



**Evidence Summary:
The association between
gender-affirming care and
youth mental health and
wellbeing outcomes**

contents

Introduction	4
Methods	4
PRISMA flow diagram	5
Results	6
Gender-affirming medical treatment	7
Puberty blockers	7
Gender-affirming hormone therapy	8
Surgical interventions	9
Combinations of gender-affirming medical treatment	10
Break out boxes	6
Social affirmation	6
Trajectory of children and young people accessing gender-affirming medical treatment	7
How common are feelings of regret?	9
Re-affirmation	10
Discussion	11
Gender-affirming care is the only evidence-based approach	11
Strengths and limitations of this literature review.	12
Conclusion	12
References	13
Appendices	15
Appendix 1: Literature search strategy and subject headings	15
Appendix 2: Inclusion and exclusion criteria	16
Appendix 3: Included studies	18

abstract

Introduction: Across the globe, recent years have seen an increase in the politicisation of gender-affirming healthcare for trans and gender diverse young people. In Australia, trans and gender diverse young people encounter many barriers to accessing gender-affirming medical care, including long wait times for specialist clinics, geographical isolation, and financial cost. Health professionals in primary care settings are often a young person's first point of contact with the health system, and their understanding and support of evidence-based practice is important to improve the accessibility and quality of health care services for trans and gender diverse young people.

Objectives: This literature review investigated the association between gender-related interventions in healthcare settings (i.e., puberty blockers, gender-affirming hormone therapy (GAHT) and gender-affirming surgery) and mental health and wellbeing outcomes for trans and gender diverse young people.

Methods: Three academic databases (Medline, PsycINFO, Embase) were systematically searched using a predefined search strategy, developed in collaboration with a team of academic, clinical, and lived experience experts, who were also consulted throughout the project. Studies involving gender-related care approaches or interventions in healthcare settings for trans and gender diverse young people under the age of 26 published before 25 September 2023 were included. A total of 14,690 abstracts were imported to Covidence software for screening. Once duplicates were removed, 10,180 were screened based on title and abstract, then narrowed to 637 full-text studies which were assessed for eligibility by at least one member of the research team.

Results: Forty-eight studies met inclusion criteria. Overall, puberty blockers were associated with improved general functioning and peer relations, and reduced depressive symptoms, suicidal ideation, and behavioural and emotional problems in trans and gender diverse young people. GAHT was associated with body image satisfaction and reduced psychological symptoms, including depression, anxiety, and suicidality. Gender-affirming surgery was associated with improved mental health outcomes, quality of life, and body image satisfaction.

Conclusion: Gender-affirming medical care is associated with positive mental health, wellbeing, and quality of life outcomes in trans and gender diverse young people.

introduction

Health professionals in primary care settings are often a young person's first point of contact with the health system. It is important that these health professionals are gender-affirming and build competency to provide high quality health care for trans and gender diverse young people. 'Trans and gender diverse' is an umbrella term used to describe people whose gender differs from the gender presumed for them at birth. This includes gender identities such as trans men or trans women, non-binary, gender questioning, agender, gender queer, Brotherboys and Sistergirls.

Trans and gender diverse young people have reported that health professionals' understanding of gender-affirming care and respect for their gender identity impacts on the accessibility of primary care services.⁽¹⁾ Australian and international guidelines for health professionals working with trans and gender diverse young people have been developed, in line with the latest evidence and in consultation with subject matter experts. These outline current best practice for primary health professionals in relation to assessment, intervention, safety, and other considerations for working with trans and gender diverse young people.

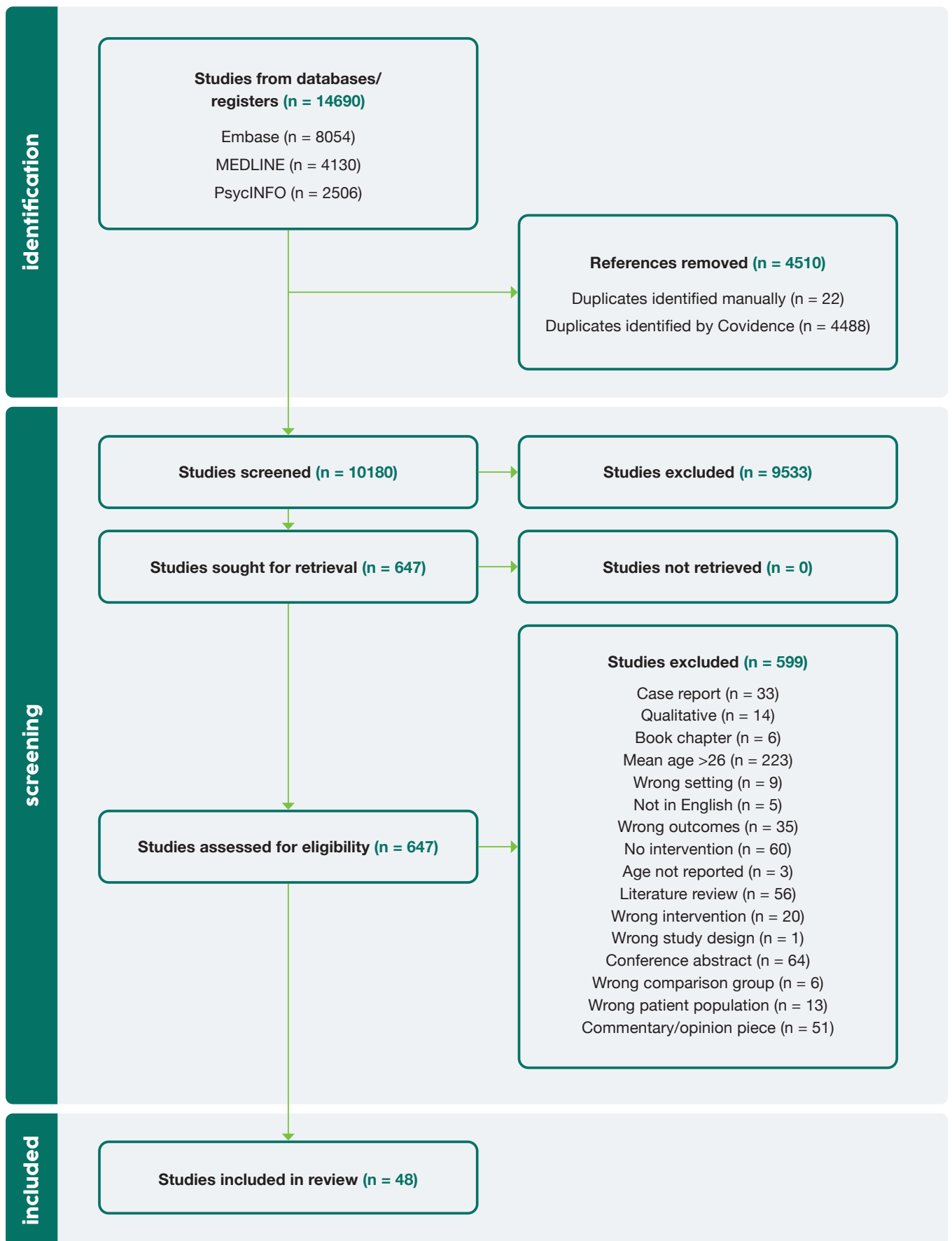
While there has been some progress in the visibility and acceptance of gender diversity in recent years, trans and gender diverse young people continue to experience discrimination and marginalisation in healthcare settings and the broader community, contributing to significantly higher rates of mental-ill health compared to their cisgender peers. ⁽²⁻⁴⁾ It is essential to explore evidence-based approaches that enhance equitable access to healthcare and foster positive mental health and wellbeing outcomes for trans and gender diverse young people.

This literature review aims to investigate the association between gender care approaches and interventions delivered in health care settings and mental health and wellbeing outcomes for trans and gender diverse young people. Evidence-based gender-affirming medical interventions include medications (i.e., puberty blockers and gender-affirming hormone therapy) and gender-affirming surgeries. It is important to note that trans and gender diverse young people do not necessarily wish to engage in all types of gender-affirming interventions, and their pathways to gender affirmation are unique.

methods

Three academic databases were systematically searched using a predefined search strategy, developed in collaboration with a team of academic, clinical and lived experience experts. The search strategies are included in Appendix 1. Studies that focused gender care approaches or interventions in healthcare settings for trans and gender diverse young people under the age of 26 published before 25 September 2023 were included. A complete list of inclusion and exclusion criteria is included in Appendix 2. Initially 14,690 abstracts were imported to Covidence software for screening. Once duplicates were removed, 10,180 records were screened based on title and abstract, then narrowed to 637 full-text studies which were assessed for eligibility by at least one member of the research team. A PRISMA flow diagram is displayed in Figure 1.

Figure 1: PRISMA flow diagram



results

A total of 48 studies met inclusion criteria for the review (Appendix 3). Despite the broad approach to exploring gender care approaches for trans and gender diverse young people, gender-affirming care was the only approach that was supported by peer-reviewed empirical research.



social affirmation

Social affirmation of one's gender refers to changes that a trans or gender diverse young person can make in their social life to express their gender.⁽⁵⁾ Studies related to social affirmation are not included in the main results of this review due to their focus on young people in the community, rather than in health services. Nonetheless, these studies suggest social affirmation is important and primary care practitioners clearly have a role to play in socially affirming their patients' gender identity. For example by using their identified name. Some research has shown socially transitioned young people have levels of depression, anxiety, and self-worth comparable to cisgender siblings (and cisgender controls), according to both self- and parent-reports.⁽⁵⁻⁷⁾ In other research with trans and gender diverse young people, chosen name use in multiple contexts

(school, home, work, with friends) was associated with lower depression, suicidal ideation, suicidal behaviour, and greater self-esteem.^(8, 9) Another study with a subset of trans and gender diverse children who had a diagnosis of gender dysphoria, found no association between social transition or chosen name use with mood, anxiety and past suicidal behaviour.⁽¹⁰⁾ Longitudinal research is needed to better understand how social affirmation may impact on youth mental health over time. Overall, most evidence suggests that when trans and gender diverse young people are supported to socially transition or when their gender identity is affirmed, they experience mental health outcomes similar to their cisgender siblings and peers.

Gender-affirming medical treatment

Puberty blockers

Puberty blockers are an informal name for Gonadotropin-releasing hormone analogues (GnRHa), such as Goserelin (Zoladex), Leuprorelin (Lucrin), or Triptorelin (Diphereline). They are recommended as an initial treatment for early adolescents experiencing gender-related distress. They are effective treatments for suppressing puberty and menses.(11) This allows additional time for gender identity development while preventing further distress caused by changes to the body during puberty.(12)

Three longitudinal studies(11, 13, 14) and two cross-sectional studies(15, 16) have investigated the youth mental health outcomes associated with GnRHa treatment. 'Gold standard' research designs that usually apply within a medical model, such as randomised controlled trials (RCTs), may not be appropriate for investigating gender-affirming care interventions, which seek to operate beyond a clinical, medical, or deficit model. Also, RCTs are rare in this field of research, given ethical issues associated with delaying access to treatment for a control group.(17) A longitudinal study of 70 trans and gender diverse adolescents found that from the start of GnRHa to the start of gender-affirming hormone therapy (GAHT; i.e. estrogen or testosterone), general functioning improved, while depressive symptoms and behavioural and emotional problems decreased significantly. There was no change in anxiety, anger, gender dysphoria or body satisfaction.(14) Similarly, another study of 121 adolescents receiving GnRHa found psychosocial function increased steadily over the 18 month study, to

within normal range for cis-gendered peers. Half of the participants experienced delayed eligibility for GnRHa and had poorer psychosocial outcomes, despite also receiving psychological support.(13) A smaller study found no significant changes in psychological distress nor self-harm during GnRHa treatment, although there were a number of study limitations including short-term follow-up with a high rate of drop out, and the majority of participants commenced GnRHa in the late stages of puberty, which may have influenced the findings.(11, 18) Half of participants reported positive mood changes, while a quarter reported negative mood changes or reduced energy.

