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# Care pathways of children and adolescents referred to specialist gender services: a systematic review

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## ABSTRACT

**Background** Increasing numbers of children and adolescents experiencing gender dysphoria/incongruence are being referred to specialist gender services. However, little is currently known about the proportions accessing different types of care and treatment following referral.

**Aim** This systematic review examines the range of care pathways of children/adolescents (under 18) referred to specialist gender or endocrinology services.

**Methods** Database searches were performed (April 2022), with results assessed independently by two reviewers. Peer-reviewed articles providing data for numbers of children and/or adolescents at referral/assessment and their treatment pathways were included. A narrative approach to synthesis was used and where appropriate proportions were combined in a random-effects meta-analysis.

**Results** 23 studies across nine countries were included, representing 6133 children and/or adolescents with a median age at assessment of 14–16 and overall a higher percentage of birth-registered females. Of those assessed, 36% (95% CI 27% to 45%) received puberty suppression, 51% (95% CI 40% to 62%) received masculinising or feminising hormones, 68% (95% CI 57% to 77%) received puberty suppression and/or hormones and 16% (95% CI 10% to 24%) received surgery. No study systematically reported information about the full pathway or psychological care received by children/adolescents. Follow-up in many studies was insufficient or unclear. Reasons for discontinuation were rarely provided.

**Conclusions** Prospective studies with long-term follow-up reporting information about the full range of pathways are needed to understand what happens to children and adolescents referred to specialist gender services. Information about provision of psychological care is needed considering high rates of psychosocial difficulties in this population.

**PROSPERO registration number** CRD42021289659.

## INTRODUCTION

Over the last 10–15 years, increasing numbers of children and adolescents experiencing gender incongruence are being referred to specialist paediatric gender services.<sup>1 2</sup> Literature also highlights changes in the demographics of referrals, with a much higher proportion of birth-registered female adolescents now being referred.<sup>1 3</sup> Many of those referred will experience gender dysphoria, which can cause significant distress.<sup>4</sup> Mental health difficulties, neurodevelopmental conditions and psychosocial complexity are higher in referred children and adolescents compared with their peers who do not experience gender incongruence;

## WHAT IS ALREADY KNOWN?

- ⇒ Increasing numbers of children and adolescents experiencing gender dysphoria/incongruence are being referred for care at specialist paediatric gender services.
- ⇒ Several countries have or are modifying referral and care pathways and provision in response to increasing numbers of referrals, changing demographics and ongoing uncertainty about the benefits, risks and long-term effects of medical interventions for these children and adolescents.
- ⇒ Little is currently known about the trajectories and outcomes of children and adolescents referred to specialist gender services.

## WHAT THIS STUDY ADDS?

- ⇒ Approximately two-thirds of adolescents referred to specialist gender services receive puberty suppression or hormones, although the rates vary considerably across services.
- ⇒ There is very little information about children/adolescents who do not receive medical intervention, or about the psychological care received by those under the care of a specialist gender service.
- ⇒ Studies consistently report small proportions of adolescents who discontinue medical treatment; however, systematic reporting and reasons for discontinuation are rarely provided and follow-up periods are limited.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Prospective studies that follow up children into adulthood and report information about the range of pathways followed are needed to understand longer-term outcomes for those referred to specialist paediatric gender services.

the relationship between gender dysphoria and these co-occurring conditions is poorly understood.<sup>4–9</sup>

Specialist gender services are evolving to the changing demand for gender-related care by establishing new triage processes,<sup>10</sup> developing multiple care pathways for those presenting with different needs,<sup>11</sup> provision of psychological care by local mental health services<sup>11 12</sup> and expanding provision.<sup>13 14</sup> Uncertainties in the evidence base about the benefits, risks and long-term effects of care pathways and medical interventions for this population are also driving these changes.<sup>15–23</sup>

National and international guidelines have recently been developed or updated in response to these uncertainties and/or the changing demand for specialist care.<sup>11 12 24 25</sup> Historically, a staged pathway was outlined first involving a comprehensive gender-related and psychosocial assessment and psychoeducational support, along with provision of psychological interventions to address any co-occurring or contributory psychosocial difficulties identified.<sup>26</sup> For adolescents experiencing gender dysphoria/incongruence that intensified during early puberty and who met the criteria for a diagnosis of gender dysphoria, puberty suppression could be considered. In later adolescence, masculinising or feminising hormones were considered for those continuing to medically transition, with surgical interventions delayed until adulthood. While this approach still broadly underpins current guidelines,<sup>11 12 24 25 27</sup> there is a lack of consensus regarding access to medical interventions, with the latest World Professional Association for Transgender Health guideline containing no minimum age criteria or requirement for diagnosis of gender dysphoria,<sup>24</sup> while in contrast the latest Swedish guideline outlines much stricter eligibility criteria and recommends that medical interventions are provided under a research framework due to uncertainties in the evidence base.<sup>12</sup>

Although a common care pathway is described by guidelines, little is known about the trajectories and outcomes for children or adolescents referred to specialist gender services. It is not known how many of those referred complete an assessment and access interventions, or how many leave services or discontinue treatment or subsequently ‘desist’ (no longer continue to experience gender dysphoria or incongruence), or how many who have started to medically transition will ‘de/re-transition’ (revert to living as their birth-registered sex or develop a new gender identity). This review aims to synthesise research reporting the care pathways for children and/or adolescents referred to specialist paediatric gender or endocrinology services, reporting the following:

- ▶ Number referred, assessed, diagnosed with gender dysphoria/incongruence, considered eligible for medical intervention and subsequently receiving medical intervention.
- ▶ Number who later desist or detransition/retransition.
- ▶ Reasons why they leave the service pathway or cease the assessment and/or medical intervention.
- ▶ Provision of psychological care while under the care of a specialist gender service.

