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Sexual Activity and Attraction, Relationship Status, and Mental Well-Being in Transgender and Gender Diverse People

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B.S., Stetson University, 2018

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An abstract of

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Abstract

Sexual Activity and Attraction, Relationship Status, and Mental Well-Being in Transgender and Gender Diverse People

By Jason McLean

Background: Transgender and gender diverse (TGD) individuals bear a higher risk for mental health problems. Little is known about the sexual activity patterns, attraction, and relationships in transfeminine (TF) and transmasculine (TM) persons, and even less is known about the influence of these factors on mental health in this population.
Methods: This study used survey data administered to members of the Study of Transition, Outcomes, and Gender (STRONG) cohort, nested within Kaiser Permanente integrated health systems in Georgia, Northern California, and Southern California. The survey data included self-reported information regarding sexual contacts in the previous 12 months, relationship status, level of gender affirming therapy (GAT) (none, hormone only, top surgery, or bottom surgery), and socio-demographic characteristics (age, education, race/ethnicity). Additionally, participants were asked to report their sexual attraction to others based on gender identity and expression. Mental health status was assessed by administering two validated instruments: the Center for Epidemiologic Studies Depression Scale (CES-D) and the Beck Anxiety Inventory (BAI). All associations were expressed as multivariable adjusted prevalence ratios (aPR) and the corresponding 95% confidence intervals (CI)
Results: Of 697 people with survey data, 651 (328 TF and 323 TM) provided required information for the study. GAT was associated with having a life partner, but only in TF. No significant association was found between GAT and reporting a life partner in TM, and no association was found in either group between GAT and sexual activity. Sexual activity was significantly related to lower prevalence of depression in TF only (aPR = 0.73, 95% CI: 0.58, 0.92). Life partnership was associated with lower prevalence of depression in both groups (aPR = 0.74, 95% CI: 0.58, 0.95 for TF; aPR = 0.72, 95% CI: 0.56, 0.91 for TM). Neither variable was significantly associated with anxiety. Bottom surgery in TF and top and bottom surgery in TM were associated with lower prevalence of anxiety and depression.
Conclusions: Although GAT was unrelated to sexual activity in this study, having a sexual and especially a life partner was associated with lower prevalence of depression in both TM and TF groups. Longitudinal studies and large clinical datasets are required to further evaluate these associations.

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Introduction

Transgender and gender diverse (TGD) people represent a historically marginalized population with multiple unmet needs and important health care priorities [1]. TGD individuals experience a fundamental discordance or mismatch between their biological sex, or "sex assigned at birth" and their gender identity [2]. Gender identity refers to the aggregate of introspective characteristics that produce a sense of being of "male, female, or other" [3]. Many TGD people completely reject the male-female dichotomy and self-identify as non-binary or agender. Some TGD individuals may seek to remedy the discordance between their natal sex and gender identity through medical gender affirmation. The specific methods of medical gender affirmation include behavior modifications, feminizing or masculinizing hormone therapy, and surgical interventions or other procedures aiming to change primary or secondary sex characteristics [2].

Available data indicate that TGD people are disproportionally affected by a wide range of mental and somatic health problems [4]. For example, prevalence of depression among TGD individuals is estimated to reach 30% greatly exceeding the corresponding measure of 8% reported in the general population [5, 6]. Anxiety is likewise significantly more prevalent in TGD people than in their cis-gender counterparts, although specific estimates tend to vary across studies [7]. Especially worrisome is the high prevalence of self-inflicting injuries and suicidal ideation in this population [8, 9].

Sexually transmitted infections, most notably HIV, are common in transfeminine people with a prevalence approaching 10% [10]. Additional unique health concerns are related to the effects of medical gender affirmation. For example, recognized long-term consequences of estrogen therapy in transfeminine people include a possible risk of thromboembolism and ischemic stroke [11]. Similarly, testosterone therapy in transmasculine individuals is associated with elevated risk of polycythemia [12]. In addition, TGD people undergoing gender affirming surgery may experience complications such as postoperative infections and fistula or stricture formation, often requiring re-hospitalization and further surgical interventions [13]. Other issues facing many TGD individuals include inadequate health care

access and utilization. These problems are attributable to a variety to socioeconomic, and psychological factors such as lack of health insurance and mistrust of health care providers [14-16]

An additional factor that may explain higher levels of mental and somatic morbidity in TGD populations is lack of social support. The potential health benefits of being in a committed relationship in the general population are well established [17]. There is evidence that these relationships decrease the prevalence of many mental health pathologies, such as depression, anxiety disorders, and substance use [18-20]. Moreover, though the data are scarce, sexual activity seems to be inversely associated with the prevalence of anxiety and depression [21, 22].