A survey of over 20,000 trans and gender diverse young adults found that 16.9% reported that they wanted to receive GnRHa as part of their gender care during early adolescence, while only 2.5% had actually received it.(15) After adjusting for other variables, those who received GnRHa treatment had significantly lower odds of lifetime suicidal ideation compared to those who wanted puberty suppression but did not receive GnRHa treatment. Finally, a Dutch study found that trans and gender diverse young people who had received gender-affirming care including GnRHa (n=178) reported less internalising problems, self-harm/suicidality, and stronger peer relationships than trans and gender diverse young people who had not yet received gender-affirming care (n=272). The group receiving treatment reported similar psychosocial functioning compared to 651 of their same-age cisgender peers.(16) Overall, the peer-reviewed literature suggests that GnRHa is correlated with improved general functioning and peer relations, and reduced depressive symptoms, suicidal ideation, and behavioural and emotional problems in trans and gender diverse young people.



Trajectory of children and young people accessing gender-affirming medical treatment

Most young people who access gender-affirming care, continue to access gender-affirming interventions over time, and most children who access GnRHa treatment go on to access GAHT in adolescence.(11) While discontinuation of treatment is not necessarily a negative outcome, the rate of discontinuation of gender affirming medical treatment among adolescents is consistently low across studies, varying from 0 to 10%.(12, 19-22). Variability across studies may be related to differing eligibility criteria, developmental stages, quality of service provision, and sociocultural contexts. When gender dysphoria continues for young people during puberty, it is unlikely to subside.(12)

Trans and gender diverse adolescents taking GnRHa have reported better psychosocial function and life satisfaction, along with lower rates of depression and lifetime suicidality than those who accessed gender-affirming medical treatment at a later stage.(23) Those accessing GnRHa (23) reported comparable rates of mental health and wellbeing to the population average, which may reflect the benefits of early access to gender-affirming care. Early access to GAHT (during adolescence) is also associated with lower odds of suicidal ideation.(24)

Gender affirming hormone therapy (GAHT)

Gender-affirming hormone therapy (GAHT) involves administering sex hormones or hormonal medications to align secondary sex characteristics more closely with gender identity. For the vast majority of trans and gender diverse young people, GAHT is their first introduction to gender-affirming medical treatment. For example, in a study of 316 youth receiving GAHT, 93% did not previously receive GnRHa treatment.(23)

Access to GAHT remains limited. A large survey found the percentage of trans and gender diverse young people who want GAHT but do not receive it (approximately 50%) far outweighs those who receive it (14%).(25). Those receiving GAHT were significantly more likely to have parental support and lower odds of recent depression and suicidality compared to those who wanted GAHT but did not have access to it.(25) Similarly, a large cross-sectional study of over 27,000 trans and gender diverse adults in the U.S. found that access to GAHT during adolescence and early adulthood was associated with better mental health outcomes compared to desiring but not accessing GAHT. (24) Overall, this correlational research found a positive association between access to GAHT for trans and gender diverse young people and positive mental health outcomes.

Research trials and longitudinal studies have further supported this association. A 3-month RCT was recently undertaken with 64 trans and gender diverse young adults seeking testosterone therapy. At three months, the immediate testosterone treatment group experienced significantly reduced gender dysphoria, depression, and suicidality compared to those who were placed on the 3-month waitlist.(26) Another study found trans and gender diverse young people receiving GAHT (testosterone) experienced significantly less depression, anxiety, and distress related to body image when compared to same-age trans and gender diverse people not receiving testosterone. (27) Many longitudinal studies, with and without control groups, have also investigated the mental health and wellbeing outcomes of GAHT for trans and gender diverse young people. Over time, GAHT appears to reduce gender dysphoria(28), body uneasiness/dissatisfaction(29-32), and psychiatric symptoms.(29, 30) For example, GAHT has been associated with reduced rates of depression(33-35), suicidality(31, 35, 36), and anxiety.(31, 34, 35) One study with a brief follow-up period found no significant changes to depression and anxiety, which suggested that improvements may occur gradually.(37) GAHT has also been associated with increased general wellbeing(36) and life satisfaction(34). Appearance congruence also increased over time and was associated with improved psychological outcomes.(34) One study focused specifically on facial appearance found that both trans men and women experienced increased satisfaction after receiving GAHT.(38) One study showed significant improvement in quality of life(39), whereas another found no change.(30) Although not the aim of GAHT treatment, it does not appear to influence self esteem(30, 38), disordered eating attitudes and behaviours(29, 40) or aggression.(41, 42)

In a small number of studies related to GAHT, only the trans-masculine cohort met the age criteria for inclusion in this review.(28, 41, 43) One study found that trans-masculine young people receiving testosterone experienced a clinically significant improvement in emotional well-being and social functioning.(28) Another study found trans-masculine young people who received testosterone experienced significantly lower rates of social anxiety, depression, and suicidality compared to the cohort who did not receive GAHT. Although there were no significant relationships between estrogen and depression and anxiety symptoms for trans-feminine participants, longer duration of estrogen was associated with less suicidality.(32)

Altogether, the evidence suggests that GAHT is associated with body image satisfaction and reduced psychological symptoms, including depression, anxiety, and suicidality.

Surgical interventions

Top surgery involves removing or augmenting chest tissue to create a more masculine or feminine appearance and is the most common gender-affirming surgical procedure accessed by trans and gender diverse young people.(44) Bottom surgery involves changing the look and function of genitals to align with gender identity. For those who desire it, bottom surgery remains inaccessible to most trans people in Australia due to significant barriers including the prohibitive cost and very limited number of skilled surgeons.

For trans-masculine youth (n=136) undergoing top surgery, chest dysphoria was significantly reduced post-surgery.(45) A qualitative study of 30 trans-masculine youth aged 13-21 found that chest dysphoria triggered strong negative emotions, suicidal ideation, and functional limitations, that were not adequately relieved by GAHT.(46) All post-surgery youth reported resolution of chest dysphoria, improved quality of life and functioning, and lack of regret. (46) Similarly, quantitative studies have supported that top surgery improves chest dysphoria, gender congruence, and body image satisfaction post-surgery for trans and nonbinary young people.(47-49) Two surveys of young people found that most were very satisfied with the overall experience of top surgery and its result including cosmetic appearance.(20, 50) Most people strongly agreed that surgery improved their mental health (77%) and overall quality of life (82%).(20). Another study found that pre-operative depression was associated with poor health-related quality of life six months post-mastectomy

(masculinising chest surgery), which suggests it is important to screen patients for depression and provide additional psychological support as needed.(44) Recent advances in top surgery procedures may further improve body satisfaction, quality of life, and psychosocial wellbeing.(51)

There is relatively little research focused on the mental health and wellbeing outcomes associated with other types of gender-affirming surgery, including bottom surgery, in young adults. One survey of young adults found that following intestinal vaginoplasty (a specific type of bottom surgery), trans women reported a good quality of life.(52) An Iranian study similarly found that gender reassignment surgery was significantly correlated with higher quality of life scores.(53) Overall, the evidence suggests that gender-affirming surgery is associated with improved mental health outcomes, quality of life, and body image satisfaction in trans and gender diverse young people.



How common are feelings of regret?

For trans and gender diverse people who pursue gender-affirming surgery, feelings of regret after surgery are rare. Across the included studies, the number of participants who reported feelings of regret was near zero.(20, 21, 45, 46, 50, 54). Another study of nearly 7,000 trans and gender diverse people in the Netherlands found that only 0.6% of transwomen and 0.3% of transmen expressed regret after gonadectomy (surgical removal of testes or ovaries).(55)

As with any type of surgery, regret may be related to outcomes, pre-operative expectations, or complications.(56) Also, external factors such as social pressure or repercussions such as family rejection, harrassment, and social stigma commonly influence feelings of regret related to gender-affirming medical care.(57)

Combinations of gender-affirming medical treatment

Longitudinal research has found young people initiating GnRHa and/or GAHT experienced improved depression symptoms(39, 58), suicidal ideation(39, 58), quality of life (39), and global self-worth(59) over time. Cross-sectional research has also found an association between gender-affirming hormonal interventions (GnRHa and GAHT) and fewer anxiety symptoms.(60) In one study, young people who received GAHT and/or gender-affirming surgery reported less emotional and behavioural problems than prior to commencing treatment, similar to the national norm.(61) GAHT and surgery combined were associated with a better body image than the absence of treatment or where only GnRHa or GAHT were applied.(62) Young people who received GnRHa followed by GAHT treatment along with psychosocial support experienced significantly improved gender dysphoria.(63)

One study followed 55 trans young people (mean age 13.6 at baseline) through commencing GnRHa, GAHT, and gender-affirming surgery. One year post-surgery (primarily vaginoplasty for transwomen and mastectomy and hysterectomy with ovariectomy for transmen), gender dysphoria was alleviated and psychological functioning and wellbeing improved to be similar to same-age cisgender peers.(54) In a survey of 350 Brazilian trans and gender diverse youth, having completed multiple steps of gender affirmation (social, legal, and medical/surgical) was associated with decreased depression and anxiety symptoms. Furthermore, engaging in gender affirmation processes helped trans young people to feel more socially accepted and positive about their gender identity.(64) This evidence suggests that gender-affirming interventions may have a cumulative effect for improving body image, mental health and wellbeing.



Re-affirmation

A small number of trans and gender diverse people may identify as gender fluid or align with a different gender identity over time or in different contexts. A recent Australian study found that of 196 children and adolescents who commenced GnRHa or GAHT, only 2 (1%) reidentified with their birth-registered sex.(65) In another study of nearly 2,000 youth and young adults who underwent gender-affirming surgery (mean age 24.5), only six (0.3%) either requested reversal surgery or re-affirmed their gender to align with their sex assigned at birth.(56) It is important to note that re-affirmation of gender is not synonymous with regret or adverse outcomes, and these should not be conflated.(57)

A survey in the United States found that over 80% of trans and gender diverse people who re-affirmed their gender were driven by at least one external factor.(57) Young people in this survey were most likely to report feeling pressure to re-affirm their gender presumed at birth from a parent, friends, the community, or societal stigma.

Discussion

The evidence that gender-affirming care is correlated with enhanced youth mental health and wellbeing outcomes is consistently and overwhelmingly positive. Despite ethical barriers to conducting high quality RCTs, there is also emerging evidence to support that gender-affirming care has a direct impact on these improved outcomes. Augmenting gender-affirming medical interventions with multi-disciplinary psychosocial support may further enhance outcomes.(60, 61, 66)

Gender-affirming care is the only therapeutic gender-care approach supported by peer-reviewed literature and endorsed by peak medical bodies in Australia, the United States, and many other countries.(67) Furthermore, it aligns with key clinical care principles including person-centred care. This means treating people with dignity and respect, communicating about treatment options, and encouraging participation in decision-making. This promotes autonomy, sense of agency and self-determination, and upholds basic human rights. Person-centred care is foundational to safe, high-quality healthcare and is embedded in clinical care standards including the National Safety and Quality Health Service (NSQHS) Standards and the Primary and Community Healthcare Standards.

