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RESEARCH

Social factors behind the AFAB predominance in LGBT youths: evidence from a large European survey

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Abstract

Trans youth reports reveal a predominance of assigned female at birth (AFAB) people (i.e. transmasculine people) over assigned male at birth (AMAB) people (i.e. transfeminine people). It has been suggested that "social contagion" through social media could be more frequent in AFAB people, causing a hypothesized "rapid-onset gender dysphoria" (ROGD) in adolescence, with detrimental correlates to health. We aim to test (1) whether the suggested effect of ROGD on an AFAB predominance in adolescence could have an alternative explanation such as the effect of national LGBT policies; (2) the suggested effects of ROGD by which transmasculine people who had a more rapid development of their trans identity in adolescence would use more often social media to connect to peers and would have a lower health status. Regarding our methods, we used the cross-sectional LGTI Survey II (2019) of the European Union Agency for Fundamental Rights (137,553 LGBT people) and the ILGA-Europe's Rainbow Index (2019) of national LGBT policy scores. We calculated the chances to recognize and share an LGBT identity for AFAB/AMAB cis/trans people, expected sex ratios for cis/trans people at every age given equal total AFAB and AMAB populations, and national AFAB vs. AMAB differences in ages of LGBT identity-sharing adjusted by their ages of self-perception. We tested among adolescent respondents whether belonging to the hypothesized ROGD population was associated with social media use or poorer self-assessed health. As regards our findings, we predicted a predominance of AFAB trans adolescents as well as AFAB LGB cis adolescents in accordance with our observation that AMAB youth shared their identity later than AFAB youth in all 30 countries, their age of self-perception being held equal. We found that national differences in ages of identity-sharing significantly correlated with ILGA-Europe's Rainbow Index. We did not find that transmasculine people who had a rapid development of a trans identity in adolescence used more social media or had worse health. However, when we restricted the sample to those who were adolescents in the survey ($N = 6209$), we found that transmasculine youth who had a more rapid affirmation (< 1 year) used more frequently social media, though they did not have poorer health. To conclude, the AFAB predominance in adolescence may not be trans-specific. The effect of social influence on the emergence of LGBT identities in adolescence may exist at the micro level (social media use by transmasculine adolescents) but also at the macro level (state laws). These findings give support to some of the ROGD hypothesis features but contradict others, and plead for more research on how gender minority stress affects the likelihood of LGBT people to disclose their identity.

Keywords Transgender · ROGD · Social contagion · LGBT · Sex ratio

Introduction

The sex ratio in trans youth reports is subject to much debate, particularly since Lisa Littman's proposition of the rapid-onset gender dysphoria hypothesis (ROGD) [1]. She hypothesized that an increasing part of youth identifies as trans as a result of "social contagion", particularly through the internet-mediated spread of beliefs that non-specific psychological symptoms (including those related to puberty) should be perceived as proofs of gender dysphoria

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and justifications for transitioning. Another element of that hypothesis is that adolescent youth subjected to ROGD would not have displayed signs of gender incongruence before puberty. This "social contagion" phenomenon is suggested to affect mostly assigned-female at birth (AFAB) adolescents, as would be the case for young anorexic cis (i.e. non-trans) females.

While "social contagion" in anorexia is itself a contested theory [2], its relevance in trans youth is merely hypothetical [3] and Littman's descriptive study of the ROGD phenomenon suffers social and methodological critiques [4–6]. Notably, these critiques point out the psychopathologizing and stigmatizing premises about being transgender, and the selection and sampling of respondents: parents of trans youth were recruited mostly on online platforms harbouring trans-antagonistic content. In Littman's study of parental reports, the majority (62.5%) of the described youth had one or more diagnoses of a psychiatric disorder or neurodevelopmental disability preceding the onset of gender dysphoria - as subjectively determined by the parents. However, high rates of co-occurring psychiatric diagnoses are frequently found in clinical samples and often attributed to transphobia, a context that may affect the youth of Littman's sample [4]. Littman herself recognized the lack of validity of the study due to the missing perspectives of the trans youth themselves or their clinicians [3]. In a clinical study testing the ROGD hypothesis, adolescents seeking gender transition with more recent knowledge regarding their gender (i.e., rapid-onset) did not differ from those with more remote knowledge in terms of psychiatric co-occurrences, gender dysphoria symptoms, having support from online and offline friends, or gender support from parents [7].

Nevertheless, the sex ratio favouring AFAB over assigned-male at birth (AMAB) trans youth in recent years remains to be explained. Data from the United States Youth Risk Behaviour survey exhibited sex ratios favouring AMAB over AFAB trans youth in a general population sample [8]. However, Lett et al. warned against an overinterpretation of these data, pointing to methodological difficulties (small size samples, great variability of the sex ratio between states and between years, and overrepresentation of northeastern states) [9]. In contrast, other data from gender identity clinics and population studies have pointed to sex ratios favouring AFAB over AMAB youth in London [10], Toronto [11], Amsterdam [11], Paris [12], Hamburg [13], Catalonia [14], Sweden [15], Norway [16], Belgium [17], and Canada [18]. This AFAB predominance in trans youth mostly covers the adolescence period, and is less marked in childhood – which exhibits sometimes an AMAB predominance [12, 16]. The long-term evolution of the trans youth sex ratio suggests it could be a relatively recent phenomenon: AMAB predominance in trans youth was indeed mostly observed in the years before the mid-2000s [11, 19].

In addition to the aforementioned methodological issues, there are other parameters to consider to adequately explore the ROGD hypothesis. First, one must be able to distinguish between an individual becoming aware of gender identity questioning (*self-perception*) and sharing it with a friend or a relative (*identity-sharing*). Identity-sharing age can also be conceptualized as the age of *coming out*. This is especially important to address since the parents in Littman's study could only recollect the moment when their child shared their identity with them, and were much less able to reliably pinpoint the moment when their child self-perceived as trans, thereby making it quasi-impossible for them to assess whether a "rapid" development of a trans identity indeed occurred [20]. Several years typically elapse between trans participants' self-perception and identity-sharing [21, 22], putting doubts on the existence of a massive "rapid" development of gender dysphoria in adolescence. Second, we need to assess whether the ROGD hypothesis is specific to trans individuals; in other words, whether it can be found in some respects in other groups belonging to the LGBT (lesbian, gay, bisexual, trans) population. Third, in the case of social influence, microenvironmental social influences through friends or social networks/media must be distinguished from macroenvironmental social influences through laws and tightness/looseness cultures [23, 24]. For instance, in the case of parental burnout, frequent in Western cultures, it was shown that societal individualism (a macroenvironmental factor) plays a larger role in parental burnout than economic inequalities across countries or any other individual and family characteristics (e.g. the number and age of children and the number of hours spent with them) [25]. In the case of trans identity, macroenvironmental influences could be anti-LGBT state policies and cultural discrimination/victimization whereas microenvironmental influences are related to individual/internal factors (e.g., anxiety), bullying, family pressure/support, friends pressure/support, or social media use [26].

