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Review Article

Prevalence of detransition in persons seeking gender-affirming hormonal treatments: a systematic review

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Abstract

Background: Despite recent evidence of the benefits of gender-affirming medical procedures, data in the literature indicate emerging demands of detransition and regrets while suggesting potential sources of bias in different datasets, including a nonconsensual definition of detransition.

Aim: The present systematic review aims to summarize the existing research regarding the prevalence of detransition in transgender persons who requested or started receiving gonadotrophin-releasing hormone analogs (GnRHa) and/or gender-affirming hormonal therapy (GAHT).

Methods: A systematic literature search (CINAHL Plus, Cochrane Library, Google Scholar, MEDLINE, Web of Science, Sage Journals, Science Direct, Scopus) for quantitative studies was conducted up to May 2024. All eligible studies were assessed using the Strengthening the Reporting of Observational Studies in Epidemiology statement. The risk of bias was assessed using the National Institute of Health quality assessment tool. The present analysis follows the PRISMA statement for systematic review articles and the synthesis without meta-analysis recommendations.

Outcomes: The primary outcome was the point-prevalence proportion of detransition events as a percentage in the population of transgender persons who were considered eligible for treatment or had initiated GnRHa and/or GAHT.

Results: Fifteen observational studies involving 3804 children and adolescents and 3270 adult participants were included in the 3212 screened studies. Five studies reported a change in request before starting GnRHa, five studies reported GnRHa discontinuation, and nine studies reported GAHT discontinuation. The point-prevalence proportions of shifts in requests before any treatment ranged from 0.8–7.4%. The point-prevalence proportions of GnRHa discontinuation ranged from 1–7.6%. The point-prevalence proportions of GAHT discontinuation ranged from 1.6–9.8%. All of the included studies were heterogeneous regarding definitions of detransition used and the study design: their numbers were too small to be statistically relevant, their time frame was insufficient, they did not use patient-level data, or they did not consider confounding factors.

Clinical implications: Quality measurement tools are needed, as are monitoring standards, and both are important for health outcomes and guarantee the attention of health care providers and policy-makers.

Strengths and limitations: The unique features of this analysis are its restrictive inclusion criteria compared with those of previous reviews, such as a strict definition of detransition and a focus on empirical studies only. However, most of the studies were retrospective and unblinded, and most were not sufficiently powered to detect detransition rates.

Conclusion: Taken together, the results of the present analysis show that detransition in persons undergoing gender-affirming treatment has been insufficiently investigated, highlighting the need for long-term follow-up studies.

Keywords: transgender; detransition; gender identity; gender-affirming hormonal therapy; gonadotrophin-releasing hormone analogs.

Introduction

Hormonal treatments are used to alleviate gender dysphoria in children and adults.[1] Among the drugs usually prescribed are gonadotrophin-releasing hormone analogs (GnRHa), which suppress the gonadal axis and therefore pubertal development, and gender-affirming hormonal therapy (GAHT), which enhances the phenotypic expression of secondary characteristics of the desired sex.[1] The aim of GnRHa is to "suspend" puberty so that children/adolescents can complete their development and achieve full awareness of their gender identity. The aims of GAHT are (i) to reduce endogenous sex hormone levels and consequently the expression of secondary sexual characteristics of one's original gender; and (ii) to add exogenous sex hormones consistent with the gender to be affirmed so that exogenous hormone plasma levels are within the physiologic range for the affirmed gender.[1] Despite recent evidence of the benefits of gender-affirming medical procedures, the literature data suggest that their potentially harmful effects indicate the need to explore more conservative approaches, particularly in children and adolescents.[2-4] Several ethical issues have also been raised regarding long-term effects.[5,6] Literature data also indicate potential sources of bias in different datasets, including a nonconsensual definition of detransition, and advocate for a comprehensive analysis of the currently available clinical experience and for long-term prospective studies.[7-14] These issues have motivated attention debates and reglementary actions in several countries.[15-17]

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The definition of de/retransition varies according to different studies based on the steps of the transition process, which are taken into consideration, such as social transition, interruption of hormonal treatments or surgical interventions to reverse changes.[13,14] While the choice to detransition is proportionally rare, it is expected that an overall increase in the number of adults who identify as transgender would result in an increase in the absolute number of people seeking to halt or reverse a transition. The existence of these requests does not mean the interruption of medically necessary care, including hormonal and surgical treatments, for the vast majority of transgender adults.[2,18,19]

Detransition relates to the transitioning back to the birth-assigned gender after some steps of transition (social, legal, medical, or surgical) have been completed.[18-20] The term "detransition" more specifically refers to individuals who underwent medical and/or surgical transition, and then stopped medications and/or chose to reverse their surgery.[14] Detransition may occur for different reasons such as an understanding of one's gender identity, health concerns or decisional regrets.[18,19,21] Several authors[14,19,22] emphasize that this decision is often determined by "external factors" such as financial or legal factors. Since the term "trans" has shifted from being a narrow definition to being used as a term covering a wider spectrum of gender diversity, it has consequences for how to conceptualize detransition. Some authors consider detransition as a decision not to pursue medical transition in persons who had identified as transgender and received health care provision or workup toward hormonal treatment regardless of what (if any) treatments have been accessed during transition.[3,23,24]

Retransition is defined as the resumption of the gender transition following detransition. It may more accurately describe a dual transition to a different gender state rather than a return to the previous gender identity.[18-20]

An important assumption is that some transgender adults may experience a change in gender identity over time so that their needs for medical treatment evolve. This is a reasonable process for determining the most comfortable and congruent way of living, which is informed by the person's gender identity and the context of their life. Therefore, this process of identity exploration should not necessarily be equated with regret, confusion, or poor decision-making.[18,19] Transgender adults should be assisted in this exploration and any other changes in their identity.[13] Detransition may represent an important burden of physical, social, and mental distress and raises concerns about the appropriateness of gender-affirming medical procedures.[25] Health care providers should be guided in how to provide counseling regarding treatment options before starting GnRHa and/or GAHT and how to provide care to persons aiming to undergo medical detransition.

