WGLM#2016537, Vol 0, ISS 0

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JOURNAL OF GAY & LESBIAN MENTAL HEALTH
https://doi.org/10.1080/19359705.2021.2016537

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REVIEW

Mental health and quality of life outcomes of gender-affirming surgery: A systematic literature review

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ABSTRACT

Introduction: Transgender individuals experience disproportionately higher rates of mental health concerns and lower quality of life (QoL) than the general population. Gender-affirming healthcare can reduce negative mental health outcomes and improve QoL. This review explores the mental health and QoL outcomes to accessing gender-affirming surgery for transgender individuals.

Method: Following the PRISMA guidelines, searches were conducted using five databases for peer-reviewed articles, in English, with full-text available online published between January 2000 and August 2021.

Result: 53 studies were included. Findings indicate reduced rates of suicide attempts, anxiety, depression, and symptoms of gender dysphoria along with higher levels of life satisfaction, happiness and QoL after gender-affirming surgery. Some studies reported that initial QoL improvements post gender-affirming surgery were not always enduring.

Conclusion: This review supports the need for more sustainable and accessible gender-affirming surgery as a means for improving the mental health and overall QoL among transgender individuals and indicates the need for further research with greater methodological rigor focusing on correlates of positive gender-affirming surgical outcomes. Without social, legal, and public policy responses to transgender discrimination, marginalization and exclusion, the beneficial outcomes of improved gender-affirming surgery will remain unclear.

ARTICLE HISTORY
Received 9 April 2021
Revised 30 November 2021
Accepted 5 December 2021

KEYWORDS
Transgender; gender-affirming surgery; mental health; quality of life; preferred models of care

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Introduction

This review aims to examine the reported mental health and quality of life (QoL) impacts of accessing gender-affirming surgery among transgender and gender diverse individuals. Globally, it is estimated that anywhere from 2% (Goodman et al., 2019) to 4.5% (Zhang et al., 2020) of the adult population are transgender or gender diverse. Transgender is an umbrella term used to describe individuals whose gender identity and expression do not conform to norms and expectations traditionally associated with sex assigned at birth (American Psychological Association, 2015). Transgender individuals may also self-identify as women, man, trans woman, trans feminine, trans man, trans masculine, transsexual, non-binary, genderqueer, genderfluid, hijra, kathoey, waria, Sistergirl and Brotherboy (within the Australian Indigenous context where the authors are located), or one of the many other transgender identities, and may express their genders in a variety of masculine, feminine, genderfluid and/or androgynous ways (Transhub, 2020; UNAIDS, 2015). Transgender individuals include (but are not limited to) those who have socially transitioned, received gender-affirming surgery, received gender-affirming medical interventions other than surgery (e.g., hormone therapy), and those who identify as having no gender, multiple genders or alternative genders (American Psychological Association, 2015).

Research indicates transgender individuals report lower levels of QoL than the general population, particularly in the domains of mental health, vitality, social functioning, emotion, general health, and body satisfaction (Defreyne et al., 2017; Lindqvist et al., 2017). The World Health Organization (WHO) define QoL as a person's "perception of their position in life in the context of the culture and values systems in which they live and in relation to their goals, expectations, standards and concerns" (2012, p. 3), and includes how one's physical health, psychological state, satisfaction with life, level of independence, social relationships, personal beliefs and environment interact (Moudjahid & Abdarrazak, 2019; Oort, 2005; World Health Organisation, 2012). QoL can be negatively affected by one's status within society, experiences of discrimination, and further confounded by multiple marginalities (when a person is a member of more than one marginalized group and experience cumulative discrimination and social exclusion based on belonging to those groups) (Cyrus, 2017). Gender-affirming healthcare and treatment have been associated with significant improvements in self-esteem, body satisfaction and QoL, and lower levels of anxiety and depression (Ainsworth & Spiegel, 2010; Allen et al., 2019; Bouman et al., 2017; Davis & Colton Meier, 2014; Tomita et al., 2019). Despite these significant benefits, transgender individuals commonly lack adequate access to gender-affirming healthcare, due to various barriers,

including large out-of-pocket costs associated with treatment, limited availability of qualified providers, unstable work opportunities, lack of private health insurance, and political barriers and policies blocking access to gender-affirming health care (Coleman et al., 2012; Grant et al., 2011; Puckett et al., 2018; Tomita et al., 2019, Transhub, 2021).

Review question

Reviews have previously explored the topic of mental health and QoL in the transgender community. With respect to management and care, they have previously explored a variety of gender-affirming medical treatments, primarily focusing on hormonal treatments (Nobili et al., 2018) or levels of psychopathology/psychiatric disorders pre- and post-intervention (Dhejne et al., 2016). This novel systematic literature review, with studies spanning between 2000 and August 2021, specifically examines the intersection of reported mental health and QoL outcomes of transgender individuals who have had gender-affirming surgery, and specifically addresses the research question: What are the mental health and QoL outcomes to accessing gender-affirming surgery for transgender individuals?

Method

This systematic literature review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement recommendations (Moher et al., 2009). The protocol for this review was registered with Open Science Framework (registration link: removed for double-blind peer-review). Each stage of the methodology was completed by three independent reviewers, XX, XX and XX; and Q3 where discrepancies arose reviewers XX, XX, XX and XX were consulted. The results of the search and progression of screening for the research question is displayed in Figure 1.

Search strategy

The data collection was conducted on 11 August 2021, employing searches within the Web of Science, EBSCOhost Megafile Ultimate, Psychiatry Online, ProQuest Academic and Scopus databases. Google Scholar was included in the initial search strategy but provided no new results, therefore was excluded in the final search. In addition, a manual search, of reference lists from eligible manuscripts, was conducted. The search strategy included the terms "transgender", "gender-affirming surgery", "mental health", "quality of life" and related synonyms. Some terms were included

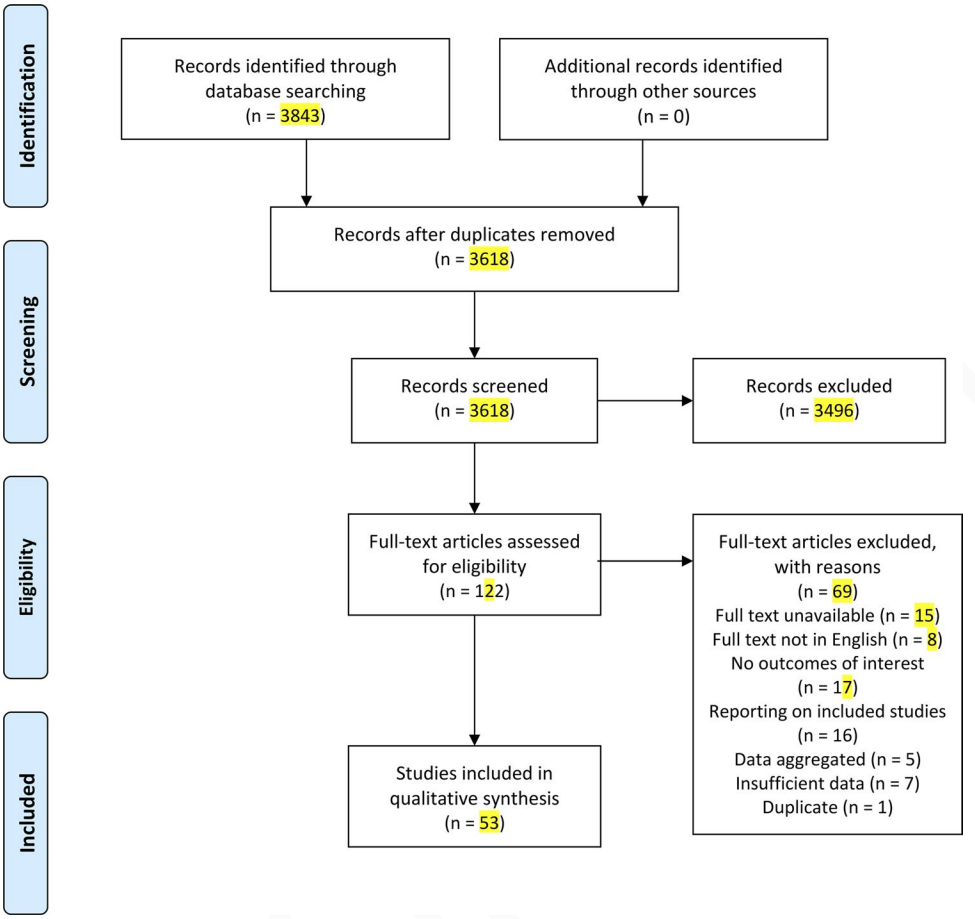

Figure 1. PRISMA flow diagram of review search for research question.

such as "transvestite" to capture older research that used these terms (which are no longer deemed contemporary). The search terms and limiters/filters were modified to the parameters of each database and used in conjunction with the appropriate filters. The general search strategy for the research question can be found in Table 1.

Eligibility criteria

Eligibility criteria for inclusion were limited to publications in English, with full text available online, and to ensure contemporary research and practices were reflected in the works reviewed, the search was restricted to the time-period January 2000 to August 2021. Publications were included if they met the following criteria:

1. examined transgender individuals who have had gender-affirming surgery; and

Table 1. Search strategy.