In the current study, we aim to address specific research gaps about some features of the ROGD hypothesis using a large European survey. This will complement clinical studies that have not found support for the ROGD hypothesis [7]. Studies on large surveys are limited to date to analysis performed on the 2015 US Transgender Survey showing that trans adults who self-perceived their trans identity early (before 10 years old) would not share it until much later into adulthood (median age at 20), thereby making it obvious that most children conceal their trans identity from their parents [21]. It has however not been addressed in a similarly large dataset whether this delay between the LGBT identity self-perception age and the LGBT identity-sharing age is

similar and stable through all childhood and adolescence [27, 28]; to what extent it varies between assigned sexes; and to what extent it varies between cis and trans people.

Here, to address these questions, we used data from the European Union Agency for Fundamental Rights [29], which surveys LGBT people, both AFAB/AMAB and cis/trans people, and asks all respondents aged 15 or more to retrospectively assess their self-perception and identity-sharing ages. Our analysis first explores to what extent the delay between self-perception and identity sharing varies between assigned sexes, which could explain an imbalanced sex ratio in trans youth; and to what extent it varies between cis and trans people, which could affect the scope of the ROGD hypothesis on trans people. Second, an additional advantage of this database relies on its possibility to appraise international differences as it includes 30 different countries. This allows us to test whether state laws and policies regarding LGBT people, measured by ILGA-Europe's Rainbow Index [30], influence the differential capacity of AFAB and AMAB LGBT people to share their identity, independently of their self-perception ability. Finally, we address two hypothesised correlates of the ROGD theory such as increased social media use and increased mental health problems that the theory believes to be associated with a more recent knowledge of a trans identity in adolescence (vs. a more remote knowledge). To address this, we used thresholds on the age of trans identity self-perception and identity-sharing to pinpoint adolescents (ages 15–17) who would most likely belong to the hypothesized ROGD population, and then tested the effect of belonging to that population on health and social media use.

Methods

Data source and study population

Using cross-sectional data from the EU LGBTI Survey II allowed the exploration of a wide range of dimensions of LGBTI (LGBT and intersex) lives, surveyed in 2019, in 30 European countries: sexual orientation, gender identity, sex characteristics, trends, and responses to LGBTI-phobias in the country, discrimination, safety, physical/sexual attacks, social context, and sociodemographic information. Overall, 139,735 LGBTI people were reached via the internet, of minimum age 15 years old, including 20,282 trans people. The methodology of the survey was fully described in the technical report by the European Union Agency for Fundamental Rights [31].

Sexual orientation

Participants were asked "In terms of sexual orientation, we can only use a limited number of categories for our analysis. So, we would like to ask you which group best matches your sexual orientation. Select the answer that best matches your sexual orientation." Proposed answers were "Lesbian", "Gay", "Bisexual", "Heterosexual/Straight", "Other, please specify" and "Don't know". Respondents who identified as heterosexual/straight, as long as they did not identify as trans and/or intersex, were excluded from the analyses ($n = 64$ people).

Gender identity

Participants were asked "How would you describe yourself today?" Response options were "Woman/girl", "Man/boy", "Trans woman/girl", "Trans man/boy", "Nonbinary or genderqueer or agender or polygender or gender-fluid", or "Do not identify as male, female, trans or nonbinary". Following recommendations from the European Union Agency for Fundamental Rights questionnaire, we considered the third, fourth and fifth answers to identify trans people. Another question asked "Are/were you a trans person? The term trans is used in this survey as a broad umbrella term that includes all those who are transgender, nonbinary, gender variant, polygender, agender, gender-fluid, cross dressers, transsexual, or men and women with a transsexual past, and other terms." Answers offered may be "Yes" or "No". Following the questionnaire, we considered the "Yes" option as an identifier for trans people. All nontrans people were considered cis people.

Sex assigned at birth

Participants were asked "What sex were you assigned at birth?" with the following instructions: "Sex assignment at birth is the classification of people as male, female, intersex or another sex assigned at birth often based on physical anatomy. The sex assigned at birth is recorded in your birth certificate when you were born". Possible answers were "Female", "Male", and "Other, specify". Since the present paper aimed to investigate the ratio between AFAB and AMAB people, we excluded the option "Other, specify" ($n = 1{,}207$ people) from the analyses. Note that most intersex people in our sample were assigned male or female at birth.

Self-perception, identity-sharing, and "rapid-onset identity-sharing"

One descriptive element in Littman's account of ROGD is that AFAB trans youth subjected to rapid-onset gender dysphoria do not display signs of gender non-conformity before puberty. We aimed to identify and quantify those people, in both AMAB and AFAB, for trans youth but also cis youth.

Lesbian, gay or bisexual participants were asked the following questions: "How old were you when you realized for the first time you are [respondent category – only L, G or B]?" and "How old were you when you first told somebody you are [respondent category – only L, G or B]?" We considered the response to the former question as the age corresponding to one's self-perception of identity questioning (LGBT self-perception) and the response to the latter as the age corresponding to LGBT identity-sharing. We withdrew individuals who had not yet shared their LGBTI identity from further analyses ($n = 7871$ people).

Trans participants were asked the following questions: "At what age did you first realize that your feelings about your gender did not match the gender assigned to you at birth?" and "How old were you when you first told someone about this?". As above, we withdrew respondents who had not yet shared their trans identity from the analyses ($n = 2637$).

For all LGBT people, we considered people who declared sharing their identity at an age prior to the age of self-perception as an inconsistent response ($n = 975$ people) and discarded those results. For trans people who were also lesbian, gay or bisexual, we considered their identity-sharing age as the age they shared their trans identity, not their lesbian gay or bisexual identity. We observed the same rule for their age of self-perception.

The rapidity or suddenness at which the "gender dysphoria" of someone appears to another one is highly subjective. We sought to describe such rapidity of development by distinguishing two categories of people: those who shared their identity during adolescence (defined as 12–17 years old) and had their self-perception at the same age of their identity-sharing age ("rapid-onset identity-sharing") and those who shared their identity during adolescence but had their self-perception strictly before their age of identity-sharing, i.e., "slow-onset identity-sharing". We generalized this definition to all LGBT people, regardless of their gender modality (cis or trans) [32].

