48]

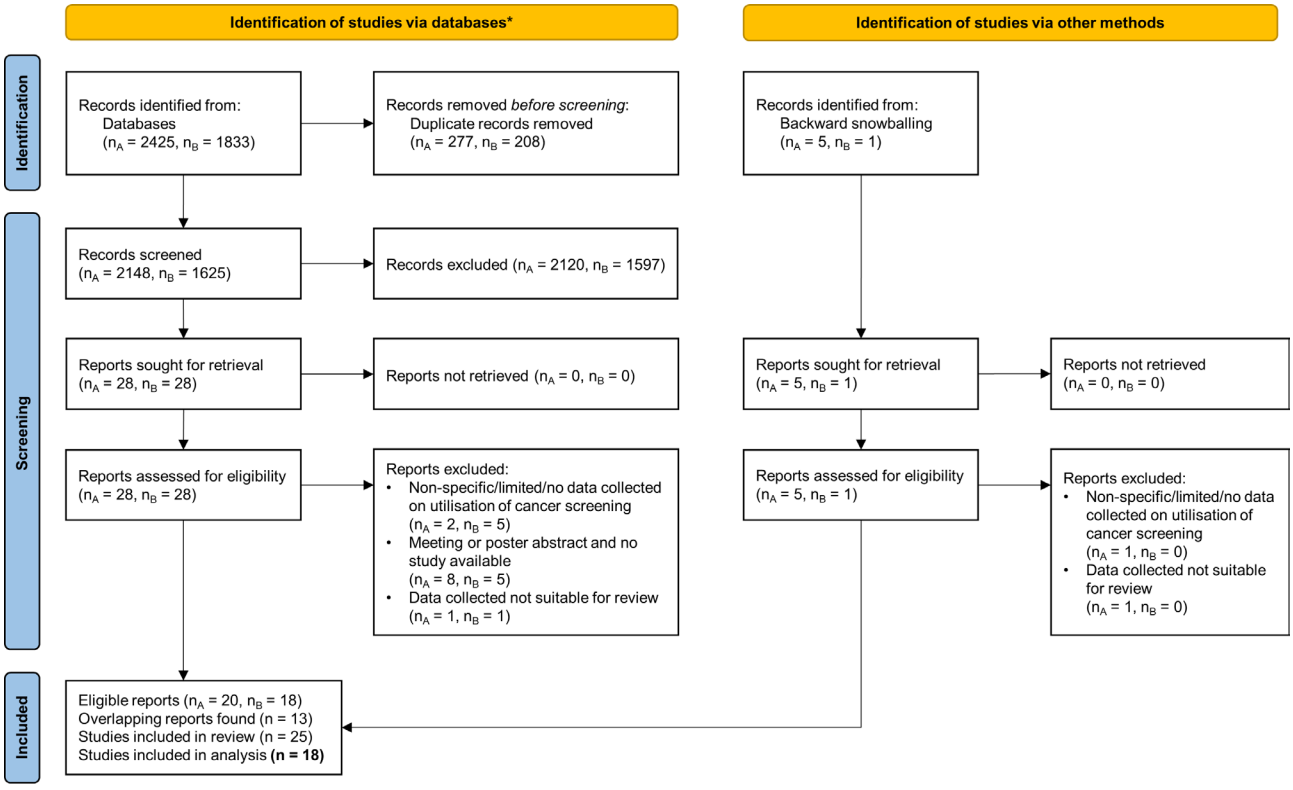
More research is required to investigate differences between TGD identities. One study found higher rates of healthcare avoidance caused by anticipated discrimination in transgender men compared with transgender women (aOR 1.32, 95% CI 1.21 to 1.45).[35] Non-binary and genderqueer individuals in this study were reported to avoid healthcare less (aOR 0.71, 95% CI 0.63 to 0.80) but experience more misunderstanding from providers and make more effort to conceal their TGD identity.[15]

Limitations

This review analysed cross-sectional studies and required modification of the NOS criteria, deviating from the validated framework of the original scoring system. Author bias may have been consequently introduced as our judgements on quality were relative to the standards we deemed necessary for the review.

Most studies included in our analysis had a higher risk of bias due to their observational or retrospective nature. Many analysed survey data, likely introducing volunteer bias. For example, three studies included in the meta-analysis used data from the BRFSS,[8 35 38] and two of these include data from the 2016 BRFSS.

This review was limited by the paucity of available data. The search process could have been more comprehensive by including results from other literature like meeting abstracts. The process



*Two reviewers performed separate searches based on the same search terms and initial query using the same databases; overlapping reports between both reviewers were identified and duplicated removed. n_A and n_B denote results from each reviewer respectively.