Search	Search terms
#1	(transgender OR "trans-gender" OR transvestism OR transvestite OR transsexual OR transsexualism OR "trans man" OR "trans men" OR "trans women" OR "trans woman" OR transman OR transmen OR transwomen OR transwoman OR transgendered OR transfeminine OR transmasculine OR "two-spirit" OR "acquired gender" OR brotherboys OR Epicene OR "Fa'afafine" OR "Gender diverse" OR "Gender dysphoria" OR "Gender fluid" OR "Gender non-conforming" OR Genderqueer OR "Gender variant" OR Katoi OR Kathoey OR Katoey OR Pangender OR Sistergirls)
#2	("gender affirming surgery" OR "gender reassignment surgery" OR "gender confirmation surgery" OR "female-to-male surgery" OR "male-to-female surgery" OR "sex reassignment surgery" OR "sex reassignment procedures" OR "gender adjustment surgery" OR "sex change surgery" OR "male-to-female chest reconstruction" OR "female-to-male chest reconstruction" OR phallectomy OR orchiectomy OR vaginoplasty OR "breast implants" OR mastectomy OR hysterectomy OR phalloplasty)
#3	("mental health" OR "mental illness" OR depression OR anxiety OR suicidal OR "suicide ideation" OR suicide OR "quality of life" OR "life satisfaction")
#4	S1 AND S2 AND S3

2. examined mental health or QoL after receiving gender-affirming surgery.

Studies were excluded if they were not accessible in full text online, not in English, published before 2000, did not report on gender-affirming surgery, or did not focus on mental health or QoL outcomes after gender-affirming surgery. The inclusion and exclusion criteria were left broad to allow for the inclusion of Gray literature to be returned in the search. Patient satisfaction with gender-affirming surgical outcomes were deemed beyond the scope of this review as (1) it did not directly answer the research question; and because (2) the sheer volume of variability of surgical results depending on surgical procedure performed, collectively effecting/affecting overall patient satisfaction.

Screening

For this systematic literature review articles were screened using the PRISMA three-phase screening process; removal of duplicates, title and abstract screening and full text screening (Moher et al., 2009). First duplicate articles were identified using Endnote, resulting in 225 duplicates being removed. Then titles and abstracts were screened by reviewers XX, XX and XX to determine eligibility against the inclusion/exclusion criteria for full text screening. Where eligibility was unclear from the title/abstract full text was reviewed and if there were any concerns pertaining to the eligibility criteria XX, XX, XX and XX confirmed eligibility. There were no disagreements between reviewers. Data extraction was conducted by XX and confirmed by XX and XX.

Study quality

Q4 To determine the quality of included studies, studies were assessed utilizing the Critical Appraisal Skills Programme (CASP; 2018) checklists for case control studies, cohort studies, qualitative studies and systematic reviews, as well as the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart Lung and Blood Institute, 2020) and A Mixed Methods Appraisal Tool for Systematic Mixed Studies Reviews (Pluye et al., 2011). Quality ratings were reviewed by XX, XX, XX and XX.

Strategy for data synthesis

Due to heterogeneity of included studies, a meta-analysis was not feasible, and findings of included studies are reported as a qualitative synthesis, consistent with the PRISMA preferred reporting criteria (Shamseer et al., 2015).

Results

The initial search of the databases resulted in a total of 3843 references. After removal of 225 duplicates, 3618 articles remained. Titles and abstracts of remaining articles were reviewed against inclusion/exclusion criteria. 122 articles were eligible to review in full text. Of these, 69 articles were removed with reasons noted (see Figure 1), leaving 53 articles for review. The search results and subsequent exclusion/inclusion stages are reported in Figure 1.

Study quality

Of the 53 studies reviewed twenty-four studies were of high quality; twenty-five studies were of medium quality; and four studies were of low quality. See further details about quality ratings for included studies in Table 2.

Findings

Table 2 provides an overview of the 53 studies including type of study, quality rating, geographic location, participant numbers and demographics, gender-affirming surgery type, time since surgery, measurement tools, and key finding pertaining to mental health and QoL outcomes to accessing gender-affirming surgery. Studies were published between 2006 and 2021

Table 2. Characteristics of reviewed studies (n = 53).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Agarwal et al. (2018)	Cohort Study (10/12)	USA	n = 42 trans men. Average age = 27.7 (range 18–50). 88% identified as White (of these 5% identified as Hispanic), 2% identified as African American, 2% identified as Asian, 4% identified as biracial	Chest masculinization surgery	6+ months	BREAST-Q	• Psychosocial well-being improved significantly post-GAS (31.3 preoperatively to 78.9 postoperatively, p<.001). • Physical well-being improved significantly post-GAS (65.3 to 80.3, p<.001). • Improvements also seen in global severity index (2.68 to 1.20, p<.001), body image concerns (3.49 to 1.33, p<.001), social avoidance behavior (2.51 to 0.74, p<.0001), compulsive self-monitoring (1.62 to 1.25, p<.001), depersonalization (2.35 to 0.82, p<.0001).
Ainsworth and Spiegel (2010)	Cohort Study (7/12)	USA	n = 247 trans women. Mean age = 51.5 years	Facial feminization and other not specified GAS.	NS	SF-36	• The MH QoL of trans women without surgical intervention was significantly lower compared to the general population (p<.05). • MH QoL scores were not significantly different between trans women who had GAS (49.3) and general female population (48.9). • Trans women who had GAS had higher MH related QoL then their non-surgical counterparts.

(*Continued*).

Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Akhavan et al. (2021)	Gray Literature (4/6)	Authors are located in USA	NS	NS	NS	Commonly used instruments include WHOQOL, SF-36, Health Survey, and Satisfaction with Life Survey	• Patients reported better QoL after GAS. • A prospective QoL study in trans men showed significant improvements post GAS, and 91% of trans women reported improvements in QoL after vaginoplasty. • QoL was shown to improve after chest wall masculinizing surgery. • 71% of patients undergoing penile inversion vaginoplasty agree that their GD has resolved as a result of the surgery • An increasing number of GAS procedures are associated with a greater degree of improvement in GD. • Vaginoplasty has been shown to significantly decrease depression and anxiety in trans women • GAS has shown a greater reduction in depression and suicidality versus isolated hormone therapy.
Almazan and Keuroghlian (2021)	Cross-Sectional Study (11/14)	USA	n = 27,715 trans men, trans women and non-binary people	NS	2 years or more	This study performed a secondary analysis of the 2015 US Transgender Survey (USTS)	• After adjusting for sociodemographic factors and exposure to other types of gender-affirming care, GAS was associated with lower past-month psychological distress (aOR, 0.58; 95% CI, 0.50-0.67; p<.001) and past-year suicidal ideation (aOR, 0.56; 95% CI, 0.50-0.64; p<.001) when compared to trans individuals with no history of GAS. • Those who had undergone all desired GAS had significant reductions in the odds of each adverse mental health outcome and the reductions were more profound than those who had only received some of their desired GAS.

Ardebili et al. (2020)	Systematic Review (8/8)	Authors located in Iran	8 studies with 1099 participant (trans men and trans women)	NS	NS	SF-36, WHOQOL-BREF	• Pooled mean of QoL after GAS (n = 633) was 59.17 on the SF-36 (mean for trans men is 57.54 and mean for trans women is 62.47) • Pooled mean of QoL after GAS (n = 466) was 70.45 on the WHOQOL-BREF (mean for transmen is 69.99 and mean for trans women is 70.65).
Awad et al. (2010)	Cross-Sectional Study (5/14)	Brazil	n = 65 (62 trans women, 3 trans men). Mean age = 35.6 years	NS	NS	WHOQOL-BREF	• Psychological, social relationship and environment domains improved significantly post-GAS (p<.001; p=.021, p=.049, respectively).
Becker et al. (2018)	Cross-Sectional Study (8/14)	Germany	n = 202. Mean age in adolescent trans men = 16.90 years and in trans women = 16.55 years. Mean age in adult trans men = 35.36 years and trans women = 43.91 years.	Mastectomy, breast construction, facial surgery, genital surgery	Average in adolescents was 7 months, average in adults was 33.25 months	Body Image Association Questionnaire	• Attractiveness/self-confidence was 1.5 *SD* below the norm (suggesting a negative evaluation of the body, including dissatisfaction and a low identification with physical appearance). • Insecurity/concern was elevated by 0.5 *SD* above the norm (implying significant concerns about physical processes). • Accentuation of body appearance was the only scale with confidence intervals within the norm range, implying that importance placed on taking care of body and appearance was comparable to the German norm. • Those who had received medical interventions scored up to 1 *SD* higher (better attractiveness/self-confidence and more accentuation of body appearance) or lower (less insecurity/concern and less sexual-physical discomfort) than those reported by individuals who had not received medical interventions). • Significant effects of medical interventions on attractiveness/self-confidence and accentuation of body appearance (even after controlling for age and treatment duration), and the group that had already received HT and GAS differed significantly from the other two groups.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Berna et al. (2018)	Case Control Study (6/11)	Turkey	n = 70 (50 new referrals, 20 who have undergone GAS) 45% Trans men, 55% trans women. Mean age = 32.6 years	Breast implants, mastectomy, vaginoplasty, phalloplasty, metoidioplasty	1–22 years	WHOQOL-BREF	• Fear of disclosure of transgender identity higher in group that had undergone GAS. • Other anxiety domains (finding a job, losing one's job, finding accommodation, healthcare, verbal victimization, physical victimization) were higher in the new referral group. • The group who underwent GAS had significantly higher scores on the WHOQOL-BREF social (p=.048), environmental (p<.001), and psychological (p<.001) subscales' and total points (p=.004) than new referral group. • GAS group scored lower (reflecting better outcomes) than new referral group on the affective responsiveness (p<.001), affective involvement (p=.049), general functioning (p=.012), communication (p=.002) and roles (p=.003). • Significant number of surgical complications for those who underwent GAS. • WHOQOL-BREF was higher among those who did not have surgical complications than those who did.