METHODS

The review forms part of a linked series of systematic reviews examining the epidemiology, care pathways, outcomes and

experiences of children and adolescents experiencing gender dysphoria/incongruence and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.<sup>28</sup> The protocol was registered on PROSPERO (CRD42021289659).<sup>29</sup>

Search strategy

A single search strategy was used comprising two combined concepts: ‘children’, which included all terms for children and adolescents; and ‘gender dysphoria’, which included associated terms such as gender incongruence and gender-related distress, and gender identity terms including transgender, gender diverse and non-binary. MEDLINE (online supplemental table S1), EMBASE and PsycINFO through OVID, CINAHL Complete through EBSCO, and Web of Science (Social Science Citation Index) were searched (13-23 May 2021, updated 27 April 2022).

Inclusion criteria

Peer-reviewed articles that reported, at a minimum, the number of children and/or adolescents at referral/assessment and the number progressing to treatment in paediatric or adolescent gender/endocrinology services were included (table 1).

Selection process

Search results were uploaded to Covidence<sup>30</sup> and screened independently by two reviewers. Full texts for potentially relevant articles were retrieved and reviewed against the inclusion criteria by two reviewers independently. Disagreements were resolved through discussion.

Data extraction

Data were extracted into a prepiloted template by one reviewer and checked by another. Data were extracted from graphs using the PlotDigitizer tool (<https://plotdigitizer.com/>). Study quality was not formally assessed.

Synthesis

A narrative approach to synthesis was used and where appropriate proportions were combined in a random-effects meta-analysis using metaprop (Stata V.18), with variances stabilised using the Freeman-Tukey double arcsine transformation.<sup>31</sup> The synthesis was performed by one reviewer and double-checked by another.

RESULTS

Our searches yielded 28 147 records, 3181 of which were identified as potentially relevant for the linked series of systematic

Table 1 Inclusion and exclusion criteria

Population	<ul style="list-style-type: none"><li>▶ Children and adolescents (ages 0–18) referred to paediatric or adolescent gender service or paediatric or adolescent endocrinology service that provides specialist gender-related healthcare.</li><li>▶ Articles reporting on child or adolescent populations or the combined population of children and adolescents were included.</li><li>▶ Mixed populations of adolescents and adults included if referred to child or adolescent gender service, eg, some services provide healthcare to age 24; or where data reported separately for all-age services.</li><li>▶ Studies of other selected subsamples were excluded, eg, those eligible for or receiving treatment, one gender group, or studies recruiting a specific or convenience sample.</li></ul>
Comparator	<ul style="list-style-type: none"><li>▶ Any or none.</li></ul>
Variables	<ul style="list-style-type: none"><li>▶ Article reports as a minimum the number of referred or assessed children and/or adolescents AND the progression of these children/adolescents to treatment.</li></ul>
Study design	<ul style="list-style-type: none"><li>▶ Studies of any design or articles reporting data from gender services.</li><li>▶ Systematic or other literature reviews were excluded.</li></ul>
Publication	<ul style="list-style-type: none"><li>▶ Published in the English language in a peer-reviewed journal.</li><li>▶ Conference abstracts and letters were excluded.</li></ul>

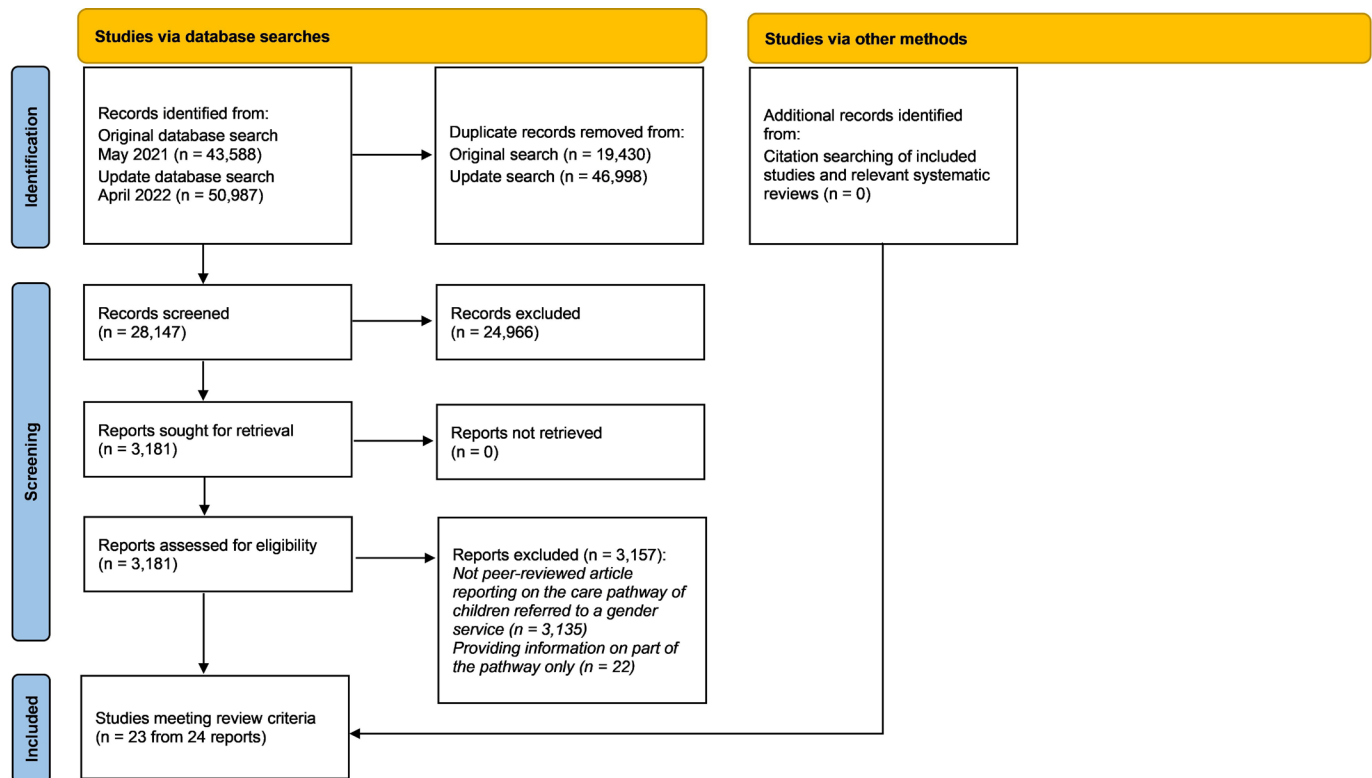


Figure 1 Study flow diagram.