Conversely, withholding gender-affirming care is known to be harmful. Young people may feel their identity has been invalidated and avoid accessing health care in the future, leading to poorer health outcomes.(1) Legislation banning gender-affirming care implemented in some parts of the United States has had a negative impact on mental health including gender dysphoria, depression, anxiety, and risk of suicide, as well as increased stigma and decreased safety and access to medical care, according to both young people and their parents.(68) Discriminatory policies and the rhetoric surrounding them are harmful to trans and gender diverse young people and their families, and health professionals play an important role in correcting misinformation perpetuated by such policies.(69) Advocacy for accessible, gender-affirming health care is clearly needed for trans and gender diverse young people internationally.

Gender-affirming care is the only evidence-based approach

The current review did not find any empirical research of alternative approaches to gender-affirming care that yielded positive mental health or wellbeing outcomes, despite the broad search strategy encompassing all approaches to gender-related distress in young people. Only one peer-reviewed paper investigating an alternative approach met the inclusion criteria. This study found that for transgender adolescents, gender identity change efforts were associated with a 55% increase in attempted suicide and doubled the risk of running away compared to those who had not been exposed, with worse outcomes for people exposed at a younger age of 11-14.(67) Additional research has confirmed that interventions with the intent to change gender identity are detrimental to mental health, including increasing suicidality and self-harm.(70, 71) Conversion practices are also unlawful across several Australian states and territories.

Gender Exploratory Therapy (GET) has been proposed as another alternative to gender-affirming care, in which gender affirmation in young people is discouraged, while first using talk therapy to explore the meaning and potential pathological roots of their gender identity or gender questioning. The approach and its parameters are not yet clearly defined and there is a lack of peer-reviewed evidence investigating the outcomes of this approach. Proponents of GET argue that it is a “neutral” approach which has no predetermined outcome.(72) However, some academics have likened it to conversion therapy in its aims, in that there is no clear endpoint for “exploration” unless the young person has accepted their gender as the gender presumed for them at birth.(17) The approach is also at odds with expert consensus that being trans is not pathological.

‘Wait-and-see’ approaches also have a negative impact on young people’s mental health and wellbeing, as studies have shown that unmet needs for gender-affirming care contribute to mental health inequities including higher rates of suicide and self-harm.(73) Distress associated with gender dysphoria also tends to increase as young people go through stages of puberty.(15) Young people presenting for gender-affirming treatment at an older age and later pubertal stage have greater rates of depression, anxiety, and use of psychoactive medication than those presenting earlier.(74) Greater perceived gender affirmation progress and gender congruence are associated with fewer mental health symptoms in trans adolescents.(75) Interventions designed to reduce wait times appear to improve mental health and wellbeing. For example, the innovative First Assessment Single-Session Triage (FASST) clinic that provided information and support to young people and their families and triaged them onto a secondary waitlist for subsequent multidisciplinary care improved depression, anxiety, quality of life, and sense of agency.(76)

Strengths and limitations of this literature review

This review used a comprehensive and systematic literature search strategy, which adds to its strength. However, it is possible that a small number of relevant studies may have been missed. Grey literature and anecdotal evidence were also excluded from this evidence review.

Most studies included in this review were uncontrolled observational studies with small to moderate sample sizes and limited follow-up. While it would be ideal to be able to draw from more high-quality evidence, such as randomised controlled trials, this is often unfeasible as it would be unethical to withhold interventions which are

known to improve the health and wellbeing of participants. Nonetheless, the quantity and quality of research related to care for trans and gender diverse young people is increasing over time, so it will be important to review the best available evidence as more data becomes available in the future. This review also focussed on mental health and wellbeing outcomes, so it is important to consider this information in conjunction with research exploring physical and sexual health outcomes associated with gender care interventions.

Conclusion

- Overall, the peer-reviewed evidence supports gender-affirming care as the best available approach to improve mental health, wellbeing, and quality of life outcomes for trans and gender diverse children and young people.
- Earlier access to gender-affirming care and accessing multiple types of gender-affirming interventions are both associated with better body image, mental health, and wellbeing outcomes.
- Augmenting medical care with multi-disciplinary, gender-affirming psychosocial support may further enhance outcomes.(60, 61, 66)
- Limiting access to gender-affirming care using a 'wait and see' approach or interventions with an aim to change a young person's gender identity are not evidence-based and are detrimental to youth mental health and wellbeing.
- There is clearly a positive correlation between gender-affirming care and youth mental health and wellbeing outcomes. Further high quality longitudinal studies, such as the Trans20 study currently underway in Australia,(77) will be useful to investigate the impact of gender-affirming care on youth mental health and wellbeing outcomes.
- Further research about the mental health outcomes associated with gender-affirming care is also needed in non-Western countries and focusing on First Nations and culturally and linguistically diverse young people in Australia.

References

1. Strauss P, Winter S, Waters Z, Wright Toussaint D, Watson V, Lin A. Perspectives of trans and gender diverse young people accessing primary care and gender-affirming medical services: findings from Trans Pathways. *Int J Transgend Health*. 2022;23(3):295-307.
2. Day JK, Fish JN, Perez-Brumer A, Hatzenbuehler ML, Russell ST. Transgender youth substance use disparities: results from a population-based sample. *J Adolesc Health*. 2017;61(6):729-35.
3. Hisle-Gorman E, Schvey NA, Adirim TA, Rayne AK, Susi A, Roberts TA, et al. Mental healthcare utilization of transgender youth before and after affirming treatment. *J Sex Med*. 2021;18(8):1444-54.
4. Mezzalana S, Scandurra C, Mezza F, Miscioscia M, Innamorati M, Bochicchio V. Gender felt pressure, affective domains, and mental health outcomes among transgender and gender diverse (TGD) children and adolescents: a systematic review with developmental and clinical implications. *Int J Environ Res Public Health*. 2022;20(1):785.
5. Olson KR, Durwood L, McLaughlin KA. Mental health of transgender children who are supported in their identities. *Pediatrics*. 2016;137(3):e20153223.
6. Durwood L, McLaughlin KA, Olson KR. Mental health and self-worth in socially transitioned transgender youth. *J Am Acad Child Adolesc Psychiatry*. 2017;56(2):116-23.
7. Gibson DJ, Glazier JJ, Olson KR. Evaluation of anxiety and depression in a community sample of transgender youth. *JAMA Netw Open*. 2021;4(4):e214739.
8. Russell ST, Pollitt AM, Li G, Grossman AH. Chosen name use is linked to reduced depressive symptoms, suicidal ideation, and suicidal behavior among transgender youth. *J Adolesc Health*. 2018;63(4):503-5.
9. Pollitt AM, Ioverno S, Russell ST, Li G, Grossman AH. Predictors and mental health benefits of chosen name use among transgender youth. *Youth Soc*. 2021;53(2):320-41.
10. Morandini JS, Kelly A, de Graaf NM, Malouf P, Guerin E, Dar-Nimrod I, et al. Is social gender transition associated with mental health status in children and adolescents with gender dysphoria? *Arch Sex Behav*. 2023;52(3):1045-60.
11. Carmichael P, Butler G, Masic U, Cole TJ, De Stavola BL, Davidson S, et al. Short-term outcomes of pubertal suppression in a selected cohort of 12 to 15 year old young people with persistent gender dysphoria in the UK. *PLoS One*. 2021;16(2):e0243894.
12. Brik T, Vrouenraets LJJJ, de Vries MC, Hannema SE. Trajectories of adolescents treated with gonadotropin-releasing hormone analogues for gender dysphoria. *Arch Sex Behav*. 2020;49(7):2611-8.
13. Costa R, Dunsford M, Skagerberg E, Holt V, Carmichael P, Colizzi M. Psychological support, puberty suppression, and psychosocial functioning in adolescents with gender dysphoria. *J Sex Med*. 2015;12(11):2206-14.
14. de Vries ALC, Steensma TD, Doreleijers TAH, Cohen-Kettenis PT. Puberty suppression in adolescents with gender identity disorder: a prospective follow-up study. *J Sex Med*. 2011;8(8):2276-83.
15. Turban JL, King D, Carswell JM, Keuroghlian AS. Pubertal suppression for transgender youth and risk of suicidal ideation. *Pediatrics*. 2020;145(2):e20191725.
16. van der Miesen AIR, Steensma TD, de Vries ALC, Bos H, Popma A. Psychological functioning in transgender adolescents before and after gender-affirmative care compared with cisgender general population peers. *J Adolesc Health*. 2020;66(6):699-704.
17. Ashley F. Interrogating gender-exploratory therapy. *Perspect Psychol Sci*. 2022;18(2):472-81.
18. McPherson S, Freedman DEP. Psychological outcomes of 12-15-year-olds with gender dysphoria receiving pubertal suppression: assessing reliable and clinically significant change. *J Sex Marital Ther*. 2023;50(3):315-25.
19. Cohen-Kettenis PT, Van Goozen SHM. Sex reassignment of adolescent transsexuals: a follow-up study. *J Am Acad Child Adolesc Psychiatry*. 1997;36(2):263-71.
20. Kelly-Schuetz KA, Wempe KA, Fritz GD, Hop AM, Wright GP. Masculinizing chest surgery for gender affirmation: a retrospective study of outcomes and patient reported satisfaction. *J Am Coll Surg*. 2021;233(5 Supplement 1):s28.
21. Tang A, Hojilla JC, Jackson JE, Rothenberg KA, Gologorsky RC, Stram DA, et al. Gender-affirming mastectomy trends and surgical outcomes in adolescents. *Ann Plast Surg*. 2022;88(4 Suppl):S325-S31.
22. Elkadi J, Chudleigh C, Maguire AM, Ambler GR, Scher S, Kozłowska K. Developmental pathway choices of young people presenting to a gender service with gender distress: a prospective follow-up study. *Children*. 2023;10(2):314.
23. Chen D, Abrams M, Clark L, Ehrensaft D, Tishelman AC, Chan Y-M, et al. Psychosocial characteristics of transgender youth seeking gender-affirming medical treatment: baseline findings from the Trans Youth Care Study. *J Adolesc Health*. 2021;68(6):1104-11.
24. Turban JL, King D, Kobe J, Reisner SL, Keuroghlian AS. Access to gender-affirming hormones during adolescence and mental health outcomes among transgender adults. *PLoS One*. 2022;17(1):e0261039.
25. Green AE, DeChants JP, Price MN, Davis CK. Association of gender-affirming hormone therapy with depression, thoughts of suicide, and attempted suicide among transgender and nonbinary youth. *J Adolesc Health*. 2022;70(4):643-9.
26. Nolan BJ, Zwickl S, Locke P, Zajac JD, Cheung AS. Early access to testosterone therapy in transgender and gender-diverse adults seeking masculinization: a randomized clinical trial. *JAMA Netw Open*. 2023;6(9):e2331919.
27. Grannis C, Leibowitz SF, Gahn S, Nahata L, Morningstar M, Mattson WI, et al. Testosterone treatment, internalizing symptoms, and body image dissatisfaction in transgender boys. *Psychoneuroendocrinology*. 2021;132(1):105358.
28. Foster Skewis L, Bretherton I, Leemaqz SY, Zajac JD, Cheung AS. Short-term effects of gender-affirming hormone therapy on dysphoria and quality of life in transgender individuals: a prospective controlled study. *Front Endocrinol (Lausanne)*. 2021;12:717766.
29. Pham AH, Eadeh H-M, Garrison MM, Ahrens KR. A longitudinal study on disordered eating in transgender and nonbinary adolescents. *Acad Pediatr*. 2023;23(6):1247-51.
30. Filipov H, Kavla Y, Sahin S, Gokler ME, Turan S. The effects of gender-affirming hormone therapy on body satisfaction, self-esteem, quality of life, and psychopathology in people with female-to-male gender dysphoria. *Transgend Health*. 2023;8(2):168-74.
31. Kuper LE, Stewart S, Preston S, Lau M, Lopez X. Body dissatisfaction and mental health outcomes of youth on gender-affirming hormone therapy. *Pediatrics*. 2020;145(4):e20193006.
32. Grannis C, Mattson WI, Leibowitz SF, Nahata L, Chen D, Strang JF, et al. Expanding upon the relationship between gender-affirming hormone therapy, neural connectivity, mental health, and body image dissatisfaction. *Psychoneuroendocrinology*. 2023;156:106319.
33. Aldridge Z, Patel S, Guo B, Nixon E, Pierre Bouman W, Witcomb GL, et al. Long-term effect of gender-affirming hormone treatment on depression and anxiety symptoms in transgender people: a prospective cohort study. *Andrology*. 2021;9(6):1808-16.
34. Chen D, Berona J, Chan Y-M, Ehrensaft D, Garofalo R, Hidalgo MA, et al. Psychosocial functioning in transgender youth after 2 years of hormones. *New Engl J Med*. 2023;388(3):240-50.
35. Kaltiala R, Heino E, Tyolajarvi M, Suomalainen L. Adolescent development and psychosocial functioning after starting cross-sex hormones for gender dysphoria. *Nordic J Psychiatry*. 2020;74(3):213-9.
36. Allen LR, Watson LB, Egan AM, Moser CN. Well-being and suicidality among transgender youth after gender-affirming hormones. *Clin Pract Pediatr Psychol*. 2019;7(3):302-11.
37. Cantu AL, Moyer DN, Connelly KJ, Holley AL. Changes in anxiety and depression from intake to first follow-up among transgender youth in a pediatric endocrinology clinic. *Transgend Health*. 2020;5(3):196-200.
38. Tebbens M, Nota NM, Liberton NPTJ, Meijer BA, Kreukels BPC, Forouzanfar T, et al. Gender-affirming hormone treatment induces facial feminization in transwomen and masculinization in transmen: quantification by 3D scanning and patient-reported outcome measures. *J Sex Med*. 2019;16(5):746-54.
39. Achille C, Taggart T, Eaton NR, Osipoff J, Tafuri K, Lane A, et al. Longitudinal impact of gender-affirming endocrine intervention on the mental health and well-being of transgender youths: preliminary results. *Int J Pediatr Endocrinol*. 2020;2020(1):8.
40. Turan S, Aksoy Poyraz C, Usta Saglam NG, Demirel OF, Haliloglu O, Kadioglu P, et al. Alterations in body uneasiness, eating attitudes, and psychopathology before and after cross-sex hormonal treatment in patients with female-to-male gender dysphoria. *Arch Sex Behav*. 2018;47(8):2349-61.
41. Defreyne J, T'Sjoen G, Bouman WP, Brewin N, Arcelus J. Prospective evaluation of self-reported aggression in transgender persons. *J Sex Med*. 2018;15(5):768-76.