Data in the literature have shown that the decision to detransition appears to be rare.[26-28] Estimates of the number of people who detransition due to a change in identity are likely to be overinflated due to research blending different cohorts.[13] The main purpose of this study was to identify available evidence regarding the prevalence of detransition in transgender persons who were considered eligible for treatment or who initiated treatments with GnRHa and/or GAHT.

Materials and methods

Data sources and searches

The literature search was conducted in the CINAHL Plus, the Cochrane Library, Google Scholar, MEDLINE, Web of Science, Sage Journals, Science Direct and Scopus electronic databases to identify relevant articles published in English and French until 7 May 2024. The search strategy is detailed in Supplementary Table 1. The reference lists from the primary search were also searched manually to detect additional eligible studies. For studies with multiple publications, the landmark trial report was used as a reference, and details from the secondary articles were added if applicable.

Study selection

This review considered quantitative studies analyzing the frequency of medical detransition in transgender persons who were eligible for treatment or who started GnRHa and/or GAHT. We excluded articles with no original data, reviews, surveys on online communities, gender reassignment surgery only, case reports, comments, letters, book chapters, study protocols, studies not in English or French, and studies published only as abstracts or conference proceedings.

Protocol and registration

Methods and inclusion criteria were defined in advance and specified in a protocol available from https://www.crd.york.ac.uk/prospero/#recordDetails. The registration number of this review in the PROSPERO register (https://www.crd.york.ac.uk/prospero/) is CRD42024541169. There were no modifications to the protocol.

Data extraction

The titles and abstracts of all the citations identified in the literature search were reviewed. The full texts of eligible articles were analyzed. The following data were extracted from the Cochrane Consumers and Communication Review Group's data extraction template (http://cccrg.cochrane.org/author-resources): (1) author; year; geographical region; setting; (2) type of study: comparator group if applicable; (3) characteristics of study participants; age; gender assigned at birth; self-identified gender; gender indicated in medical records; (4) inclusion and exclusion criteria; (5) treatment received; (6) length of study; duration of follow-up; (7) reasons for retransition or detransition; (8) clinical outcomes; (9) and results of sensitivity analyses.

Quality assessment and data analysis

All eligible studies were assessed using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (Supplementary Table 2).[29] The risk of bias within each of the included studies was assessed using the National Institute of Health quality assessment tool, which categorizes each study as "good", "fair," or "poor"[30] (Supplementary Table 3). Among the 14 items of the tool, the following three were considered as essential: (1) Item 7 (asking whether the timeframe was sufficient to assess detransition); (2) Item 13 (asking what percentage of patients were lost to follow-up because it can influence data analysis); (3) and Item 14 (asking whether confounding factors, such as family, work, social environment or income, were considered). A study was considered good quality if all three items had been met, at least two items were needed to classify the study as fair quality, and if one or less than one item corresponded to poor quality. The present analysis followed the PRISMA statement for systematic review articles[31] (Supplementary Table 4) and the synthesis without meta-analysis (SWiM) recommendations[32] (Supplementary Table 5). The Grading of Recommendations Development, Assessment and Evaluation (GRADE)

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categories were utilized to examine certainty in the facts[33] (Supplementary Table 6).

Outcomes

A primary outcome was the point-prevalence proportion of detransition, expressed as a percentage, in the population of transgender persons who were considered eligible for treatment or had initiated GnRHa and/or GAHT. The secondary outcomes were to describe the prevalence (as a percentage) of detransition by the type of gender transition (transfeminine or transmasculine), the age category (child, adolescent, adult) and the duration of treatment (GnRHa and/or GAHT) and the reasons for detransition.

Strategy for data and statistical analysis

The summary results of each clinical study were tabulated for analysis. Data were not presented whenever outcomes of interest were not formally stated. To evaluate the prevalence of detransition as most accurately as possible, we considered the following definition of detransition: (1) a person who was eligible for treatment (i.e. a transgender person who received any health care provision, toward medical transition and decided not to pursue transition, regardless of whether any hormonal treatments had been accessed during transition)[3,23,24]; and (2) a person who had undergone GnRHa; and/or GAHT, and then discontinued with a desire to revert to the birth-assigned gender.

Given the heterogeneity of the included studies, insufficient or not reported follow-up times and missing follow-up data, a meta-analysis could not be usefully carried out; consequently, a SWiM was undertaken.[34] The information available in the included studies did not enable the calculation of the incidence rate as person-years for all studies; therefore, the point-prevalence was expressed as the proportion of the population that had a particular event at a specific point in time.[35,36] The point-prevalence proportions of the detransition events were calculated as the sum of all patients with an event corresponding to the detransition event divided by the population, where available. The size of the population was used for point-prevalence proportions.[35] Detransition events were expressed as percentages (point-prevalence proportions) or per 1000 person-years, whichever was appropriate. All calculations were performed using MS Excel. Reasons for discontinuation (such as side effects of hormonal treatments, poor compliance or changes in gender identity) are synthetized and described quantitatively. To enhance clarity of the research findings, the estimates of detransition or change in request are also illustrated based on the following criteria: (1) prior to commencing any medication; (2) after starting GnRHa; and (3) after starting GnRHa and GAHT.

