ORIGINAL RESEARCH—LGBT

Evidence for an Altered Sex Ratio in Clinic-Referred Adolescents with Gender Dysphoria

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ABSTRACT

Introduction. The number of adolescents referred to specialized gender identity clinics for gender dysphoria appears to be increasing and there also appears to be a corresponding shift in the sex ratio, from one favoring natal males to one favoring natal females.

Aim. We conducted two quantitative studies to ascertain whether there has been a recent inversion of the sex ratio of adolescents referred for gender dysphoria.

Methods. The sex ratio of adolescents from two specialized gender identity clinics was examined as a function of two cohort periods (2006–2013 vs. prior years). Study 1 was conducted on patients from a clinic in Toronto, and Study 2 was conducted on patients from a clinic in Amsterdam.

Results. Across both clinics, the total sample size was 748. In both clinics, there was a significant change in the sex ratio of referred adolescents between the two cohort periods: between 2006 and 2013, the sex ratio favored natal females, but in the prior years, the sex ratio favored natal males. In Study 1 from Toronto, there was no corresponding change in the sex ratio of 6,592 adolescents referred for other clinical problems.

Conclusions. Sociological and sociocultural explanations are offered to account for this recent inversion in the sex ratio of adolescents with gender dysphoria. **Aitken M, Steensma TD, Blanchard R, VanderLaan DP, Wood H, Fuentes A, Spegg C, Wasserman L, Ames M, Fitzsimmons CL, Leef JH, Lishak V, Reim E, Takagi A, Vinik J, Wreford J, Cohen-Kettenis PT, de Vries ALC, Kreukels BPC, and Zucker KJ. Evidence for an altered sex ratio in clinic-referred adolescents with gender dysphoria. J Sex Med 2015;12:756–763.**

Key Words. Gender Dysphoria; Gender Identity Disorder; Sex Ratio; Adolescents

Introduction

The prevalence of gender dysphoria (GD) [1] is uncertain because of the absence of formal epidemiological studies. As reviewed by Zucker and Lawrence [2], prevalence has often been gauged, at least in adults, by the number of individuals seeking out hormonal treatment and sex-reassignment surgery at specialty clinics in different regions or countries.

Information on the sex ratio of individuals with GD is one element of these para-epidemiological studies. In adult samples, in almost all cases, the number of natal males either exceeds the number

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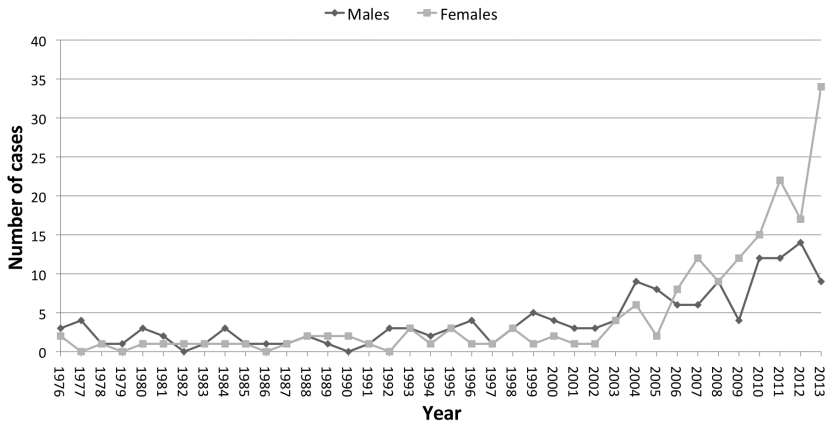