The above definition being arbitrary as regards the pubertal onset age (12 years old) and of what is considered "rapid" (here, when identity-sharing is done within a year from self-perception), we defined for sensitivity analyses rapid-onset vs. slow-onset identity-sharing for k varying degrees of delay between ages of self-perception and identity-sharing, and for p varying ages of pubertal onset. With *isa* the age of identity-sharing, and *spa* the age of self-perception, we note:

$$\text{rapid-onset identity-sharing} = \begin{cases} 1 \text{ if } spa \geqslant isa - k \text{ and } isa \geqslant p \text{ and } isa < 18 \\ 0 \text{ if } spa < isa - k \text{ and } isa \geqslant p \text{ and } isa < 18 \end{cases}$$

$$\text{Knowing that : } spa \leq isa; k \in [\![0;8]\!]; p \in [\![8;13]\!]$$

LGBTI national laws and policies

The ILGA-Europe's Rainbow Index [30] reflects the legal and policy human rights situation of LGBTI people in Europe, scoring each country on a scale from 0% ("gross violation of human rights, discrimination") to 100% ("respect of human right, full equality"). In 2019, it scored and ranked 49 European countries, by evaluating in each one 69 dichotomous measures from 6 dimensions: "Equality and non-discrimination"; "Family"; "Hate crime & hate speech"; "Legal gender recognition & Bodily integrity"; "Civil society space"; "Asylum". We used that scale to capture the quality of national laws and policies regarding LGBTI people.

ROGD hypothesis-related variables

Since the EU LGBTI Survey II is not a clinical sample, very few variables explore health, and fewer explore the mental health dimension, hypothesized to be influenced negatively by the ROGD. Participants were asked "How is your health in general?" and answers offered were classified from 1 to 5 points as follows: "Very bad", "Bad", "Fair", "Good", "Very good". Another question investigated the presence of long-standing illness: "Do you have any long-standing illness or health problem?" The survey gave the following instructions: "Long-standing means illness or health problems or which have lasted, or are expected to last, for 6 months or more." Answers were coded 0 for "No" and 1 for "Yes". A question approached more directly the mental health dimension: "Have you been feeling downhearted or depressed over the last two weeks?", and possible answers were coded reversely from 1 to 6 as follows: "At no time", "Some of the time", "Less than half of the time", "More than half of the time", "Most of the time", and "All the time".

Regarding social media use, we used the fact that the participants who were reached by social media (the most effective way of reaching participants in the survey) had to answer the following question: "How often do you visit online this page or group you follow on Facebook, Instagram, Twitter, etc.?". The "page or group" mentioned refers

to the social group in which the invitation to the survey was posted. This is a proxy to measure the connectedness of the participants to social media serving as platforms for LGBTI content. Answers were coded from 1 to 7 points: "Never", "Very few times a year", "Once a month", "Two or three times a month", "Once a week", "2–3 times a week", "Every day".

Sociodemographic variables

Age is a categorical variable containing 11 levels, starting from the 15–17 years old category, then the 18–24 years old, then 8 levels of 5 years of age intervals, until the last category (65 years old and more).

Education level was coded as follows. To the question "What is the highest level of education you have completed?", respondents were coded "Primary or no education" when answering "No formal education" or "Primary education"; "Secondary education" when answering "Lower secondary education" or "Upper secondary education"; "Tertiary education" when answering "Post-secondary education other than college/university", "Bachelor or equivalent", "Master or equivalent", or "Doctoral or equivalent".

Living in an urban/rural area was coded according to answers to the question "Where do you currently live?". Possible answers were "A big city", "The suburbs or outskirts of a big city", "A town or a small city", "A village", or "A farm or home in the countryside", however the dataset only refers to "urban" and "rural" areas.

Belonging to a minority was coded according to answers to the question "In the country where you live, do you consider yourself to be part of any of the following, other than LGBTI?". Possible answers include: "An ethnic minority (including of migrant background)", "A religious minority", "A minority in terms of disability".

Easiness with income was coded following answers to the question "Thinking of your household's total income, is your household able to make ends meet?". Answers "Fairly easily", "Easily", and "Very easily" were coded as 1; "With great difficulty", "With difficulty", "With some difficulty" were coded as 0.

Statistical analyses

We performed all statistics under Stata 18 [33]. Overall, this study explores the whole sample and two subsamples. The whole sample serves to compute probabilities of identity-sharing at all ages, as well as constructing country-level sex differences in the capacity of identity-sharing. The subsample of respondents of any age who self-perceived before 18 allows us to investigate retrospectively how long it has taken for self-perceived LGBT children and adolescents to share their identity. The adolescent subsample (respondents aged 15, 16 or 17) allows us to define rapid and slow-onset identity-sharing young populations, questioned on their health and their social media use at these ages.

To appraise how cis LGB and trans youth, AFAB and AMAB youth, share their LGBT identity differently when given equal conditions of self-perception as LGBT, we ran a weighted least squares regression of the age of identity-sharing on all possible ages of self-perception prior to 18 years old, interacted with the category of people (cis or trans, AFAB or AMAB). Since we expected cultural influences to constrain the possibilities of sharing one's LGBT identity, we controlled for country-fixed effects to capture these influences (see the method in Supplementary Materials).

To better appreciate the impact on a sex ratio that gaps in the chance of identity-sharing between AFAB and AMAB make, we estimate in the whole sample the probabilities of identity-sharing before the age of *j*, for those who have had already their self-perception by the age *j*, for AMAB, AFAB, cis and trans people, and hypothesizing equality of all population sizes. We compute p_j^{TM}, p_j^{TF}, p_j^{CM} and p_j^{CF} these probabilities, respectively for transmasculine people (i.e. AFAB trans people), transfeminine people (i.e. AMAB trans people), cis males and cis females. We then construct the sex ratio of people who shared their identity before the age of *j*, which we note s_j^T and s_j^C respectively for trans and cis people. We hypothesize that the AFAB and AMAB populations who self-perceived are equal in size (which we note *n*), both for trans and cis people, and write sex ratios as random variables:

$$s_j^T \rightsquigarrow \frac{Bin(n, p_j^{TM})}{Bin\left(n, p_j^{TM}\right) + Bin(n, p_j^{TF})};\ s_j^C \rightsquigarrow \frac{Bin(n, p_j^{CF})}{Bin\left(n, p_j^{CF}\right) + Bin(n, p_j^{CM})}$$

Given the hypothesized equality of sizes of AFAB and AMAB populations who self-perceived, we expect the sex ratio to converge towards 0.5 at the latest age. Any deviation from 0.5 in earlier ages would be the result of the differences in the distribution of probabilities of identity-sharing for AFAB and AMAB people who already self-perceived. We run the model 10,000 times with *n* fixed at 1,000.