Results

Literature search results

The search strategy yielded 3212 citations, and 9 records were identified through manual search, generating a total of 64 records that appeared relevant to the review (Fig. 1). Among these 64 studies, 49 were excluded for the following reasons: case studies ($n = 8$); not concerned with hormonal treatment ($n = 1$); full text not available (full text requested from authors, but no answer received; $n = 1$); health care provider perspectives ($n = 2$); not original studies ($n = 22$); reviews ($n = 3$); gender reassignment surgery regrets ($n = 3$); studies using identical patient cohorts ($n = 1$); and surveys in online communities ($n = 8$; see Supplementary Table 7 for details of the articles excluded from the review), leaving 15 studies eligible for the final analysis.[9,12,23,37-48] The studies included in the review are reported in Table 1.

Description of the studies

The analysis involved data from 3804 children and adolescents (assigned male/female ratios could not be determined because of missing data) and 3270 adult participants (assigned male/female ratios could not be determined because of missing data). Ten studies involved children and adolescents, and five studies involved adult participants. Fourteen studies had a retrospective designs, and one was an uncontrolled prospective observational study[40] (Table 1). All studies were published between 2014 and 2024. Five of these studies were conducted in the United Kingdom[9,37,39,40,46], four in the United States,[12,41,44,45] three in the Netherlands,[38,47,48] one in Australia,[23] one in Denmark,[43] and one in Spain.[42] Six studies had single center designs,[23,38,40,42,45,46] and nine studies were multicentric or used data from national registries and/or insurance system databases. Definitions of detransition used by the included studies are presented in Table 2. As shown in Table 1, age and treatment modality were not systematically reported. The present analysis evaluated one primary outcome variable, the point-prevalence proportion of detransition events expressed as a percentage, and one secondary outcome variable, the prevalence of detransition in children and adolescents and in adult participants based on treatment modalities (GnRHa +/- GAHT). Other secondary outcome variables could not be analyzed due to missing information and the heterogeneity of the data.

Outcomes of included studies and estimations of detransition

Estimations of detransition as the point-prevalence proportions are shown in Table 3. Five studies reported a change in request before starting GnRHa,[23,38,39,41,42] five studies reported GnRHa discontinuation,[38,39,45-47] and nine studies reported GAHT discontinuation[9,12,37,41-44,46,48] (Table 4).

The point-prevalence proportions of shifts in requests before any treatment ranged from 0.8–7.4%.[23,38,39,41,42] All the studies concerned children and adolescents; however, the ages of the patients were not disclosed. Among the reported reasons for shifts in requests were no wish for hormonal treatment[38] or no self-identification as a gender variant.[23,39,42]

The point-prevalence proportions of GnRHa discontinuation ranged from 1.6–7.6%[38,40,45-47] and from 1–3.8% when considering only no wish to pursue transition[38,45-47] (Table 4). Among the reasons for GnRHa discontinuation were mood changes or suicidal thoughts,[38,40,45,47] no wish for GAHT, uncertainties about GAHT side effects,[38,40,46,47] or the presence of side effects of GnRHa.[38] In two studies reporting GnRHa and/or GAHT discontinuation and reidentification with the birth sex, without further specification of treatment modalities,[23,39] the point-prevalence proportions were 0.4%[23] and 5.3%,[39] respectively (Table 4).

Regarding GAHT, the point-prevalence proportions of discontinuation ranged from 1.6–9.8%[9,37,41,42,44,46,48]

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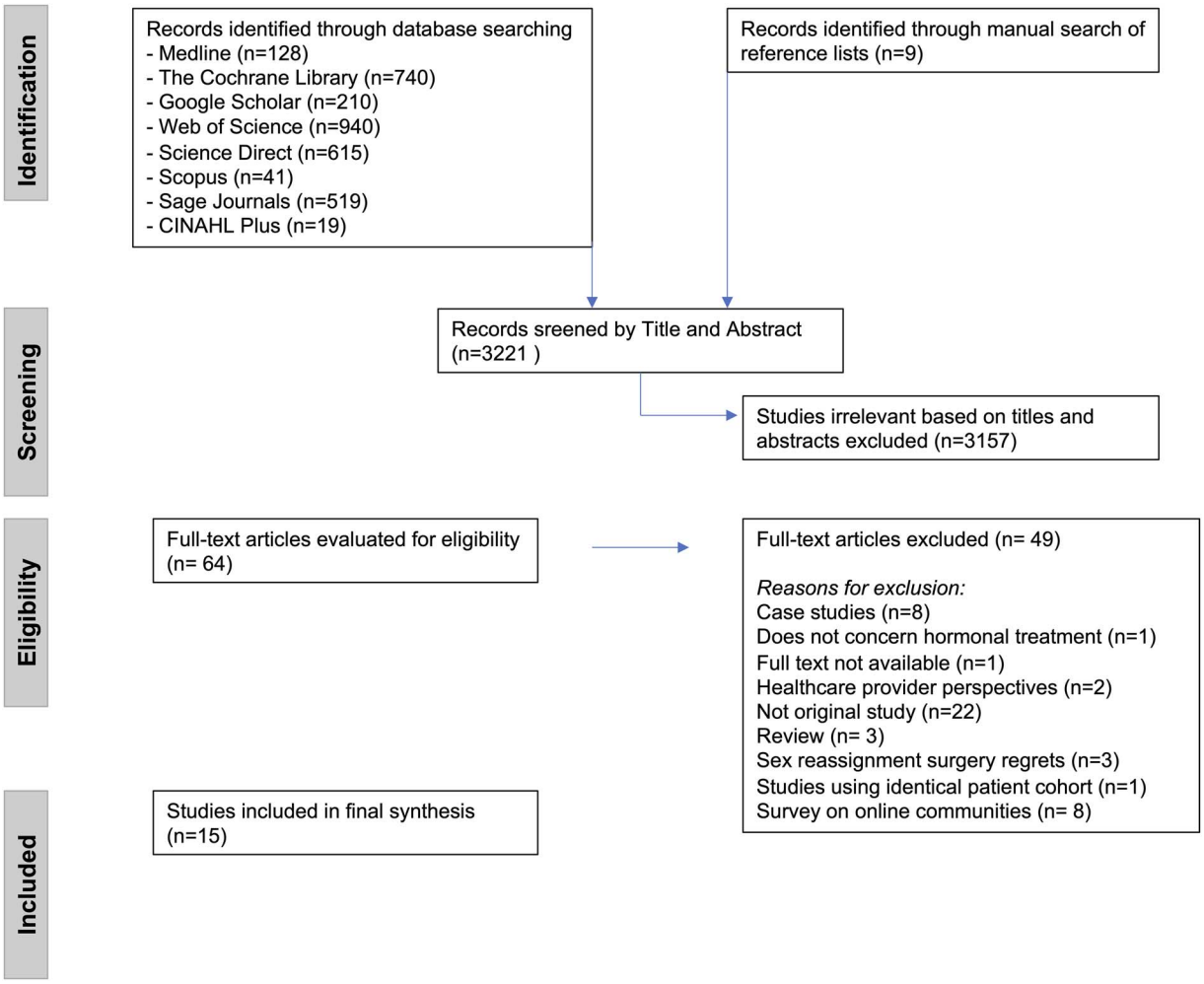

