Sex Assigned at Birth Ratio Among Transgender and Gender Diverse Adolescents in the United States

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abstract

OBJECTIVE: Representatives of some pediatric gender clinics have reported an increase in transgender and gender diverse (TGD) adolescents presenting for care who were assigned female sex at birth (AFAB) relative to those assigned male sex at birth (AMAB). These data have been used to suggest that youth come to identify as TGD because of "social contagion," with the underlying assumption that AFAB youth are uniquely vulnerable to this hypothesized phenomenon. Reported changes in the AMAB:AFAB ratio have been cited in recent legislative debates regarding the criminalization of gender-affirming medical care. Our objective was to examine the AMAB:AFAB ratio among United States TGD adolescents in a larger and more representative sample than past clinic-recruited samples.

METHODS: Using the 2017 and 2019 Youth Risk Behavior Survey across 16 states that collected gender identity data, we calculated the AMAB:AFAB ratio for each year. We also examined the rates of bullying victimization and suicidality among TGD youth compared with their cisgender peers.

RESULTS: The analysis included 91 937 adolescents in 2017 and 105 437 adolescents in 2019. In 2017, 2161 (2.4%) participants identified as TGD, with an AMAB:AFAB ratio of 1.5:1. In 2019, 1640 (1.6%) participants identified as TGD, with an AMAB:AFAB ratio of 1.2:1. Rates of bullying victimization and suicidality were higher among TGD youth when compared with their cisgender peers.

CONCLUSION: The sex assigned at birth ratio of TGD adolescents in the United States does not appear to favor AFAB adolescents and should not be used to argue against the provision of gender-affirming medical care for TGD adolescents.

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Dr Turban conceptualized and designed the study and conducted the initial analyses; Brett Dolotina provided administrative support, assisted with initial analyses, and drafted the initial manuscript; Dana King coordinated data acquisition and assisted with initial analyses; Dr Keuroghlian supervised all phases of this study; and all authors critically reviewed and revised the manuscript for intellectual content, approved the final manuscript as submitted, and agree to be accountable for all aspects of the work.

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WHAT'S KNOWN ON THIS SUBJECT: Representatives of some pediatric gender clinics have reported an increase in transgender youth assigned female sex at birth relative to those assigned male sex at birth. Such data have been used to suggest a theory of social contagion leading to transgender identity.

WHAT THIS STUDY ADDS: Our findings from a national sample of adolescents across 16 states reveal that the sex assigned at birth ratio of transgender adolescents does not favor transgender adolescents assigned female sex at birth.

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Transgender and gender diverse (TGD) youth are those whose gender identity does not strictly align with societal expectations based on their sex assigned at birth.[1] Some TGD youth experience gender dysphoria, which, as currently described in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision* refers to the distress that arises secondary to one's gender identity being incongruent with societal expectations based on one's sex assigned at birth.[2]

A recent descriptive article hypothesized the existence of a new subtype of gender dysphoria, putatively termed "rapid-onset gender dysphoria" (ROGD).[3] The ROGD hypothesis asserts that young people begin to identify as TGD for the first time as adolescents rather than as prepubertal children and that this identification and subsequent gender dysphoria are the result of social contagion. This hypothesis further asserts that youth assigned female sex at birth (AFAB) are more susceptible to social contagion than those assigned male sex at birth (AMAB),[3] with a resultant expectation of increasing overrepresentation of TGD AFAB youth relative to TGD AMAB youth.