Available evidence indicates that gender affirming hormone therapy and surgery may influence sexual activity and affect satisfaction with sex life in TGD people [23]; however, the types of sexual relationship and partner characteristics within the TGD population require further characterization. Similarly, the data on the proportions of TGD people engaged in stable committed relationships are largely lacking [24]. With these knowledge gaps in mind, the overall goal of the present study is to characterize sexual and interpersonal relationships using data from a survey of TGD people enrolled in three large integrated health care systems. The overall goal of this study is achieved by investigating the distribution and determinants of sexual relationships and partnerships among survey participants and by assessing the association of these relationship and partnerships with self-reported mental health problems.

Methods

Study Population

The data for the present analysis were obtained from a survey of TGD people included in the Study of Transition, Outcomes, and Gender (STRONG). STRONG is a cohort study nested within three Kaiser Permanente integrated care systems in Georgia, Northern California, and Southern California [25, 26]. The survey eligibility criteria included being 18 years of age or older, enrollment in one of the three Kaiser Permanente health systems, and having TGD status verified by at least one pertinent diagnostic code and a confirmatory clinical note [26]. Exclusion criteria consisted of having relevant ICD-9 codes or text strings limited to mental health records and a lack of consent from the treating physician [26]. In addition, participants were excluded if their responses to screening questions were most consistent with cis-gender identity or with intersex status [26]. The details of survey recruitment methods were described in greater detail elsewhere [26].

Study Measures

Based on screening questions each participant was characterized as transfeminine (TF) or transmasculine (TM). Due to the survey inclusion and exclusion criteria, nearly all participants identified with binary gender categories (as transmen or transwomen); however, the terms TM and TF are used throughout to account for the possible spectrum of identities and presentations. The main socio-demographic variables included age, race/ethnicity and education. Self-reported information regarding each participant's sexual and romantic relationships was collected. Study subjects indicated whether they were sexually active within the past 12 months, and, if they were, the gender identity of their sexual partner. Additionally, they were asked to rate their sexual attraction to those who identify as male, female, masculine, and feminine on a scale from 0-100. Finally, each participant indicated their current relationship status (i.e. single, married, domestic partnership, open relationship, etc.), and they had the opportunity to answer in free response if they believed multiple choice options did not accurately describe their relationship status. Current hormone therapy and the history of gender affirming procedures was used to characterize the extent of medical gender affirmation achieved to date. The resulting variable

included four mutually exclusive categories: 1) no medical gender affirmation, 2) hormone therapy only, 3) top surgery (i.e., breast augmentation, mastectomy, etc.) with or without hormone therapy, and 4) bottom surgery (i.e., orchiectomy, penectomy, vaginoplasty, phalloplasty, vaginectomy, metoidioplasty, etc.) with or without other types of gender affirming treatment. Mental health outcomes were evaluated using validated screening instruments. Depressive symptoms were evaluated using the Center for Epidemiologic Studies Depression Scale (CES-D-10) and Beck Anxiety Inventory (BAI) was used to define presence of anxiety.

Data Analysis

The data analysis addressed two broad objectives 1) to investigate factors associated with having a sexual partner or being engaged in a long-term relationship and 2) to assess how sexual partnership or long-term relationship status may be associated with mental health problems.

The two outcome variables in the first part of the analysis were self-reported sexual activity in the past 12 months (Yes vs. No) and current relationship status (single, married/in civil union/domestic partnership, other committed relationship, casual/open or polyamorous relationship, and other). For the purposes of this study, the relationship status was converted into a binary variable "Reporting a life partner" where "yes" applied to participants who were married, in civil union or in a domestic partnership and as well as those involved in other committed relationship and "no" applied to all other responses as well as those who declined to respond to this question. The main independent variable of interest in both analyses was extent of medical gender affirmation: None (reference), hormone therapy only, top surgery, and bottom surgery.

In the second part of the analysis the outcomes of interest were based on the CES-D-10 and BAI scores. As in our previous studies, CES-D-10 score of 10 or higher was used to define clinically significant depression symptoms whereas a BAI cutoff of 21 (mid-point of the moderate anxiety interval) was used to define moderate-to-severe anxiety [26-29]. The two alternative exposure variables in the second part of the analysis were reporting sexual activity in the past 12 months and having a life partner.

The covariates in all analyses were generally the same. These included age (≤30, 31-40, 41-50, and 51+ years), race/ethnicity categorized as Non-Hispanic Whites, minority groups (Blacks, Hispanics and Asian/Pacific islanders) and other/unknown, and education (high school or less, some college, completed college and graduate). In the analyses assessing the associations of sexual relationship/partnership status with depression and anxiety, the extent of medical gender affirmation was included as a covariate.

All associations of interest were examined using modified Poisson regression models with *proc genmod* command, as described elsewhere [30]. The results of all models were reported as adjusted prevalence ratios (aPR) accompanied by the corresponding 95% confidence level (CI). All statistical analyses were performed using SAS version 9.4 for Windows SAS Institute, Cary, NC.

Results

Overview of the study population

Among 2,136 people invited to complete the survey, 697 (33%) agreed to participate, and of those, 651 (328 TF and 323 TM) provided information regarding their extent of gender affirming treatment and educational attainment [26]. Fewer study subjects reported information regarding depression (288 TF and 297 TM) and anxiety (291 TF and 287 TM), and subsequent analyses of mental health outcomes were limited to these individuals.