Bränström and Pachankis (2020)	Cross-Sectional Study (9/14)	Sweden	n = 9,747,324 (total Swedish population); 2,679 with a diagnosis of GD. Mean age of those with GD = 31.5 years. Mean age of general population = 40.7 years. Legal gender: 1284 = Male, 1395 = Female	1018 have had GAS. 77.4% hadchest reconstruction surgery (CRS), 53% had reproductive organ surgery, 30.9% had dermatological surgery,6.9% had laryngeal surgery	Time since last GAS: 13.2% = <1 year, 19.7% = 1–5 years, 4.3% = 6–9 years, 0.7% ≥ 10 years	NS	• Among those receiving GAS, the risk of MH treatment was significantly reduced with increased time since last surgical treatment, (adjusted odds ratio = 0.92, 95% confidence interval = 0.87, 0.97). • The likelihood for being treated for a mood/anxiety disorder was reduced by 8% for each year since last GAS. • Pre-GAS, 45.3% of transgender individuals were receiving treatment for a mood/anxiety disorder and 2.8% were hospitalized after a suicide attempt. • 1-year post-GAS, 36.2% were receiving treatment for a mood/anxiety disorder and 0.9% were hospitalized for a suicide attempt. • 2–9 years post-GAS, the rate of those receiving treatment for mood/anxiety disorders averaged 34.25% and 0.12% were hospitalized after a suicide attempt. • At the ≥10-year post-GAS 21.2% were receiving treatment for mood/anxiety disorders and 0% were hospitalized for a suicide attempt. • Treatment for mood/anxiety disorders was still higher than the general population in which 12.5% received treatment for mood/anxiety disorders.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Cardoso da Silva et al. (2016)	Cohort Study (10/12)	Brazil	n = 207 (160 trans women completed pre-GAS questionnaire, 47 completed post-GAS questionnaire.) Mean age = 47 years. Of those who completed pre- and post-GAS mean age = 31.23 years (range 16–54)	Penile inversion vaginoplasty	NS	WHOQOL-100	• Psychological (p=.041) and social relationship (p=.007) domains were improved significantly post-GAS. • Physical health (p=.002) and level of independence (p=.31) were significantly worse post-GAS. • Facets of sexual activity (p<.001), freedom, physical safety and security (p=.002), financial resource (p=.012), health and social care (p=.009) were improved post-GAS. • Fatigue (p=.001), sleep and rest (p=.019), negative feelings (p=.045), mobility (p=.048), activities of daily living (p=.026) and physical environment (p=.001) worsened post-GAS. • 16 (34.04%) did not undergo a new surgical procedure in the 1-year post-GAS. • Individuals who underwent surgical procedures during the 1-year follow up period worsened in the psychological and social relationship domains.
Davis and Colton Meier (2014)	Cross-Sectional Study (6/14)	USA	n = 208 trans men. Mean age = 31.5 years (range 18-64). 79.3% identified as Caucasian, 7.6% as African American, 4.8% as Native American, 2.3% as multiracial, 2.87% as Latino, 1.6% as Asian/Pacific Islander	CRS	NS	Beck Anxiety Index, Beck Depression Index, Snell Clinical Anger Scale	• Those who had CRS and HT had fewer symptoms of anxiety, depression and anger and less body dissatisfaction (p<.001). • No significant difference between the group that has only had HT and the CRS and HT group (p<.05).

De Cuypere et al. (2006)	Mixed Methods (1/5)	Netherlands	n = 62 trans men and trans women. Mean age of trans women = 41.4 years, mean age of trans men = 33.3 years.	NS	1+ year	Utrecht Gender Scale, Global assessment of functioning scale, SCL-90 (Dutch),	• No significance could be shown for GD post-GAS between trans women and control group of Dutch women without GD (p=.415); nor with trans men and a control group of Dutch men without GD (p=.510). • Trans men scored significantly higher on the Global Assessment of Functioning scale (p=.008). • The younger the applicants were at the time of their first consultation, the better they functioned in daily life post-GAS (p=.029). • No significant difference between trans men and trans women on the total score of the subscales in SCL-90. • Those with psychiatric problems in their preoperative history retained more psychological symptoms postoperatively. • Suicide attempt rate dropped to 5.1% (from 29.3%), which is still higher than the average population (0.15%). • Trans men were significantly more satisfied with their social relationships than pre-GAS. • Significantly more trans women had established a stable relationship post-GAS. • Individuals reported that they "felt themselves more real, happier" and "more confident in their own possibilities" compared to pre-GAS.

(*Continued*).

Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
de Rooij et al. (2021)	Cross Sectional Study (10/14)	The Netherlands	N = 102 trans men	Phalloplasty (n = 74); Metoidioplasty (n = 28); Urethral Lengthening was performing in 51/74 phalloplasties and 5/28 metoidioplasties	Patients received surgery between 2004-2019 and were recruited for the study between December 2018 and February 2020	Patient-reported outcome measure	• 80% of participants without urethral lengthening and 71% of participants with urethral lengthening were satisfied to very satisfied with life • 81% of participants would undergo the same surgical procedure if they had to do it all over again
de Vries et al. (2014)	Cohort Study (9/12)	Netherlands	n = 55 (22 trans women, 33 trans men). Mean age at GAS = 19.2 years (range 18–21.3).	Vaginoplasty, mastectomy, hysterectomy with ovariectomy, phalloplasty	1+ years	WHOQOL, Beck Depression Inventory, Spielberger's trait anxiety, Utrecht Gender Dysphoria Scale, Children's Global assessment scale	• GD decreased post-GAS ($p<.001$). • Post-GAS, individuals were similar to general Dutch population in terms of objective well-being. • Psychological functioning improved steadily over time, resulting in rates of clinical problems that are indistinguishable from general population samples. • QoL, satisfaction with life, and subjective happiness scores are comparable to same age peers.

Defreyne et al. (2017)	Systematic Review (6/8)	NS	Trans men	CRS, hysterectomy, oophorectomy genital surgery	NS	NS	• In a study on trans men in Belgrade, participants rarely expressed feelings of regret. • In trans women, MH related QoL diminished post-GAS compared to trans women without GAS. • In studies about trans men post-GAS, the cohorts are often small, and they have produced contradictory results. • In a report on 446 trans men, those that underwent CRS had a higher QoL scores for general health, social functioning and all three MH concepts, compared to trans men without CRS. • A Belgian study of 65 trans men found no significant difference in QoL of those who had GAS and those that didn't. • In an 8-year follow up post-GAS, it was found that the trans men had lower QoL for MH and vitality compared to cisgender males. • Several studies have found an increase QoL and body image in trans men post-CRS, and patients reported less GD and improved self-esteem. • Older studies have shown that gender-affirming genital surgery did not lead to direct psychological benefits. • In a study of 33 trans men post CRS there was a positive effect on their daily life, QoL, social situations, relationships and body image. • Another study showed overall better psychological functioning with reduced anger and anxiety. • Conflicting outcomes on QoL after genital-affirming surgery may be because of complications leading to poor sexual functioning - which can cause psychosocial distress due to decreased psychological well-being and impaired relationship satisfaction.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Dhejne et al. (2011)	Cohort Study (11/12)	Sweden	n = 324. 59% trans women, 41% trans men. Mean age of trans men = 33.3 years (range 20–62). Average age of trans women = 36.3 years (range 21–60)	NS	NS	NS	• Transgender individuals pre-GAS were hospitalized for psychiatric morbidity four times more often than controls. • Post-GAS, that rate dropped to three times as likely (19 cases in the transgender group and 4.2 cases in the control group). • Inpatient care of psychiatric disorders was significantly more common among transgender individuals than among controls both pre- and post-GAS.
Drydakis (2017)	Cohort Study (8/12)	UK	n = 132 (78 trans women, 54 trans men)	NS	All had GAS within the 4 years of the study starting	4-item Mental Health scale	• GAS was positively associated with MH ($p<.01$). • GAS was positively associated with life satisfaction ($p<.01$). • Authors suggest that transgender individuals might experience higher life satisfaction over time post-GAS.

El-Hadi et al. (2018)	Qualitative Study (6/9)	USA and Canada	n = 32 (37.5% trans men, 62.5% trans women.) 53% American, 47% Canadian. Mean age = 33 years (range 18-81)	Mastectomy, breast reducing/ contouring, breast augmentation hysterectomy, bilateral salpingo-oophorectomy, genital reconstructive procedures, facial surgery. 41.7% of trans men has bottom surgery (metoidioplasty, urethroplasty, vaginectomy, scrotoplasty, phalloplasty, hysterectomy, and bilateral salpingo-oophorectomy) 40% of trans women has bottom surgery (orchiectomy, penectomy, labiaplasty, clitoroplasty, and vaginoplasty)	Average was 2.8 years (range 0.5–7 years)	QOL	• 84% agreed that their surgical transition was important to their QOL. • "Before the surgery, I had a lot of depression and dysphoria… and surgery alleviated this". • Respondent stated that GAS had a profound impact on their psyche and that they are finally able to go about their life. • All respondents reported that they were happy with their decision to undergo GAS. • It's the "best thing I ever did for myself". "After three attempts at suicide, I knew that life was no longer possible without transition".

(*Continued*).

Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Fallahtafti et al. (2019)	Case Control Study (4/11)	Iran	n = 66 (42 pre-GAS, 24 post-GAS). Mean age = 25.27 years (23.76 pre-GAS, 27.92 post-GAS)	NS	1+ years	Oxford Happiness Questionnaire	• Significant difference between the levels of happiness in the pre-operative group and the post-operative group, with happiness in the pre-operative group being low. • Significant difference between the mean score of pre-GAS and post-GAS individuals' MH ($p<.01$). • Significant difference between the pre-GAS and post-GAS individuals in the mean score of somatization ($p<.01$), anxiety ($p<.01$), depression ($p<.01$), interpersonal sensitivity ($p<.01$), phobia ($p<.05$), obsession-compulsion ($p<.01$), paranoia ($p<.05$) and psychosis ($p<.01$).
Gijs and Brewaeys (2007)	Systematic Review (8/8)	Belgium, Brazil, Germany, Netherlands, Sweden, Switzerland, UK, USA, Yugoslavia	Transgender individuals	Phalloplasty, clitoris mobilization, mastectomy, hysterectomy, ovariectomy	Range across studies of 6–168 months		• Trans men:One study showed a reduction in suicidality post-GAS. • Another showed trans men post-GAS matched general population on anxiety, depression, life satisfaction, body image and social interactions. • Another showed the near disappearance of GD post-GAS, along with a strong diminishment in body dissatisfaction and psychological issues. • In some studies, a few patients showed regret for the surgery - most did not wish to de-transition but would not undergo further GAS. Trans women:In group of 10 trans women, no suicide attempts post-GAS compared to three pre-GAS. • In another, 90% thought their QoL had ameliorated and no suicide attempts has occurred post-GAS. • In another, 8 of 11 said that their lives had ameliorated markedly, and no patient rated herself as depressed or anxious and they scored normal for the general health questionnaire • In another 91% rated their psychological functioning as 'in order'. • In another study 97% believed their QoL improved post-GAS.

Glynn et al. (2016)	Cross-Sectional Study (7/14)	USA	n = 573 trans woman. Mean age = 35.10 years. 41% identified as Black, 21% as white, 19% as Latina.	Breast augmentation, vaginoplasty, Adam's apple reduction, hip enlargement, facial plastic surgery	NS	CES-D, RSE	• Participants who had GAS reported lower depressive symptoms (p=.07) and higher self-esteem (P=.03).
Heylens et al. (2014)	Cohort Study (11/12)	Belgium	n = 57 (46 trans women, 11 trans men)	NS	1–12 months	SCL-90, Psychosocial Questionnaire	• SCL-90 scores decreased after beginning HT (from 56 to 47), but no further significant decrease was seen post-GAS (score of 42). • Significant differences were found between baseline and post-GAS measures for anxiety (p<.001), depression (p=.001), interpersonal sensitivity (p=.005) and hostility (p=.008). • SCL-90 scores after HT and GAS are similar to those of the general population. • No significant differences were found between baseline and post-GAS scores for the psychosocial questionnaire. • There was an increase in social contacts and a decrease in substance abuse post-GAS. • Post-GAS, majority of patients indicated that they have a better mood (95.2%), are happier (92.9%) and feel less anxious (81%). • Participants reported to be more self-confident (78.6%) and encounter a better body-related experience (97.6%), indicating a less distorted self-image than before treatment.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Jokic-Begic et al. (2014)	Mixed Methods (5/5)	Croatia	n = 6 (3 trans men, 3 trans women) Mean age = 33.83 years (range 24–42)	NS	NS	Depression Anxiety and Stress Scale-21, Clinical Outcomes in Routine Evaluation -Outcome Measure (Croatian), SF-36	• All participants scored within normal ranged on the Depression Anxiety and Stress Scale and overall results of the Clinical Outcomes in Routine Evaluation-Outcome Measure. • On the SF-36 one participant scored lower on the MH scale. • On the SF-36, three participants achieved scores on some of the scales that fell below the average normative results for age and gender. • Three participants achieved somewhat lower QoL, which can be attributed to their general physical condition from post-operative consequences and internalized transphobia (demonstrated in their responses later in the questionnaire). • Positive outcomes of GAS can be contributed to good social support, absence of psychopathology, good surgical results, and satisfaction with physical appearance.
Lindqvist et al. (2017)	Cohort Study (8/12)	Sweden	n = 190 trans women. 146 completed questionnaire pre-GAS, 108 completed it 1-year post-GAS; 64 completed it 3 years post-GAS; 45 at 5 years post-GAS. 17 participants completed it at all 4 timepoints. Mean age = 36 years (range 19–76)	NS	1, 3 and 5 years	SF-36 (Swedish)	• Trans women rated their QoL significantly lower than the general population in the dimensions of MH, vitality, social functioning, emotion, and general health. • Trans women rated their bodily pain and physical functioning higher than the general population. • 1-year post-GAS showed the highest QoL scores, which were significantly higher than pre-operative scores ($p<.05$). • The score for years three and five were significantly worse ($p<.001$) than the scores for year one but did not reach the pre-GAS level.

Mahfouda et al. (2019)	Systematic Review (7/8)	Netherlands, USA, Belgium, Sweden	n = 12 studies, Transgender individuals	NS	NS	NS	• Studies found that post-GAS, substantial decreases were observed in GD and psychopathology and improved global functioning, psychological functioning and QoL similar to cisgender peers. • One study found that body satisfaction was reported in 60% of transgender males (40% felt neutral) and 100% in transgender females post-GAS. • One study found lower scores of anxiety, depression and hostility post-GAS and the post-GAS scores were similar to cisgender peers. • Another study reported on post-GAS MH in adolescents who received CRS and found that one patient continued to experience high levels of depression post-GAS, but almost all patients reported improvements in symptoms. • Another study examined chest dysphoria between non-surgical and post-GAS transgender males and found that the non-surgical group had significantly higher levels of chest dysphoria than the post-GAS group.
Massie et al. (2018)	Cross-Sectional Study (9/14)	USA	n = 117 trans women (66 completed the patient reported outcomes survey). Mean age at time of surgery = 38 years (range 16–78)	Penile inversion vaginoplasty	Average was 21 months (range 13–34 months)	20-item survey adapted from the Female Genital Self-Image Scale	• 71% respondents indicated "resolution of their GD".

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
McNichols et al. (2020)	Cohort Study (11/12)	USA	N = 246 trans men	94% had mastectomy, 20.5% had a hysterectomy, 1.5% has a phalloplasty, 0.5% had a scrotoplasty and 0.5% had a prosthesis insertion	The average follow-up time was 1 year post surgery	22-question self-developed survey	• 60% of patients felt as through their QoL had very much improved • 26% felt as though their life was at least 80% better when looking back to how they felt prior to having undergone GAS • Participants self-reported a history of the following psychiatric morbidities before GAS: depression (73%), anxiety (70%), suicide attempt (27%), social phobia (23%), panic disorder (18%), obsessive-compulsive disorder (16%) and substance abuse disorder (15%) • Post GAS, participants expressed to having at least some improvements in depression (52%), anxiety (48%), suicidal ideation (14%), social phobia (14%), panic disorder (7%), obsessive compulsive disorder (5%) and substance abuse disorder (9%).
Naeimi et al. (2019)	Cohort Study (8/12)	Iran	n = 42 trans women. Mean age = 34.17 years.	NS	NS	SF-36 (Persian)	• Total mean scores of QoL were significantly improved (from 26.43 to 37.52) 6-months post-GAS ($p<.001$). • Improvements also seen in the domains of physical functioning (23.12 to 40.36), social functioning (19.55 to 38.48), physical problem (20.71 to 40.17), MH (21.17 to 40.14), energy and vitality (23.35 to 42.05), bodily pain (19.50 to 37.79), general perception of health (20.38 to 40.14) (all $p=.001$). • There was an increase in emotional problem (38.67 to 48.10) which was not statistically significant.

Owen-Smith et al. (2018)	Cohort Study (11/12)	USA	n = 697 (347 trans men, 350 trans women) 31.1% aged 18-29, 22.5% aged 30-39, 24.1% aged 40-54, 22.2% aged 55 or older. 56.2% identified as white, 2.9% as Black, 6.9% as Asian or Pacific Islander, 19.1% as Hispanic, 7% as other, 2.6% as mixed race, and 5.3% declined to answer	41% of trans men and 8% of trans women had top surgery (mastectomy or breast augmentation), 1.2% of trans men and 21.7% of trans women had definitive bottom surgery (vaginectomy or vaginoplasty), 18.4% of trans men and 5.6% of trans women had partial bottom surgery (hysterectomy without vaginectomy or orchiectomy without vaginoplasty),	NS	Transgender Congruence Scale, Revised Physical Self-Perception Profile, CES-D, Beck Anxiety Index	• Body image satisfaction was higher among individuals who had more extensive gender-affirming treatment compared to those with less treatment/no treatment at all. • Depression and anxiety rates were lower among individuals who received more gender-affirming treatment. • For trans men the body image satisfaction score in the no treatment was 9 vs 17 (top surgery), 15 (partial bottom surgery) and 16 (definitive bottom surgery). • Depression scores for no treatment was 16, vs 8 (top surgery), 9 (partial bottom surgery) and 6 (definitive bottom surgery). • Anxiety scores in no treatment group was 25 vs 7 (top surgery), 9 (partial bottom surgery) and 5 (definitive bottom surgery). • For trans women, body image satisfaction score was 11 for no treatment group vs 12 (top surgery), 14 (partial bottom surgery) and 18 (definitive bottom surgery). • Depression scores for no treatment group was 14, vs 11 (top surgery), 8 (partial bottom surgery) and 6 (definitive bottom surgery). • Anxiety score in the no treatment group was 12 vs 7 (top surgery), 9 (partial bottom surgery) and 5 (definitive bottom surgery).