42. van Kemenade JF, Cohen-Kettenis PT, Cohen L, Gooren LJ. Effects of the pure antiandrogen RU 23.903 (anandron) on sexuality, aggression, and mood in male-to-female transsexuals. *Arch Sex Behav.* 1989;18(3):217-28.
43. Matthys I, Defreyne J, Elaut E, Fisher AD, Kreukels BPC, Staphorsius A, et al. Positive and negative affect changes during gender-affirming hormonal treatment: results from the European network for the investigation of gender incongruence (enigi). *J Clin Med.* 2021;10(2):1-13.
44. Kaur MN, Gallo L, Wang Y, Rae C, McEvenue G, Semple J, et al. Health state utility values in patients undergoing chest masculinization surgery. *J Plast Reconstr Aesthet Surg.* 2023;81(101264239):26-33.
45. Olson-Kennedy J, Warus J, Okonta V, Belzer M, Clark LF. Chest reconstruction and chest dysphoria in transmasculine minors and young adults: comparisons of nonsurgical and postsurgical cohorts. *JAMA Pediatrics.* 2018;172(5):431-6.
46. Mehringer JE, Harrison JB, Quain KM, Shea JA, Hawkins LA, Dowshen NL. Experience of chest dysphoria and masculinizing chest surgery in transmasculine youth. *Pediatrics.* 2021;147(3):e2020013300.
47. Ascha M, Sasson DC, Sood R, Cornelius JW, Schauer JM, Runge A, et al. Top surgery and chest dysphoria among transmasculine and nonbinary adolescents and young adults. *JAMA Pediatrics.* 2022;176(11):1115-22.
48. Boskey ER, Jolly D, Kant JD, Ganor O. Prospective evaluation of psychosocial changes after chest reconstruction in transmasculine and non-binary youth. *J Adolesc Health.* 2023;73(3):503-9.
49. van de Grift TC, Elfering L, Greijdanus M, Smit JM, Bouman M-B, Klassen AF, et al. Subcutaneous mastectomy improves satisfaction with body and psychosocial function in trans men: findings of a cross-sectional study using the BODY-Q Chest Module. *Plast Reconstr Surg.* 2018;142(5):1125-32.
50. Day DL, Klit A, Lang CL, Mejdahl MK, Holmgaard R. High self-reported satisfaction after top surgery in gender-affirming surgery: a single-center study. *Transgend Health.* 2023;8(2):124-9.
51. Romano G, Bouaoud J, Schmidt M, Rausky J, Stivala A, Atian M, et al. Improvements in transgender masculinizing chest surgery: a pilot study of a tailored approach with a life satisfaction assessment. *Transgend Health.* 2023.
52. Bouman M-B, van der Sluis WB, van Woudenberg Hamstra LE, Buncamper ME, Kreukels BPC, Meijerink WJHJ, et al. Patient-reported esthetic and functional outcomes of primary total laparoscopic intestinal vaginoplasty in transgender women with penoscrotal hypoplasia. *J Sex Med.* 2016;13(9):1438-44.
53. Arianmehr T, Cheraghi Z, Ahmadpanah M, Mohammadi Y. Quality of life and the related factors in Iranian transgender people: a cross-sectional study. *J Public Health.* 2022;30(7):1745-51.
54. de Vries ALC, McGuire JK, Steensma TD, Wagenaar ECF, Doreleijers TAH, Cohen-Kettenis PT. Young adult psychological outcome after puberty suppression and gender reassignment. *Pediatrics.* 2014;134(4):696-704.
55. Wiepjes CM, Nota NM, de Blok CJM, Klaver M, de Vries ALC, Wensing-Kruger SA, et al. The Amsterdam cohort of gender dysphoria study (1972–2015): trends in prevalence, treatment, and regrets. *J Sex Med.* 2018;15(4):582-90.
56. Jedrzejewski BY, Marsiglio MC, Guerriero J, Penkin A, Connolly KJ, Berli JU. Regret after gender-affirming surgery: a multidisciplinary approach to a multifaceted patient experience. *Plast Reconstr Surg.* 2023;152(1):206-14.
57. Turban JL, Loo SS, Almazan AN, Keuroghlian AS. Factors leading to “detransition” among transgender and gender diverse people in the United States: a mixed-methods analysis. *LGBT health.* 2021;8(4):273-80.
58. Tordoff DM, Wanta JW, Collin A, Stepney C, Inwards-Breland DJ, Ahrens K. Mental health outcomes in transgender and nonbinary youths receiving gender-affirming care. *JAMA Netw Open.* 2022;5(2):e220978.
59. Arnoldussen M, van der Miesen AIR, Elzinga WS, Alberse A-ME, Popma A, Steensma TD, et al. Self-perception of transgender adolescents after gender-affirming treatment: a follow-up study into young adulthood. *LGBT Health.* 2022;9(4):238-46.
60. Olsavsky AL, Grannis C, Bricker J, Chelvakumar G, Indyk JA, Leibowitz SF, et al. Associations among gender-affirming hormonal interventions, social support, and transgender adolescents’ mental health. *J Adolesc Health.* 2023;72(6):860-8.
61. Becker-Hebly I, Fahrenkrug S, Campion F, Richter-Appelt H, Schulte-Markwort M, Barkmann C. Psychosocial health in adolescents and young adults with gender dysphoria before and after gender-affirming medical interventions: a descriptive study from the Hamburg Gender Identity Service. *Eur Child Adolesc Psychiatry.* 2021;30(11):1755-67.
62. Becker I, Auer M, Barkmann C, Fuss J, Moller B, Nieder TO, et al. A cross-sectional multicenter study of multidimensional body image in adolescents and adults with gender dysphoria before and after transition-related medical interventions. *Arch Sex Behav.* 2018;47(8):2335-47.
63. Lavender R, Shaw S, Maninger J-K, Butler G, Carruthers P, Carmichael P, et al. Impact of hormone treatment on psychosocial functioning in gender-diverse young people. *LGBT Health.* 2023;10(5):382-90.
64. Fontanari AMV, Vilanova F, Schneider MA, Chinazzo I, Soll BM, Schwarz K, et al. Gender affirmation is associated with transgender and gender nonbinary youth mental health improvement. *LGBT Health.* 2020;7(5):237-47.
65. Cavve BS, Bickendorf X, Ball J, Saunders LA, Thomas CS, Strauss P, et al. Reidentification with birth-registered sex in a Western Australian pediatric gender clinic cohort. *JAMA Pediatrics.* 2024;178(5):446-53.
66. Oda H, Kinoshita T. Efficacy of hormonal and mental treatments with MMPI in FtM individuals: cross-sectional and longitudinal studies. *BMC Psychiatry.* 2017;17(1):256.
67. Campbell T, Rodgers YvdM. Conversion therapy, suicidality, and running away: an analysis of transgender youth in the U.S. *J Health Econ.* 2023;89:102750.
68. Abreu RL, Sostre JP, Gonzalez KA, Lockett GM, Matsuno E, Mosley DV. Impact of gender-affirming care bans on transgender and gender diverse youth: parental figures’ perspective. *J Fam Psychol.* 2022;36(5):643-52.
69. Pacey MS, Dikitsas ZA, Greenwood E, McInroy LB, Fish JN, Williams N, et al. The perceived health implications of policies and rhetoric targeting transgender and gender diverse youth: a community-based qualitative study. *Transgend Health.* 2023;8(1):100-3.
70. Fenaughty J, Tan K, Ker A, Veale J, Saxton P, Alansari M. Sexual orientation and gender identity change efforts for young people in New Zealand: demographics, types of suggesters, and associations with mental health. *J Youth Adolesc.* 2023;52(1):149-64.
71. Green AE, Price-Feeney M, Dorison SH, Pick CJ. Self-reported conversion efforts and suicidality among US LGBTQ youths and young adults, 2018. *Am J Public Health.* 2020;110(8):1221-7.
72. Ayad S, D’Angelo R, Kenny DT, Levine SB, Marchiano L, O’Malley S. A clinical guide for therapists working with gender-questioning youth. *Therapy First;* 2022.
73. Tan KKH, Byrne JL, Treharne GJ, Veale JF. Unmet need for gender-affirming care as a social determinant of mental health inequities for transgender youth in Aotearoa/New Zealand. *J Public Health.* 2023;45(2):e225-e33.
74. Sorbara JC, Chiniara LN, Thompson S, Palmert MR. Mental health and timing of gender-affirming care. *Pediatrics.* 2020;146(4).
75. Thoma BC, Jardas EJ, Choukas-Bradley S, Salk RH. Perceived gender transition progress, gender congruence, and mental health symptoms among transgender adolescents. *J Adolesc Health.* 2023;72(3):444-51.
76. Allen SD, Tollit MA, McDougall R, Eade D, Hoq M, Pang KC. A waitlist intervention for transgender young people and psychosocial outcomes. *Pediatrics.* 2021;148(2):e2020042762.
77. Tollit MA, Pace CC, Telfer M, Hoq M, Bryson J, Fulkoski N, et al. What are the health outcomes of trans and gender diverse young people in Australia? Study protocol for the Trans20 longitudinal cohort study. *BMJ Open.* 2019;9(11):e032151.
78. Brandsma T, Visser K, Volk JJG, Rijn ABV, Dekker LP. A pilot study on the effect of peer support on quality of life of adolescents with autism spectrum disorder and gender dysphoria. *J Autism Dev Disord.* 2022;54:997-1008.
79. Moussaoui D, O’Connell MA, Elder CV, Grover SR, Pang KC. Characteristics of menstrual suppression and its association with mental health in transgender adolescents. *Obstet Gynecol.* 2023;142(5):1096-104.