Table 1 summarizes the characteristics of survey participants. TF respondents tended to be older than their TM counterparts (44% vs 14% over the age of 51). Less than 5% of both TM and TF groups reported no medical gender affirmation of any kind. Compared to TM survey respondents, TF participants were more likely to receive hormone therapy only (48% vs. 22%) and far less likely to report top surgery (9% vs. 43%). In the TF group 39% of participants reported a history of any bottom surgeries (e.g. orchiectomy and vaginoplasty), the corresponding proportion of TM persons who had bottom surgery (e.g. hysterectomy and phalloplasty) was 31%.

The TM survey respondents were more likely to have a BAI score over 21 (22% vs 13%) while the proportion of participants with CES-D-10 score over 10 was the same (48%) in the two groups. TM participants were more likely to engage in sexual activity in the previous 12 months (73%) compared to TF people (47%). By contrast the proportions of people with a life partner were similar in the two groups (45% for TF and 49% for TM).

As shown in Figure 1A nearly one-half (47%) of TF respondents were sexually attracted to those who identified as “female”, 29% were attracted mostly attracted to “males”, 20% were attracted to both and only 5% were attracted to neither. These percentages were similar to the results shown in Figure 2A which represents sexual attraction of the TF by masculine/feminine expression. Regarding the gender identify of their sexual partner, as shown in Figure 3A, TF respondents engaged with cis-gender men and women with approximately equal frequency (22% and 24%), but 53% of TF study participants reported having no sexual partners (n=152) or did not disclose (n=22). Figures 1B, 2B, and 3B give the

corresponding information for TM respondents. Similar to their TF counterparts, TM individuals were more likely to be attracted to females (44%) or feminine individuals (43%). However, unlike the TF group, the proportion of TM participants with no sexual partner in the previous 12 months was only 27% (Figure 3B).

Factors associated with having sexual relationship or a life partner

Among TF participants, the extent of gender affirming treatment was inversely associated with having a sexual relationship in the past 12 months (Table 2) and having a life partner (Table 3); however, only the latter result was statistically significant. In the TM survey respondents, gender affirming therapy receipt was not significantly associated with either outcome (Tables 2-3), although the direction of the association with having a sexual of the partner in the past 12 months in the TM group was opposite of the association observed in the TF group. Compared to the people ≤30 years of age, those in the oldest age group were less likely to report a sexual partnership in the last 12 months; the difference was pronounced among the TF than among the TM study participants with aPR estimates of 0.52 (95% CI: 0.36, 0.68) and 0.74 (95% CI: 0.56, 0.98), respectively. The corresponding associations for having a life partner were in the opposite direction, statistically significant for TF (PR=1.66; 95% CI 1.11, 2.49) but not for TM (aPR=1.21; 95% CI: 0.82, 1.77) survey respondents. TM persons of mixed, other, or unknown race/ethnicity were somewhat more likely report a sexual partnership in the last 12 months (aPR=1.17; 95% CI: 1.00, 1.37), whereas TF person in the same racial/ethnic group were less likely to have a life partner (aPR= 0.54; 95% CI: 0.32, 0.92), relative to Non-Hispanic Whites. Other socio-demographic factors were not associated with either outcome (Tables 2-3).

Associations of having a sexual relationship or a life partner with depression and anxiety

As shown in Table 4, sexually active individuals were less likely to report depression; however, this association was only significant among TF study participants (aPR = 0.73, 95% CI: 0.58, 0.92) and not among their TM counterparts (aPR = 0.80; 95% CI: 0.63, 1.02). The corresponding results for anxiety (Table 5) were suggestive of a positive, albeit not statistically significant, association among TF respondents (aPR=1.88; 95% CI; 0.98, 3.62), but showed no association in the TM group (aPR= 1.03;

95% CI: 0.63, 1.67). Having a life partner was significantly associated with lower prevalence of depression in both groups with aPR (95% CI) estimates of 0.74 (0.58, 0.95) for TF and 0.72 (0.56, 0.91) for TM individuals (Tables 6-7).

Among covariates, the most consistent association with lower prevalence of depression and anxiety was observed for the extent of medical gender affirmation, especially among persons who underwent bottom surgery (Table 4-7). Advanced age was also associated with lower prevalence of depression and anxiety, but the results were not always statistically significant across analyses. Neither depression nor anxiety varied significantly by education or by race/ethnicity.

Discussion

In this survey of adult TGD people mostly identifying with binary gender categories, gender affirming therapy of any type was not associated with sexual activity status. In other studies evaluating sexual health outcomes post-gender affirming therapy (particularly surgery), a general increase in sexual activity was reported [31-35]. However, previous studies on this subject tended to be relatively small, and used a broader definition of sexual activity not necessary requiring a partner [33]. We additionally found that gender affirming therapy was associated with lower likelihood of being in a committed relationship, although only in the TF group. This aspect of gender affirmation has not been properly studied. One descriptive study did find a deleterious effect of transition on relationship status in TM with approximately 50% of relationships ending during transition, and nearly the same proportion citing the transition itself as the inciting event [36].