Of note, this hypothesis was formed solely through the analysis of online parental survey data. As a subsequently issued correction to the article outlined, "ROGD is not a formal mental health diagnosis at this time. This report did not collect data from the adolescents and young adults or clinicians and therefore does not validate the phenomenon."[4]

Despite this parent-centered study prompting substantial social[5] and methodological[6] critique in tandem with calls for more robust research studies with samples of TGD adolescents,[7] the notion of ROGD has been used in recent legislative debates to argue for and subsequently enact policies that prohibit gender-affirming medical care for TGD adolescents.[8] Notably, all relevant major medical organizations, including the American Academy of Pediatrics, oppose such legislative efforts.[8]

One element of the ROGD hypothesis has been understudied, namely, the sex assigned at birth ratio of TGD adolescents (ie, the number of TGD AFAB adolescents relative to the number of TGD AMAB adolescents). Although representatives of some pediatric gender clinics have reported an increase in TGD AFAB patients relative to TGD AMAB patients,[9,10] there is a dearth of studies that explore this ratio in larger, national samples of adolescents. Using data from the 2017 and 2019 iterations of the Youth Risk Behavior Survey (YRBS) across 16 US states, we explored this component of the ROGD hypothesis and examined the AMAB:AFAB ratio among United States TGD adolescents in a larger and more representative sample than past clinic-recruited samples. Moreover, to test the assertion that youth identify as TGD because of social desirability, we also examined rates of bullying among those who identified as TGD and those who did not. We further compared rates of bullying victimization among TGD youth with rates among cisgender sexual minority youth because some have asserted that TGD youth identify as TGD because of their underlying sexual orientation and presumption that TGD identities are less stigmatized than sexual minority cisgender identities.[11]

METHODS

Data Source and Study Population

Data for this study come from the 2017 and 2019 iterations of the YRBS, which is a biennial survey of high school students in the United States conducted by the Centers for Disease Control and Prevention, with the objective of assessing risk behaviors among United States adolescents. The complete YRBS methodology (ie, sampling methodology, data collection processes, response rates) has previously been described.[12] Sixteen states that administered the YRBS in 2017 and 2019 collected gender identity data. Because data were publicly available, this study was exempt from institutional review board review.

Gender Identity

Participants were asked, "Some people describe themselves as transgender when their sex at birth does not match the way they think or feel about their gender. Are you transgender?" Response options were "Yes, I am transgender," "No, I am not transgender," "I am not sure if I am transgender," and "I do not know what this question is asking." Youth who chose "I am not sure if I am transgender" and "I do not know what this question is asking" were excluded from analyses.

Sex Assigned at Birth

Youth reported their sex assigned at birth by answering: "What is your sex?" Response options were female or male. Although this question does not refer to sex assigned at birth specifically, several studies have found that TGD youth are likely to understand "sex" to be sex assigned at birth rather than gender identity, due to the foundational salience of these characteristics to their identities.[13,14,15] For this reason, we conceptualize responses to this question as referring to sex assigned at birth. Survey questions used to ascertain gender identity and sex assigned at birth are displayed in Supplemental Table 5.

Demographic, Bullying, and Mental Health Variables

Demographic variables including age, grade, race/ethnicity, and sexual orientation were collected. Because proponents of ROGD have argued that youth are increasingly identifying as TGD because of social desirability,[11] variables related to school bullying and electronic bullying were also included in the study analyses, to examine the veracity of these assertions. Moreover, because bullying is a predictor of negative mental health outcomes,[1] we also included history of suicide attempts as a variable in the analyses.

Statistical Analyses

Percentages were calculated to determine the proportion of TGD adolescents overall as well as by sex assigned at birth. AMAB:AFAB ratios were calculated to compare the number of AFAB and AMAB participants who identified as TGD. Variables related to demographics, bullying, and suicidality were compared between TGD and cisgender youth by using χ^2 tests.

RESULTS

The analyses included 91 937 adolescents in 2017 and 105 437 adolescents in 2019. The percentages of excluded youth