Appendix 1 – Literature Search Strategy (Medline, PsycINFO, Embase) Please note: Some of the terms included in the search are outdated, but were included to be inclusive of relevant historical research.

Population		Mental Health and Wellbeing Outcomes
Youth*	Gender dysphori*	Mental health
Young adj2 adult*	Gender-related distress	Psychosocial function*
Adolescen*	Gender incongruen*	Psychological distress
Young adj2 person*	Transgender*	Depressi*
Young adj2 people*	Trans-gender*	Anxiety
Teen*	Non-binary	Well-being
Emerging adult*	Nonbinary	Wellbeing
Young adj2 female*	Trans	Quality of life
Young adj2 male*	Genderqueer	Mental illness
Young adj2 wom#n	Gender queer	Mental ill-health
Young adj2 m#n	Agender	Mental disorder*
P?ediatric*	Gender divers*	Psychosocial impairment*
Underage	Gender-divers*	Life adj2 satisfaction
Minors	Gender varian*	School adj2 attendance
	Gender atypical	Academic achievement
	Gender atypical	Vocational outcome*
	Transm#n	Employment outcome*
	Transwom#n	Body image
	Trans-m#n	Eating disorder*
	Trans-wom#n	Suicid*
	Gender-nonconform*	Self harm*
	Gender questioning	“Substance use”
	Gender fluid	Alcohol adj3 drug
	Gender minority	Substance abuse
	Intergender	
	Gender identity disorder	
	Trans-male	
	Bigender	
	Trans-fem*	
	Trans-masculin*	
	Brotherboy	
	Sistergirl	

Appendix 1 (continued) – Subject Headings – e.g. MeSH in Medline

Population		Mental Health and Wellbeing Outcomes
Adolescent/	Sexual and Gender Minorities/ -intersex persons -transgender persons	Mental Health/
Young Adult/	Transexualism/	Quality of Life/
Pediatrics/	Gender dysphoria/	Mental Disorders/
		Personal satisfaction/
		Psychological well-being/
		Depression/
		Anxiety/ or Anxiety Disorders/
		Body Dysmorphic Disorders/ or Body Image/

Appendix 2 – Inclusion and Exclusion Criteria

	Inclusion criteria	Exclusion criteria
Population	<ul style="list-style-type: none"> • Trans and gender diverse young people (mean age <25.9 years old or 'youth' descriptors if age not reported) • Studies where the sample was aged 26 or over if the mean age at time of receiving treatment was below 26. • Studies where the mean age of one group was aged under 26 if results were reported separately. (e.g., if the mean age of trans men was below 26.0 but the mean age of trans women was above, this study would be included if the results for trans men were reported separately. Only this group's results would be used for this current review) 	<ul style="list-style-type: none"> • Mean age 26.0 or over • Differences of Sex Development (DSD): congenital condition in which development of chromosomal, gonadal or anatomical sex is atypical (e.g., people who are intersex), unless the participants identify as trans.
Intervention/exposure	<ul style="list-style-type: none"> • Gender care intervention or approach delivered by a health professional (e.g. GP, allied health professional). Gender care refers to health care to support trans and gender diverse people with their gender identity and/or gender dysphoria • Legislative bans or other restrictions to the delivery of gender care interventions (e.g. Covid pandemic) 	<ul style="list-style-type: none"> • Interventions with a primary aim of treating mental health disorders in trans and gender diverse people (e.g. prevention or treatment of eating disorders, substance use, major depression etc.)
Context	<ul style="list-style-type: none"> • In a health care setting 	<ul style="list-style-type: none"> • All non-health care settings, such as schools or community centres

Appendix 2 (continued) – Inclusion and Exclusion Criteria

	Inclusion criteria	Exclusion criteria
Outcomes	<ul style="list-style-type: none"> • Mental health • Mental ill-health/symptoms • Wellbeing and related concepts (e.g. quality of life, resilience, coping, self esteem) • Psychosocial function/impairment • Minority stress • Gender-related distress/gender dysphoria • Body image/satisfaction 	<ul style="list-style-type: none"> • Physical health • Sexual function/satisfaction
Study characteristics	<ul style="list-style-type: none"> • Peer reviewed original research, including controlled trials, cohort studies and cross-sectional studies 	<ul style="list-style-type: none"> • Editorials • Commentary • Conference abstracts • Dissertations • Secondary research (i.e., literature reviews) • Case studies and case series • Qualitative studies
Comparison	<ul style="list-style-type: none"> • Between groups <ul style="list-style-type: none"> - No treatment control - Active treatment control • Within participants <ul style="list-style-type: none"> - Before and after 	<ul style="list-style-type: none"> • Cisgender youth • No comparison

Appendix 3 – Included studies

Table 1. Studies investigating GnRHa and mental health outcomes

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Carmichael, Butler, Masic, Cole, De Stavola, Davidson, et al., 2021 (11) McPherson & Freedman, 2023 (18)	Uncontrolled before-and-after study	44 young people with severe and persistent gender dysphoria attending a specialist gender service (AMAB=25; AFAB=19) aged 12-15 years, (Tanner ≥III for AMAB; Tanner ≥II for AFAB), on GnRHa treatment.	GnRHa (24-month of treatment vs baseline): There were no changes from baseline to 12 or 24 months in CBCL or YSR total t-scores or for CBCL or YSR self-harm indices, nor for CBCL total t-score or self-harm index at 36 months. NS change in gender dysphoria or body image. For both self-report (YSR) and parent report (CBCL), most participants experienced no reliable change in distress across all time points. Between 15% and 34% reliably deteriorate and between 9% and 29% reliably improve. Rates of reliable recovery range from 0% to 35% depending on the scale and time point. Reliable recovery fell to zero percent on all subscales at the final time point except for CBCL Externalizing scale which shows 1 out of 5 participants (20%) had moved into the normal range at 36 months.
Costa, Dunsford, Skagerberg, Holt, Carmichael & Colizzi, 2015 (13)	Controlled before-and-after study	201 adolescents aged 12-17 years (AMAB:AFAB ratio 1:1.6) attending the London Gender Identity Development Service.	Puberty suppression (12 months GnRHa + psychological support vs 12 months psychological support only): Higher psychosocial functioning (67.4 ± 13.9 vs 60.9 ± 12.2 , $p = 0.001$).
de Vries, Steensma, Doreleijers & Cohen-Kettenis, 2011 (14)	Uncontrolled before and after study	70 adolescents (33 AMAB; 37 AFAB) aged 11-17 years ($M=13.6$) receiving GnRHa and preparing for GAHT.	GnRHa (vs pre-GnRHa): Less impairment to psychological functioning (CBCL: $M(SD) 54.46(11.23)$ vs $60.70(12.76)$, $F(df, errdf) 26.17(1,52)$, $p < .001$); YSR: $M(SD) 50.00 (10.56)$ vs $55.46 (11.56)$, $F(df, errdf) 16.24 (1,52)$, $p < .001$). NS differences in gender dysphoria or body image dissatisfaction.
Turban, King, Carswell & Keuroghlian, 2020 (15)	Cross-sectional survey	$N = 20,619$ trans and gender diverse people aged 18-35 years ($M = 23.4$ years). 45.2% AMAB.	Puberty suppression (vs wanting and not receiving puberty suppression): Lower prevalence of lifetime suicidal ideation ($aOR = 0.3$, $P = 0.001$, 95% CI: 0.2-0.6), controlling for demographic variables.
van der Miesen, Steensma, de Vries, Bos & Popma, 2020 (16)	Cross-sectional survey	Pre-treatment: 272 adolescents referred to a gender clinic (AMAB=116; AFAB=156; age $M=14.5$) who had not yet received GAC. Mid-treatment: 178 adolescents (AMAB=68; AFAB=110; age $M=16.8$) receiving puberty suppression treatment.	Puberty suppression (vs pre-treatment): Less suicidality ($M(SD) .17(.52)$ vs $.41(.78)$, $F=44.26$, $p < .001$, $d=.36$), internalising behaviours ($M(SD) 7.76(6.67)$ vs $11.67(8.38)$, $F=14.16$, $p < .001$, $d=.52$), and peer relationship issues ($M(SD) .70(1.06)$ vs $1.08(1.31)$, $F=12.58$, $p < .001$, $d=.32$).

Note: AFAB = assigned female at birth, AMAB = assigned male at birth, aOR = adjusted odds ratio, CBCL = Child Behavior Checklist, M = mean, GAHT =gender affirming hormone therapy, GnRHa = gonadotropin-releasing hormone agonist, NS = not significant, SD = standard deviation, YSR = youth self report.