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Papadopulos et al. (2017)	Cohort study (9/12)	Germany, Greece, UK, USA	n = 47 trans women. Mean age at time of first surgery = 38.6 years (range 19–66)	Orchiectomy, penectomy, vaginoplasty, breast augmentation,	6+ months	Questions on Life Satisfaction modules, Freiburg Personality Inventory, RSE, PHQ.	• Participants had significantly higher scores for items of hobbies (p=.03), health (p=.01), partner relationships (p<.01), and a significantly higher sum score (p<.01) on the general life satisfaction questionnaire. • Post-operative improvements were seen on the items "ability to relax" (p<.01), energy (p<.01), mobility (p=.04), freedom from anxiety (p<.01) and a higher sum score (p<.01). • 7 of the 22 items relating to body image delivered significantly increased results post-GAS (p<.01). • The Freiburg personality inventory displayed higher results in emotional stability compared to the preoperative (p=.03) and German norm data (p=.01). • RSE showed higher self-esteem after surgery (p=.01), which was also higher than the general German population (p<.01). • PHQ produced a higher mean score than the norm data (p<.01) suggesting mild depression and anxiety disorders. • However post-GAS, the score was significantly lower (p<.01) and not statistically different from the norm population.

Papadopulos et al. (2020)	Cohort Study (9/12)	NS	n = 47 trans women, mean age = 38.3 years (range 18–57)	Vaginoplasty	6–58 months	PHQ, Freiburg Personality Inventory Revised, RSE	• Mean scores of 4 or higher (on a scale of 1 - do not agree at all to 5 - I fully agree) can be found on eight statements: "I feel more liberated in choosing clothes", "I feel better, I feel better at the swimming pool, "I feel more balanced", "I am more content with my body", "I have more self-confidence, the operation was worth the struggle" and "The operation should have been done earlier". • The mean score on the PHQ was 2.2 post-GAS, indicating a mild positive score for depression and anxiety, but this does not differ significantly from the norm data. • The Freiburg personality inventory shows a normal emotionality and a sane self-assessment post-GAS that does not differ significantly from the norm data. • The RSE suggests a high self-esteem post-GAS and is higher (p=.029) than the norm data.
Papadopulos et al. (2021)	Cohort Study (11/12)	Germany	N = 32 trans men	Phalloplasty (Osteo-fasciocutaneous fibula free flap and/or osteo-fascioucuteneous radial free forearm flap)	Mean follow-up time was 5 years, (minimum 1.5 years and maximum 12 years)	A self-developed questionnaire on QoL, emotional stability, self-esteem and psyche along with Freiburg Personality Inventory, RSE and Patient Health Questionnaire-4, and a life-satisfaction questionnaire: Fragebogen zur Lebenszu-friendenheit	• 81% reported a marked improvement in QoL • 91% would undergo the same GAS again • GAS improves QoL in trans men in most aspects of everyday life and has a positive influence on the patients psyche and self esteem • No significant difference between study group and norm data on Fragebogen zur Lebenszufriendenheit (life-satisfaction questionnaire). • Freiburg Personality Inventory indicated that participants emotionality after GAS was very well balanced • RSE showed high self-esteem for the participants • Patient Health Questionnaire-4, demonstrated a 'normal psyche'

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Parola et al. (2010)	Mixed Methods (4/5)	France	n = 68 trans men and trans women (30 patients in Interview, 38 completed QoL questionnaire).	NS	>2 years	SF-36	• Among trans men, QoL improved after HT and GAS specifically in the areas of relationships, MH, and overall QOL. • Trans men were found to feel more embarrassment in their daily lives, related to their physical condition, and have limitations in their emotional state, compared to trans women. • Participants reported better social integration and personal relationships after HT and GAS. • There were mixed reports of changes to romantic relationships, family relationships, friendships and work situations - likely because these are very individual experiences, and transphobic opinions are not likely to change post-GAS.

Passos et al. (2020)	Systematic Review (8/8)	Belgium, Brazil, Germany, Italy, Norway, Sweden, Turkey, USA	Meta-Analysis focused on 7 studies, involving 420 individuals (259 trans women, 122 trans men) Average age in the studies range between 20.7–51	Facial feminization, hystero-oophorectomy, mastectomy, metoidioplasty, phalloplasty, vaginoplasty, hysterectomy, ovariectomy, mammoplasty, Orchiectomy, penectomy, clitoroplasty, mamma augmentation, thyroid cartilage reduction, vocal cord surgery,	NS	King Health Questionnaire, WHOQOL-Bref, Subjective Happiness Scale, Satisfaction with Life Scale, WHOQOL-100, Body Image-related QoL, Fragen zur Lebenzu-friedenheit, Freiburg Personality Inventory, RSE, PHQ, Cantril Ladder	• The combination of studies shows a slight positive effect of GAS on QoL. • Studies on trans men who underwent a mastectomy obtained better results, with significant results in all modules of the QoL questionnaire. • Top results include breast satisfaction (p<.0001), sexual satisfaction (p<.0001) and physical well-being (p<.0001). • Studies on trans women showed improvements in the domains of psychological well-being (p=.041), social relationships (p=.007) as well as improvements in general satisfaction (p=.01), satisfaction with body image (p<.01) and self-esteem (p=.01). • Negative effects were reported in the domains of physical health (p=.002) and level of independence (p=.031) post-GAS. • Before surgery, results of the PHQ were high, suggesting mild depression and anxiety disorder, and after surgery the values were significantly lower (p<.01). • The graphical similarity between post-GAS and normative values may suggest that the QoL post-GAS reached the expected value for the general population. • The Freiburg personality inventory showed lower value scores post-GAS (p=.03) suggesting greater emotional stability.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Poudrier et al. (2019)	Mixed Methods (3/5)	USA	n = 58. 43% identify as male, 66% as trans man, 22% as gender nonconforming, 5% as other. Mean age of GAS = 33 years (range 18–57)	Masculinizing CRS	<1 year = 33 (57%), 1–2 years = 13 (22%), 3–4 years = 1 (2%), 4–6 years = 5 (9%), >6 years = 6 (10%)	BREAST-Q	• No more than 30% of respondents were satisfied on any given measure that asked about preoperative life. • Most respondents rated their QoL and sexual confidence before CRS as very low. • Following CRS, QoL and sexual confidence improved significantly in all domains ($p<.001$). • 91% reported improvements in self-confidence. • 85% reported improvements in confidence in social settings. • 83% felt more attractive. • 96% felt more comfortable with their clothes. • 94% felt satisfied with their bodies. • 96% felt less dissatisfied with their bodies. • 83% felt emotionally able to do the things they wanted to do. • 78% felt emotionally healthy. • Pre-GAS 53% of participants rated their MH as poor and 81% reported depression, anxiety and/or another MH condition related to GD. • After CRS, 86% reported improvement in their MH.

Prunas et al. (2017)	Case Control Study (9/11)	Italy	n = 126 (67 pre-GAS, 59 post-GAS). In pre-GAS sample, 59% trans women, 41% trans men. Mean age = 31.96 years. In post-GAS sample, 58% trans women, 42% trans men. Mean age = 35.70 years.	Among trans men, one underwent a phalloplasty, and the others underwent hysterectomy and mastoplasty. All trans women group underwent vaginoplasty and breast surgery.	NS	84-item Psychological Well-Being Scale	• Post-GAS group had higher scores on environmental mastery ($p<.01$) and Self-acceptance ($p<.001$) and lower scores on Personal Growth ($p<.05$) than the no treatment group. • No correlation was found between number of years since GAS and any of the subscales.
Ramella et al. (2020)	Cohort Study (7/12)	Italy	12 trans men	Subcutaneous Mastectomies (with either semicircular or the double incision free nipple grafting	Many of the participants engaged in the research one year after GAS	Breat-Q	• More than 80% of participants experienced positive outcomes in reference to QoL (including psychosocial well-being; sexual well-being; and physical well-being)
Richards and Barrett (2013)	Gray Literature (5/6)	UK	Trans men	Bilateral mastectomy, male chest contouring	NS	SF-36	• A study on 376 trans men using SF-36, found higher QOL scores in those who received CRS than those who did not, with significant results ($p<.01$) for general health, social functioning and three of the MH measures. • GAS is important for trans men to live safely and effectively in their identified gender. • GAS acts as a protection against distress, removes distress as well as providing improved QoL and global functioning.
Simbar et al. (2018)	Case Control Study (9/11)	Iran	n = 90 (30 untreated, 30 HT only, 30 who have had GAS). 31% trans men, 69% trans women. 35.6% aged 18–25, 51.7% aged 26–35, 12.6% aged 36-45.	NS	NS	WHOQOL-BREF, Fisher Body Image Scale	• Significantly higher QoL (69.50) and body image scores (69.23) post-GAS compared to HT only (60.00 and 64.84 respectively, $p=.007$) and no treatment groups (53.50 and 60.17 respectively, $p<.001$). • The HT and no treatment groups were not significantly different in terms of QoL ($p=.07$) and body image ($p=.09$).

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Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Simonsen et al. (2016)	Cohort Study (8/12)	Denmark	n = 104 (56 trans women, 48 trans men). Mean age at permission for GAS = 37.1 years for trans women and 32.6 years for trans men	NS	Average follow-up of trans women = 16.38 years and of trans men = 10.21	ICD Diagnosis criteria for anxiety, depression, substance abuse, personality disorder, psychosis	• 29 of 104 individuals (28%) were given a psychiatric diagnosis before GAS, and only 23 of 104 (22%) were given a diagnosis post-GAS. • 7% of the sample received a diagnosis both before and post-GAS.
Tanti-rattanakulchai et al. (2019)	Cross-Sectional Study (7/14)	Thailand	n = 108 trans women (84 without GAS, 24 with GAS). In group without depression, 18.4% = aged 24 or under, 30.6% = 25–30, 22.4% = 31–35, 28.6% = > 35. In the group with depression, 22% = aged 24 years or under, 32.2% = 25–30 years, 15.3% = 31–35 years, 30.5% = > 35	NS	NS	CES-D	• 15 (30.6%) of those who had depression have had GAS, 34 (69.4%) have not had GAS. • 9 (15.3%) of those who did not have depression have had GAS, and 50 (84.7%) have not had GAS. • After adjusting for covariates, there was no association between depression and GAS (p=.08).