Figure 1 Number of adolescent patients assessed by sex and year

of natal females or the sex ratio is near parity [2, Table 3] (see also Kreukels et al. [3]).[1] The exceptions are studies from Poland and Japan, where the sex ratio is inverted [4,5]. In clinic-referred child samples, it has long been noted that the number of males also exceeds the number of females. Wood et al. [6], for example, reported a sex ratio of 4.49:1 of boys to girls (N = 577) ages 3–12 years from their clinic in Toronto, Canada, which was significantly higher than the sex ratio of 2.02:1 of boys to girls (N = 468) in a specialty clinic in Amsterdam, the Netherlands, but which also favored boys. Regarding the sex ratio of adolescents referred for GD, Wood et al. reported a sex ratio of 1.04:1 of males to females (N = 253) from the Toronto clinic for the years 1976–2011, which was virtually identical to the sex ratio of 1.01:1 of males to females (N = 393) in the Amsterdam clinic (as cited in Wood et al.).

For many years in the Toronto clinic, the number of adolescent referrals was quite low. Between 1976 and 2003, for example, no more than five adolescents of one biological sex were assessed in a calendar year and, during this period, the number of males exceeded the number of females (Figure 1). Beginning in 2004, however, the number of adolescent referrals began to rise quite dramatically [6], which appears to be consistent with the observations of clinicians and researchers from other gender identity clinics. Starting in 2006, we noted that the number of referred female adolescents with GD was now exceeding the number of referred male adolescents with GD in the Toronto clinic. Thus, there appears to be an emerging inversion in the sex ratio of adolescents with GD which, to our knowledge, has not been documented formally in the empirical literature.

In Study 1, we analyzed the sex ratio of the Toronto clinic adolescents and, for comparative purposes, used an administrative database that contained information on the sex ratio of adolescent males and females seen clinically for other psychiatric concerns in our department. The use of a clinical comparison group allowed us to test the hypothesis that the temporal shift in the sex ratio was specific to adolescents with GD but not clinic-referred adolescents in general. In Study 2, we analyzed the sex ratio of the Amsterdam clinic adolescents to test for a temporal shift over the same time period.

Study 1

Methods

Participants

The probands consisted of 328 adolescents (13–19 years of age) referred to a Gender Identity Service, housed within the Child, Youth, and Family Services (CYFS) at the Centre for Addiction and Mental Health (CAMH) between 1976 and 2013. Mean age at the time of assessment was 16.66 years (standard deviation [SD] = 1.70), and there was no significant difference in age between the males and females, $t(326) < 1$. Depending on the year of assessment, DSM-III, DSM-III-R, or DSM-IV criteria were used to diagnose Gender Identity Disorder (GID) or Gender Identity Disorder Not Otherwise Specified (GIDNOS) (in DSM-III and III-R, the diagnostic term was Transsexualism, not GID, which was first used as the diagnostic term in the DSM-IV). All probands met criteria for either GID or GIDNOS. Beginning in 2001,

[1]For ease of readability, we truncate hereafter the use of the terms natal males and natal females to males and females, respectively.

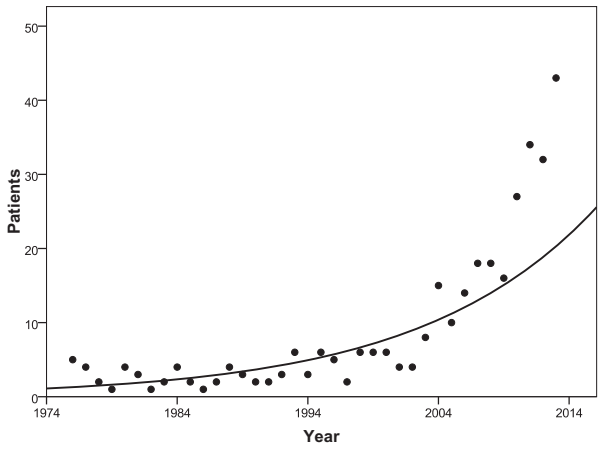

Figure 2 Curvilinear relationship between number of patients assessed by year (1975–2013)

we measured the severity of GD in the probands with the Gender Identity/Gender Dysphoria Questionnaire for Adolescents and Adults (GIDYQ-AA) (7). The GIDYQ-AA is a 27-item questionnaire designed to capture multiple indicators of gender identity and GD, including subjective, social, somatic, and sociolegal parameters. Each item was rated on a five-point scale, ranging from 1 to 5. A lower score indicates more GD. Based on prior studies, a mean score ≤3.00 indicated "casesness," with excellent sensitivity and specificity rates [7,8].