Figure 1. Study flowchart.

and from 0.5–9.8% when considering only no wish to pursue transition[9,37,44,46,47] or doubts regarding transgender identity.[42] One study[43] reported an estimate of detransition of 0.06% per person-year, and one study[12] reported rates of discontinuation at the 4-year follow-up of 19% among transfeminine individuals and 35.6% among transmasculine individuals. The reasons for discontinuation reported by the included studies are illustrated in Table 4. Among the reasons for discontinuation were not identifying as transgender,[9,12,37,45,46] treatment goals met,[41] side effects of treatment,[41,44] and financial or social issues.[44] In pediatric cohorts, GAHT discontinuation rates ranged from 1.5–2.4%.[41,42,46,48] However, considering the fact that Van der Loos et al. published two studies[47,48] using the same dataset, the first one evaluating GnRHa discontinuation[47] and the second one assessing GAHT discontinuation,[48] pooled data from both studies yielded a point-prevalence proportion of detransition of 3.2% for this cohort of patients.

Quality of the studies

The overall quality of the included studies was low (Supplementary Table 3). The studies varied in how authors defined detransition, and it was not clear whether individuals identified as nonbinary were excluded. Five studies did not analyze primary patient-level data, but reported secondary use of existing data.[12,23,37,41,43] The follow-up times were either insufficient[9,38,40,42,44-48] or not reported.[23,39,41,43] Variable sample sizes also made comparisons between studies difficult. For several studies, the outcome measures were not clear.[12,23,39-41,44,47] Butler et al.[39] used discharge reports, which may be a source of bias. In addition, a follow-up time was not reported in this study. Carmichael et al.[40] used an uncontrolled study design with a small sample size and included a highly selected group of participants. Moreover, the sample size varied during follow-up due to missing data. Cavve et al.[23] used secondary data and the accuracy of the outcome measures was unclear. Cohen et al.[41] did not analyze patient-level data. In addition, a follow-up time was not reported in this study. A study by Gupta et al.[44] suffered from missing data, which introduced a bias in data interpretation. Roberts et al.[12] used data from a single insurance system and reported an overall discontinuation rate of 29.8%. However, the result was not clear given that 60.9% of the adult population had a 35.6% discontinuation rate and that 39.1% of the minority population had a 25.6% discontinuation rate. A study by Van der Loos et al.[47] was not suitable for measuring detransition as it covered only a short puberty suppression period. The certainty assessment of the included studies using the GRADE approach revealed a very low overall quality evidence (Supplementary Table 6).

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Table 1. Study characteristics.