Tomita et al. (2019)	Cross-Sectional Study (7/14)	USA	n = 868 (58% trans men (mean age = 31 years) and 42% trans women (mean age = 36.6 years)) 81.5% European American, 2.2% African American, 1.6% Native American, 2.3% Asian American, 0.5% Pacific Islander, 7.9% Other	32.3% had CRS and 11.8% had genital surgery	NS	Suicidal Ideation Scale, CES-D, 3-item shortened form of the Social Phobia Inventory, Generalized Anxiety Disorder-7, 17-item Post-Traumatic Stress Disorder Check List-Civilian Version	• Among trans women there was a significant association between CRS and lower scores on generalized anxiety (p=.035). • No significant associations between the completion of CRS and scores of suicidality, depression, social anxiety or Post-Traumatic Stress Disorder symptoms. • Among trans men there were significant associations between the completion of CRS and lower scores on suicidality (p=.003), depressive symptoms (p<.001), social anxiety (p=.008), generalized anxiety (p=.012) and Post-Traumatic Stress Disorder symptoms (p<.001). • Among trans women there was a significant association between genital surgery and lower scores on social anxiety (p=.008) though there were no significant associations between the completion of genital surgery and scores on suicidality, depression, generalized anxiety and Post-Traumatic Stress Disorder symptoms. • Among trans men there were significant associations between genital surgery and lower scores on depression (p=.043) and Post-Traumatic Stress Disorder (p=.025), but no significant associations between genital surgery and suicidality, social anxiety and generalized anxiety.
Udeze et al. (2008)	Cohort Study (7/12)	UK	n = 40 trans women. Mean age = 47.33 years (range 25–80)	NS	6+ months	SCL-90R	• None of the SCL-90R subscales reached significant changes pre- and post-GAS, suggesting there was no difference postoperatively. • Reported trend of an increase in anger/hostility post-GAS. • Suggested that perhaps patients need a longer period of time to adjust to their new lives than was the case of this study as most studies use a minimum of 1-year postoperatively.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
van de Grift et al. (2016)	Cohort Study (8/12)	Netherlands	n = 26 trans men. Mean age = 26.1 years (range 18–59)	Mastectomy, some combined with uterus extirpation, chest correction performed/ planned and genital surgery planned.	6+ months	Appearance Schemes Inventory – Revised; Body Image Quality of Life Inventory; Body Image Scale for Transsexuals; Multidimensional Body-Self Relations Questionnaire, RSE, Situational Inventory of Body Image Dysphoria; Perceived Effect of Surgery	• Participants reported positive to very positive effects of mastectomy on their daily lives, QoL, self-esteem and body image. • Self-esteem did not differ significantly post-GAS. • GAS significantly improved the level of satisfaction with breasts ($p<.001$), overall body satisfaction ($p<.001$) and satisfaction with social and hair growth items ($p<.05$), hip region ($p<.05$) and genitalia ($p<.01$). • Post-GAS, trans men still scored significantly less positively than control men on the muscularity and posture ($p<.01$), hip region ($p<.001$) and genital ($p<.001$) domains. • Most self-attitudinal aspects of body image did not change significantly after surgery. • Post-GAS behavior related to appearance was similar to that of control cisgender men. • Appearance Schemes Inventory - Revised scores were not significantly influenced by mastectomy. • Body image QoL showed no significant change post-GAS, although participants reported significantly more positive contribution of body image on satisfaction with life and feelings of self-worth. • Post-GAS body image QoL was significantly lower than cisgender control males ($p<.001$) and females ($p<.01$). • GAS significantly improved the overall situational body dysphoria score ($p<.01$) and scores did not differ significantly from reference males.

van de Grift et al. (2018)	Cohort Study (12/12)	Belgium, Germany, Netherlands, Norway	n = 136 (81 trans women, 51 trans men), Mean age = 36.3 years (range 17–63)	71 had vaginoplasty, 33 had breast augmentation, 9 had thyroid cartilage reduction, 7 had facial surgery, 3 had vocal cord surgery, 49 had mastectomy, 48 had uterus extirpation, 15 had phalloplasty, 3 had metoidioplasty,	NS	Utrecht Gender Dysphoria Scale, SCL-90, Satisfaction with Life Scale, Subjective Happiness Scale, Cantril Ladder	• None of the respondents reported major regret, eight reported minor regret or dissatisfaction with the outcomes, seven of these were dissatisfaction with complications and functional/esthetic outcomes. The other had reported dissatisfaction with HT as well. • Patients satisfied with the results of their surgery reported lower SCL-90 scores (p=.05) than the dissatisfied group. • A significant difference was seen on the subjective happiness scale (p=.04), with the satisfied group having a higher level of happiness, with a trend in the same direction seen for the Cantril Ladder (p=.08). • Significantly more psychological symptoms and lower satisfaction with life was reported in the satisfied group than in the normative controls.
van de Grift et al. (2018)	Cross-Sectional Study (8/14)	Netherlands	n = 62 trans men. Mean post-operative age = 26.4 years	Mastectomy	6+ months	Body-Q Chest Module	• The pre-GAS group scored lower on the chest (p<.001), nipples (p<.001), and body (p<.001) scales compared with post-GAS participants, and somewhat more positive on the psychological (p=.05) and social (p>.05) scales. • No associations between chest, psychological and social domains and the items measuring anxiety/depression symptoms were observed.
Weigert et al. (2013)	Cohort Study (11/12)	France	n = 35 trans women. Mean age at the time of GAS = 42.2 years (range 18–63)	Breast augmentation	4 and 12 months	BREAST-Q	• BREAST-Q subscale scores for satisfaction with breasts, psychosocial well-being and sexual well-being were significantly higher at both post-operative times than the baseline values. • Significant improvements in psychosocial well-being was assessed at 4-months (48 points) and 12-months (37 points, p<.0001).

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Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Weinforth et al. (2019)	Systematic Review (8/8)		n = 1052, over 13 studies. Trans women Mean age = 39.9 years (range 18–76)	Vaginoplasty, facial feminization surgery, breast augmentation	Range of follow up periods across studies from 3 months to 29.6 years	SF-36, WHOQOL-100, Subjective Happiness Scale, Satisfaction with life scale, Cantrils ladder of life scales, Kings Health Questionnaire, Fragebogen zur Leben--szufriedenheit	• Studies that used the SF-36 found significant improvements in social functioning, physical, emotional role functioning, general health perceptions, vitality and MH post-GAS ($p<.05$). • In two studies MH did not differ significantly from the standard sample. • Two studies showed an improvement in self-perceived health in the first-year post-GAS ($p<.05$ and $p<.009$). • This deteriorated with time but did not fall as low as the pre-GAS score ($p<.0001$). • Studies that used the WHOQOL-100 found improvements post-GAS in psychological domain ($p=.041$) and social relationships ($p=.007$) but a deterioration in physical health ($p=.002$) and independence ($p=.031$). • When comparing results of a group of trans women post-GAS with control group of women there was no significant differences in body image ($p>.05$) and QoL ($p>.05$). • Reported a high degree of "subjective happiness", "satisfaction with life", and "subjective well-being" in trans women after vaginoplasty. • A German study on post-operative trans women found that there was no significance in health QoL compared to the general population.

Wernick et al. (2019)	Systematic Review (6/8)	USA	33 studies, totaling 4413 participants (2056 trans men, 2265 trans women). Mean ages ranged between 17–51 years	Breast augmentation, mastectomy, CRS, surgical voice feminization, craniofacial reconstructive surgery, vaginoplasty, phalloplasty,	NS	BREAST-Q, Satisfaction with Life Scale, WHOQOL-100	• 7 of 16 studies assessed the psychological impact of specific surgical procedures using pre- and post-operative data. • Studies showed significant improvements in the psychological constructs measured pre- and post-GAS. • Three studies did not produce any significant results. • Common constructs that were assessed included QOL, body image, GD, general psychological functioning, depression, anxiety and psychological outcomes. • Six studies demonstrated in improvements in QoL post-GAS. • It was found that in trans women QoL and overall well-being improved initially post-GAS and gradually declined in comparison to the general population over a 5-year period. • Eight studies demonstrated statistically significant improvements post-GAS, including a study that showed trans men who underwent genital surgery showed that GD and body dissatisfaction were significantly lower post-GAS in comparison to admission. • Another study that looked specifically at trans men who underwent mastectomy showed significant improvements in overall body image post-GAS. • Nine studies measure general psychological functioning and well-being pre- and post-GAS, and all nine demonstrated significant improvements. • One study on trans women showed improvements in subjective emotional stability, self-esteem, as well as fewer symptoms of depression and anxiety. • Another on trans men and trans women found a decrease in anxiety, depression, interpersonal sensitivity and hostility post-GAS.

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Table 2. (Continued).

Author/ year	Study design and quality	Location	Participants	GAS type	Time since surgery	Measurement tools	Key findings
Wesp and Deutsch (2017)	Gray Literature (6/6)	NS	n = 1093 trans women	Genital surgery	NS	NS	• A systematic review of 28 observational studies on trans women who received both HT and GAS found evidence that these interventions were associated with decreased GD, improved QoL and improved psychological symptoms. • Studies exploring self-reported outcomes after vaginoplasty surgery also found improved global functioning, body image and QoL.
Wierckx et al. (2011)	Cross-Sectional Study (7/14)	Belgium	n = 49 trans men. Mean age = 37 years, (range 22–53)	Metaoidioplasty and phalloplasty	Average of 8 years (range 2–22 years)	SF-36 (Dutch)	• Results indicated a satisfying QoL post-GAS. • Most scored well on self-perceived health. • 3 of 8 summary scores/subscales (Vitality (p=.002), MH (p=.02) and physical functioning (p=.015)) were found to be significantly different than those obtained in a large sample of Dutch men and women. • The other domains (role physical, bodily pain, general health, social functioning and role emotion) were not significantly different from the general population scores.