TABLE 1 Demographic and Mental Health Characteristics

YRBS Year	2017[a]			2019[b]		
	Cisgender, *n* = 89 776	Transgender, *n* = 2161	*P*	Cisgender, *n* = 103 797	Transgender, *n* = 1640	*P*
Sex assigned at birth, *n* (%)			<.001			.001
Female, AFAB	45 928 (51.2)	876 (40.5)		53 179 (51.2)	774 (47.2)	
Male, AMAB	43 848 (48.8)	1285 (59.5)		50 618 (48.8)	866 (52.8)	
Age, y			<.001			<.001
≤12	235 (0.3)	142 (6.6)		208 (0.2)	110 (6.7)	
13	209 (0.2)	19 (0.9)		443 (0.4)	37 (2.3)	
14	14 326 (16.0)	310 (14.4)		17 933 (17.3)	227 (13.9)	
15	23 947 (26.7)	504 (23.4)		28 377 (27.4)	351 (21.5)	
16	24 005 (26.8)	504 (23.4)		26 648 (25.7)	361 (22.1)	
17	20 250 (22.6)	464 (21.5)		22 287 (21.5)	358 (21.9)	
≥18	6726 (7.5)	201 (9.3)		7804 (7.5)	192 (11.7)	
Grade, *n* (%)			.009			.001
9th	24 706 (27.7)	557 (27.2)		29 648 (28.8)	403 (25.7)	
10th	23 760 (26.7)	529 (25.8)		27 840 (27.0)	407 (25.9)	
11th	23 033 (25.8)	496 (24.2)		25 216 (24.5)	392 (25.0)	
12th	17 609 (19.8)	465 (22.7)		20 361 (19.8)	368 (23.4)	
Race/ethnicity, *n* (%)			<.001			<.001
American Indian/Alaska Native	1110 (1.3)	34 (1.7)		1022 (1.0)	27 (1.7)	
Asian	5097 (5.8)	94 (4.6)		6123 (6.0)	81 (5.2)	
Black or African American	11 641 (13.3)	430 (21.2)		14 259 (14.0)	140 (9.0)	
Hispanic/Latino	9415 (10.7)	396 (19.5)		16 500 (16.2)	408 (26.4)	
Native Hawaiian/Other Pacific Islander	1783 (2.0)	78 (3.8)		2131 (2.1)	52 (3.4)	
White	52 859 (60.3)	860 (42.3)		55 261 (54.4)	734 (47.4)	
Multiracial	5767 (6.6)	140 (6.9)		6301 (6.2)	105 (6.8)	
Sexual orientation, *n* (%)			<.001			<.001
Heterosexual	77 451 (87.1)	761 (37.5)		88 172 (85.6)	403 (25.3)	
Gay or lesbian	1932 (2.2)	465 (22.96)		2236 (2.2)	442 (27.7)	
Bisexual	6462 (7.3)	545 (26.8)		8546 (8.3)	530 (33.2)	
Not sure	3117 (3.5)	261 (12.8)		4012 (3.9)	220 (13.8)	
Bullied at school,[c] *n* (%)	13 052 (14.5)	675 (31.2)	<.001	15 494 (14.9)	567 (34.6)	<.001
Electronically bullied,[d] *n* (%)	13 291 (14.8)	628 (29.1)	<.001	15 089 (14.5)	573 (34.9)	<.001
Attempted suicide,[e] *n* (%)			<.001			<.001
0 times	41 015 (94.0)	428 (67.0)		56 131 (92.7)	617 (69.2)	
1 time	1577 (3.6)	75 (11.7)		2649 (4.4)	111 (12.5)	
2 or 3 times	708 (1.6)	62 (9.7)		1221 (2.0)	79 (8.9)	
4 or 5 times	138 (0.3)	13 (2.0)		241 (0.4)	23 (2.6)	
6 or more times	175 (0.4)	61 (9.5)		277 (0.5)	61 (6.8)	

Note: All variables have <3% missing data except for attempted suicide (52% and 42% missing in 2017 and 2019, respectively).

[a] 2017 YRBS data come from the following states: Colorado, Delaware, Hawaii, Maine, Maryland, Massachusetts, Michigan, Rhode Island, Vermont, Virginia, and Wisconsin.

[b] 2019 YRBS data come from the following states: Colorado, Florida, Hawaii, Maine, Maryland, Massachusetts, Michigan, Nevada, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and Wisconsin.

[c] Bullied on school property in the past 12 mo, "During the past 12 months, have you ever been bullied on school property" (response options "Yes" or "No).