reviews and for which full texts were reviewed. From these, there were 24 papers including 23 studies that met the inclusion criteria for this review (figure 1, online supplemental table S2).

### Study characteristics

Studies included specialist gender services (n=14)<sup>32–46</sup> or endocrinology services (n=9)<sup>47–55</sup> in Australia (n=2),<sup>32 33</sup> Canada (n=3),<sup>34 47 48</sup> the Netherlands (n=4),<sup>36–39 50</sup> Spain (n=2)<sup>40 41</sup> and the US (n=8),<sup>43–46 52–55</sup> and single studies from Finland,<sup>49</sup> Israel,<sup>35</sup> Scotland<sup>51</sup> and the UK.<sup>42</sup> Eight studies commented on the length of follow-up, but not at standardised points and so this varied for each person.<sup>34–39 41 42 51</sup> The longest time from assessment to follow-up was 10 years, but this study also included some patients who had only recently been assessed and so they had limited follow-up within the same study.<sup>34</sup> Most studies reporting follow-up times had a median of 1–2 years of follow-up.<sup>35 41 42 51</sup> Studies included referrals/assessments from 1972 to 2019, although most were from 2000 onwards.

Overall, 6133 children/adolescents were included across studies, with samples ranging from 38 to 1360. Nine studies included referred adolescents only,<sup>34 37 38 42 47–51 53</sup> whereas others included all referrals. Two US<sup>45 46</sup> and three Dutch<sup>37–39 50</sup> studies likely included overlapping samples. The median age at referral was 14–15 and at assessment was 14–16. Most studies reported a higher percentage of birth-registered females compared with males (online supplemental table S2).

### Referral, assessment, diagnostic and treatment pathways

Ten studies reported the numbers referred, whereas all reported the numbers assessed within services (table 2). The numbers being assessed ranged from 46% to 100% of those referred.

Seven studies reported both the numbers assessed and receiving a diagnosis of gender dysphoria/incongruence.<sup>32 33 36 41 42 50 53</sup> The numbers receiving a diagnosis

ranged from 44% to 100% of those assessed. Less than half of the studies (n=11) reported the reasons why individuals either discontinued during the assessment process or did not receive a diagnosis, with studies that reported these often not distinguishing between these two outcomes. Reasons included the following: being referred for other reasons than gender dysphoria/incongruence, experiencing resolution of gender dysphoria or acceptance of gender incongruence with ongoing counselling, no longer seeking medical treatment, not attending clinic after the first visit, coexisting problems interfering with the diagnostic process and/or might interfere with successful treatment, confusion about their gender identity and sexual orientation, being referred to mental health professionals, and being prepubertal and continuing with psychological counselling.

Five studies reported the numbers considered eligible or referred for further treatment out of the children/adolescents receiving a diagnosis of gender dysphoria/incongruence.<sup>32 33 36 42 50</sup> This varied between studies, ranging from 60% to 100% of those diagnosed and considered eligible for further treatment. Eighteen studies reported the total number of adolescents who started either puberty suppression and/or masculinising or feminising hormone interventions (referred to hereon as hormones). Of the 4797 assessed in these 18 studies, 68% (95% CI 57% to 77%) received either puberty suppression and/or hormones; however, the proportions varied considerably between services (from 21%<sup>32</sup> to 100%<sup>49</sup>) and there were differences between gender (60%; 95% CI 50% to 69%) and endocrine (83%; 95% CI 68% to 94%) services. Receipt of psychological treatment was unclear in most studies, and where it was reported the details of what this included and who received it were absent (online supplemental table S2).