Zagami et al. (2019)	Systematic Review (8/8)	Belgium, Brazil, Croatia, France, Germany Iran, Italy, Netherlands, Switzerland, USA, UK, Yugoslavia,	n = 1449 (768 trans women, 681 trans men). Mean age ranged between 20.5–37.3 years in trans men and 21–56.9 years in trans women	NS	6 months–22 years	WHOQOL-BREF, SF-36, Kings Health Questionnaire	• 16 articles included in review. • All aspects of MH were significantly lower in trans men compared to controls, except for physical role and bodily pain. • GAS found to improve QoL and physical and psychological health of individuals with GD. • One study found no difference between post-operative trans women and general population. • QoL dimensions in trans men were not similar to those of general population of males, except for in the dimensions of bodily pain and physical role. • Social functioning, emotional role and MH were significantly lowered in trans men aged 44 years or younger compared to general population.
Zhu et al. (2019)	Cross-Sectional Study (4/14)	China	n = 5677 (30.2% trans men, 34.3% trans women, 26.1% gender queer and 9.4% cross-dressing individuals)	Chest wall masculinization, scrotal surgery, vaginal closure and urethroplasty, penis reconstruction, ovariohysterectomy, facial feminization, breast augmentation, voice surgery, laryngotomy, vaginoplasty, ditoral reconstruction, orchiectomy	NS	CES-D, General Anxiety Disorder Scale	• Trans men who were willing but unable to have surgery had significantly higher self-reported depressive (p=.02) and anxious (p=.04) symptoms compared to those who had CRS. • 45 of respondents underwent CRS, four of these reported depressive symptoms and five reported anxious symptoms. • Trans women who were willing to have surgery but unable had higher self-reported depressive symptoms (p=.03) but no significant results in anxious symptoms. • Of 28 trans women who underwent vaginoplasty, six reported depressive symptoms and nine reported anxious symptoms. • CES-D average total score <17, indicating risk for depression. • General Anxiety Disorder Scale score <10 indicating anxiety disorder.

Acronyms and abbreviations used in this table are as follows: CES-D = Center for Epidemiologic Studies Depression Scale; CRS = Chest Reconstruction Surgery; GAS = gender-affirming surgery; GD = gender dysphoria; HT = hormone therapy; MH = mental health; NS = not specified; PHQ = Patient Health Questionnaire; QoL = quality of life; RSE = Rosenberg Self Esteem Scale; SCL-90R = Symptom Checklist -90, Revised; SF-36 = 36-Item Short Form Survey; UK = United Kingdom; USA = United States of America; WHOQOL = World Health Organization Quality of Life Assessment.

and included: 20 cohort studies, 13 cross-sectional studies, eight systematic reviews, four case control studies, four mixed method studies, three Gray literature articles, and one qualitative study. Studies were reporting on information from Belgium, Brazil, Canada, China, Croatia, Denmark, France, Germany, Greece, Iran, Italy, Netherlands, Sweden, Thailand, Turkey, the United Kingdom (UK) and the United States of America (USA). Key findings were further described via narrative synthesis in relation to the research question.

Quality of life

Thirteen studies reported significant improvements to the QoL of transgender individuals after engaging in gender-affirming surgery (Akhavan et al., 2021; Berna et al., 2018; Cardoso da Silva et al., 2016; Lindqvist et al., 2017; Naeimi et al., 2019; Parola et al., 2010; Passos et al., 2020; Richards & Barrett, 2013; Simbar et al., 2018; van de Grift et al., 2016; Wesp & Deutsch, 2017; Wierckx et al., 2011; Zagami et al., 2019). The sources utilized a wide variety of measures including San Francisco Short Form 36-item Questionnaire, BREAST-Q, 100-item World Health Organization Quality of Life Assessment, 20-item Center for Epidemiologic Studies Depression Scale, Patient Health Questionnaire, Rosenberg Self Esteem Scale and Symptom Check List-90R. El-Hadi et al. (2018) reported that 84% of participants agreed that gender-affirming surgery was important to their QoL (using a QoL survey created for the research project); and Papadopulos et al. (2021) reported that 81% of participants noticed marked improvements in QoL after gender-affirming surgery. Parallel to this, Cardoso da Silva et al. (2016) reported that the domains of physical health and levels of independence were significantly poorer post gender-affirming surgery (when measured using the World Health Organization Quality of Life Assessment). Defreyne et al. (2017) reported one study found no significant difference in QoL (measured using the Short Form 36-item Questionnaire) between those who had pursued gender-affirming surgery and those who had not. Akhavan et al. (2021) reported that 91% of trans women expressed improvements in QoL after gender-affirming surgery. Lindqvist et al. (2017) found (using Short Form 36-item Questionnaire) that QoL scores improved when measured one-year after gender-affirming surgery. The scores measured at three- and five-year follow up were nonetheless significantly poorer than the scores measured at the one-year, although they did not drop to the baseline scores measured before gender-affirming surgery (Lindqvist et al., 2017).

Five studies, using a wide variety of QoL measures, described QoL levels after gender-affirming surgery as similar to those of the general

population (de Vries et al., 2014; Mahfouda et al., 2019; Papadopulos et al., 2021; Passos et al., 2020; Weinforth et al., 2019). Defreyne et al. (2017) reported eight years post gender-affirming surgery, trans men had lower QoL than cisgender peers. Lindqvist et al. (2017) also found that trans women rated their QoL significantly lower than the general population in the domains of mental health, vitality, social functioning, emotion and general health. Wierckx et al. (2011) stressed that three of eight sub scores on the Short Form 36-item Questionnaire (vitality, physical functioning and mental health) were significantly different from the general population after gender-affirming surgery, but the other sub scores (role physical, bodily pain, general health, social functioning and role emotion) were not significantly different from the general population. Additionally, Zagami et al. (2019) found across studies using the Short Form 36-item Questionnaire to evaluate QoL among trans men after gender-affirming surgery, QoL dimensions were dissimilar to the general population, except in the areas of bodily pain and physical role. Social functioning, emotional role and mental health were significantly lower in trans men under the age of 44 years compared to the general population (Zagami et al., 2019).

Post-surgical complications appear to affect transgender individual's QoL scores after gender-affirming surgery. Berna et al. (2018) reported a significant number of surgical complications in those who underwent gender-affirming surgery and found those who experienced surgical complications had lower QoL scores (on the World Health Organization Quality of Life Assessment – BREF) than those who did not. Cardoso da Silva et al. (2016) reported those who underwent further surgical procedures during the one-year follow up period (65.59% of the respondents) experienced deterioration in the psychological and social relationship domains of QoL.

Mental health

Overall, participants had high rates of mental health concerns prior to accessing gender-affirming surgery (Bränström & Pachankis, 2020; Davis & Colton Meier, 2014; De Cuypere et al., 2006; Dhejne et al., 2011; Fallahtafti et al., 2019; Passos et al., 2020; Zhu et al., 2019). Studies reported an overall improvement in mental health concerns and psychological functioning after gender-affirming surgery (Ainsworth & Spiegel, 2018; Akhavan et al., 2021; Almazan & Keuroghlian, 2021; de Vries et al., 2014; Defreyne et al., 2017; Drydakis, 2017; Fallahtafti et al., 2019; Mahfouda et al., 2019; Passos et al., 2020; Poudrier et al., 2019; Weinforth et al., 2019; Wesp & Deutsch, 2017; Zagami et al., 2019; Zhu et al., 2019). Additionally, other studies reported reductions in depression, suicidality

and anxiety (Berna et al., 2018; Davis & Colton Meier, 2014; De Cuypere et al., 2006; Gijs & Brewaeys, 2007; Glynn et al., 2016; Heylens et al., 2014; Mahfouda et al., 2019; McNichols et al., 2020; Owen-Smith et al., 2018; Papadopulos et al., 2017; Passos et al., 2020; Poudrier et al., 2019; Tomita et al., 2019). For example, Almazan and Keuroghlian (2021) found that undergoing gender-affirming surgery was associated with lower past-month psychological distress and lower past-year suicidal ideation, and that the reductions were more profound in individuals who had received all of their desired gender-affirming surgery, when compared to those who had only received some of their desired gender-affirming surgery. Also, a large Swedish study by Bränström and Pachankis (2020) reported that rates of treatment for mental health concerns reduced by 8% (odds ratio = 0.92, 95% CI [0.87, 0.97]) per year since last gender-affirming surgery. Some studies also reported levels of anxiety, depression, mental health, and suicidality after gender-affirming surgery were similar to cisgender peers (Ainsworth & Spiegel, 2018; de Vries et al., 2014; Gijs & Brewaeys, 2007; Mahfouda et al., 2019; Papadopulos et al., 2017). Jokic-Begic et al. (2014) reported positive mental health outcomes from gender-affirming surgery can be attributed to sufficient social support, absence of psychopathology, optimal surgical results and satisfaction with physical appearance.