Probands were coded as males or females. The controls consisted of 6,592 adolescents referred for other reasons to the CYFS between 1999 and 2013. Controls were referred for many different reasons, spanning the gamut of psychiatric issues experienced by youth (e.g., mood and anxiety disorders, disruptive behavior disorders, substance use disorders, and pervasive developmental disorders). Eleven additional controls were subsequently referred to the Gender Identity Service, so they were not included as clinical controls. The controls were also coded as males or females.

For the probands, we classified their sexual orientation as follows: for males, androphilic vs. nonandrophilic; for females, gynephilic vs. nongynephilic, as is commonly done for adults with GD (see Lawrence [9]). This was based either on clinical chart data or two quantitative measures: the Erotic Response and Orientation Scale and the Sexual History Questionnaire [10].

Procedure

The sex of the probands was extracted from an SPSS file. The sex of the controls was extracted from an administrative database and converted to an SPSS file. The database allowed us to eliminate any duplicate health record numbers and, if such duplicates were identified, only the first admission was used. The administrative database of clinical controls prior to 1999 was no longer accessible. The study protocol was approved by the CAMH Research Ethics Board (#004/2014).

Data Analysis

As noted in the Introduction, visual inspection of the sex ratio for the probands indicated a change starting in 2006, so, for some of the analyses reported below, we created two time periods (1999–2005 and 2006–2013). For both the probands and the controls, we used a binomial test to see if there was a significant sex difference in the proportion of referred males vs. females for each of the two time periods. We also conducted a logistic regression that tested for the presence of a group × time period interaction for the proportion of referred females.

Results

As noted earlier, there has been a general increase in the number of referred adolescents (Figure 1). The correlation between calendar year and the number of cases assessed in that year was 0.76, $P < 0.001$, based on the assumption of a linear relation between these variables (i.e., the number of cases increases by roughly the same amount each year and the graphed data approximate a straight line). It can, however, be seen in Figure 2 that the relation between calendar year and the number of cases assessed was strongly curvilinear. An exponential equation showed that 68% of the variance in assessments was accounted for by calendar year (vs. 58% for the linear model).

Table 1 shows the number and percentage of males vs. females as a function of group × time

Table 1 Number and percentage of adolescent referrals by group and time period

Time period	1999–2005	2006–2013
Group		
Gender dysphoria		
Males (N/%)	36 (67.9)	73 (36.1)
Females (N/%)	17 (32.1)	129 (63.9)
Sex ratio (M : F)	2.11:1	1:1.76
Clinical controls		
Males (N/%)	1,601 (68.9)	2,828 (66.2)
Females (N/%)	721 (31.1)	1,444 (33.8)
Sex ratio (M : F)	2.22:1	1.96:1

Table 2 Logistic regression: proportion of adolescent referred males vs. females by group × time period

Step	β	SE	Wald	df	Exp(β)	*P*
Block 1						
Group	0.98	0.13	58.07	1	2.68	<0.001
Time period	0.16	0.05	8.60	1	1.17	0.003
Block 2						
Group × time period	1.19	0.33	12.86	1	3.30	<0.001

Note: Group dummy coded where 0 = clinical controls and 1 = GD probands and time period 1999–2005 = 0 and 2006–2013 = 1. Sex was dummy coded as male = 0 and female = 1. Exp(β) is the same as the odds ratio

period. Between 1999 and 2005, a two-tailed binomial test showed that, for the GD group, there was a greater percentage of males than females ($P = 0.013$). In the same time period, for the clinical controls, there was also a greater percentage of males than females ($P < 0.001$). Between 2006 and 2013, a binomial test showed that, for the GD group, there was a greater percentage of females than males ($P < 0.001$) but, for the clinical controls, there was a greater percentage of males than females ($P < 0.001$). For the time period 1976–1998, we only had data available on the GD group, and a binomial test showed that there was a trend for a greater percentage of males (N = 44) than females (n = 29) to be referred ($P = 0.101$).