To evaluate the macro-environmental factors that may influence someone's capacity to share their LGBT identity, we investigated systematic differences between countries as regards the different chances AFAB and AMAB LGBT people may have in such countries to share their identity, holding equal their age of self-perception. Using weighted least squares, we regressed in the whole sample the age of identity-sharing on the assigned sex (AFAB or not) and the country, and their interaction, while controlling for the age of self-perception. Based on these estimates, we computed for each country the national LGBT contrasts (see method in

Supplementary Materials), which are the national adjusted average differences in age of identity-sharing between AFAB and AMAB LGBT people. The ILGA-E's index of 2019 was used as a measure of macro-environmental factors affecting LGBT people, and its correlation with the national LGBT contrasts was computed.

To test whether having had a rapid-onset identity-sharing may relate to poorer health or increased social media use among subcategories of the LGBT adolescent population, we used weighted least squares, on the subsample of adolescent respondents (aged 15, 16 or 17). We regressed each of our ROGD hypothesis-related variables (self-assessed health, long-standing illness, depressed feelings, social media use) on the category of people (trans or not, AFAB or not, having had a rapid-onset identity-sharing or a slow-onset identity-sharing). Country weights have been systematically implemented in regressions to address imbalances between national sample sizes. Country fixed effects have also systematically used to capture heterogeneity of health or social media responses due to national differences. Additionally, since sociodemographic variables are likely to influence health and social media use, we checked whether the regression results held with additional controls for education level, living in a rural/urban area, belonging to another minority group, and easiness with income.

Results

Sex ratios and distribution of people by ages of self-perception and identity-sharing

Of all trans respondents whose sex assigned at birth was not "other" ($n = 18{,}608$), 54% were AFAB people. Of all LGB cis people with the same condition ($n = 118{,}945$), 42% were AFAB. Among the 15-17-year-old adolescents, 80% were AFAB trans respondents out of 3,384 adolescents, while 65% were AFAB cis respondents in the sample of 14,873 adolescents.

AMAB trans people shared their trans identity on average 4.67 years later than AFAB trans people, and AMAB cis people shared their LGB identity on average 0.25 years later than AFAB cis people (see Table S1).

The patterns of frequencies by age of self-perception and age of identity-sharing display an unimodal distribution across gender modalities and assigned sexes at birth: having a recent self-perception when people have shared their identity during their adolescence is a frequent phenomenon, not uniquely displayed by AFAB trans youth (see Figure S1).

Adjusted averages of identity-sharing ages given the age of self-perception

Figure 1 shows the marginal effects of being trans vs. being cis LGB, AFAB vs. AMAB, given the age of self-perception, on the age of identity-sharing of LGBT people who self-perceived before adulthood (see method in Supplementary Materials). Underlying weighted least squares regression analysis (Table S2) showed a main effect of being trans, delaying the age of identity-sharing by 3 years, and a main effect of being AFAB, reducing the age of identity-sharing by 2.1 years. Figure 1 shows a significant gap in the possibilities of identity-sharing at the expense of AMAB trans youth for almost every age of self-perception, although such a gap also exists, with a smaller magnitude at the expense of AMAB cis youth, specifically adolescents.

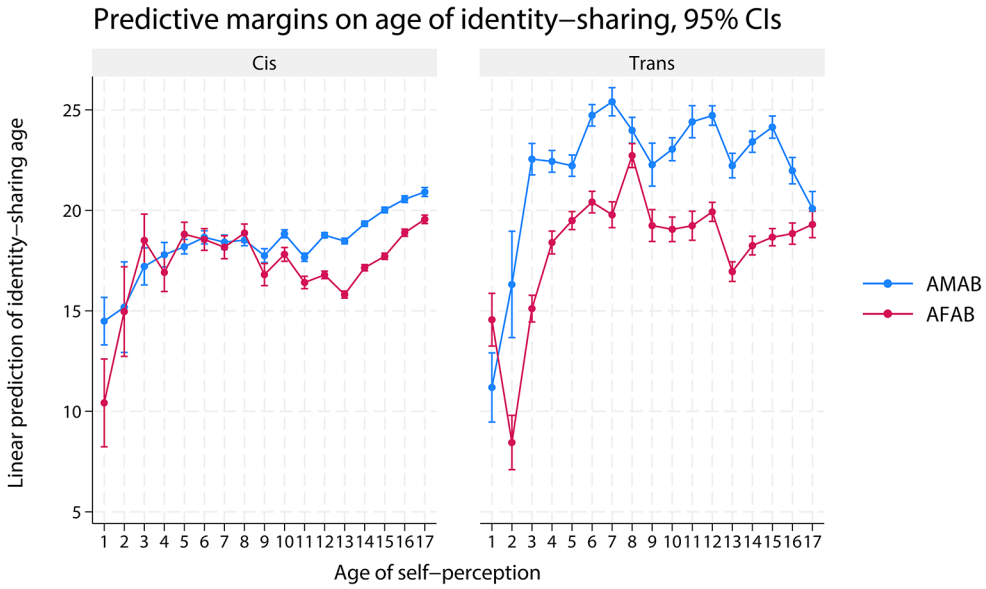

Fig. 1 Predictive margins of being trans vs. cis LGB, being AFAB vs. AMAB, and having had self-perception of identity between 1 and 17 years old, on the age of identity-sharing. Weighted regression with country controls. Rendered with Stata 18

Expected sex ratios under the assumption of equal AMAB and AFAB populations

Figure 2 shows the distributions of sex ratios (percentages of AFAB people) given the probability distributions of identity-sharing by specific ages and hypothesizing equality of AMAB and AFAB self-perceived populations (see Table S3 for the underlying distributions). Even when we assume such equality of populations, AMAB people, whether cis or trans, have profound difficulties sharing their identity at earlier ages relative to AFAB people, which results in higher-than-0.5 sex ratios for most earlier ages.