Table 2 Summary of care pathways of included studies

Authors	Country	Service	Data collection period	Referred	Assessed	Diagnosed	Eligible/referred for medical treatment	Received	PS	MFH	Surgery
Hewitt <i>et al</i> <sup>22</sup>	Australia	Gender clinic	2003–2011	39	39	17	17	8	6	6	
Tollitt <i>et al</i> <sup>33</sup>	Australia	Gender clinic	2007–2016	359	359	291	234	118	54	48	
Chiniara <i>et al</i> <sup>47</sup>	Canada	Endocrinology	2014–2016	218	203				115	75	
Khatchadourian <i>et al</i> <sup>48</sup>	Canada	Endocrinology	1998–2011		84				52	63	13
Zucker <i>et al</i> <sup>24</sup>	Canada	Gender clinic	2000–2009	165	109	71	71	45	43		
Vehmas <i>et al</i> <sup>49</sup>	Finland	Endocrinology	2011–2018		124	124	124	124	56	124	
Segev-Becker <i>et al</i> <sup>35</sup>	Israel	Gender clinic	2013–2018	106	106		96	77	77	61	19
Arnoldussen <i>et al</i> <sup>50</sup>	The Netherlands	Endocrinology	2000–2016	1072	965	908	908	846			
Brik <i>et al</i> <sup>36</sup>	The Netherlands	Gender clinic	2010–2018		269	147	147	143	143	125	
de Vries <i>et al</i> <sup>37 38</sup>	The Netherlands	Gender clinic	2000–2008	196	196		140	140	111	99	62
Wiepjes <i>et al</i> <sup>39</sup>	The Netherlands	Gender clinic	1972–2015		1360			816	554	589	
McCallion <i>et al</i> <sup>51</sup>	Scotland	Endocrinology	2011–2019		91		79	79	79	41	
DeCastro <i>et al</i> <sup>2022 41</sup>	Spain	Gender clinic	1999–2016		140	124			13	35	
Esteva de Antonio <i>et al</i> <sup>40</sup>	Spain	Gender clinic	2000–2012		141			89	7	82	36
Costa <i>et al</i> <sup>42</sup>	UK	Gender clinic	2010–2014	436	201	201	121	121	121		
Chen <i>et al</i> <sup>43</sup>	USA	Endocrinology	2002–2015		38			15	15	8	
Chen <i>et al</i> <sup>42</sup>	USA	Gender clinic	2013–2016		220			116	34	82	7
Handler <i>et al</i> <sup>44</sup>	USA	Gender clinic	2015–2018	417	417						89
Kuper <i>et al</i> <sup>53</sup>	USA	Endocrinology	2014–2017	158	158	158		146	49	139	
Leon <i>et al</i> <sup>45</sup>	USA	Gender clinic	2017–2019		185			159	49	119	17
Nahata <i>et al</i> <sup>54</sup>	USA	Endocrinology	2014–2016		79				9	40	
O'Bryan <i>et al</i> <sup>46</sup>	USA	Gender clinic	Unclear		139			123	41	106	20
Spack <i>et al</i> <sup>55</sup>	USA	Endocrinology	1998–2009		97			56	11	39	
MFH, masculinising or feminising hormone interventions; PS, puberty suppression.											



## Interventions to suppress puberty

Twenty-one studies reported the numbers receiving puberty suppression from 13 specialist paediatric and 8 endocrinology services.<sup>32–43 45–49 51–55</sup> Of the referred population, the pooled estimate was 36% (95% CI 23% to 51%,  $n=1677$ , 8 studies), with similar figures reported when focusing on those completing an assessment (36%; 95% CI 27% to 45%,  $n=4338$ , 21 studies) or diagnosed with gender dysphoria/incongruence (43%; 95% CI 15% to 74%,  $n=938$ , 6 studies). Higher percentages were reported from those considered eligible for medical intervention (75%; 95% CI 49% to 94%,  $n=1029$ , 9 studies).

The age at which children/adolescents received puberty suppression was between 9 and 18 years, with an average of 15. Three studies reported age by birth-registered sex, but inconsistent results were found.<sup>33 36 51</sup> Most studies did not report the reasons why individuals did not receive puberty suppression. Where the reasons were stated, they included needing more time, co-occurring psychiatric problems and/or psychological difficulties, lost to follow-up, and financial considerations, including not receiving coverage from insurance.

Seven studies reported the number of discontinuations and three reported the reasons why.<sup>32 33 36 39 46 48 51</sup> Discontinuation with puberty suppression ranged from no patients<sup>32</sup> to 8%.<sup>51</sup> Reasons for discontinuation included emotional distress, undecided on gender, reidentifying or happy being birth-registered gender, side effects, not complying with treatment protocol and difficulties attending clinic/pharmacy for injection/medication. One study reported that six (8%) young people discontinued gonadotropin-releasing hormone analogues (GnRH-a) for puberty suppression following a median duration of 6 months (range 6–18 months). Compared with those who continued with treatment, young people who discontinued had initiated treatment at an older age and included a higher proportion of those with mental health conditions and autism spectrum condition.<sup>51</sup>

## Masculinising and feminising hormone interventions

Nineteen studies reported the numbers receiving hormones from 11 specialist paediatric and 8 endocrinology services.<sup>32 33 35–41 43 45–49 51–55</sup> Of the referred population, the pooled estimate was 43% (95% CI 19% to 69%,  $n=1076$ , 6 studies), with slightly higher figures reported when focusing on those completing an assessment (51%; 95% CI 40% to 62%,  $n=4028$ , 19 studies) or diagnosed with gender dysphoria/incongruence (52%; 95% CI 17% to 86%,  $n=737$ , 5 studies). Higher percentages were reported from those considered eligible for medical intervention (65%; 95% CI 36% to 89%,  $n=837$ , 7 studies). Few studies provided a breakdown of those who progressed to hormones following puberty suppression and those who started hormones as their first medical intervention.

The age at which adolescents received hormones was between 13 and 19 years, with an average age of 17. Three studies reported age by birth-registered sex, but inconsistent results were found.<sup>33 36 51</sup> Most studies did not report the reasons why eligible individuals did not receive hormones. Where reasons were stated, they included being close to 18 when court approval is not required within the specific country, family not supporting treatment, financial considerations including not receiving coverage from insurance, delaying interventions for fertility preservation or other reasons, not wishing to receive hormone treatment, and needle phobia.

Six studies reported whether hormones were continued or discontinued, all reporting either no discontinuations or one or two individuals discontinuing.<sup>32 33 35 46 48 51</sup> Four of these reported

the reasons or context.<sup>35 46 48 51</sup> In one study, a single person stopped treatment after 4 months as their gender dysphoria had resolved.<sup>51</sup> In another, two discontinued, with one reverting to living as their birth-registered sex and the second continuing to take GnRH-a while exploring an emerging gender identity.<sup>46</sup> In the third study, two birth-registered males who had been taking GnRH-a and low-dose oestrogen for 3 months decided not to transition. In the final study, three birth-registered females stopped treatment temporarily (two due to psychiatric difficulties and one due to distress over androgenic alopecia) but reported later resuming.<sup>48</sup>