In contrast to this, a 2019 study (Tantirattanakulchai et al.) of transgender individuals living in Thailand found no significant associations between depression and receipt of gender-affirming surgery. De Cuypere et al. (2006) found that those who had experienced psychiatric issues prior to surgery retained more psychological symptoms postoperatively. Tomita et al. (2019) found mixed results, with significant associations between chest reassignment surgery in trans women and lower scores on generalized anxiety, with no significant associations with the scores of suicidality, depression, social anxiety nor post-traumatic stress symptoms. Among trans men there were significant associations between chest reassignment surgery and lower scores of suicidality, depressive symptoms, social anxiety, generalized anxiety and post-traumatic stress symptoms (Tomita et al., 2019). van de Grift et al. (2018) found that transgender individuals still reported significantly more psychological symptoms and lower satisfaction with life after gender-affirming surgery when compared to normative controls, and Zhu et al. (2019) reported ongoing instances of depression and anxiety in those who had gender-affirming surgery. Udeze et al. (2008) saw no significant changes to self-reported psychometric scores (using the instrument Symptom Checklist-90-Revised which helps to evaluate broad psychological problems and symptoms of psychopathology) after gender-affirming surgery and suggested perhaps the follow-up time-period of six months after surgery was not sufficient to see significant changes.

Gender-affirming surgery was shown in multiple studies to have a positive effect on gender dysphoria, with several studies reporting reduced dysphoria (Akhavan et al., 2021; de Vries et al., 2014; Gijs & Brewaeys, 2007; Mahfouda et al., 2019, van de Grift et al., 2016, Wesp & Deutsch, 2017). A 2018 cross-sectional study in the USA reported 71% of respondents indicated a "resolution" of their gender dysphoria (Massie et al., 2018), and one study quoted a participant saying, "before surgery I had lots of depression and dysphoria… and surgery alleviated this" (El-Hadi et al., 2018). Postoperative gender dysphoria levels have also been shown to not be significantly different to a control group without gender dysphoria (De Cuypere et al., 2006).

Discussion

This systematic literature review examines the reported mental health and QoL impacts of accessing gender-affirming surgery among transgender individuals. It adds to the growing body of literature highlighting that gender-affirming surgery largely has a positive effect on the mental health and QoL of transgender individuals and may contribute to the evidence-base upon which best-practice guidelines can be developed and supported.

The studies included in this review raised a number of issues regarding the quality of results and suggest opportunities for enhancing future research. One such issue is the limited number of participants engaged in studies indicative of either the limited availability or access to gender affirming surgery world-wide, the challenges of long-term follow-up of persons post-operatively, and/or the reluctance of transgender individuals to self-identify and participate in such studies. Many studies compared participants yet to undertake gender-affirming surgery with those who have already had gender-affirming surgery, rather than following the same individuals longitudinally, which may skew the results as QoL is a highly individualized concept.

Transgender individuals experience significantly higher rates of mental health concerns and lower QoL compared to the general population (Lindqvist et al., 2017; National LGBTI Health Alliance, 2020). This review presents a number of studies reporting that gender-affirming surgery has a positive effect on the mental health and QoL of transgender individuals including reductions in suicide attempts, symptoms of gender dysphoria, anxiety, depression and higher levels of life satisfaction, happiness and QoL after gender-affirming surgery. In the largest cross-sectional study to date, performing secondary analysis of the 2015 US Transgender Survey (n = 27,715), Almazan and Keuroghlian (2021) found that reductions in

past-moth psychological distress and past-year suicidal ideation were significantly reduced in individuals who had undergone gender-affirming surgery (n = 3,559), when compared to transgender persons with no history of gender-affirming surgery (n = 16,401). Additionally, Selvaggi et al. (2019) suggested that the results from one of the included studies show that gender-affirming surgery is "life-rescuing" (p. 280) in that many patients reported halting self-harm and suicide attempts after surgery. Other studies found mixed results in QoL particularly when comparing QoL to the general public or when examining sustained improvements to QoL over time. Some studies found that gender-affirming surgery does not always have a lasting effect on QoL (Defreyne et al., 2017; Lindqvist et al., 2017; Weinforth et al., 2019). Weinforth et al. (2019) found that while QoL improved in the first year after gender-affirming surgery, it deteriorated as time passed. Hendricks and Testa (2012) gender minority stress model can be used to explain how individuals may continue to experience stressors such as transphobia, discrimination and harassment leading to an increase in poor-health outcomes and a reduction in QoL after the initial improvements experienced with gender-affirming surgery, and further confuted by cumulative discrimination and social exclusion rooted in multiple marginalities (Cyrus, 2017).

QoL is an individualized and complex measure, with a range of independent variables (developmental, psychological, social, educational, economic) that may impact outcomes (White Hughto et al., 2015; World Health Organisation, 2012). Further complicating this, is the variety of measures used across studies and what each tool measures. This could explain some of the mixed results found across studies, but also raises issues of research rigor and the need for consistent measurement tools when seeking to determine QoL.

Parallel to this, Parola et al. (2010) found that there were mixed reports of changes in romantic relationships, family relationships, friendships, and work situations after gender-affirming surgery and hypothesized that individuals would continue to face negative experiences in these domains after surgery, as such surgery does not remove transphobic attitudes from friends, family and colleagues. In spite of increased access to high quality healthcare and improvements in surgical techniques, any positive outcomes will be limited without concomitant social, legal and welfare policies that address ongoing discrimination, marginalization, and exclusion. Moreover, limited access to publicly funded gender-affirming surgery, and the consequential high costs imposed on an already economically disadvantaged population, will only compound the long-term stress and mental anxiety of transgender individuals.

Despite findings suggesting gender-affirming surgery outcomes were not positive or lasting in some studies, very few studies reported instances of

regret. Where regret was reported, it was inevitably linked to the experience of surgical complications. Gijs and Brewaeys (2007) as well as McNichols et al. (2020) reported a few patients that had regretted pursuing gender-affirming surgery because of surgical complications, nevertheless most of them did not wish to detransition but rather would not want to undergo any further gender-affirming surgeries. This is supported by the findings by van de Grift et al. (2018) showing that eight participants reported minor regret after gender-affirming surgery, and the findings by McNichols et al. (2020) showing that 1% of participants (2 persons) experienced regret after having surgery, and these were primarily related to complications and functional or esthetic outcomes. Parallel to this, Papadopulos et al. (2021) found that 91% of their respondents would undergo the same gender-affirming surgery if they were to do it all again. Berna et al. (2018) found that those who experienced surgical complications have lower QoL scores compared to those without complications. As such, it is plausible that as surgical techniques advance, and complications are minimized there will be greater QoL changes after gender-affirming surgery and less regret.

Clinical significance

This review highlights how gender-affirming surgery may result in increased levels of life satisfaction, happiness and QoL and reductions in suicide attempts, self-harming, symptoms of gender dysphoria, anxiety and depression. Due to gender minority stressors, such as transphobic attitudes, discrimination and harassment (Hendricks & Testa, 2012), gender-affirming surgery may not improve all aspects of QoL for a person (Parola et al., 2010). Consequently, it is important that health care providers and researchers are cognizant that transgender persons may still experience stressors that lead to poor-health outcomes and a reduction in QoL post initial improvements experienced with gender-affirming surgery.

From a clinical perspective, it should also be noted that few transgender individuals regret pursuing gender-affirming surgical procedure/s (Gijs & Brewaeys, 2007; McNichols et al., 2020). Where regret was reported in our review, it was connected to the experience of surgical complications and poor functional or esthetic outcomes (Gijs & Brewaeys, 2007; Grift et al., 2018; McNichols et al., 2020). This review confirms the clinical distinction between those who experience regret due to surgical complications versus those facing non-surgical challenges that lead to detransition.

High costs of healthcare functions to perpetuate the stress and anxiety of transgender persons. As such, gender-affirming health-care providers are encouraged to explore opportunities for developing sustainable health

responses (such as publicly funded gender-affirming surgeries) for transgender persons that reflect a commitment to human rights and international best practice.

To promote transgender health and reduce health inequities and disparities associated with gender identity, underlying social and economic determinants of health among transgender individuals also need to be critically explored through policy and program revisions consistent with WHO guidelines, the Yogyakarta Principles (2007; 2017), and through campaigns increasing gender affirming attitudes and practices (Pega & Veale, 2015; World Health Organisation, 2012). Continued and targeted awareness raising about transgender social and health conditions would contribute to reducing stigma, prejudice, transphobia, and violence toward transgender people, and promote optimal health outcomes, by facilitating access to transgender models of healthcare.

Limitations

Languages other than English were not included. There is likely a publications bias amongst the included studies, with published literature often favored toward positive results (Joober et al., 2012). The limited sample sizes (except for the cross-sectional study by Almazan & Keuroghlian, 2021, and the cohort study by McNichols et al., 2020) challenges the capacity for long term follow-up of subjects. Many studies compared participants yet to undertake gender-affirming surgery with those who have already had gender-affirming surgery, which may skew the results as QoL is a highly individualized concept. Additionally, there was a lack of randomized control trials comparing QoL in participants before and after gender-affirming surgery versus a control group. This lack is likely due to the ethical dilemma of withholding a potentially lifesaving treatment for the purpose of research. Similarly, drawing on the study by Bränström and Pachankis (2020), further research is needed to clarify QoL outcomes in those who have or have not had gender-affirmation surgery.

Concluding remarks

This review documents that gender-affirming surgery reduces mental health concerns and increases QoL among transgender individuals, but further research is needed with larger samples and longitudinal designs. The few studies that indicated unsustained gains in mental health and QoL suggest that surgical techniques will continue to be challenged without parallel social, legal, and public policy responses to discrimination, marginalization and exclusion. The review consistently found that

the gender minority stress model links events that are likely to affect QoL. As such, research should take into account the gender minority stress model to examine events that are likely to affect QoL over time following gender-affirming surgery. This would benefit the transgender community and health care providers by supplying high quality research upon which to base optimal clinical and consent decision making processes. Reflecting a commitment to human rights, and working toward the alleviation of long-term stress and mental anxiety, another future step includes for health-care providers to develop viable health-care responses, such as publicly funded gender-affirming surgeries, to address the high costs placed on an already economically disenfranchized subgroup of society. Q5

Funding

The author(s) reported there is no funding associated with the work featured in this article. Q8

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