Mapping national differences between AMAB and AFAB people's ages of identity-sharing

Figure 3 shows, for each country, the weighted marginal mean of the age of identity-sharing for AMAB LGBT people, contrasted against the age of identity-sharing for AFAB LGBT people while controlling for the age of self-perception. The contrasts were positive in each country and all significant except for Luxembourg (see Table S4), indicating that AMAB people share their LGBT identity on average later than AFAB people throughout Europe. E.g., Portugal had the lowest sex difference in the capacity to share one's LGBT identity given equal conditions of self-perception (AMAB people shared their LGBT identity on average 1.08 years later than AFAB LGBT people), and Bulgaria had the highest sex difference (3.4 years later for AMAB). As regards national LGBT laws and policies, the correlation between the national LGBT contrasts and ILGA-Europe's scores was negative ($r = -0.4553$) and significant ($p = 0.0115$). The scatterplot of Fig. 4 shows the ILGA-E's score against the national LGBT contrasts and allows to observe the outlying effect of Malta, which scored the maximum on the ILGA-E's scale while having a rather high LGBT contrast. Without Malta, the correlation in the remaining 29 countries was substantially higher ($r = -0.6110; p = 0.0004$). The national sample sizes were too small regarding AMAB trans and AFAB trans respondents (see Table S4), preventing us from estimating with confidence the correlation between trans contrasts of identity-sharing ages and any index of trans rights and policies.

Testing of ROGD hypothesis-related variables

Table 1 shows the effects on several ROGD hypothesis-related variables (health, illness, depressed feeling, and social media use) of being trans vs. being cis LGB, AFAB vs. AMAB, and having had rapid-onset identity-sharing vs. slow-onset identity-sharing while controlling for the country. The total sample (N$\simeq$62,000 except for social media use, see Table 1) and the restricted subsample of adolescent respondents ages 15 to 17 (N=6209) are shown. In the total sample, we did not find that transmasculine people who had a more rapid affirmation of trans identity in adolescence used more social media or had worse health.

However, analyses on the restricted adolescent sample showed that being trans relates to poorer health ($p<0.01$), more frequent long-standing illnesses ($p<0.05$), and more frequent depressed feelings ($p<0.01$), but no statistically significant more social media use; being AFAB relates to poorer health, more frequent long-standing illnesses and more frequent depressed feelings ($p<0.01$), and less social media use ($p<0.05$); and having a rapid-onset identity-sharing does not relate to changes in health, long-standing illnesses, depressed feelings, or social media use. We then explored the statistical interaction between 'being trans, 'being AFAB' and 'having a rapid onset identity-sharing'. We did not find that transmasculine youth who had a rapid-onset identity sharing had lower health, more frequent illnesses, or more frequent depressed feelings. However, we

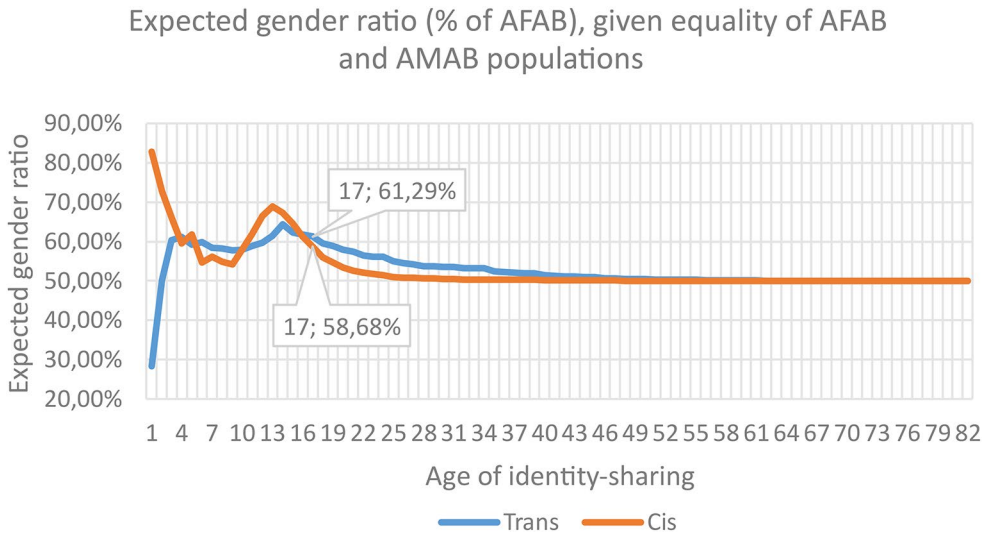

Fig. 2 Expected sex ratios for people who share their identity by the age given on the X-axis under the hypothesis of equal populations of AMAB and AFAB people. Reading: by the age of 17 years old, 61% of trans people who had already shared their identity were AFAB, and 59% of cis people who had already shared their LGB identity were AFAB. Rendered with Excel