## Surgical interventions

Nine studies reported the numbers receiving surgical interventions from the referred/assessed populations of eight specialist paediatric and one endocrinology service.<sup>35 37 39 40 43–46 48</sup> A Dutch study reported that of those treated with hormones for at least 1.5 years and were at least 18 years old, 78.2% received surgery (actual numbers were not reported).<sup>39</sup> For the remaining eight studies, the pooled estimates for those adolescents receiving surgical interventions varied from 16% to 34% across the different stages; referred 24% (95% CI 17% to 31%,  $n=719$ , 3 studies), assessed 16% (95% CI 10% to 24%,  $n=1488$ , 8 studies) and eligible for medical intervention 34% (95% CI 28% to 40%,  $n=236$ , 2 studies). Six studies reported the types of surgery received and included chest, facial feminisation and genital surgery.<sup>35 39 40 43 44 48</sup>

Three studies commented on the age at the time of surgery.<sup>35 44 48</sup> A US study reported that 57 (of 89) had surgery before they were age 18.<sup>44</sup> An Israeli study reported that the median age of 15 birth-registered females who had mastectomy was 17.6 (range 15–19).<sup>35</sup> In the same study, two birth-registered males had breast augmentation and two had vaginoplasty at age over 18. Finally, in a Canadian study, nine people had mastectomy at a median age of 18.1 (range 15–22), six had hysterectomy and salpingo-oophorectomy at a median age of 18.9 (range 17–22), and two had penectomy, orchidectomy and vaginoplasty at 18 and 21 years of age.<sup>48</sup>

## DISCUSSION

This review of 23 studies from nine countries found that children and adolescents referred to or assessed in specialist paediatric gender and endocrinology services leave the care pathway at all stages following referral for multiple reasons. However, the numbers leaving at each possible stage of care were rarely reported, and follow-up in many studies was insufficient or unclear and in others varied considerably, with some participants followed up for several years while others had only just completed assessment, meaning their subsequent care trajectories were not reported. Few studies provided information about adolescents who completed assessment but did not subsequently receive medical intervention, estimated to be around a third of those entering assessment with differences between gender and endocrine services. No study provided clear information about psychological care received by children/adolescents under the care of gender services.

There is mixed and partial evidence about the numbers of children completing an assessment or receiving a diagnosis of gender dysphoria or incongruence. Most studies did not report the numbers referred, instead starting with the numbers assessed. Given increasing referral numbers and waiting times, a better understanding of the needs of all children/adolescents referred would provide needed insights into service provision.<sup>56</sup>

Studies published more recently have systematically examined data on assessment and treatment pathways for national services in the Netherlands<sup>56 57</sup> and the UK.<sup>58 59</sup> However, only one reported data on those not completing assessment, which was presented for different time periods and age at first visit (range 6%–38%).<sup>56</sup> Of 1401 adolescents who were eligible for puberty suppression, 882 (63%) received this, with higher rates in birth-registered females compared with males (73% vs 47%). Of 707 adolescents who received GnRH-a and were eligible for hormones during follow-up, 93% progressed. Only three adolescents received hormones without first receiving GnRH-a. A second Dutch study reported a similarly high progression from GnRH-a to hormones (98%).<sup>57</sup>

The recent UK studies report data for a subset of adolescents who had been under the care of a national paediatric gender service and were subsequently referred onto the endocrine pathway within the service.<sup>58 59</sup> Of 439 adolescents referred with a view to start medical intervention, 431 (98%) commenced GnRH-a and 8 (2%) commenced hormones only. At follow-up of 2–3 years, 183 (42%) had progressed to hormones after receiving GnRH-a.<sup>59</sup> In this review, an average of 36% and 51% of those assessed received puberty suppression and hormones, respectively, which differ from the more recent UK and Dutch studies. Having said that, the pooled estimate presented here for those receiving either treatment was 69%, which was similar to the proportion starting GnRH-a in the Netherlands, with study authors concluding that GnRH-a may be used as the start of transition rather than being seen as an extension of the diagnostic phase. Overall, there was considerable variation between services, which likely reflects country differences in intervention criteria, regulations, insurance coverage and clinical practice, as well as whether services focus on medical interventions or provide care to children and adolescents across the care pathway.

In both the UK and the Netherlands, a similar approach is followed, with most adolescents first receiving puberty suppression before progressing to masculinising/feminising hormones.<sup>56 57 59</sup> However, a recent study of 434 adolescents who had at least two encounters for gender-related care in the US Military Healthcare System found no association between GnRH-a use and subsequent hormone initiation, with 16.1% prescribed GnRH-a and 46.4% prescribed hormones within 1 year of the initial encounter and 88.3% within 4 years.<sup>60</sup> Few of the reviewed studies provided clarity about which adolescents who received hormones had first received puberty suppression, although many reported a higher proportion of adolescents receiving hormones than those receiving puberty suppression. In wider research, little is known about any difference in outcomes for adolescents who start hormones with or without first receiving puberty suppression.<sup>15</sup>

Discontinuation of medical treatments was similar across reviewed studies. In the seven studies reporting data for puberty suppression, discontinuation ranged from no patients to 8%. In the recent Dutch study, five (0.8%) birth-registered females and nine (3.4%) birth-registered males discontinued treatment during follow-up, and in the UK 30 (7%) adolescents consenting to GnRH-a did not start or discontinued treatment.<sup>56</sup> For masculinising/feminising hormones, six studies reported discontinuation, with very low rates (0–2 individuals) reported.<sup>57</sup> High rates of continuation were also reported in the recent Dutch study, with 98% still prescribed them at follow-up (average 3.2 years for birth-registered females, 6.1 years for birth-registered males), and the UK study which found no discontinuation at 2–3 years of follow-up.<sup>59</sup> A second UK study which reported discharge outcomes (length of follow-up

unclear) found that of 1089 adolescents referred to the endocrine pathway, 90 (8.3%) stopped identifying as gender incongruent, 58 (5.3%) of whom had started puberty suppression or hormones and subsequently stopped these and reverted to their birth-registered sex.<sup>58</sup> The lack of reporting on reasons for discontinuation makes drawing conclusions problematic. Longer-term follow-up into adulthood is necessary to understand trajectories more comprehensively. Detransitioning has been reported to occur on average around 3.9 years later,<sup>61</sup> with expressions of regret reported as ranging between 3.8 and 22 years after transition.<sup>39 62</sup>