To examine whether there was evidence for a group × time period interaction for the proportion of referred males vs. females, we conducted a logistic regression analysis. The predictor variables were group (GD vs. controls) × time period (1999–2005 vs. 2006–2013). We used indicator coding for these categorical variables. The criterion variable was the sex of the adolescent clients.

Table 2 shows the results of the logistic regression analysis. The regression equation was built in two blocks: direct entry of group × time period (main effects), followed by direct entry of the interaction term for group × time period. It can be seen that, in Block 2, there was a significant group × time period interaction. It can be seen in Table 1 that the percentage of referred females was stable for the controls when comparing the two time periods (1999–2005 vs. 2006–2013). In the 1999–2005 cohort, the percentage of referred GD females was virtually identical to that of the clinical control females but, in the 2006–2013 cohort, the percentage of referred GD females was markedly higher than the percentage of clinical control females.

Table 3 shows the number and percentage of adolescents with GD as a function of sex, sexual orientation, and time period. We conducted a logistic regression with sex and sexual orientation as the predictor variables and time period as the criterion variable. Table 4 shows that female sex increased the odds that a proband presented in the second time period by almost 300% and that a nonandrophilic sexual orientation (for males) and a nongynephilic sexual orientation (for females) increased the odds that a proband presented in the second time period by over 200%. However, the sex × sexual orientation interaction was not significant.

For the 234 probands for whom a GIDYQ-AA was available, 223 (95.3%) met the criterion for casesness. To examine whether or not there was a relationship between severity of GD and year of assessment, we calculated a Pearson correlation. For females, the correlation was not significant, $r = 0.026$. For males, the correlation was significant, $r = -0.26$, $P = 0.011$, indicating that more recently assessed cases had moderately higher GD severity.

Study 2

Methods

Participants and Procedure

The probands consisted of 420 adolescents (13 years of age and older) referred to the Center of

Table 3 Number and percentage of adolescent referrals by sex, sexual orientation, and time period

Time period	1976–2005	2006–2013
Group		
Males		
Androphilic (N/%)	52 (66.7)	32 (43.8)
Nonandrophilic (N/%)	26 (33.3)	41 (56.2)
Females		
Gynephilic (N/%)	39 (88.6)	82 (64.0)
Nongynephilic (N/%)	5 (11.4)	46 (36.0)

Note: Sexual orientation is in relation to birth sex. Data on sexual orientation were not available for 5 probands

Table 4 Logistic regression: number of adolescent referred males vs. females by sexual orientation

Step	β	SE	Wald	df	Exp(β)	*P*
Block 1						
Sex	1.36	0.26	28.44	1	3.91	<0.001
Sexual orientation	1.11	0.27	16.57	1	3.05	<0.001
Block 2						
Sex × sexual orientation	0.53	0.61	0.76	1	1.70	ns

Note: Sex was dummy coded as male = 0 and female = 1. Sexual orientation was dummy coded as 0 = androphilic or gynephilic and 1 = nonandrophilic or nongynephilic in relation to birth sex. Exp(β) is the same as the odds ratio
ns = not significant

Expertise on Gender Dysphoria at the VU University Medical Center in Amsterdam, the Netherlands between 1989 and 2013. Mean age at the time of assessment was 16.14 years (SD = 1.59), and there was no significant difference in age between the males and females, $t(418) = 1.21$. The sex of the probands was extracted from an SPSS data file. Extraction of the relevant data was approved by the Research Ethics Board at the VU University Medical Center.