The prevalence of depression was lower for both TF and TM individuals who had life partners and for TF participants who were sexually active. Available data suggest that being in a sustained relationship may indeed alleviate anxiety and depression in TGD people [36]. Our data likewise indicated that gender affirming therapy was associated with better mental health. In TF, both hormone therapy and bottom surgery were associated with a lower prevalence of depression, and the latter was inversely associated with anxiety. Likewise, in TM, both top and bottom surgery were associated with lower prevalence of anxiety and depression. This corresponds to previous literature indicating a mental health benefits of gender affirming hormone therapy and surgery [37, 38].

The data on sexual preferences of study participants offer a few interesting observations. Both TF and TM reported a preference for female or feminine partners. Among those who were sexually active, both groups had the highest percentage of persons reporting a female sexual contact. These findings are not without precedent. A high attraction to female sexual partners in both groups has previously been described in the literature in both the United States and Europe [39-41].

Perhaps the most important limitation of the present analysis is the cross-sectional study design. The inability to establish temporal relation between the independent and dependent variables (e.g. timing

of gender affirming therapy and engaging in a sexual or romantic partnership) limits our ability to raw causal inferences; despite this, historically much of our data about the TGD population have been derived from cross-sectional studies [4]. An additional limitation was that all key variables used in the analyses were self-reported leaving room for misclassification. Further, the survey response was low at 33%, raising concerns about selection bias; however, a previous study based on the same survey found that correction for non-response using inverse probability weighting did not affect the results [26]. Finally, it is important to point out that the STRONG cohort includes persons with access to quality healthcare [26]. This in combination with nearly 90% of the cohort having at least some college education may suggest access to financial means and limit generalizability of study findings. For these reasons, future research should seek to expand the target population to include subgroups affected by poverty, lack of social support, and other factors that may influence the observed associations.

Conclusions and Future Directions

This study sought to close the gaps in the current understanding of the distribution of sexual and life partnership status in TGD people and to investigate factors associated with these aspects of life in TM and TF individuals. Our data showed little evidence that gender affirming therapy was related to sexual activity in this population. By contrast having a sexual and especially a life partner was associated with lower prevalence of depression in both groups. These data indicate the importance of social and personal support in mental well-being of TGD people. Future research should seek to confirm these associations by using more advanced longitudinal study design and by focusing on objective clinical data in addition to patient-reported outcomes. Once confirmed, the observed associations may be used to inform interventions aimed at providing social and personal support for TGD people with the long-term objective of improving mental health in this vulnerable population.

Public Health Implications

Data from this study contribute to existing knowledge in in a number of ways. Gender affirming therapy is currently an ongoing target of ethical and legal debate in the United States, and our results provide evidence pointing to its benefit to TGD individuals [42]. In addition, efforts to risk-stratify individuals based on their sexual behaviors may help with the ongoing efforts of preventing HIV and other sexually transmitted infections in this population.