Figure 1 Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols flow chart. Diagram showing the selection process of relevant articles, screened by title, abstract and full text, prior to quality assessment and meta-analysis.

also required greater standardisation in implementation, that is, identical search strategies between authors.

We lacked the resources required to perform further statistical tests for detailed analysis of the results. For example, the subgroups in the meta-analysis were unpowered, thus the data from these analyses could not be reliably interpreted. Furthermore, statistical heterogeneity was high, with I^2 >90% for most of the analyses. This was likely attributable to broad inclusion criteria in searches and differences in study design but could not be reliably investigated.

Implications

TGD people may attend cancer screening less frequently due to multiple structural and individual determinants. For example, socioeconomic status independently impacts cancer screening rates through income, insurance and healthcare access. TGD people are more likely to have lower incomes and higher rates of unemployment,[35] affecting screening uptake. Prioritisation of basic needs may take precedence over accessing cancer screening in people with financial or housing insecurity.[50] Health insurance, a major consideration in countries like the USA, can present barriers as well. Cancer screening may not be free on every insurance plan or may be inaccessible to those without insurance.[51 52]

Education may affect engagement with cancer prevention services. While emotional distress strongly prevents LGBTQ+ people from accessing cancer screening, advanced education and increased age are correlated with lower levels of emotional distress.[53] Better patient education could improve screening rates. Several studies suggest that TGD people may receive less education about HPV and its links to head, neck and oral cancers compared with CG people.[41 53] However, once educated, TGD people are likely to understand these risks just as well. Compounded with greater vulnerability to distress surrounding cancer screening and healthcare, TGD people are likely more at risk of poor adherence with screening for HPV-related cancers.

Causes of emotional distress around cancer screening can include anxiety due to anticipated or experienced discrimination[15] and gender dysphoria from intimate procedures or heavily gendered healthcare environments.[5] Poor education of healthcare providers (HCPs) and administrative staff contributes to prejudice against TGD individuals, ranging from avoidance of conversations about screening and safe sex practices to outright discrimination through refusal to provide adequate care.[13]

Evidently, a greater number of studies investigating the experiences of TGD people all across the world is required to better explore what disparities TGD people experience in cancer screening and what factors affect degrees of disparity. Gaps in data exist regarding differences experienced by GNC people. New studies may consider including participant characteristics specific to TGD populations, such as the type of transition being undertaken (eg, medical, social, none) and the length of time that has been involved. Reasons for intergroup differences would benefit from intersectional analyses to evaluate how racism, classism and sexism may affect this in cancer screening.

Further research into how hormone therapy affects susceptibility to cancers and whether this affects how clinicians should approach cancer screening guidelines for TGD populations is needed. For instance, eligibility for breast screening in TF individuals may need to be guided by current age and length of time exposed to feminising hormones.[54]