Author/country	Study design	Population/age (y)	Type of care/treatment modalities
Children/adolescents			
Brik (2020) Netherlands	Retrospective single-center review of medical records	*N* = 154 pubertal children diagnosed with gender dysphoria	143 (transgirls *n* = 38, transboys *n* = 105) started GnRHa treatment at median ages of 15.0 years (transgirls) and 16.0 years (transboys) 125 (87%; 36 transgirls, 89 transboys) started GAHT at median ages of 16.2 years (transgirls) and 17.1 years (transboys)
Butler (2022) United Kingdom	Retrospective review of discharge reports (2 centers; 2008–2021)	*N* = 1089 (AMAB/AFAB ratio NR) Age < 18 years	GnRHa and/or GAHT
Carmichael (2021) United Kingdom	Prospective uncontrolled single-center observational study (2011–2015)	*N* = 44 (AMAB *n* = 25 AFAB *n* = 19) aged 12–15 years who started GnRHa Median age 13.6 years	GnRHa: evaluation at 6–15 months and 15–24 months until the age of 16 years
Cavve (2024) Australia	Retrospective single-center cohort study (2014–2020) including children/adolescents up to 18 years	*N* = 548 closed referrals (AMAB *n* = 211; AFAB *n* = 337) Median age (AMAB 13.9 years; AFAB 15.8 years)	GnRHa and/or GAHT
Cohen (2022) USA	Retrospective chart review from a multidisciplinary gender services program (2010–2021) and qualitative interviews with clinicians	*N* = 68 youth (age at first visit <21 years) followed >2 years (mean age 15.11 years, 47% autistic, 22% NB)	GnRHa and/or GAHT
De Castro (2022) Spain	Retrospective single-center review of medical records (1999–2016)	*N* = 124 minors confirmed as being transgender (AMAB/AFAB ration 1:1.2)	GnRHa (AMAB *n* = 10; AFAB *n* = 3) Mean age 13.3 years GAHT (AMAB *n* = 13; AFAB *n* = 21) Mean age 17.3 years
Khatchadourian (2014) USA	Retrospective single-center review of medical records (1998–2011)	*N* = 84 minors (AFAB *n* = 45; AMAB *n* = 37; and AMAB *n* = 2 undecided) Median age (AFAB16.9 years AMAB 16.6 years)	27 started GnRHa (15 AFAB, 11AMAB and 1 AMAB with undecided gender) 25 started anti-androgens 63 started GAHT
McCallion (2021) Scotland	Retrospective single-center review of medical records (2011–2019)	*N* = 91 young persons with GD AFAB *n* = 59 AMAB *n* = 32 Median age at initial assessment 14.6 years	79 started GnRHa at a median age of 14.8 years 41 started GAHT
Van der Loos (2023) Netherlands	Retrospective cohort study (Amsterdam Cohort of Gender Dysphoria; 1987–2018)	*N* = 882 minors who had started GnRHa (AMAB *n* = 266; AFAB *n* = 616)	Median ages at the start of GnRHa: AMAB 14.0 years AFAB 15.5 years Mean follow-up times under GnRHa: AMAB 1.6 years AFAB 0.7 years
Van der Loos (2022) Netherlands	Retrospective cohort study (1972–2018) nationwide prescription registry coupled with hospital records (Amsterdam Cohort of Gender Dysphoria)	*N* = 720 (AMAB *n* = 220; AFAB *n* = 500) who began GnRHa before the age of 18 years, maintained GnRHa for at least 3 months, and then started GAHT:	Median ages at the start of GnRHa: AMAB 14·1 years AFAB 16·0 years Median ages at the start of GAHT: AMAB 16.0 years AFAB 16.7 years Median ages at the end of data collection: AMAB 20.2 years AFAB19.2 years
Adult persons			
Boyd (2022) United Kingdom	Retrospective review of medical records with the UK multisite GP practice	*N* = 41 transgender persons (AMAB/AFAB ratio NR)	GAHT
Glintborg (2022) Denmark	Retrospective national register-based cohort study from 2000–2018 Diagnosis of GID obtained by ICD-10 codes	*N* = 1717 persons with GID (AMAB *n* = 878; AFAB *n* = 839) Median age (AMAB 26.2 years; AFAB 19.8 years)	GAHT prescription followed by at least one purchase of feminizing and/or masculinizing treatment Definitions: Transgender women = prescription of estrogen and/or cyproterone acetate and/or testosterone-5-alpha reductase inhibitors; transgender men = prescription of testosterone
Gupta (2023) USA	Retrospective multicentric cohort study (Center 1: pediatric care; Center 2: adult care; 2000–2019)	*N* = 385 persons prescribed GAHT (AMAB *n* = 231; AFAB *n* = 154)	Phase 1 (pediatric cohort): 121 initiated GAHT before the age of 18 years (mean age 15 years) Phase 2 (adult cohort): 264 initiated GAHT at the mean age 32 years

(*Continued*)

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Table 1. Continued

Author/country	Study design	Population/age (y)	Type of care/treatment modalities
Hall (2021) United Kingdom	Retrospective multicentric (2 centers) review of medical records over a 15-month period (2018–2019)	*N* = 175 AFAB (59 FtM, 8 NB) AMAB (101 MtF, 6 NB, 1 previously transitioned to female referred to detransition) Median age (AMAB 36 years; AFAB 20 years)	93.1% AMAB estradiol 95.4% AFAB testosterone
Roberts (2022) USA	Retrospective review of medical and pharmacy records (US military health care system prescriptions; 2009–2018)	*N* = 952 (AFAB *n* = 627; AMAB *n* = 325) Mean age 19.2 ± 5.3 years	GAHT defined as: = prescriptions for testosterone to individuals coded as female at their first encounter and estrogens to individuals coded as male at their first encounter. = at least 2 prescriptions of GAHT = initial prescription of GAHT between 30 days before the first and 90 days after the last medical encounter.

AFAB—assigned female at birth; AMAB—assigned male at birth; FtM—female-to-male; GAHT—gender affirming hormone therapy; GD—gender dysphoria, GID—gender identity disorder; GnRHa—gonadotropin releasing hormone analog; HR—hazard ratio; MtF—male-to-female; NB—nonbinary; NR—not reported.

Table 2. Definitions of detransition used by the studies included in the review.