Appendix 3 (continued) – Included studies

Table 2. Studies investigating GAHT and mental health outcomes

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Aldridge, Patel, Guo, Nixon, Pierre Bouman, Witcomb, et al., 2021 (33)	Uncontrolled before and after study	N=178 (95 AMAB; 83 AFAB) young people (M age = 23 years).	GAHT (18 months treatment vs baseline): Decreased depression (M change = -2.05 (95%CI -2.72 to -1.38), $p < .001$). NS change in anxiety.
Allen, Watson, Egan & Moser, 2019 (36)	Uncontrolled before and after study	N=47 young people (33 AFAB; 14 AMAB) aged 12-20 years (M=16.59; SD=1.19) receiving GAHT.	GAHT (≥ 3 months vs pre-treatment): Less suicidality (F(1, 44) 15.09, $p < .001$, partial $\eta^2 = .26$), higher wellbeing (F(1, 44) 11.39, $p = .002$, partial $\eta^2 = .21$, respectively).
Chen, Abrams, Clark, Ehrensaft, Tishelman, Chan, et al., 2021 (23)	Cross-sectional	GnRHa Group: N=95 youth (M age = 11.22 years (SD= 1.46)). 51.6% AMAB. GAHT Group: N=316 youth (M age = 16.0 years (SD=1.88)) 62% AFAB. 93% had not received prior gender affirming care.	GnRHa access in early puberty (vs GAHT in later puberty): Less depression (28.6% vs 51.6%), anxiety (22.1% vs 57.3%), and lifetime suicidality (23.6% vs 66.6%).
Chen, Berona, Chan, Ehrensaft, Garofalo, Hidalgo, et al., 2023 (34)	Uncontrolled before and after study	N=315 transgender and nonbinary young people (60.3% transmasculine) aged 12-20 years (M=16; SD=1.9) receiving testosterone or estradiol.	GAHT (change over time from baseline to 24 months treatment): Improvements over time for all psychosocial outcomes (Wilk's lambda, 0.32; F (20,122) = 12.86; $p < 0.001$). Significant increases in appearance congruence (annual increase on a 5-point scale, 0.48; 95%CI, 0.42 to 0.54; $s\beta = 1.48$), positive affect (annual increase on a 5-point scale, 0.48; 95%CI, 0.42 to 0.54; $s\beta = 1.48$), and life satisfaction (annual increase on a 100-point scale, 2.31; 95%CI, 1.65 to 2.99; $\beta = 0.52$). Significant decrease in depression (annual change on a 63-point scale, -1.27; 95% CI, -1.98 to -0.57; $s\beta = -0.29$) and anxiety (annual change on a 100-point scale, -1.47; 95% CI, -2.15 to -0.80; $\beta = -0.35$).
Defreyne, T'Sjoen, Bouman, Brewin & Arcelus, 2018 (41)	Uncontrolled before and after study	64 transmen aged 18-26 (M=20.0) years.	Testosterone HRT (pre-post): Depression decreased (-1.42, 95% CI 2.61-0.24, $p = .019$). NS changes to aggression or anxiety.
Filipov, Kavla, Sahin, Gokler & Turan, 2023 (30)	Cross-sectional	No GAC: N=37 FtM gender diverse adults (M age 24.38 \pm 4.55). GAHT: N=35 FtM gender diverse adults who received GAHT for >6 months (M age 24.20 \pm 4.71).	Testosterone (vs no GAC): Better body satisfaction (116.00 (IQR 111.00–142.00) vs 143.00 (IQR133.00–157.00), $p < 0.001$). Less psychoticism (0.70 (IQR .40–1.10) vs 0.40 (IQR .2–.8), $p = 0.003$). No other significant QoL or psychological health differences.
Foster Skewis, Bretherton, Leemaqz, Zajac & Cheung, 2021 (28)	Controlled before and after study	Masculinising GAHT: N=42 (35 = trans; 7 =NB) adults newly commencing GAHT. M age = 24.0.	Full-dose masculinising GAHT (baseline -> 6 month treatment): Reduced gender dysphoria (aMD -6.80 (95%CI -8.68, -4.91), $p < 0.001$). Improved emotional well-being (aMD 7.48 (95%CI 1.32, 13.64), $p = 0.018$) and social functioning (aMD 12.50 (95%CI 2.84, 22.15), $p = 0.011$).

Appendix 3 (continued) – Included studies

Table 2. Studies investigating GAHT and mental health outcomes

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Grannis, Leibowitz, Gahn, Nahata, Morningstar, Mattson, et al., 2021 (27)	Cross-sectional	<p>Testosterone: N=19 transboys and men aged 9-21 (M=17.03±1.24).</p> <p>No treatment: N=23 transboys and men aged 9-21 (M=15.75±1.47).</p>	<p>Testosterone (vs no treatment): Lower generalized anxiety (F(1, 39) = 6.99, p = 0.01, η^2 = 0.16), social anxiety, (F(1, 39) = 17.21, p < 0.001, η^2 = 0.32), depression (F(1, 39) = 7.39, p = 0.01, η^2 = 0.16), and body image dissatisfaction (M(SD) = 91.16 (19.67) vs M(SD) = 108.09 (13.32), F(1, 39) = 10.47, p < 0.01, η^2 = 0.21).</p> <p>NS difference in suicidality or non-suicidal self-injury.</p>
Grannis, Mattson, Leibowitz, Nahata, Chen, Strang, et al., 2023 (32)	Cross-sectional	<p>AFAB GAHT: N=21 trans and non-binary AFAB young people aged 9-21 (M=17.04±1.18) years, receiving testosterone.</p> <p>AFAB no GAHT: N=29 trans and non-binary AFAB young people aged 9-21 (M= 15.24±1.72) years not receiving GAHT (N=3 receiving puberty blockers).</p> <p>AMAB GAHT: N=15 trans and non-binary AMAB young people aged 9-21 (M= 17.64±0.86) years receiving estrogen.</p> <p>AMAB no GAHT: N=15 trans and non-binary AMAB young people aged 9-21 (M= 16.27±1.49) not receiving GAHT (N=10 receiving puberty blockers).</p>	<p>Testosterone (vs AFAB no GAHT): Lower generalised anxiety (M(SD) 38.75(17.41) vs 50.25(14.12), F(df1,df2) 7.76(1,45), p<.01), depressive symptoms (M(SD) 13.38(7.81) vs 18.34(7.02), F(df1,df2) 5.62(1,47), p<.05), social anxiety (M(SD) 50.21(22.34) vs 78.62(31.41), F(df1,df2) 14.80(1,42), p<.001), body image dissatisfaction (M(SD) 92.29(19.74) vs 103.14(18.99), F(df1,df2) 7.46(1,47), p<.01). NS difference in suicidality.</p> <p>Estrogen (vs AMAB no GAHT): Lower body image dissatisfaction (M(SD) 85.33(16.21) vs 88.53(29.01), F(df1,df2) 4.88(1,29),p<.05). NS difference in generalised anxiety, depressive symptoms, social anxiety, or suicidality.</p>
Green, DeChants, Price & Davis, 2022 (25)	Cross-sectional	<p>GAHT: 1216 trans and non-binary young people aged 13-24 (M=19.95(±2.80)) years who accessed GAHT.</p> <p>No GAHT: 4537 transgender or nonbinary youth aged 13-24 (M=16.91(±2.97)) years who wanted but did not receive GAHT.</p>	<p>GAHT access (vs wanting but not receiving GAHT): Lower rates of depression (60.8% vs 75%, $\chi^2(1)=95.38$, p<.001), serious consideration of suicide (43.9% vs 57.1%, $\chi^2(1)=65.89$, p<.001), and suicide attempt (14.6% vs 23.2%, $\chi^2(1)=40.24$, p<.001).</p>
Kaltiala, Heino, Tyolajarvi & Suomalainen, 2020 (35)	Uncontrolled before-and-after study	52 adolescents who had taken GAHT (11 transfemales; 41 transmales). Mean age at diagnosis= 18.1 years (SD=1.1; range 15.2–19.9).	<p>GAHT (12 months treatment vs baseline): Less depression (54% vs 15%, p<.001), anxiety (48% vs 15%, p<.001), and suicidality/self-harm (35% vs 4%, p<.001).</p>
Kuper, Stewart, Preston, Lau & Lopez, 2020 (31)	Uncontrolled before-and-after study	N= 148 young people aged 9–18 years (M=14.9) receiving gender affirming hormone therapy (N = 25 puberty suppression only; N = 123 feminising or masculinising hormone therapy).	<p>GnRHa and/or GAHT (one year treatment vs pre-treatment): Lower body image dissatisfaction (M(SD) 69.9(15.6) vs 51.7(18.4), p<.001), self-reported depressive symptoms (M(SD) 9.4(5.2) vs 7.3(4.6), p<.001), anxiety symptoms (M(SD) 32.4(16.3) vs 28.6(16.1), p<.01). NS difference reported to any other mental health outcome.</p>

Appendix 3 (continued) – Included studies

Table 2. Studies investigating GAHT and mental health outcomes

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Matthys, Defreyne, Elaut, Fisher, Kreukels, Staphorsius, DenHeijer & T'sjoen 2021 (43)	Uncontrolled before-and-after study	422 transmen, aged 20-28 (M age = 22.00).	Testosterone (36 months treatments vs baseline): NS differences in positive or negative affect.
Nolan, Zwickl, Locke, Zajac & Cheung, 2023 (26)	Randomised controlled trial	N=62 trans and gender diverse adults aged 20-28 (Median=22.5) seeking initiation of testosterone therapy.	Testosterone (3 month treatment vs waitlist control): Decreased gender dysphoria (M difference, -7.2; 95% CI, -8.3 to -6.1; p < .001), suicidality (mean difference, -6.5; 95% CI, -8.2 to -4.8 points; p < .001), and depression (PHQ-9 M difference, -5.6; 95% CI, -6.8 to -4.4; p < .001), greater cessation of suicidal ideation (52% vs 5%, p = .002).
Oda & Kinoshita, 2017 (66)	Cross-sectional survey, controlled before and after study	N=155 female-to-male individuals aged 15-43 (M age = 25.6) who consulted a gender identity clinic, diagnosed with gender dysphoria.	GAHT (vs no GAHT) at initial consultation: NS difference on any MMPI scales. Commencing GAHT + Psychotherapy (vs no treatment at baseline): Significant improvements in depression, hysteria, psychiatric disease qualitative deviation, and psychasthenia MMPI scale scores. GAHT + Psychotherapy (vs GAHT) at follow up: Significantly lower psychiatric disease qualitative deviation score on MMPI.
Pham, Eadeh, Garrison & Ahrens, 2023 (29)	Uncontrolled before and after study	91 transgender and non-binary adolescents with a new visit to a multidisciplinary gender clinic, not already taking medications (estrogen, testosterone or puberty blockers). M age = 15.2 years. 61% transmasculine, 32% transfeminine, 7% non-binary or gender fluid.	NS changes in disordered eating after gender-affirming medical care for 3, 6 or 12 months. NS difference in disordered eating by gender identity or gender affirming medications or time spent receiving gender affirming care.
Tebbens, Nota, Liberton, Meijer, Kreukels, Forouzanfar, et al., 2019 (38)	Uncontrolled before and after study	14 transmen, aged 21-25, M age = 22.	NS difference in self-esteem at 3 months or 12 months compared to baseline after starting hormone treatment. Increase in satisfaction with facial appearance overall at 3-months [59.9, 95% CI 53.2-66.5, p<.05] and 12-months [59.9, 95% CI 54.1-65.6, p=<.05] compared to baseline [52.4, 95% CI 44.2-60.6].
Turan, Aksoy Poyraz, Usta Saglam, Demirel, Haliloglu, Kadioglu, et al., 2018 (40)	Uncontrolled before and after study	37 with female-to-male gender dysphoria.	Body uneasiness BUT*A-Global Severity Index (t(37) = 3.42, p = .002), BUT*A- Body Image Concern (t(37) = 3.70, p = .001), and BUT*A-Depersonalization (t(37) = 3.27 p = .002) scores decreased significantly after hormone therapy compared to before hormone therapy. NS change at 6 months compared to baseline on all BUT*B subscales (the focus of attention of a specific body part or function). General psychopathological symptoms of interpersonal sensitivity [t(37)=3.35, p=.002] and psychoticism [t(37)=3.90, p=<.001] statistically significantly decreased after 6 months of hormone treatment compared to baseline. NS on other SCL-90-R subscales. NS difference in eating attitudes and behaviours.