References

1. Feldman, J., et al., *Priorities for transgender medical and health care research.* Current opinion in endocrinology, diabetes, and obesity, 2016. **23**(2): p. 180.
2. Winter, S., et al., *Transgender people: health at the margins of society.* Lancet, 2016. **388**(10042): p. 390-400.
3. Bethea, M.S. and E.E. McCollum, *The Disclosure Experiences of Male-to-Female Transgender Individuals: A Systems Theory Perspective.* Journal of Couple & Relationship Therapy, 2013. **12**(2): p. 89-112.
4. Reisner, S.L., et al., *Global health burden and needs of transgender populations: a review.* Lancet, 2016. **388**(10042): p. 412-436.
5. Brody, D.J., L.A. Pratt, and J.P. Hughes, *Prevalence of depression among adults aged 20 and over: United States, 2013-2016.* 2018.
6. Wanta, J.W., et al., *Mental Health Diagnoses Among Transgender Patients in the Clinical Setting: An All-Payer Electronic Health Record Study.* Transgend Health, 2019. **4**(1): p. 313-315.
7. Millet, N., J. Longworth, and J. Arcelus, *Prevalence of anxiety symptoms and disorders in the transgender population: A systematic review of the literature.* International Journal of Transgenderism, 2017. **18**(1): p. 27-38.
8. Cawley, R., et al., *What is the relationship between rejection and self-harm or suicidality in adulthood?* Journal of Affective Disorders, 2019. **242**: p. 123-134.
9. Grant, J.M., et al., *Transgender Discrimination Survey.* National Center for Transgender Equality and National Gay and Lesbian Task Force: Washington, DC, USA, 2011.
10. Becasen, J.S., et al., *Estimating the Prevalence of HIV and Sexual Behaviors Among the US Transgender Population: A Systematic Review and Meta-Analysis, 2006-2017.* Am J Public Health, 2019. **109**(1): p. e1-e8.
11. Connelly, P.J., et al., *Gender-affirming hormone therapy, vascular health and cardiovascular disease in transgender adults.* Hypertension, 2019. **74**(6): p. 1266-1274.
12. Tatarian, J., Q. Walcott, and K. Richardson, *Incidence, Contributing Factors, and Implications for Clinical Management of Polycythemia in Transmasculine Patients on Testosterone.* LGBT health, 2023. **10**(1): p. 72-79.
13. Veerman, H., et al., *Functional Outcomes and Urological Complications after Genital Gender Affirming Surgery with Urethral Lengthening in Transgender Men.* J Urol, 2020. **204**(1): p. 104-109.
14. Sanchez, N.F., J.P. Sanchez, and A. Danoff, *Health care utilization, barriers to care, and hormone usage among male-to-female transgender persons in New York City.* American journal of public health, 2009. **99**(4): p. 713-719.
15. Downing, J., K.A. Lawley, and A. McDowell, *Prevalence of private and public health insurance among transgender and gender diverse adults.* Medical care, 2022. **60**(4): p. 311-315.
16. Downing, J.M. and J.M. Przedworski, *Health of transgender adults in the US, 2014–2016.* American journal of preventive medicine, 2018. **55**(3): p. 336-344.
17. Braithwaite, S. and J. Holt-Lunstad, *Romantic relationships and mental health.* Current Opinion in Psychology, 2017. **13**: p. 120-125.
18. Gibb, S.J., D.M. Fergusson, and L.J. Horwood, *Relationship duration and mental health outcomes: findings from a 30-year longitudinal study.* The British Journal of Psychiatry, 2011. **198**(1): p. 24-30.
19. Williams, K., *Has the future of marriage arrived? A contemporary examination of gender, marriage, and psychological well-being.* Journal of health and social behavior, 2003. **44**(4): p. 470.

20. Scott, K.M., et al., *Gender and the relationship between marital status and first onset of mood, anxiety and substance use disorders.* Psychological medicine, 2010. **40**(9): p. 1495-1505.
21. Mollaioli, D., et al., *Benefits of sexual activity on psychological, relational, and sexual health during the COVID-19 breakout.* The journal of sexual medicine, 2021. **18**(1): p. 35-49.
22. Ganong, K. and E. Larson, *Intimacy and belonging: the association between sexual activity and depression among older adults.* Society and Mental Health, 2011. **1**(3): p. 153-172.
23. Mattawanon, N., K. Charoenkwan, and V. Tangpricha, *Sexual Dysfunction in Transgender People: A Systematic Review.* Urologic Clinics of North America, 2021. **48**(4): p. 437-460.
24. Marshall, E., et al., *The quality and satisfaction of romantic relationships in transgender people: A systematic review of the literature.* Int J Transgend Health, 2020. **21**(4): p. 373-390.
25. Quinn, V.P., et al., *Cohort profile: Study of Transition, Outcomes and Gender (STRONG) to assess health status of transgender people.* BMJ Open, 2017. **7**(12): p. e018121.
26. Owen-Smith, A.A., et al., *Association between gender confirmation treatments and perceived gender congruence, body image satisfaction, and mental health in a cohort of transgender individuals.* The journal of sexual medicine, 2018. **15**(4): p. 591-600.
27. Andresen, E.M., et al., *Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale).* Am J Prev Med, 1994. **10**(2): p. 77-84.
28. Carney, C.E., et al., *Should we be anxious when assessing anxiety using the Beck Anxiety Inventory in clinical insomnia patients?* Journal of psychiatric research, 2011. **45**(9): p. 1243-1249.
29. To, M., et al., *Visual conformity with affirmed gender or "passing": Its distribution and association with depression and anxiety in a cohort of transgender people.* The journal of sexual medicine, 2020. **17**(10): p. 2084-2092.
30. Zhao, K. *Proper estimation of relative risk using PROC GENMOD in population studies*. in *Proceedings of the Western Users of SAS Software Conference*. 2013.
31. Lobato, M.I.I., et al., *Follow-up of sex reassignment surgery in transsexuals: a Brazilian cohort.* Archives of Sexual Behavior, 2006. **35**: p. 711-715.
32. Lief, H.I. and L. Hubschman, *Orgasm in the postoperative transsexual.* Archives of Sexual Behavior, 1993. **22**: p. 145-155.
33. van de Grift, T.C., et al., *A longitudinal study of motivations before and psychosexual outcomes after genital gender-confirming surgery in transmen.* The journal of sexual medicine, 2017. **14**(12): p. 1621-1628.
34. Özer, M., et al., *ESSM position statement "sexual wellbeing after gender affirming surgery".* Sexual medicine, 2022. **10**(1): p. 100471-100471.
35. Kloer, C., et al., *Sexual health after vaginoplasty: A systematic review.* Andrology, 2021. **9**(6): p. 1744-1764.
36. Amand, C.S., et al., *Romantic relationships of female-to-male trans men: A descriptive study.* International Journal of Transgenderism, 2013. **14**(2): p. 75-85.
37. Nguyen, H.B., et al., *Gender-affirming hormone use in transgender individuals: impact on behavioral health and cognition.* Current psychiatry reports, 2018. **20**: p. 1-9.
38. Bränström, R. and J.E. Pachankis, *Reduction in mental health treatment utilization among transgender individuals after gender-affirming surgeries: a total population study.* American journal of psychiatry, 2020. **177**(8): p. 727-734.
39. Szoko, N., et al., *Sexual Orientation Among Gender Diverse Youth.* Journal of Adolescent Health, 2023. **72**(1): p. 153-155.
40. Iantaffi, A. and W.O. Bockting, *Views from both sides of the bridge? Gender, sexual legitimacy and transgender people's experiences of relationships.* Cult Health Sex, 2011. **13**(3): p. 355-70.