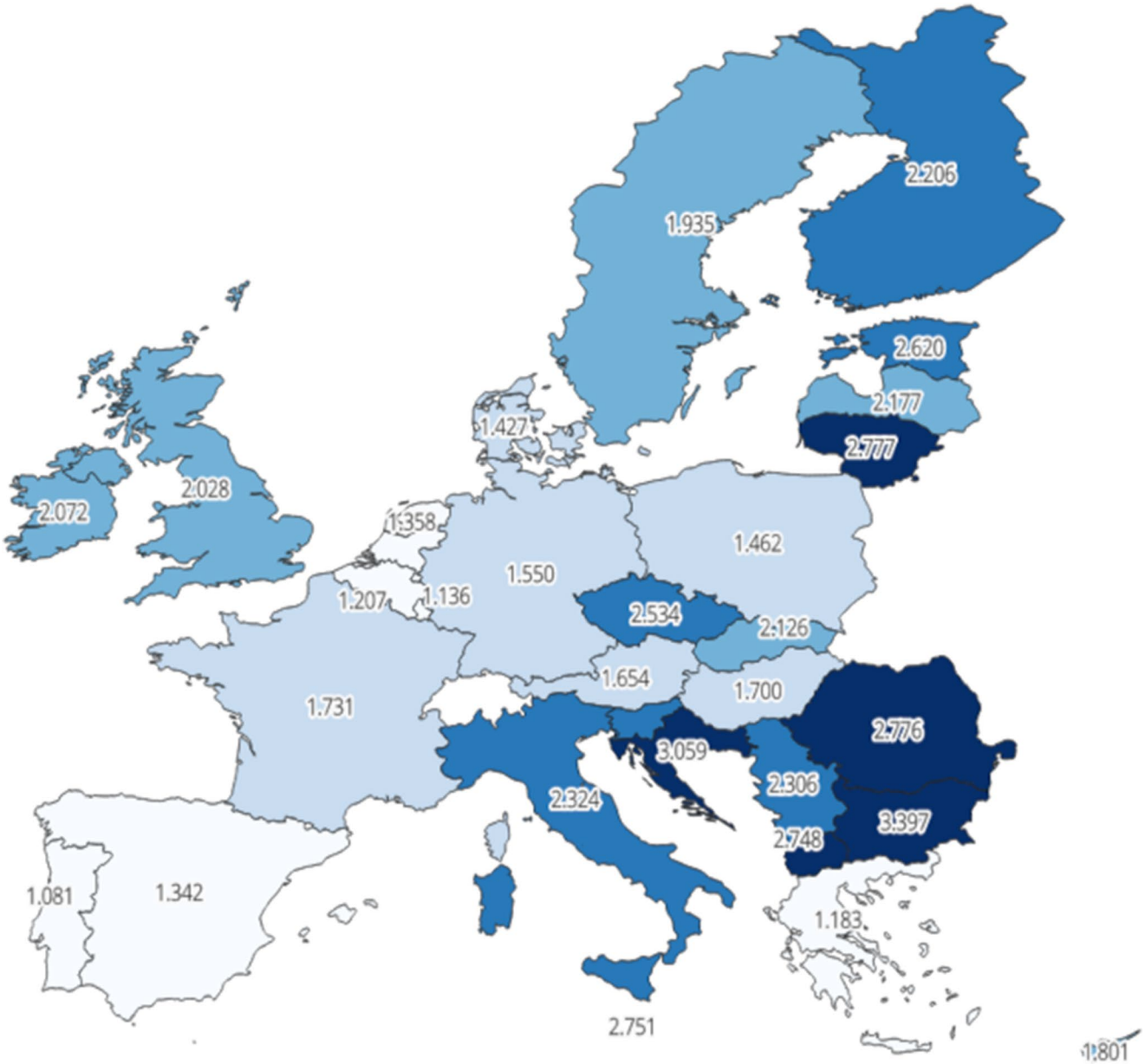

Fig. 3 National weighted marginal means of the age of identity-sharing for AMAB people, contrasted against the age of identity-sharing for AFAB people, controlling for the age of self-perception ("LGBT contrasts"). Reading: in France, AMAB people share their LGBT identity on average 1.731 years later than AFAB people, the ages of self-perception being kept equal. Rendered with QGIS

did find they had a more frequent social media use than transmasculine youth who had a slow-onset identity-sharing, a characteristic that was not shared by transfeminine youth or cis female youth (see Figure S2). Controlling for ILGA-E's index instead of country-fixed effects did not yield different results on these effects.

Running the same analyses on the whole sample limited to respondents who answered the social media question ($N = 21{,}924$) (see Table S5) did yield a similarly positive interactive effect in the social media use model, albeit smaller in magnitude and significance ($p < 0.05$). The consistency of this result in the whole sample is possibly explained by the fact the respondents were very young (74% of them were 24 years old or younger), thereby showing a similar sociodemographic profile as the adolescent subsample.

Running the sensitivity analysis on the interactive effect of the social media use model showed (see Figure S3) that the effect was significant across defined pubertal onset ages (p between 8 and 13 years old), but only for $k = 0$: transmasculine adolescents shows a higher use of social media when they shared their trans identity within a year ($k = 0$) from their self-perception, in comparison to their counterparts