Results

Between 1989 and 2005, the number of referred male adolescents was 109 (58.6%), and the number of referred female adolescents was 77 (41.4%) (an M : F sex ratio of 1.41:1), a significant difference using a binomial test, $P = 0.023$. Between 2006 and 2013, the number of referred male adolescents was 86 (36.7%), and the number of referred female adolescents was 148 (63.3%) (an M : F sex ratio of 1:1.72), a significant difference using a binomial test, $P < 0.001$. A χ^2 test showed a significant association between the sex distribution of the adolescents and the two time periods, $\chi^2(1) = 19.02$, $P < 0.001$.

The percentage of female adolescents from Amsterdam in the first time period did not differ significantly from the percentage of female adolescents from the Toronto clinic, and the percentage of female adolescents from Amsterdam in the second time period also did not differ from the percentage of female adolescents from the Toronto clinic, both $\chi^2(1) < 1$.

Discussion

In two independent samples, we found that there was a significant temporal shift in the sex ratio of clinic-referred gender-dysphoric youth, from a ratio favoring males (prior to 2006) to a ratio favoring females (2006–2013). In Study 1, we showed that this inversion in the sex ratio was specific to gender-dysphoric youth and not clinic-referred adolescents in general. In Study 2, we found an almost identical shift in the sex ratio of adolescents assessed at the major gender identity clinic for adolescents in the Netherlands,[2] thus matching the findings from Toronto. The sex ratio favoring females (between 2006 and 2013) is consistent with at least two other recent reports [11,12]. Becker et al. [11], in Hamburg, Germany, reported an M : F sex ratio of 1:3.14 (n = 29) for adolescents with GD assessed between 2006 and 2010 but did not have data for prior years as their clinic had not yet been established. Spack et al. (12), in Boston, reported an M : F sex ratio of 1:1.30 (n = 83) for adolescents with GD assessed between 1998 and 2010 but did not provide data on any changes in the sex ratio as a function of year of assessment.

This inversion in the sex ratio of gender-dysphoric youth is a new development, which requires an explanation or set of explanations. The inversion appears to correspond with, albeit independently, an increase in the number of clinic-referred GD youth in general. As noted in Study 1, we found that there was a very strong curvilinear correlation between number of cases assessed annually and year of assessment for adolescents with GD. This general increase in referrals for GD is likely due to several factors: the increased visibility of transgendered people in the media, which likely contributes to at least a partial destigmatization of GD; the wide availability of information on the Internet about transgenderism or GD, which also likely contributes to destigmatization; and the increased awareness of the availability of biomedical treatment for adolescents, including the use of gonadotropin-releasing hormone agonists to delay or suppress biological puberty [13,14]. All of these factors have probably made it easier for youth and their families to seek out clinical care [15]. It is unclear, however, if these factors per se would account for the inversion in the sex ratio, which requires a more nuanced explanation or set of explanations.

In Study 1, we did not find any indication that there was a significant relationship in females between severity of GD, as measured by the GIDYQ-AA, and year of assessment for the time period 2001–2013 (the period for which we now had available for analysis this measure). Thus, there was no evidence in females that the greater number of referrals in recent years might be accounted for by an increase in referrals of more "mild" cases.[3] For males, however, there was a weak correlation between severity and year of assessment, but this accounted for only 6.7% of the variance. Thus, it is unlikely that the recent

[2]Prior to 2011, the Centre of Expertise on Gender Dysphoria was the sole specialty clinic for children and adolescents in the Netherlands. In 2011, a satellite clinic was opened in Leiden, but adolescents seen in that clinic were not part of the Dutch data reported in this study.

[3]We would like to thank two of the referees for suggesting this possibility.

inversion in the sex ratio can be accounted for by a substantive change in severity variation.