41. Auer, M.K., et al., *Transgender transitioning and change of self-reported sexual orientation.* PLoS One, 2014. **9**(10): p. e110016.
42. Bizic, M.R., et al., *Gender Dysphoria: Bioethical Aspects of Medical Treatment.* Biomed Res Int, 2018. **2018**: p. 9652305.

Tables and Figures

Table 1. Descriptive characteristics of survey participants

Participant characteristics	All respondents (N=651)		Transfeminine (N=328)		Transmasculine (N=323)	
	N	%*	N	%*	N	%*
Age (years)						
≤30	221	33.9%	71	21.6%	150	46.4%
31-40	137	21.0%	44	13.4%	93	28.8%
41-50	104	16.0%	69	21.0%	35	10.8%
51+	189	29.0%	144	43.9%	45	13.9%
Race/ethnicity						
Non-Hispanic Whites	380	58.4%	196	59.8%	184	57.0%
Minority groups*	196	30.1%	93	28.4%	103	31.9%
Mixed, other or unknown race/ethnicity	75	11.5%	39	11.9%	36	11.1%
Education						
High school or less	74	11.4%	29	8.8%	45	13.9%
Some college	238	36.6%	140	42.7%	98	30.3%
Finished College	192	29.5%	90	27.4%	102	31.6%
Graduate	147	22.6%	69	21.0%	78	24.1%
Gender affirming therapy						
None	27	4.1%	16	4.9%	11	3.4%
Hormone therapy only	227	34.9%	156	47.6%	71	22.0%
Top surgery	168	25.8%	28	8.5%	140	43.3%
Bottom surgery	229	35.2%	128	39.0%	101	31.3%
Anxiety scale (BAI)						
≤21	475	82.2%	252	86.6%	223	77.7%
>21	103	17.8%	39	13.4%	64	22.3%
Depression (CESD-10)						
<10	307	52.5%	151	52.4%	156	52.5%
≥10	278	47.5%	137	47.6%	141	47.5%

Sexually Active in past 12 months						
No	262	40.2%	174	53.0%	88	27.2%
Yes	389	59.8%	154	47.0%	235	72.8%
Relationship status						
Single	224	34.4%	125	38.1%	99	30.7%
Married/civil union/domestic partnership	189	29.0%	105	32.0%	84	26.0%
Other committed relationship	117	18.0%	44	13.4%	73	22.6%
Casual/open or polyamorous relationship	53	8.1%	24	7.3%	29	9.0%
Other	24	3.7%	11	3.4%	13	4.0%
Declined to respond	44	6.8%	19	5.8%	25	7.7%
Total	651	100%	328	100%	323	100%

* Column percentages, except total which shows row percentages
** Includes Non-Hispanic Blacks, Hispanics and Asians/Pacific Islanders
Acronyms: BAI-Beck Anxiety Index , CES-D-10-Center for Epidemiologic Studies Depression Scale