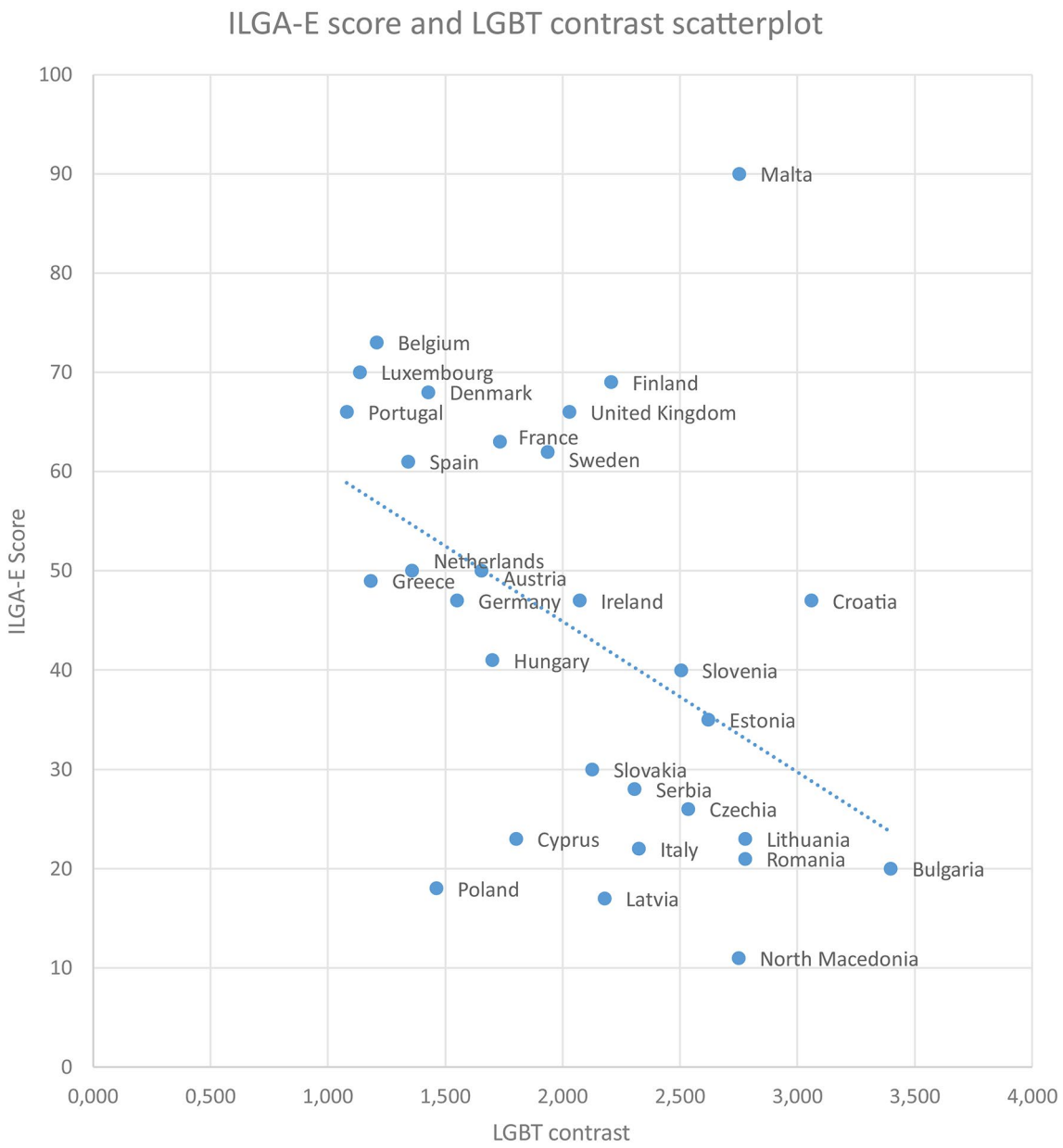

Fig. 4 Scatterplot of ILGA-E's scores vs. LGBT contrasts. Linear fit added. Rendered with Excel

sharing their trans identity more than a year after their self-perception.

Discussion

We used the EU LGBTI Survey II of the European Union Agency for Fundamental Rights to investigate the discrepancies between the ages of self-perception and identity-sharing and the predominance of AFAB people (versus AMAB people) in the young population. For several authors, this predominance found in trans clinics for adolescents would be a salient feature of a new clinical population of trans youths due to social media influences and frequent co-occurring psychopathologies [34, 35].

We did find more transmasculine (AFAB) people in the trans youth population. However, this predominance was not specific to trans people: LGB cis young people were also predominantly AFAB. The so-called "rapid-onset gender dysphoria" may be inappropriate, as it could correspond to a wider phenomenon, affecting LGB cis young people as well as trans youth. Transfeminine (AMAB) people who self-perceived during adolescence shared their identity years after their transmasculine (AFAB) counterparts, but this was also true for AMAB LGB cis people *vis-à-vis* AFAB LGB cis people. The phenomenon hypothesized as

Table 1 Weighted regression outputs on ROGD hypothesis-related variables of interactions of gender modality, gender assigned at birth, and rapid-onset identity-sharing, controlling for countries

Variables	Health	Illness	Depressed	Social Media Use
Total sample				
Observations	62,484	62,255	62,481	22,053
Rapid-Onset Identity-Sharing	0.000834	-0.0104	-0.101**	-0.0164
	(0.0122)	(0.00699)	(0.0231)	(0.0523)
Trans	-0.249**	0.0714**	0.815**	0.212**
	(0.0208)	(0.0119)	(0.0393)	(0.0727)
Rapid-Onset Identity-Sharing*Trans	-0.138**	0.0660**	-0.0236	-0.109
	(0.0435)	(0.0250)	(0.0823)	(0.150)
AFAB	-0.229**	0.0820**	0.312**	-0.206**
	(0.00812)	(0.00464)	(0.0153)	(0.0307)
Rapid-Onset Identity-Sharing*AFAB	0.111**	-0.0280**	-0.111**	0.0700
	(0.0160)	(0.00912)	(0.0302)	(0.0624)
Trans*AFAB	-0.0837**	0.0342*	-0.250**	-0.0527
	(0.0259)	(0.0148)	(0.0489)	(0.0884)
Rapid-Onset Identity-Sharing*AFAB*Trans	0.145**	-0.0461	0.102	0.327
	(0.0525)	(0.0301)	(0.0992)	(0.180)
Age Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Constant	4.284**	0.183**	2.913**	5.337**
	(0.0263)	(0.0151)	(0.0497)	(0.108)
R-squared	0.067	0.047	0.108	0.105
Restricted to the subsample of respondents aged 15, 16 or 17				
Observations	6,209	6,209	6,209	6,209
Rapid-Onset Identity-Sharing	-0.0563	-0.00840	-0.120	0.157
	(0.0485)	(0.0267)	(0.0939)	(0.110)
Trans	-0.317**	0.0837*	1.011**	0.250
	(0.0734)	(0.0404)	(0.142)	(0.166)
Rapid-Onset Identity-Sharing*Trans	0.0137	-0.0176	0.0599	-0.425
	(0.123)	(0.0678)	(0.238)	(0.279)
AFAB	-0.214**	0.0802**	0.495**	-0.138*
	(0.0290)	(0.0160)	(0.0561)	(0.0656)
Rapid-Onset Identity-Sharing*AFAB	0.154**	-0.0112	-0.188	-0.238
	(0.0555)	(0.0306)	(0.107)	(0.126)
Trans*AFAB	0.00164	-0.0118	-0.387*	-0.317
	(0.0836)	(0.0460)	(0.162)	(0.189)
Rapid-Onset Identity-Sharing*AFAB*Trans	0.0821	-0.0546	-0.155	0.893**
	(0.141)	(0.0778)	(0.274)	(0.320)
Country Fixed Effects	Yes	Yes	Yes	Yes
Constant	3.973**	0.197*	2.891**	5.040**
	(0.153)	(0.0843)	(0.297)	(0.346)
R-squared	0.072	0.049	0.070	0.158

Standard errors in parentheses

** $p < 0.01$, * $p < 0.05$

ROGD, by which transmasculine youth who self-perceive during adolescence and share their identity suddenly after, in comparison to transfeminine youth who have their self-perception at the same age but share their identity later, merits reframing to incorporate a similar phenomenon affecting cis LGB people. For all youths, AMAB people have more difficulties sharing their LGBT identity than AFAB people, resulting in sex ratios favouring AFAB people in youth that are balanced only at later ages. Unsurprisingly then, samples of gender identity clinics show consistently more AFAB people: whether they are cis or trans, they are more likely to share their identity earlier than AMAB people. As a consequence, they are more likely to access any sexual or gender minority-related services.

Regarding medical and psychiatric morbidities, transmasculine youths who had rapid-onset identity-sharing

did not have poorer health than transmasculine youth who had slow-onset identity-sharing. Therefore, health status does not seem to contribute to the predominance of AFAB people in clinics for trans adolescents cannot be explained by ROGD [10–12, 14]. Our result contradicts the ROGD hypothesis [1].