[d] Bullied through texting, Instagram, Facebook, or other social media in the past 12 mo, "During the past 12 months, have you ever been electronically bullied? (Count being bullied through texting, Instagram, Facebook, or other social media" (response options "Yes" or "No").

[e] Number of suicide attempts in the past 12 mo, "During the past 12 months, how many times did you actually attempt suicide?" (response options those listed in table).

TABLE 2 Numbers and Percentages of Transgender and Cisgender Adolescents by YRBS Year and Sex Assigned at Birth

YRBS Year	2017	2019
All adolescents, *n* (%)		
Transgender	2161 (2.4)	1640 (1.6)
Cisgender	89 776 (97.6)	103 797 (98.4)
AMAB adolescents, *n* (%)		
Transgender	1285 (2.8)	866 (1.7)
Cisgender	43 848 (97.2)	50 618 (98.3)
AFAB adolescents, *n* (%)		
Transgender	876 (1.9)	774 (1.4)
Cisgender	45 928 (98.1)	53 179 (98.6)
Sex assigned at birth ratio, transgender AMAB:transgender AFAB	1.5:1	1.2:1

who indicated "I am not sure if I am transgender" or "I do not know what this question is asking" were 4.0% ($n = 3785$) and 3.2% ($n = 3505$) in 2017 and 2019, respectively. TGD and cisgender youth demonstrated significant differences across all demographic variables, bullying victimization, and suicidality (Table 1). TGD youth were more likely to be victims of school bullying and electronic bullying when compared with their cisgender peers, and they were also more likely to endorse a history of suicide attempts.

Table 2 highlights the numbers and percentages of TGD adolescents by year and sex assigned at birth. In 2017, 2161 (2.4%) of participants identified as TGD, with an AMAB:AFAB ratio of 1.5:1. In 2019, 1640 (1.6% of) participants identified as TGD, with an AMAB:AFAB ratio of 1.2:1.

Additionally, TGD youth were significantly more likely to be victims of school bullying and electronic bullying when compared with cisgender sexual minority youth, who themselves were more likely to be victims of these types of bullying when compared to cisgender heterosexual youth (Tables 3 and 4).

DISCUSSION

Using a national sample of United States adolescents, we found that there were more TGD AMAB adolescents than TGD AFAB adolescents in both 2017 and 2019. Additionally, the total percentage of TGD adolescents in our sample decreased from 2.4% in 2017 to 1.6% in 2019. This decrease in the overall percentage of adolescents identifying as TGD is incongruent with an ROGD hypothesis that posits social contagion.

The AMAB:AFAB ratio, still in favor of more TGD AMAB participants for both years, shifted slightly toward TGD AFAB participants from 2017 to 2019. Importantly, this change was due to a reduction in the number of TGD AMAB participants, rather than an increase in TGD AFAB participants, again arguing against a notion of social contagion with unique susceptibility among AFAB youth.

Moreover, we found that TGD youth were more likely to be victims of bullying and to have attempted suicide when compared with cisgender youth, which is consistent with past studies.[1] Our additional analyses reveal that TGD youth experience significantly higher rates of bullying than cisgender sexual minority youth, who themselves experience significantly higher rates of bullying when compared with cisgender heterosexual youth (Tables 3 and 4). These exceptionally high rates of bullying among TGD youth are inconsistent with the notion that young people come out as TGD either to avoid sexual minority stigma or because being TGD will make them more popular among their peers, both of which are explanations that have recently been propagated in the media.[11] Of note, a substantial percentage of TGD adolescents in the current study sample also identified as gay, lesbian, or bisexual with regard to their sexual orientation (Table 1), which further argues against the notion that adopting a TGD identity is an attempt to avoid sexual minority stigma.