There was variation in the percentages of referred, assessed and eligible for medical intervention populations receiving surgical interventions (16%–34%). However, the numbers receiving surgery were only at the observation point, which was often unclear and/or relatively short, and therefore unlikely to include surgery received later in adulthood, which is often when it occurs. A Spanish study reported the numbers receiving and waiting for surgery (36 received surgery and 46 were awaiting surgery), which combined would lead to a much higher proportion of adolescents going on to receive surgery.<sup>40</sup> Numbers receiving surgery are also likely to differ by country due to different regulations, insurance coverage, service provision and the clinical guideline informing practice. A key difference is whether adolescents under the age of 18 are considered for surgery. However, only three of the nine studies reporting information on surgery provide this detail.<sup>35 44 48</sup> These studies suggest surgery is relatively common among adolescents under the age of 18. However, in the recently published Dutch study, surgery is only provided to young people aged 18 or over.<sup>56</sup> Longer-term follow-up is therefore required to gain a fuller picture about the proportion of children/adolescents who go on to request and receive surgery to modify their bodies.

Like the studies reviewed here, these more recent studies do not report systematic information about any psychological care provision. In some countries, there is now an expectation that psychological care is provided by local mental health services, in part due to increasing demand for specialist gender services.<sup>11</sup> At the same time, clinical guidelines recommend that psychological care for this population is provided by professionals with expertise in gender development and gender dysphoria/incongruence.<sup>24 63</sup> Currently, there is limited understanding about the provision of psychological care for children and adolescents experiencing gender dysphoria/incongruence by specialist gender or local mental health services, or about professional competence in this area of practice. There is also little evidence about the effectiveness of psychosocial interventions for this population.<sup>23 40</sup>

### Strengths and limitations

Strengths include a published protocol with robust search strategies and comprehensive synthesis. As searches were conducted to April 2022 this review does not include more recently published studies; as this is a rapidly evolving area this is a limitation. Pooled estimates for each stage of the care pathway must be interpreted with caution due to inadequate and/or unclear reporting of follow-up and studies not reporting data on the full care pathway, in particular not reporting the numbers referred. This review did not extract information about fertility care for adolescents, which was reported by few of the identified studies and has been examined in separate studies.<sup>64–67</sup>

## CONCLUSION

This review aids our understanding of the assessment and treatment trajectories of children and adolescents who are referred to specialist gender and endocrinology services, showing children/adolescents leave at different stages, suggesting there is not just one care pathway. However, prospective studies that follow up children into adulthood and report information about all possible trajectories and outcomes are needed. A better understanding is also needed about what care is provided to around a third of adolescents who undergo assessment within a gender service but do not go on to receive medical intervention. Information about provision of psychological care is needed, particularly considering the high prevalence of mental health and psychosocial difficulties in this population.