We also investigated whether micro or macro social factors, or both, could contribute to AFAB predominance in youths. When we explored the whole trans sample, we did not find support for micro-social factors such as social media use, in the emergence of transmasculine identities. We did find however an effect of macro-social factors, such as countries' laws and policies regarding the LGBT population. This effect was significant when we correlated the national sex differences in the capacity to share one's LGBT identity with the ILGA-Europe's Rainbow Index. However, when we restricted the sample to the participants who were adolescents at the time of the survey, we did find support for micro-social factors in the form of a relation between social media use and the rapid (within a year) emergence of transmasculine identities in adolescence, yet it was not associated with detrimental correlates to health or mental distress. Running the same analyses on the whole sample limited to respondents who answered the social media question yielded a similar positive interactive effect. The consistency of the two models (on adolescents only and on respondents who answered the social media question) may be explained by the very young age of both respondents' subsamples (adolescents only vs. 74% of respondents aged 24 years old or younger). This is not surprising given the spread of social media use in the last two decades.

In other words, we found a partial dissociation between the effect of micro-social factors and macro-social factors. First, national LGBT laws and policies contribute to the AFAB predominance in the overall LGBT youth population which includes trans adolescents. National sex differences in the capacity to share one's LGBT identity were favouring AFAB people in each of the 30 European countries studied, when assuming equal chances of self-perceiving as LGBT. Second, the possible influence of social media use as a contributor to the AFAB predominance in trans adolescents only accounts for a part of them (in the survey around 30% of transmasculine adolescents had a rapid onset identity sharing, see Table S1). These associations are consistent with the wide number of Western countries where an AFAB predominance in trans adolescents has been recently observed, and as we suggested above, pleads for a more global and complex understanding of sex differences in individual strategies of concealment/disclosure of any LGBT identity.

As suggested by Aitken et al., sex differences in the degree of stigmatization might account for the differences in the likelihood of identity-sharing between AFAB and AMAB youth [11]. Cis young gays, cis bisexual boys, as well as transfeminine young, would be less likely to share their identity - or "come out" - than young cis lesbians, cis bisexual girls and transmasculine young, due to a higher social cost at transgressing cis-heterosexist stereotypes associated with manhood than transgressing those associated with womanhood. Further research is still needed to identify the characteristics and origins of such costs, as well as their evolution. As regards the observed reversal of the trans youth sex ratio following the mid-2000s, improvements in LGBTI rights and policies in some countries may have contributed to reducing such costs disproportionately in favour of AFAB sexual and gender minorities in recent years, while degradations in LGBTI rights in some other countries may have elevated the costs of being AMAB. Another explanation would lie in the delayed puberty that often occurs earlier in AFAB as compared to AMAB people: its potential dysphoric effects may result in more frequent identity-sharing behaviours in transmasculine adolescents.

The sexual and gender minority stress model offers a theoretical approach to conceptualize the concealment of an LGBT identity. The model combines proximal (i.e. internal) stressors, secondary to distal (i.e. external) stressors, both types of stressors having negative effects on the health of an LGBT individual. These effects could be moderated by resilience factors such as identity pride or community connectedness [36–38]. Concealment is typically described as a coping strategy for an LGBT person facing distal stressors (e.g. anti-LGBT state policies, discrimination, victimization), that could be maladaptive, in the sense that maintaining secrecy about their sexual orientation or gender modality is a stressful process. Additionally, concealment prevents from accessing health-relieving resilience factors shared among the LGBT communities. Interestingly, in the adolescent subsample, depressed feeling was associated with trans identity, AFAB but not rapid-onset identity sharing. Therefore, we believe that the journey between self-perception and identity sharing is complex, as its relationship with psychiatric cooccurrences in adolescents [26]. This complexity has been confirmed even in individuals who have expressed regrets and detransition [39]. Causality may be bidirectional. In some individuals, concealment-related stress may contribute to the emergence of mental health problems. In others, mental health problems would precede trans identity questioning [26, 40] as hypothesized in the ROGD hypothesis [28].

Limitations to this study include the cross-sectional and retrospective nature of the data, which prevents causal inference and may have introduced memorizing biases, including about reported ages of self-perception and identity-sharing; the lack of puberty assessment by the survey, limiting the possibility of correctly pinpointing adolescent populations; and

the exclusion of people assigned to another sex than male or female, which reduced diversity within our sample and possibly reinforced homogeneity of responses. Also, the lack of objective clinical data results in lower chances of proving or disproving the health aspects of ROGD. Specifically, respondents may not actively think about their mental health problems when assessing their health [41] even though multivariate analyses have shown that self-assessed health was related to mental health [42, 43]. Finally, mapping national differences between AMAB and AFAB people's ages of identity-sharing was not assessed with robust statistical models due to power limitations; exploration of the subsample of trans people was not possible due to small sample sizes in many countries.

Future research could investigate the role sexual or gender minority stressors such as discrimination, acts of violence, and harassment, may have on the capacity of LGBT people to share their identity, and on sex differences in this capacity.

To conclude, by examining the ages of identity-sharing and self-perception of AFAB and AMAB cis and trans populations and how their differences in all countries generate predominantly AFAB sex ratios in LGBT youth, we found that some of the features of the "rapid-onset gender dysphoria" hypothesis could be the mere reflection of a wider phenomenon that deserves more research, by which all AMAB sexual or gender minorities, cis or trans, prove disproportionate difficulties in sharing their identity in adolescence compared to AFAB sexual or gender minorities. We did find mixed support for the other features of the "rapid-onset gender dysphoria" hypothesis: increased social media use in transmasculine youth who have had their trans-self-perception recently, but with no detrimental effects on health variables. We did find macro-environmental influences (state laws) on the age of identity-sharing in LGBT individuals. While ROGD is merely a hypothesis trying to explain some recent demographic changes, it has often been erroneously framed as a fact and weaponized as such in the passing of dozens of trans-specific healthcare bans for minors in the United States [44], including in the well-documented case of Florida [45]. Our results align with others critical of the ROGD hypothesis and should justify policymakers to abstain from making pseudoscientific claims that could foster additional barriers to care.

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Author contributions CV and DC conceived and conceptualized the study. DC and CV conducted the literature search. CV and DC performed data curation. CV analysed the data and produced the figures. CV and DC wrote the original draft of the manuscript. DC acquired funding for the study. CV and DC were responsible for the decision to submit for publication.

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Data availability The EU LGBTI Survey II (2019) individual dataset of the European Union Agency for Fundamental Rights is available upon request from the GESIS Data Archive: https://doi.org/10.4232/1.13733. The ILGA-Europe's Rainbow Index (2019) is publicly available at https://www.ilga-europe.org/report/rainbow-europe-2019/.

Declarations

Competing interests CV declares being employed by a trans-led non-profit organisation, Acceptess-T.

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