The deleterious effect of unfounded hypotheses stigmatizing TGD youth, particularly the ROGD hypothesis, cannot be overstated, especially in current and longstanding public policy debates. Indeed, the notion of ROGD has been used by legislators to prohibit TGD youth from accessing gender-affirming medical

TABLE 3 χ^2 Comparison of Bullying Rates Between TGD Youth and Cisgender Sexual Minority Youth

YRBS Year	2017			2019		
	Cisgender Sexual Minority, *n* (%)	Transgender and Gender Diverse, *n* (%)	*P*	Cisgender Sexual Minority, *n* (%)	Transgender and Gender Diverse, *n* (%)	*P*
School bullying	2034 (30.5)	675 (38.7)	<.001	2515 (28.7)	567 (45.4)	<.001
Electronic bullying	2213 (26.7)	628 (32.2)	<.001	2577 (24.1)	573 (37.5)	<.001

TABLE 4 χ^2 Comparison of Bullying Rates Between Cisgender Heterosexual Youth and Cisgender Sexual Minority Youth

YRBS Year	2017			2019		
	Cisgender Heterosexual, *n* (%)	Cisgender Sexual Minority, *n* (%)	*P*	Cisgender Heterosexual, *n* (%)	Cisgender Sexual Minority, *n* (%)	*P*
School bullying	10 296 (17.1)	2034 (30.5)	<.001	12 077 (16.6)	2515 (28.7)	<.001
Electronic bullying	10 426 (13.5)	2213 (26.7)	<.001	11 729 (13.4)	2577 (24.1)	<.001

care, despite the considerable methodological limitations underlying the generation of this hypothesis, as well as the unequivocal support for gender-affirming medical care by multiple major medical organizations, including the American Medical Association, the American Academy of Pediatrics, the American Academy of Child & Adolescent Psychiatry, and the American Psychiatric Association.[8] Multiple studies have revealed that prohibiting TGD adolescents from accessing gender-affirming medical care would be expected to have detrimental impacts on TGD youth wellbeing.[16–18,22] The current study adds to the extant research arguing against the ROGD hypothesis by providing evidence inconsistent with the theories that (1) social contagion drives TGD identities, with unique susceptibility among AFAB youth, and (2) that youth identify as TGD due to such identities being less stigmatized than cisgender sexual minority identities.

Limitations of this study include that data were collected through a school-based survey; therefore, TGD youth who do not attend school were not represented. Additionally, all participants included in this study lived in states that administered the YRBS gender identity question, thus TGD youth in other states are not represented. Moreover, the question through which the sex of participants was ascertained did not use the established 2-step method of asking about gender identity.[19] Although our results should be understood in the context of this limitation, we posit that TGD youth are likely able to accurately differentiate between sex and gender identity, given that these characteristics are foundationally salient to their identities. Indeed, several studies found that TGD youth seem to accurately navigate the differences between their sex assigned at birth and gender identity.[13,14,15] Moreover, it is unlikely that the proportion of youth who answered the sex question based on their gender identity would differ by sex assigned at birth. Thus, the ratio of youth by sex assigned at birth is likely to be largely unaffected.[19] Future studies could use the 2-step method of determining gender identity to more accurately capture subgroup characteristics by sex assigned at birth and gender,[19] although we also acknowledge that best practices for gender identity data collection are iterative and ever-evolving.[15,20,21,23]

CONCLUSIONS

By examining the AMAB:AFAB ratio of TGD adolescents across 16 states in 2017 and 2019, our findings are in direct contrast with central components of the ROGD hypothesis, as well as previous studies that used smaller samples from single clinics.[9,10] The AMAB:AFAB ratio of TGD adolescents in the United States does not appear to favor TGD AFAB adolescents, and the notion of ROGD should not be used to restrict the provision of gender-affirming medical care for TGD adolescents. Results from this study also argue against the notions that TGD youth come to identify as TGD because of social contagion or to flee stigma related to sexual minority status.

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ABBREVIATIONS

AFAB: assigned female sex at birth
AMAB: assigned male sex at birth
ROGD: rapid-onset gender dysphoria
TGD: transgender and gender diverse
YRBS: Youth Risk Behavior Survey

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