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## REFERENCES

- Thompson L, Sarovic D, Wilson P, *et al.* A PRISMA systematic review of adolescent gender dysphoria literature: 1) epidemiology. *PLOS Glob Public Health* 2022;2:e0000245.
- Kaltiala R, Bergman H, Carmichael P, *et al.* Time trends in referrals to child and adolescent gender identity services: a study in four nordic countries and in the UK. *Nord J Psychiatry* 2020;74:40–4.
- Masala B, Love A, Carmichael P, *et al.* Demographics of referrals to a specialist gender identity service in the UK between 2017 and 2020. *Clin Child Psychol Psychiatry* 2023.
- Thompson L, Sarovic D, Wilson P, *et al.* A PRISMA systematic review of adolescent gender dysphoria literature: 2) mental health. *PLOS Glob Public Health* 2022;2:e0000426.
- Kallitsounaki A, Williams DM. Autism spectrum disorder and gender dysphoria/Incongruence. A systematic literature review and meta-analysis. *J Autism Dev Disord* 2023;53:3103–17.
- Thoma BC, Rezeppa TL, Choukas-Bradley S, *et al.* Disparities in childhood abuse between transgender and cisgender adolescents. *Pediatrics* 2021;148:e2020016907.
- Feil K, Riedl D, Böttcher B, *et al.* Higher prevalence of adverse childhood experiences in transgender than in cisgender individuals: results from a single-center observational study. *J Clin Med* 2023;12:4501.
- Surace T, Fusar-Poli L, Vozza L, *et al.* Lifetime prevalence of suicidal ideation and suicidal behaviors in gender non-conforming youths: a meta-analysis. *Eur Child Adolesc Psychiatry* 2021;30:1147–61.
- Frew T, Watsford C, Walker I. Gender dysphoria and psychiatric comorbidities in childhood: a systematic review. *Aust J Psychol* 2021;73:255–71.
- Dahlgren Allen S, Tollit MA, McDougall R, *et al.* A waitlist intervention for transgender young people and psychosocial outcomes. *Pediatrics* 2021;148.
- Council for Choices in Healthcare in Finland. Medical treatment methods for Dysphoria associated with variations in gender identity in minors – recommendation. Council for Choices in Healthcare in Finland; 2020. Available: <https://palveluvalikoima.fi/en/recommendations#genderidentity>
- The Swedish National Board of Health and Welfare. Care of children and young people with gender Dysphoria - national knowledge support with recommendations for the profession and decision makers. The Swedish National Board of Health and Welfare; 2022. Available: <https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/kunskapsstod/2022-12-8302.pdf>
- The Cass Review. Independent review of gender identity services for children and young people: interim report; 2022. Available: <https://cass.independent-review.uk/publications/interim-report/>
- Kozłowska K, McClure G, Chudleigh C, *et al.* Australian children and adolescents with gender dysphoria: clinical presentations and challenges experienced by a multidisciplinary team and gender service. *Human Systems* 2021;1:70–95.
- Thompson L, Sarovic D, Wilson P, *et al.* A PRISMA systematic review of adolescent gender dysphoria literature: 3) treatment. *PLOS Glob Public Health* 2023;3:e0001478.
- National Institute for Health and Care Excellence (NICE). Evidence review: Gonadotrophin releasing hormone analogues for children and adolescents with gender Dysphoria. NICE; 2020. Available: [https://cass.independent-review.uk/wp-content/uploads/2022/09/20220726\\_Evidence-review\\_GnRH-analogues\\_For-upload\\_Final.pdf](https://cass.independent-review.uk/wp-content/uploads/2022/09/20220726_Evidence-review_GnRH-analogues_For-upload_Final.pdf)
- Pasternack I, Söderström I, Saijonkari M, *et al.* Medical approaches to treatment of dysphoria related to gender variations. A systematic review. 2019. Available: <https://app.box.com/s/y9u791np8v9gsunwgr2kqn8swd9vdx>
- Ludvigsson JF, Adolfsson J, Höistad M, *et al.* A systematic review of hormone treatment for children with gender dysphoria and recommendations for research. *Acta Paediatr* 2023;112:2279–92.
- Baker KE, Wilson LM, Sharma R, *et al.* Hormone therapy, mental health, and quality of life among transgender people: a systematic review. *J Endocr Soc* 2021;5.
- Chew D, Anderson J, Williams K, *et al.* Hormonal treatment in young people with gender dysphoria: a systematic review. *Pediatrics* 2018;141:e20173742.
- National Institute for Health and Care Excellence (NICE). Evidence review: gender-affirming hormones for children and adolescents with gender Dysphoria. NICE; 2020. Available: [https://cass.independent-review.uk/wp-content/uploads/2022/09/20220726\\_Evidence-review\\_Gender-affirming-hormones\\_For-upload\\_Final.pdf](https://cass.independent-review.uk/wp-content/uploads/2022/09/20220726_Evidence-review_Gender-affirming-hormones_For-upload_Final.pdf)
- Expósito-Campos P, Pérez-Fernández JJ, Salaberria K. Empirically supported affirmative psychological interventions for transgender and non-binary youth and adults: a systematic review. *Clin Psychol Rev* 2023;100:102229.
- Catelan RF, Costa AB, Lisboa C de M. Psychological interventions for transgender persons: a scoping review. *Int J Sex Health* 2017;29:325–37.
- Coleman E, Radix AE, Bouman WP, *et al.* Standards of care for the health of transgender and gender diverse people, version 8. *Int J Transgend Health* 2022;23:51–259.
- Telfer MM, Tollit MA, Pace CC, *et al.* Australian standards of care and treatment guidelines for transgender and gender diverse children and adolescents. *Med J Aust* 2018;209:132–6.
- de Vries ALC, Cohen-Kettenis PT. Clinical management of gender dysphoria in children and adolescents: the Dutch approach. *J Homosex* 2012;59:301–20.
- Hembree WC, Cohen-Kettenis PT, Gooren L, *et al.* Endocrine treatment of gender-dysphoric/gender-incongruent persons: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 2017;102:3869–903.
- Page MJ, McKenzie JE, Bossuyt PM, *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71.
- Fraser L, Hall R, Taylor J, *et al.* The epidemiology, management and outcomes of children with gender-related distress / gender dysphoria: a systematic review. *PROSPERO* 2021.
- Veritas Health Innovation. *Covidence systematic review software*. Melbourne, Australia: Veritas Health Innovation, 2023.
- Nyaga VN, Arbyn M, Aerts M. Metaprop: a STATA command to perform meta-analysis of binomial data. *Arch Public Health* 2014;72:39.
- Hewitt JK, Paul C, Kasiannan P, *et al.* Hormone treatment of gender identity disorder in a cohort of children and adolescents. *Med J Aust* 2012;196:578–81.
- Tollit MA, May T, Maloof T, *et al.* The clinical profile of patients attending a large, Australian pediatric gender service: a 10-year review. *Int J Transgend Health* 2023;24:59–69.
- Zucker KJ, Bradley SJ, Owen-Anderson A, *et al.* Puberty-blocking hormonal therapy for adolescents with gender identity disorder: a descriptive clinical study. *J Gay Lesbian Ment Health* 2010;15:58–82.
- Segev-Becker A, Israeli G, Elkon-Tamir E, *et al.* Children and adolescents with gender dysphoria in Israel: increasing referral and fertility preservation rates. *Endocr Pract* 2020;26:423–8.