One possibility that might explain the inversion of the sex ratio pertains to the well-known normative sex difference in pubertal onset, in which females begin puberty, on average, at an earlier age than males [16]. On the assumption that our adolescent females with GD began puberty, on average, at an earlier age than our adolescent males with GD, perhaps it could be argued that this results in a relatively greater salience of the incongruity between their felt gender identity and their natal sex because this incongruence began at an earlier age. As a result, this might explain the greater number of adolescent females presenting with GD than adolescent males because they experienced a longer period of distress related to the gender incongruence as a result of an earlier onset of puberty. If this were the case, we might have expected that the females to present at an earlier age than the males. However, in both studies, the mean age at assessment did not differ significantly between the females and the males.

A second possibility is related to sexual orientation. For a long time, it has been argued that sexual orientation is more variable in biological males than it is in biological females referred for GD. In adults with GD, there tends to be a relatively equal percentage of biological males with an androphilic vs. a nonandrophilic sexual orientation [17,18]. In contrast, a substantial majority of biological females have a gynephilic sexual orientation [17,18]. In recent years, however, more biological females with a nongynephilic sexual orientation have been described in the literature (many of whom identify as gay men after a gender transition) [19,20]. In the cohort examined in Study 1, perhaps it could be argued that, in the first time period, the greater number of biological males than biological females was an artifact of there being two prominent subtypes of GD (androphilic and nonandrophilic) in the former, whereas the latter were predominantly of only one subtype (gynephilic), but that this shifted in the second time period, with a greater number of females with a nongynephilic sexual orientation. However, the logistic regression analysis shown in Table 4 did not provide evidence for a sex × sexual orientation interaction. It only showed that a nonandrophilic or nongynephilic sexual orientation increased the odds that a proband presented in the second time period, but sexual orientation did not interact with probands' biological sex.

Might sociological or sociocultural factors account for the recent inversion in the sex ratio? It is well-known that individuals with GD who are sexually attracted to members of their birth sex have an early-onset (i.e., in childhood) history of marked cross-gender (gender-variant) behavior, a developmental parameter that is similar to that of some gay men and lesbians [21], who also have a childhood history of cross-gender behavior. Prospective studies of GD in children suggest that the degree of cross-gender behavior is predictive of GD persistence into adolescence and adulthood, with many of the desisters differentiating a same-sex sexual orientation [22–24]. Nonetheless, there is a good deal of overlap in the degree of childhood cross-gender behavior between individuals with an early-onset of GD and some gay men and lesbians. For example, Lee [25] noted that the developmental histories of "butch lesbians" and female-to-male transsexuals showed many similarities, and it was difficult to predict, on an individual basis, which "group" these females would wind up in.

Given that there is at least some overlap in the gender-variant developmental histories of early-onset individuals with GD and some gay men and lesbians, it might, therefore, be asked whether or not degree of stigmatization for gender-variant behavior might account for the recent inversion in the sex ratio of GD adolescents. It is well-known that cross-gender behavior in children is subject to more social stigma (e.g., peer rejection and peer teasing) in males than in females, in both clinic-referred adolescents with GD and in the general population [26–30]. Thus, it could be argued that it is easier for adolescent females to "come out" as transgendered than it is for adolescent males to come out as transgendered because masculine behavior is subject to less social sanction than feminine behavior. Some support for this was found in Shiffman's [31] study of peer relations in adolescents with GD, in which adolescent males with GD reported more "social bullying" than adolescent females with GD. Given that a transgendered identity as an "identity option" has become much more visible over the past decade, it is conceivable, therefore, that such an identity option is easier for females to declare than it is for males because it does not elicit as much of a negative response. Thus, it could be argued that it is this sex difference in degree of stigmatization that accounts for the inversion in the sex ratio that we have identified in the two studies reported here. In other words, there are greater costs for a male to

adopt a female gender identity in adolescence than it is for a female to adopt a male gender identity.

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