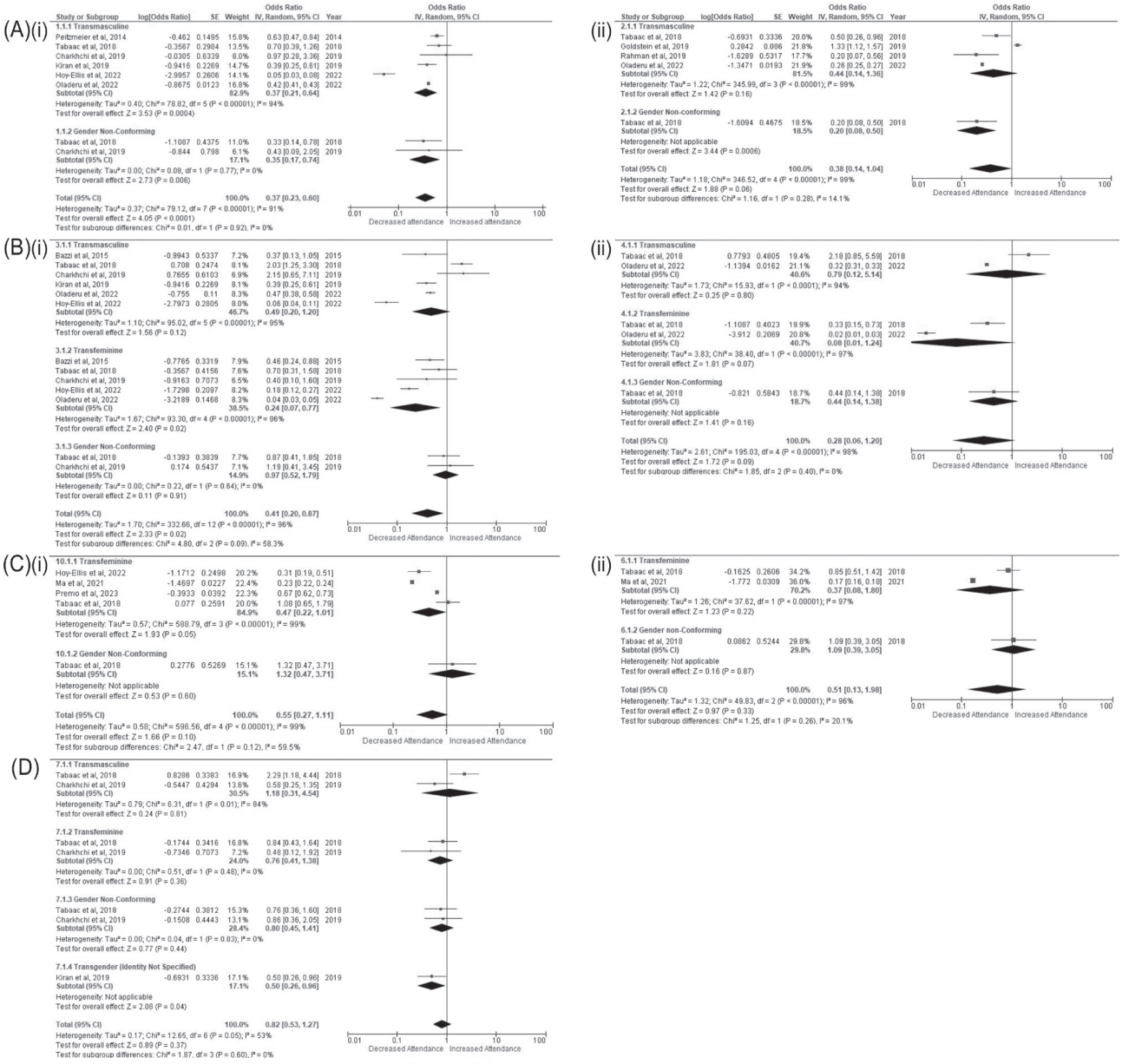


Figure 2 Forest plots for the meta-analysis of TGD individuals at cancer screening appointments. Random-effects meta-analysis shows up-to-date (i) and lifetime attendance (ii) of TGD patients for (A) cervical; (B) breast; (C) prostate and (D) colorectal cancer.

Improved patient engagement with cancer screening may be facilitated by designing healthcare structures for better accessibility,[53] for example, providing gender-neutral environments in settings like breast screening clinics, online systems for scheduling appointments,[40 55] improving medical coding for TGD identities and implementing inclusive cancer screening protocols. Other actions include considering more acceptable alternatives, such as self-collected HPV swabs,[40 55] formal training of HCPs to address ignorance and discrimination,[56] targeted patient education specific to cancer screening and TGD identity with inclusive language[57] and exploring an 'organ-based approach' where screening recalls are tailored based on the relevant organs present.[58]

The relationship between TGD status and cancer screening requirements can be poorly understood by both patients and HCPs, leading to deviations from recommended guidelines as seen in cervical screening.[59 60] Correlations between lower socioeconomic status and lower cancer screening rates suggest that interventions like HCP or patient education alone will not suffice in reducing disparities.

Conclusions

While this systematic review supports the hypothesis that TGD people have lower prevalences of accessing cancer screening, suggestions of areas for improvement are inferred and not conclusive. Historically, interventions implemented to address healthcare disparities experienced by TGD patients have lacked cultural competence[22]; it is imperative to consider this when exploring new interventions.

There are still individual and institutional barriers preventing TGD people from accessing cancer screening services. Further investigations would provide insight into the degree of inequity experienced by TGD patients. Bridging this gap will require consolidated efforts from healthcare systems with a 'multilevel and multifaceted approach'.[15] The joint production of future

interventions with the TGD community is vital to improving both cancer screening experience and outcomes. Good examples include accessible guides devised with TGD individuals, self-sampling programmes and targeted screening programmes.

X Barbara-ann Guinn @GuinnLab

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Contributors AC had the idea for the article, AC and CJ performed the literature search, AC, CJ and BG wrote the article. The planning, conduct, and reporting of the work described in the article was performed by AC, CJ and BG. HD and SO'C provided unique insights based on lived experience while HD, BG and SO'C provided specialist knowledge into the topics discussed. BG is the guarantor and accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

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ORCID iDs
Alvina Chan http://orcid.org/0000-0002-1993-866X
Stewart O'Callaghan http://orcid.org/0000-0003-3978-5020
Barbara-ann Guinn http://orcid.org/0000-0003-0639-4541

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