Appendix 3 (continued) – Included studies

Table 2. Studies investigating GAHT and mental health outcomes

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Turban, King, Kobe, Reisner & Keuroghlian, 2022 (24)	Cross-sectional	21,598 transgender adults who had ever wanted GAHT. One group had received GAHT in adolescence.	<p>GAHT (vs wanting and not receiving GAHT): Lower past-year suicidal ideation for those who accessed GAHT in early adolescence (aOR = 0.4, 95% CI = 0.2–0.6, p < .0001), late adolescence (aOR = 0.5, 95% CI = 0.4–0.7, p < .0001), or adulthood (aOR = 0.8, 95% CI = 0.7–0.8, p < .0001) compared to no access.</p> <p>GAHT access at age 14-17 years (vs as an adult): Lower odds of past-month severe psychological distress (aOR = 0.6, 95% CI = 0.5–0.8, p < .0001), past-year suicidal ideation (aOR = 0.7, 95% CI = 0.6–0.9, p = .0007), past-month binge drinking (aOR = 0.7, 95% CI = 0.5–0.9, p = .001), and lifetime illicit drug use (aOR = 0.7, 95% CI = 0.5–0.8, p = .0003).</p>
van Kemenade, Cohen-Kettenis, Cohen & Gooren, 1989 (42)	Uncontrolled before and after study	14 trans females, M age = 25.7 (SD = 4.4) years.	<p>Antiandrogen treatment at 8 weeks (vs at week 1): Increased VAMS energy (M(SD) = 40 (12.2) vs 45.3(8.3) p < .05) and relaxation (M(SD) = 39.0(12.5) vs 45.3(11.5)). Decreased feelings of irritation (M(SD) = 22.9(12.1) vs 16.8(13.2)), fatigue (M(SD)=34.7(15.0) vs 17.5(11.4)) and tension/anxiety (M(SD)=23.2(15.8) vs 18.3(13.0)). Significance tests conducted at 8 weeks for energy only.</p> <p>NS difference in VAMS fatigue, cheerfulness, sociability, unhappiness, aggression, depression and feelings of change. NS difference in anxiety, depression or aggression.</p>

Note: AFAB = assigned female at birth, AMAB = assigned male at birth, aMD = adjusted mean difference, aOR = adjusted odds ratio, BUT = Body Uneasiness Test, CI = confidence interval, GAC = gender affirming care, GAHT = gender affirming hormone treatment, GnRHa = gonadotropin-releasing hormone agonists, IQR = interquartile range, M = mean, MMPI = Minnesota Multiphasic Personality Inventory, NS = not significant, PHQ-9 = Patient Health Questionnaire, SCL-90-R = Symptom Checklist-90 Revised, SD = standard deviation, QoL = quality of life, VAMS = Visual Analogue Mood Scale

Appendix 3 (continued) – Included studies

Table 3. Studies investigating gender-affirming surgery and mental health outcomes in trans young people

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Arianmehr, Cheraghi & Ahmadpanah, Mohammadi, 2022 (53)	Cross-sectional survey	N=235 transgender people (189 transmen; 46 transwomen; M age = 24.16 years, SD=4.81) from provinces around Iran.	<p>Gender Affirming Surgery (vs no surgery): Higher vitality (M(SD), 60.76(18.35) vs 38.64(21.88), p<.001), emotional role (M(SD) 9.23(41.85) vs 37.38(40.59), p=.011), and mental health (M(SD)59.07(18.55) vs 41.22(21.02), p=.001). Lower social functioning (M(SD) 31.73(29.58) vs 61.65(25.91), p=.001).</p>
Ascha, Sasson, Sood, Cornelius, Schauer, Runge, et al., 2022 (47)	Controlled before-and-after study	N=70 trans and non-binary AFAB people aged 13 to 24 years (M=18.6; SD=2.7) seeking gender-affirming top surgery (N=36 received surgery; N=34 did not receive surgery).	<p>Top surgery (3-month post-op vs no surgery): Significant improvement in chest dysphoria (relative decrease -25.48 (95% CI, -32.85 to -18.11), gender congruence (relative increase 7.78 (95% CI, 6.06–9.50), and body dissatisfaction (relative decrease -7.20 (95% CI -11.68 to -2.72)).</p>

Appendix 3 (continued) – Included studies

Table 3. Studies investigating gender-affirming surgery and mental health outcomes in trans young people

Authors, year	Study design	Sample characteristics	Summary of mental health findings
Boskey, Jolly, Kant & Ganor, 2023 (48)	Uncontrolled before-and-after study	N=153 transmasculine and non-binary young people aged 15-35 (M=20.1 (SD=4.2)) seeking gender affirming top surgery.	Gender affirming top surgery (6-month, 12-month post-op vs baseline): Improved gender congruence (M(SD) 4.2(95%CI 4.0-4.4), 4.2(95%CI 4.1-4.4) vs 3.1(95%CI 3.0-3.3), p<.001), appearance congruence (M(S) 4.2(95%CI 4.0-4.4), 4.2(95%CI 4.0-4.3) vs 2.8(95%CI 2.6-3.0), p<.001), and reduced chest dysphoria (M(SD) 3.6(95%CI 2.3-4.6), 3.5(95%CI 2.5-4.4) vs 27.7(95%CI 26.1-29.0), p<.001). NS difference in gender identity acceptance.
Cohen-Kettenis & Van Goozen, 1997 (19)	Uncontrolled before-and-after study	N=19 young people undergoing gender-affirming surgery (14 transmen; 5 transwomen). M age= 17.5 at pretest, 22.0 at follow-up.	Gender affirming top surgery (one-year post-surgery vs pre-surgery): Lower gender dysphoria (M(SD) 14.8(3.2) vs 51.7(6.3), p<.001). Higher self-esteem (M(SD) 27.9(7.1) vs 24.3(6.8), p=.05) and significantly less feelings of inadequacy (M(SD) 12.0(6.7) vs 16.2(10.2), p=.04).
Kaur, Gallo, Wang, Rae, McEvenue, Semple, et al., 2023 (44)	Uncontrolled before-and-after study	N=115 people aged 16-61 (M= 25.7±6.9) years undergoing masculinising chest surgery.	Gender affirming top surgery (mastectomy; six month follow up vs pre-operatively): Lower rates of anxiety/ depression problems (52.18% vs 73% reporting “some” or “a lot” of problems).
Olson-Kennedy, Warus, Okonta, Belzer & Clark, 2018 (45)	Cross-sectional	Transmasculine youth. 68 postsurgical, M age = 19 (SD = 2.5) years. 68 non surgical M age = 17 (2.5) years.	Gender affirming top surgery (vs no gender affirming top surgery): Lower chest dysphoria M(SD)= 3.3 [3.8] vs 29.6 (10.0), p < .001.
Romano, Bouaoud, Schmidt, Rausky, Stivala, Atlan, et al., 2023 (51)	Uncontrolled before and after study	25 transgender patients who had undergone masculinising torsoplasty. M age 25.84 (SD = 9.17).	Mastectomy (>6 months post-surgery vs pre-surgery): Improved satisfaction with appearance (chest t98 = -11.4, p < 0.001, d = 2.3; nipples t97 = -5.2, p < 0.001, d = 1.0; body t97 = -5.2, p < 0.001, d = 1.0) and psychological outcome (p=0.05). NS change to social outcomes.
van de Grift, Elfering, Greijdanus, Smit, Bouman, Klassen & Mullender, 2018 (49)	Cross-sectional	N=101 transmen seeking or having received gender affirming top surgery (50 pre-operative, M age=24.5 ± 9.6 years; 52 post-operative, M age=26.4 ± 7.7 years).	Mastectomy (>6 months post-surgery vs pre-surgery): Significantly improved satisfaction with appearance (chest t98 = -11.4, p < 0.001, d = 2.3; nipples t97 = -5.2, p < 0.001, d = 1.0; body t97 = -5.2, p < 0.001, d = 1.0) and psychological outcome (p=0.05). NS change to social outcomes.

Note: Note: CI = confidence interval, M = mean, NS = not significant

Appendix 3 (continued) – Included studies

Table 4 . Studies investigating combinations of gender-affirming treatment and mental health outcomes in trans young people

Authors, year	Study design	Sample characteristics	Intervention/exposure	Summary of mental health findings
Achille, Taggart, Eaton, Osipoff, Tafuri, Lane, et al., 2020 (39)	Uncontrolled before and after study	N=50 endosex trans young people (M age = 16.2 years; SD=2.2; range = 9-25) referred to an endocrinology clinic.	Puberty suppression (GnRHa and or antiandrogens for transfemales, GnRHa and/or Medroxyprogesterone for transmales); GAHT (testosterone for transmales, estrogen for transfemales).	Endocrine interventions (pre-post): Improved depression on CESD-R (21.4 vs 13.9 (t(48) = 3.996, p< 0.001)). PHQ-9 decreased (t(49) = 3.753, p< 0.001), QoL NS.
Allen, Tollit, McDougall, Eade, Hoq & Pang, 2021 (76)	Uncontrolled before and after study, controlled before and after study	FASST group: 142 children's gender clinic patients (80 trans males, 29 trans females, 16 non-binary, 16 unsure, 1 response declined). Median age 15.0 years (IQR 13.7 -16.2). Control group: 120 historical patients, median age 14.9 years (IQR 12.4 - 16.7) and 50.8% AFAB.	FASST single intake and information session at a children's gender clinic	FASST (pre-post): Improved QoL (SMD 0.39, 95% CI: 0.23 to 0.56; p < .001), reduced depression (SMD 0.24; 95% CI: 0.36 to 0.11; p <.001) anxiety (SMD 0.14, 95% CI: 0.26 to 0.02; p =.025, respectively), and family dysfunction (55.8% vs 44.9%; 95% CI: 21.4 to 0.6; p = .039). NS change to high-risk suicidality. FASST (vs no FASST): Less anxiety (SMD 0.31; 95% CI: 0.57 to 0.05; p= .021).
Arnoldussen, van der Miesen, Elzinga, Alberse, Popma, Steensma, et al., 2022 (59)	Uncontrolled before-and-after study	N=70 adolescents (49 transmen and 21 transwomen) with M age = 14.65 years (SD=2.08) at T0 and M age = 20.70 years (SD=1.49) at T1.	GnRHa, GAHT, and gender affirmation surgery	Medical transition (≥6 months treatment vs pre-medical transition): Improved self-perceived physical appearance (M(SD) 12.81(95%CI 11.92-13.70) vs 10.16(95%CI 9.37-10.95), p<.001), and global self-worth (M(SD) 14.19(95%CI 13.32-15.06) vs 12.02(95%CI 11.13-12.90), p<.001). Transmen saw improved self-perceived behavioural conduct (M(SD) 16.88(95%CI 16.11-17.64) vs 15.37(95%CI 14.53-16.20), p=.003).
Becker, Auer, Barkmann, Fuss, Moller, Nieder, et al., 2018 (62)	Cross-sectional	N=82 adolescents (62 transmen; 20 transwomen) aged 14-21 years with diagnosed gender dysphoria.	No medical intervention VS GnRHa and/or GAHT only VS GAHT and surgery	Medical transition (surgery + GAHT, GAHT vs no medical intervention): Improved feelings of attractiveness/self-confidence (M(SD) 41.70(11.05), 33.01(10.91), vs 29.29(7.93), F=4.77, p<.010, ηp2=.048) and accentuation of body appearance (M(SD) 55.59(10.25), 51.50(9.56) vs 46.20(11.26), F=6.0, p=.003, ηp2=.060).