- 36 Brik T, Vrouwenraets LJ, de Vries MC, *et al.* Trajectories of adolescents treated with gonadotropin-releasing hormone analogues for gender dysphoria. *Arch Sex Behav* 2020;49:2611–8.
- 37 de Vries ALC, McGuire JK, Steensma TD, *et al.* Young adult psychological outcome after puberty suppression and gender reassignment. *Pediatrics* 2014;134:696–704.
- 38 de Vries ALC, Steensma TD, Doreleijers TAH, *et al.* Puberty suppression in adolescents with gender identity disorder: a prospective follow-up study. *J Sex Med* 2011;8:2276–83.
- 39 Wiepjes CM, Nota NM, de Blok CJM, *et al.* The Amsterdam cohort of gender dysphoria study (1972–2015): trends in prevalence, treatment, and regrets. *J Sex Med* 2018;15:582–90.
- 40 Esteva de Antonio I, Gómez-Gil E, GIDSEEN Group. Coordination of healthcare for transsexual persons: a multidisciplinary approach. *Curr Opin Endocrinol Diabetes Obes* 2013;20:585–91.
- 41 De Castro C, Solerdelcoll M, Plana MT, *et al.* High persistence in Spanish Transgender minors: 18 years of experience of the gender identity unit of Catalonia. *Spanish Journal of Psychiatry and Mental Health* 2022. 10.1016/j.rpsm.2022.02.001 [Epub ahead of print]
- 42 Costa R, Dunsford M, Skagerberg E, *et al.* Psychological support, puberty suppression, and psychosocial functioning in adolescents with gender dysphoria. *J Sex Med* 2015;12:2206–14.
- 43 Chen D, Hidalgo MA, Leibowitz S, *et al.* Multidisciplinary care for gender-diverse youth: a narrative review and unique model of gender-affirming care. *Transgend Health* 2016;1:117–23.
- 44 Handler T, Hojilla JC, Varghese R, *et al.* Trends in referrals to a pediatric transgender clinic. *Pediatrics* 2019;144:e20191368.
- 45 Leon K, O'Bryan J, Wolf-Gould C, *et al.* Prevalence and risk factors for non-suicidal self-injury in transgender and gender-expansive youth at a rural gender wellness clinic. *Transgend Health* 2021;6:43–50.
- 46 O'Bryan J, Leon K, Wolf-Gould C, *et al.* Building a pediatric patient registry to study health outcomes among transgender and gender expansive youth at a rural gender clinic. *Transgend Health* 2018;3:179–89.
- 47 Chiniara LN, Bonifacio HJ, Palmert MR. Characteristics of adolescents referred to a gender clinic: are youth seen now different from those in initial reports? *Horm Res Paediatr* 2018;89:434–41.
- 48 Khatchadourian K, Amed S, Metzger DL. Clinical management of youth with gender dysphoria in Vancouver. *J Pediatr* 2014;164:906–11.
- 49 Vehmas N, Holopainen E, Suomalainen L, *et al.* Somatic health and psychosocial background among Finnish adolescents with gender dysphoria seeking hormonal interventions. *Transgend Health* 2022;7:505–13.
- 50 Arnoldussen M, Steensma TD, Popma A, *et al.* Re-evaluation of the Dutch approach: are recently referred transgender youth different compared to earlier referrals? *Eur Child Adolesc Psychiatry* 2020;29:803–11.
- 51 McCallion S, Smith S, Kyle H, *et al.* An appraisal of current service delivery and future models of care for young people with gender dysphoria. *Eur J Pediatr* 2021;180:2969–76.
- 52 Chen M, Fuqua J, Eugster EA. Characteristics of referrals for gender dysphoria over a 13-year period. *J Adolesc Health* 2016;58:369–71.
- 53 Kuper LE, Mathews S, Lau M. Baseline mental health and psychosocial functioning of transgender adolescents seeking gender-affirming hormone therapy. *J Dev Behav Pediatr* 2019;40:589–96.
- 54 Nahata L, Quinn GP, Caltabellotta NM, *et al.* Mental health concerns and insurance denials among transgender adolescents. *LGBT Health* 2017;4:188–93.
- 55 Spack NP, Edwards-Leeper L, Feldman HA, *et al.* Children and adolescents with gender identity disorder referred to a pediatric medical center. *Pediatrics* 2012;129:418–25.
- 56 van der Loos MATC, Klink DT, Hannema SE, *et al.* Children and adolescents in the Amsterdam cohort of gender dysphoria: trends in diagnostic- and treatment trajectories during the first 20 years of the Dutch protocol. *J Sex Med* 2023;20:398–409.
- 57 van der Loos M, Hannema SE, Klink DT, *et al.* Continuation of gender-affirming hormones in transgender people starting puberty suppression in adolescence: a cohort study in the Netherlands. *Lancet Child Adolesc Health* 2022;6:869–75.
- 58 Butler G, Adu-Gyamfi K, Clarkson K, *et al.* Discharge outcome analysis of 1089 transgender young people referred to paediatric endocrine clinics in England 2008–2021. *Arch Dis Child* 2022.
- 59 Masic U, Butler G, Carruthers P, *et al.* Trajectories of transgender adolescents referred for endocrine intervention in England. *Arch Dis Child* 2022;107:1012–7.
- 60 Nos AL, Klein DA, Adirim TA, *et al.* Association of gonadotropin-releasing hormone analogue use with subsequent use of gender-affirming hormones among transgender adolescents. *JAMA Netw Open* 2022;5:e2239758.
- 61 Littman L. Individuals treated for gender dysphoria with medical and/or surgical transition who subsequently detransitioned: a survey of 100 detransitioners. *Arch Sex Behav* 2021;50:3353–69.
- 62 Dhejne C, Lichtenstein P, Boman M, *et al.* Long-term follow-up of transsexual persons undergoing sex reassignment surgery: cohort study in Sweden. *PLOS One* 2011;6:e16885.
- 63 American Psychological Association. Guidelines for psychological practice with Transgender and gender Nonconforming people. The American psychologist; 2015. Available: doi:10.1037/a0039906
- 64 Cooper HC, Long J, Aye T. Fertility preservation in transgender and non-binary adolescents and young adults. *PLOS ONE* 2022;17:e0265043.
- 65 Ker A, Shaw RM, Byrne J, *et al.* Access to fertility preservation for trans and non-binary people in Aotearoa New Zealand. *Cult Health Sex* 2022;24:1273–88.
- 66 Komorowski AS, Fisher AR, Jungheim ES, *et al.* Fertility preservation discussions, referral and follow-up in male-to-female and female-to-male adolescent transgender patients. *Hum Fertil (Camb)* 2023;26:903–7.
- 67 Mattelin E, Strandell A, Bryman I. Fertility preservation and fertility treatment in transgender adolescents and adults in a Swedish region, 2013–2018. *Hum Reprod Open* 2022.