Figure 1: Sexual attraction by gender among TF (A) and TM (B) study participants

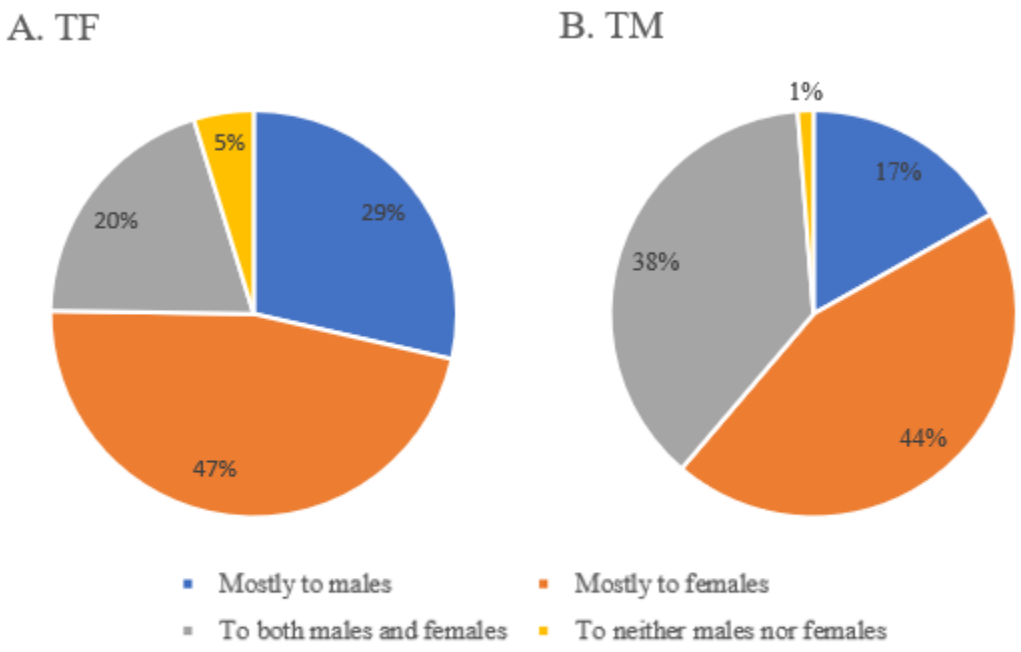

Figure 2: Sexual attraction by gender expression among TF (A) and TM (B) study participants

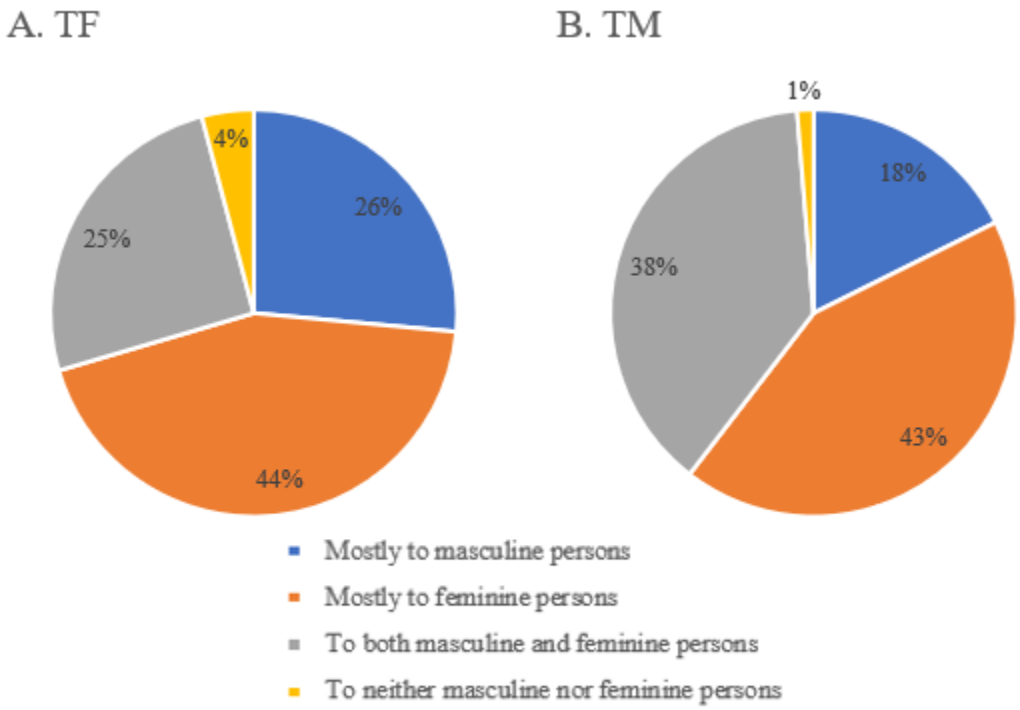

Figure 3: Gender identities of sexual partners in past 12 months among TF (A) and TM (B) study participants