Author/country	Definition of detransition
Studies in children and adolescents	
Brik (2020) Netherlands	GnRHa discontinuation
Butler (2022) United Kingdom	Stopped identifying as gender variant: – prior to commencing GnRHa – after starting GnRHa. – after starting GnRHa and GAHT
Carmichael (2021) United Kingdom	GnRHa discontinuation
Cavve (2024) Australia	People who have discontinued a trans identity, regardless of what (if any) social or legal changes or medical or surgical treatments were accessed during transition
Cohen (2022) USA	Requests treatment/Receives treatment/Gender needs changed (treatment terminated).
De Castro (2022) Spain	"Desisters": (1) the subject's gender identity did not differ from the assigned sex, (2) the subject experienced serious doubts about their gender identity leading to reverse the social transition, or (3) discontinuation of hormonal treatment
Khatchadourian (2014) USA	Decision not to pursue transition
McCallion (2021) Scotland	GnRHa and/or GAHT discontinuation as GD had desisted
Van der Loos (2023) Netherlands	GnRHa discontinuation
Van der Loos (2022) Netherlands	GAHT discontinuation
Studies in adult persons	
Boyd (2022) United Kingdom	GAHT discontinuation and medical records expressing a desire to detransition
Glintborg (2022) Denmark	Discontinuation of GAHT = no purchase of GAHT ≥13 months or shift from feminizing to masculinizing hormone treatment, or vice versa.
Gupta (2023) USA	GAHT discontinuation and reverting to birth-assigned gender
Hall (2021) United Kingdom	Persons who had lived in an alternative gender role, reverting to their original role either during or after the care episode
Roberts (2022) USA	Discontinuation of GAHT: Failure to obtain another prescription for GAHT for >90 days after completing the most recent prescription in the database.

GAHT—gender-affirming hormone therapy; GD—gender dysphoria, GID—gender identity disorder; GnRHa—gonadotropin-releasing hormone analog.

Discussion

The studies included in the present analysis were heterogeneous. The vast majority of studies reported small samples of patients from specialized gender clinics[9,37,38,40-42,45,46] or were limited to pediatric/adolescent ages[23,38-42,45-48] or to adult ages. Various definitions of detransition were used, and

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Table 3. Outcomes of included studies and estimates of detransition.

Author/country	Follow-up time	Did not start treatment	GnRHa discontinuation	GAHT discontinuation	Reasons for discontinuation and/or shifts in request	Estimates of detransition*
Children and adolescents						
Brik (2020) Netherlands	Median time 2.1 years (1.6–2.8)	4 of 154	9 of 143 after a median of 0.8 years (0.1–3.0), at a median age of 15.0 years (13.4–18.9).	NA *(GAHT started by 125 persons)*	4 out of 154 (2.6%) who did not start treatment reported no wish for hormonal treatment Among 9 of 143 who stopped GnRHa: – no wish GAHT ($n = 5$) – suicidal thoughts; started GAHT at adult age ($n = 1$) – hot flashes, migraines, restarted GnRHa; started GAHT ($n = 1$) – mood swings, nausea, weight loss, stopped GnRHa, started lynestrenol to suppress menses; $n = 1$) - reason NR ($n = 1$)	4 out of 154 (**2.6%**) did not start treatment 9 of 143 (**6%**) discontinued GnRHa of whom 5 (**3.5%**) did not wish for GAHT
Butler (2022) United Kingdom	NR	32 of 1089: 8/217 (3.7%) were in the under 16-year group at the time of referral and 24/872 (2.8%) in the 16 years and over group	58 of 1089 stopped GnRHa or GAHT: <16 years (20/217; 9.2%); ≥16 years (38/872; 4.4%)		32 of 1089 stopped identifying as gender variant, before starting GnRHa 58 of 1089 stopped GnRHa or GAHT and reidentified with their birth sex	32 of 1089 (**2.9%**) stopped identifying as gender variant, before starting GnRHa. 58 of 1089 (**5.3%**) stopped GnRHa or GAHT
Carmichael (2021) United Kingdom	Median time in the study was 31 months (44 patients had data at 12 months follow-up, 24 at 24 months and 14 at 36 months)	None	1 of 44	NA *(GAHT started at the end of the study by 43 persons)*	Continued uncertainty and some concerns about side-effects of GAHT	1 of 44 (**2.3%**) stopped GnRHa and did not start GAHT
Cavve (2024) Australia	NR	27 of 548	2 of 548 GnRHa or GAHT		29 of 548(20 AFAB, 9 AMAB) reidentified with their birth-registered sex, among whom 2 of 548 stopped GnRHa or GAHT	29 of 548 (**5.3%**) reidentified with their birth-registered sex, with 27 (4.9%) before treatment; 2 (0.4%) stopping GnRHa or GAHT
Cohen (2022) USA	NR (followed more than 2 years)	17 of 68, of whom 5 of 68 no longer requested; 12 of 68 considering or oscillations in requests	NA	3 of 68 2 of 68 stopped treatment because treatment goals met 1 of 68 stopped treatment due to negative effects	Profiles of shifts in request for GAHT in 20 of 68 persons: *Before treatment* - no longer requested (25%) - considering/oscillation (60%) *After treatment* – stopping treatment because treatment goals met (10%) – stopping treatment due to negative report regarding commencing the treatment (5%)	5 of 68 (**7.4%**) shifted before GAHT 1 of 68 (**1.5%**) shifted after GAHT