Appendix 3 (continued) – Included studies

Table 4 . Studies investigating combinations of gender-affirming treatment and mental health outcomes in trans young people

Authors, year	Study design	Sample characteristics	Intervention/exposure	Summary of mental health findings
Becker-Hebly, Fahrenkrug, Campion, Richter-Appelt, Schulte-Markwort & Barkmann, 2021 (61)	Controlled before-and-after study	N=75 young people seeking or receiving gender affirming care (64 transmen; 11 transwomen; M age 15.6 years at baseline (SD=1.2), 17.4 years (SD=1.7) at follow-up.)	Psychosocial intervention; GnRHa; GAHT; GAHT and gender affirming surgery (mostly mastectomy).	<p>No medical intervention (2 year follow-up vs baseline): More externalising problems (56.38(95%CI 59.19-62.57) vs 57.81(95%CI 53.67-61.95)). NS change to internalising problems or global functioning.</p> <p>GnRHa (2 years treatment vs baseline): Improved global functioning (81.82 (95%CI 76.77-86.86) vs 57.73 (95%CI 50.98-64.48)). NS change to internalising or externalising problems.</p> <p>GAHT + GnRHa (2 years treatment vs baseline): Less internalising problems (59.56(95%CI 55.83-63.29) vs 64.94(95%CI 60.91-68.97)). Significantly higher global functioning (85.63(95%CI 82.33-88.92) vs 73.13(95%CI 69.19-77.06)). NS change to externalising problems.</p> <p>Gender affirming surgery + GAHT (vs baseline): Less internalising problems (55.36(95%CI 49.49-61.24) vs 65.73(95%CI 59.31-72.14)) and externalising problems (45.27(95%CI 37.97-52.58) vs 54.09(95%CI 48.85-59.33)). Significantly improved global functioning (83.64(95%CI 78.20-89.07) vs 66.36(95%CI 52.42-64.13)).</p>
Cantu, Moyer, Connelly & Holley, 2020 (37)	Controlled before-and-after study	77 trans and gender non-conforming young people aged 11–18 years seeking gender-affirming care.	GnRHa and/or GAHT	Commencing GAHT (vs not commencing GAHT): NS difference to depression or anxiety.
de Vries, McGuire, Steensma, Wagenaar, Doreleijers & Cohen-Kettenis, 2014 (54)	Uncontrolled before-and-after study	N=55 transgender young adults (22 transwomen and 33 transmen) who had received puberty suppression during adolescence. Mean age 13.6 years at T0 (intake), 16.7 years at T1 (on puberty suppression), 20.7 years at T2 (after gender affirming surgery).	GnRHa + surgery (vaginoplasty for transwomen; mastectomy and hysterectomy with ovariectomy for transmen).	Gender Affirming Surgery and GAHT combination (>1 year post surgery vs intake): Higher global functioning (M(SD) 79.94(11.56) vs 71.13(10.46), $p<.001$). Lower internalising symptoms (CBCL: M(SD) 50.45(10.04) vs 60.83(12.36), $p<.001$; YSR: 50.06(11.15) vs 55.47(13.08), $p=.005$), externalising symptoms (CBCL: M(SD) 47.85(8.59) vs 57.85(13.73), $p<.001$), gender dysphoria (M(SD) 15.81(2.78) vs 53.51(8.29), $p<.001$), primary sex characteristic dissatisfaction (M(SD) 2.59(.82) vs 4.13(.59), $p<.001$), secondary sex characteristic dissatisfaction (M(SD) 1.93(.63) vs 2.63(.6), $p<.001$).

Appendix 3 (continued) – Included studies

Table 4 . Studies investigating combinations of gender-affirming treatment and mental health outcomes in trans young people

Authors, year	Study design	Sample characteristics	Intervention/exposure	Summary of mental health findings
Fontanari, Vilanova, Schneider, Chinazzo, Soll, Schwarz, et al., 2020 (64)	Cross-sectional	N=350 young people (42.64% transboys, 24.28% transgirls, 33.14% non-binary) aged 16 to 24 (M=18.61) years old.	Hormonal and/or surgical intervention.	Hormonal and/or surgical gender affirmation (vs no hormonal or surgical affirmation): Less anxiety and impairment (8.03 (95%CI 6.59-9.49) vs 10.84 (95%CI 9.97-11.71) p=.001), depression 15.61 (95%CI 14.06-16.27) vs 18.21 (95%CI 17.52-18.90), p<.001).
Lavender, Shaw, Maninger, Butler, Carruthers, Carmichael, et al., 2023 (63)	Uncontrolled before-and-after study	N=38 young people (28 AFAB; 10 AMAB), <15 years old when at Tanner stage II or above.	>1 year GnRHa + GAHT	GAHT (one year of GAHT vs Baseline): Lower rates of suicidality and self-harm (9% vs 64% thoughts of suicide and/or deliberate self-harm actions). Less externalising problems (49.38 (95%CI 44.96-53.79) vs 52.91 (95%CI 48.26-59.56), p=.04), primary sex characteristic dissatisfaction (4.11 (95%CI 3.75-4.48) vs 4.71 (95%CI 4.39-5.02, p=.02), gender dysphoria (3.97 (95%CI 3.49-3.63) vs 4.70 (95%CI 4.45-4.94), p=.02).
Olsavsky, Grannis, Bricker, Chelvakumar, Indyk, Leibowitz, et al., 2023 (60)	Cross-sectional	75 trans and non-binary adolescents, M age = 16.39. 52% were receiving gender-affirming hormonal interventions.	GnRHa or GAHT	Receiving gender-affirming hormonal interventions were associated with fewer anxiety symptoms (b = -0.23; p <.05) and marginally associated with less depression symptoms (b = -0.21; p <.05) compared to young people not receiving gender-affirming hormonal interventions. NS for non-suicidal self injury and suicidality.
Tordoff, Wanta, Collin, Stepney, Inwards-Breland & Ahrens, 2022 (58)	Uncontrolled before and after study.	Trans and non-binary adolescents and young adults, mean age 15.8 (SD=1.6) years.	GnRHa, GAHT or both.	After 12 months, 60% lower odds of depression (adjusted odds ratio [aOR], 0.40; 95% CI, 0.17-0.95) and 73% lower odds of suicidality (aOR, 0.27; 95% CI, 0.11-0.65) among youths who had initiated GnRHa or GAHT compared with youths who had not. NS association between GnRHa or GAHT and anxiety.

Note: AFAB= assigned female at birth, AMAB = assigned male at birth, aOR = adjusted odds ratio, CBCL = Child Behaviour Checklist, CESD-R= Center for Epidemiological Studies Depression Scale - Revised, CI = confidence interval, FASST= First Assessment Single Session Triage, GAHTs = gender affirming hormones, GAHT = gender affirming hormone therapy, GnRHa = gonadotropin-releasing hormone agonist, M = mean, N = number, PHQ-9 = Patient Health Questionnaire, QoL = quality of life

Appendix 3 (continued) – Included studies

Table 5 . Other interventions

Authors, year	Study design	Sample characteristics	Intervention/exposure	Summary of mental health findings
Brandsma, Visser, Volk, Rijn & Dekker, 2022 (78)	Uncontrolled before and after study	Young people aged 12-23 years (M=17.8; 56.1% AMAB; 43.9% AFAB) with co-occurring autism spectrum disorder and gender dysphoria.	Peer support group and parent support sessions	<p>Peer support (vs no peer support at baseline): Improved parent-reported psychological wellbeing ($t(16) = -2.39, p=.029, d=0.58$) and self-reported psychological complaints ($t(23)=2.63, p=.015, d=0.54$).</p> <p>Increased feelings of gender dysphoria ($z(25)=3.05, p=.002, r = -.61$). NS effect on self-reported psychological wellbeing, self-esteem or social responsiveness.</p>
Campbell & Rodgers 2023 (67)	Cross-sectional survey	27,715 trans adults. Results reported as “transgender youth exposed to conversion therapy”.	Conversion therapy	<p>Conversion therapy (vs no conversion therapy): Associated with an immediate 13.8%, and lifetime 55% increase in risk of suicide attempt ($p<.001$), and immediate 47.5%, and lifetime 128% increase in risk of running away from home ($p<.01$).</p> <p>NS difference in risk of suicide attempt or absconding prior to exposure to conversion therapy.</p> <p>Younger age at time of conversion therapy (11-14) associated with greater increases in suicidality and absconding risk.</p>
Moussaoui, O’Connell, Elder, Grover, & Pang, 2023 (79)	Cross-sectional	530 trans and gender diverse adolescents AFAB attending their first appointment at a specialist paediatric gender service. M age = 15.2 (SD=1.3).	Menstrual suppression via combined oral contraceptive pill or one of several different progestin-only methods.	<p>Menstrual suppression via combined oral contraceptive pill (vs no menstrual suppression): NS differences in depression, anxiety, or gender dysphoria.</p>

Note: AFAB = assigned female at birth, AMAB = assigned male at birth, M = mean, SD = standard deviation, SMD = standard mean difference, IQR = interquartile range.

Authors

This evidence summary was produced by Orygen's Knowledge Translation team for headspace National Youth Mental Health Foundation.

Expert reviewers

Professor Ashleigh Lin (she/her) – Senior Principal Research Fellow, School of Population and Global Health, The University of Western Australia

Dr. Sonya Morrissey (she/her) – GP, headspace Craigburn

Dr. Melody Miolin (she/her) – GP, headspace Broome

Dr. Michelle Dutton (she/her) – GP, Orygen Trans and Gender Diverse Service

Hayden Williams (they/them) - Mental Health Clinician, Orygen Trans and Gender Diverse Service

Dr. Penelope Strauss (she/her) – Research Fellow, Telethon Kids Institute

Dr. Thomas Nguyen (he/him) – Psychiatry Registrar/Conjoint Associate Lecturer, Western Sydney University

Sally Goldner (she/her) – Diversity Consultant and Committee Member, Transfamily

Annie Mulcahy (she/her) – Carer and Committee Member, Transfamily

Fox Williams (they/them) – hY National Reference Group Member, headspace

Date approved: August 2024

Version 1.0

For more details about headspace visit:

headspace.org.au

headspace National

p +61 3 9027 0100
f +61 3 9027 0199
info@headspace.org.au

Acknowledgements

This resource was produced by Orygen for headspace National Youth Mental Health Foundation, and funded by the Australian Government Department of Health. The series aims to highlight for service providers the research evidence and best practices for the care of young people with mental health and substance abuse problems. The content is based on the best available evidence that has been appraised for quality. Experts on the topic have reviewed the summary before publication. The authors would like to thank all consultants for their input on this resource.

Disclaimer

This information is not medical advice. It is generic and does not take into account your personal circumstances, physical wellbeing, mental status or mental requirements. Do not use this information to treat or diagnose your own or another person's medical condition and never ignore medical advice or delay seeking it because of something in this information. Any medical questions should be referred to a qualified healthcare professional. If in doubt, please always seek medical advice.



headspace centres and services operate across Australia, in metro, regional and rural areas, supporting young Australians and their families to be mentally healthy and engaged in their communities.



headspace would like to acknowledge Aboriginal and Torres Strait Islander peoples as Australia's First People and Traditional Custodians. We value their cultures, identities, and continuing connection to country, waters, kin and community. We pay our respects to Elders past and present and are committed to making a positive contribution to the wellbeing of Aboriginal and Torres Strait Islander young people, by providing services that are welcoming, safe, culturally appropriate and inclusive.



headspace is committed to embracing diversity and eliminating all forms of discrimination in the provision of health services. headspace welcomes all people irrespective of ethnicity, lifestyle choice, faith, sexual orientation and gender identity.