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Table 3. Continued

Author/country	Follow-up time	Did not start treatment	GnRHa discontinuation	GAHT discontinuation	Reasons for discontinuation and/or shifts in request	Estimates of detransition*
De Castro (2022) Spain	Median follow-up 2.6 years	1 AMAB) of 124 during adolescence	0 of 124	2 (AMAB) of 124 (one during adulthood)	2 expressed doubts regarding their transgender identity during adolescence and one at adult age	3 of 124 (2.4%), of whom: 1 of 124 (**0.8%**) before treatment; 2 of 124 (**1.6%**) after GAHT
Khatchadourian (2014) USA	Median follow-up 2 years	None	2 of 27 who started GnRHa	0 of 63 who started GAHT	1 AFAB and 1 AMAB stopped GnRHa after <2 months due to emotional lability 1 AMAB with undecided gender stopped GnRHa, after 13 months and chose not to pursue transition	2 of 84 (**2.4%**) stopped GnRHa
McCallion (2021) Scotland	Median follow-up 1.9 years	None	6 of 79 who started GnRHa, of whom 3 resolved from GD	1 of 41 who started GAHT	6 of 79 of those who started GnRHa discontinued: 3 persons resolved from GD, 3 poor treatment compliance), following a median duration of 6 months 1 of 41 of those who started GAHT stopped as GD had desisted	6 of 79 (7.6%) stopped GnRHa of whom 3 (**3.8%**) resolved from GD 1 of 41 (**2.4%**) stopped GAHT
Van der Loos (2023) Netherlands	Mean follow-up time 1.2 years	None	9 of 266 AMAB 5 of 616 AFAB	NA	9 of 266 AMAB stopped GnRHa (6 remissions of GD, 2 psychological or social issues, 1 poor compliance) 5 of 616 AFAB stopped GnRHa (3 remissions of GD, 2 poor compliance)	9 of 882 (**1.0%**) resolved from GD and stopped GnRHa
Van der Loos (2022) Netherlands	Median follow-up 3.5 years	None	NA	16 of 720 (of whom 2 had unknown outcomes)	NR	16 out of 718 (**2.2%**) with known outcomes stopped GAHT
Adult persons						
Boyd (2022) United Kingdom	Mean follow-up 5 years	NA	NA	4 of 41	4 trans men stopped testosterone and stopped identify as transgender	4 of 41 (**9.8%**) stopped GAHT
Glintborg (2022) Denmark	Calendar time trends of subcohorts of 1 year according to index date	NA	NA	108 during 1844 person years	NR	**0.06%** **per person years****, corresponding to an event rate of 0.059 CI (0.049; 0.071) stopped GAHT

(*Continued*)

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Table 3. Continued

Author/country	Follow-up time	Did not start treatment	GnRHa discontinuation	GAHT discontinuation	Reasons for discontinuation and/or shifts in request	Estimates of detransition*
Gupta (2023) USA	Mean follow-up 24 months (pediatric cohort); 64 months (adult cohort)	NA	NA	6 of persons from pediatric cohort stopped GAHT; among those, 4 participants provided additional information: 2 had discontinued GAHT permanently, 2 temporarily	Among 6 persons: 2 changed their gender identity, 2 reported financial barriers, 1 had venous thrombosis and 1 reported "bullying by peers" Among 4 who provided additional information, 2 returned to their gender assigned at birth	6 of 385 (**1.6%**) stopped GAHT
Hall (2021) United Kingdom	NR	NA	NA	12 of 175: 8 AMAB 4 AFAB	Regret ($n = 2$) detransitioned to their natal gender within 16 months of starting medical transition NR ($n = 10$)	12 of 175 (**6.9%**) stopped GAHT
Roberts (2022) USA	Follow-up 4 years from the start of GAHT	NA	NA	*4-year continuation rate:* 81.0% (95% CI, 72.0–90.0) transfeminine individuals vs. 64.4% (95% CI, 56.0–72.8) transmasculine individuals. 74.4% (95% CI, 66.0–82.8) people who started treatment <18 years vs. 64.4% (95% CI, 56.0–72.8) people ≥18 years	Transmasculine gender identity (HR 2.40; 95% CI, 1.50–3.86) and starting hormones as an adult (HR, 1.69; 95% CI, 1.14–2.52) independently associated with increased detransition	Discontinuation at 4 years of follow-up: **19%** in transfeminine individuals and **35.6%** in transmasculine individuals

*The estimates of detransition are provided as point-prevalence proportions. The point-prevalence proportions of the detransition events were calculated as the sum of all patients with an event corresponding to the detransition event divided by the population. The size of the population was used for point-prevalence proportions Detransition events are expressed as percentages (point-prevalence proportions) or per 1000 person-years, whichever is appropriate. **The point-prevalence proportion could not be calculated; therefore, detransition is expressed per 1000 person-years. GD—gender dysphoria; NA—not applicable; NR—not reported.

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Table 4. Estimates of detransition or change in request depending on the medication used.

Author/country	Estimates*
Before starting any medication (range estimate from 0.8–7.4%)	
Brik (2020)	4 of 154 (**2.6%**)
Netherlands	
Butler (2022)	32 of 1089 (**2.9%**)
United Kingdom	
Cavve (2024)	27 of 548 (**4.9%**)
Australia	
Cohen (2022)	5 of 68 (**7.4%**)
USA	
De Castro (2022)	1 of 124 (**0.8%**)
Spain	
GnRHa discontinuation (range estimate from 1.6–7.6%)	
Brik (2020)	9 of 143 (**6%**) discontinued GnRHa:
Netherlands	– no wish for GAHT ($n = 5$; 3.5%)
	– suicidal thoughts; started GAHT at adult age ($n = 1$; 0.7%)
	– hot flashes, migraines, restarted GnRHa; started GAHT ($n = 1$; 0.7%)
	– mood swings, nausea, weight loss, stopped GnRHa, started lysestrenol to suppress menses; $n = 1$; 0.7%)
	– reason NR ($n = 1$; 0.7%)
Carmichael (2021)	1 of 44 (**2.3%**) uncertainty and some concerns about side-effects of GAHT
United Kingdom	
Khatchadourian (2014)	2 of 84 (**2.4%**) due to emotional lability of whom:
USA	1 (1.2%) no wish to pursue transition
McCallion (2021)	6 of 79 (**7.6%**) of whom:
Scotland	3 (3.8%) resolved from GD,
	3 (3.8%) poor treatment compliance
Van der Loos (2023)	14 of 882 (**1.6%**) of whom:
Netherlands	9 remissions of GD (1.0%)
	2 psychological or social issues (0.2%)
	3 poor compliance (0.3%)
GnRHa and/or GAHT discontinuation (range estimate from 0.4–5.3%)	
Butler (2022)	58 of 1089 (**5.3%**) and reidentified with their birth sex
United Kingdom	
Cavve (2024)	2 of 548 (**0.4%**) and reidentified with their birth sex
Australia	
GAHT discontinuation (range estimate from 1.6–9.8%)	
Boyd (2022)	4 of 41 (**9.8%**) stopped GAHT and stopped identifying as transgender
United Kingdom	
Cohen (2022)	3 of 68 (**4.4%**) of whom:
USA	2 treatment goals met (3%)
	1 negative effects (1.5%)
De Castro (2022)	2 of 124 (**1.6%**) doubts regarding transgender identity
Spain	
Glintborg (2022)	**0.06% per person years** stopped GAHT
Denmark	
Gupta (2023)	6 of 385 (**1.6%**) stopped GAHT of whom:
USA	2 changed their gender identity (0.5%)
	2 financial barriers (0.5%)
	1 venous thrombosis (0.25%)
	1 "bullying by peers" (0.25%)
Hall (2021)	12 of 175 (**6.9%**) of whom:
United Kingdom	2 detransitioned to their natal gender (1.1%)
	10 reason not reported (5.7%)
McCallion (2021)	1 of 41 (**2.4%**) as GD had desisted
Scotland	
Roberts (2022)	Discontinuation at 4 years of follow-up:
USA	**19%** in transfeminine individuals
	35.6% in transmasculine individuals
Van der Loos (2022)	16 out of 718 (**2.2%**) stopped GAHT
Netherlands	

*The estimates of detransition are provided as point-prevalence proportions. The point-prevalence proportions of the detransition events were calculated as the sum of all patients with an event corresponding to the detransition event divided by the population, where available. The size of the population was used for point-prevalence proportions. Prevalence proportions are reported per 1000 person-years, whichever is appropriate. GAHT—gender-affirming hormone therapy; GD—gender dysphoria, GID—gender identity disorder; GnRHa—gonadotropin-releasing hormone analog.

the studies had heterogeneous designs: their numbers were too small to be statistically relevant, their time frame was insufficient, they did not use patient-level data, or they did not consider confounding factors. The observational design of the studies did not enable conclusions about any possible effect of GnRHa and/or GAHT on gender identification. Given the heterogeneous design of the included studies and various definitions of detransition used, the ranges rather than a pooled

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estimate of detransition are reported with reasons for discontinuation based on the information available in the different studies. The findings of the present review further indicate that hormonal treatment is not the sole way in which transgender individuals may overcome gender dysphoria. Among the reasons for discontinuation reported by the different studies were not only doubts regarding transgender identity but also financial barriers, side effects, poor compliance, social issues or goals of treatment met. The current literature shows that the decision to detransition appears to be rare.[26-28] By not controlling for these factors, pooled estimates of the number of people who detransition due to a change in identity are likely to be overinflated because research blends different cohorts.[13]

In the present study, most of the identified cases were from the Netherlands, the USA, the United Kingdom and Denmark; therefore, the results may reflect country-specific protocols. Care provided by different health care centers within each country was variable, further limiting the interpretability of the data.

The studies included in the present analysis reported variable ages at the start of GnRHa and/or GAHT. This may be due to the long waiting lists in some gender clinics or loss to follow-up with treatment initiation at another center.[12,37,39,47] Future studies need to report relevant outcomes with a sufficient follow-up, control for confounding factors and evaluate whether these persons anticipate restarting treatment in the future. The optimal length of follow-up to evaluate detransition should be determined.

Unique features of this analysis are its restrictive inclusion criteria compared with those of previous reviews,[49,50] such as a strict definition of detransition and a focus on empirical studies only. We did not consider studies that primarily examined regret or desistance. Indeed, regret may not reflect a desire of the individual to return to the birth-assigned gender and not all people who detransition expressed regret.[4] In addition, not all studies consider the individual who sought to reverse the transition as someone who regrets.[4] The term "desistance" remains poorly defined in the literature and does not seem to predict gender outcomes.[51] Furthermore, the present analysis focused only on empirical studies to remain accurate in the evaluation of detransition estimates. For example, surveys on online communities were not included because they are susceptible to self-selection and nonresponse bias.[52,53]

Limitations

Several limitations to the current review should be acknowledged. The vast majority of the studies included in the present analysis were retrospective and unblinded. Data were thus available to the investigators, which could influence the results. Most studies were not sufficiently powered to detect detransition rates. Finally, only one researcher participated in this work, which limits the collection of information and analysis of the collected data, as other researchers would probably suggest other points of view.

Conclusion

This review provides the point-prevalence proportions of detransition among persons who sought hormonal treatments (GnRHa and/or GAHT). Taken together, the results of the present analysis indicate that detransition in persons undergoing gender-affirming treatment has been insufficiently investigated. Quality measurement tools are needed, as are long-term follow-up and monitoring standards. The present study highlights the need for well-designed prospective studies to evaluate the number of transgender persons experiencing detransition after starting GnRHa and/or GAHT and associated factors and to detect individuals at a greater risk of detransition. These data are important for health outcomes and to guarantee the attention of health care providers and policy makers.

Author contributions

E.F.: Conceptualization-Equal, Data curation-Equal, Formal analysis-Equal, Investigation-Equal, Methodology-Equal, Project administration-Equal, Resources-Equal, Software-Equal, Supervision-Equal, Validation-Equal, Visualization-Equal, Writing—original draft-Equal, Writing—review & editing-Equal.

Supplementary material

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The author declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data availability

The data supporting the findings of this study are available within the article and its supplementary materials.

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