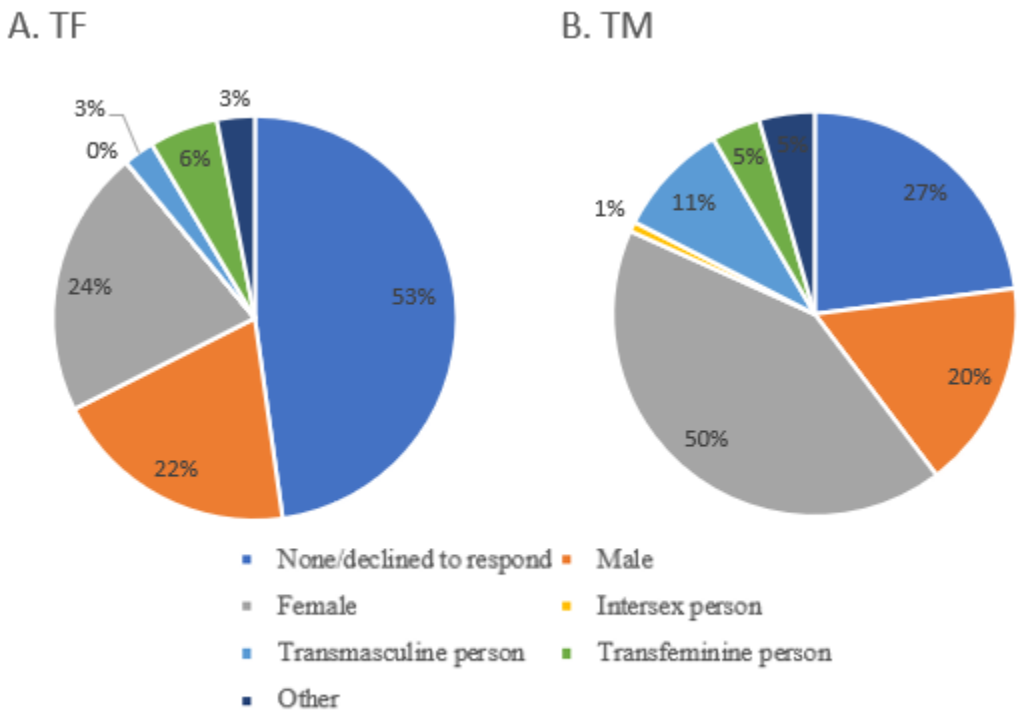

Table 2. Factors associated with reporting a sexual partnership in the last 12 months

Participant characteristics	Transfeminine (N=328)				Transmasculine (N=323)			
	Crude PR	95% CI	Adjusted PR	95% CI	Crude PR	95% CI	Adjusted PR	95% CI
Age (years)								
≤30	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
31-40	1.11	(0.84, 1.48)	1.10	(0.82, 1.47)	1.08	(0.95, 1.24)	1.05	(1.08, 1.86)
41-50	1.00	(0.76, 1.32)	1.03	(0.78, 1.37)	0.80	(0.60, 1.06)	0.81	(0.60, 1.08)
51+	0.49	(0.36, 0.68)	0.52	(0.37, 0.73)	0.74	(0.56, 0.97)	0.74	(0.56, 0.98)
Race/ethnicity								
Non-Hispanic Whites	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Minority Groups	1.40	(1.10, 1.77)	1.21	(0.95, 1.53)	0.91	(0.78, 1.07)	0.90	(0.77, 1.06)
Mixed, Other, or Unknown	0.97	(0.64, 1.46)	0.89	(0.60, 1.32)	1.17	(1.00, 1.37)	1.17	(1.00, 1.37)
Education								
High school or less	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Some college	1.06	(0.73, 1.56)	1.08	(0.76, 1.53)	1.13	(0.90, 1.41)	1.16	(0.93, 1.45)
Finished College	0.77	(0.50, 1.19)	0.84	(0.56, 1.26)	1.11	(0.89, 1.39)	1.10	(0.88, 1.39)
Graduate	0.73	(0.46, 1.16)	0.90	(0.58, 1.39)	0.93	(0.72, 1.20)	0.96	(0.73, 1.26)
Gender affirming therapy								
None	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Hormone therapy only	0.85	(0.54, 1.36)	0.75	(0.47, 1.21)	1.14	(0.64, 2.01)	1.14	(0.66, 1.95)
Top surgery	0.95	(0.55, 1.66)	0.90	(0.51, 1.59)	1.45	(0.84, 2.51)	1.42	(0.85, 2.38)
Bottom surgery	0.76	(0.47, 1.23)	0.87	(0.53, 1.42)	1.34	(0.77, 2.33)	1.37	(0.81, 2.30)

Table 3. Factors associated with reporting a life partner

Participant characteristics	Transfeminine (N=328)				Transmasculine (N=323)			
	Crude PR	95% CI	Adjusted PR	95% CI	Crude PR	95% CI	Adjusted PR	95% CI
Age (years)								
≤30	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
31-40	1.47	(0.91, 2.36)	1.49	(0.92, 2.42)	1.36	(1.06, 1.75)	1.44	(1.08, 1.92)
41-50	1.54	(1.01, 2.36)	1.58	(1.02, 2.43)	1.21	(0.83, 1.75)	1.30	(0.88, 1.94)
51+	1.66	(1.13, 2.43)	1.66	(1.11, 2.49)	1.09	(0.76, 1.57)	1.21	(0.82, 1.77)
Race/ethnicity								
Non-Hispanic Whites	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Minority Groups	0.89	(0.68, 1.17)	0.96	(0.73, 1.27)	0.92	(0.72, 1.19)	0.92	(0.71, 1.19)
Mixed, Other, or Unknown	0.57	(0.34, 0.96)	0.54	(0.32,0.92)	0.88	(0.59, 1.30)	0.88	(0.59, 1.30)
Education								
High school or less	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Some college	1.15	(0.70, 1.90)	1.16	(0.71, 1.91)	1.26	(0.87, 1.83)	1.21	(0.83, 1.76)
Finished College	1.20	(0.72, 2.02)	1.11	(0.67, 1.86)	1.04	(0.70, 1.53)	0.89	(0.60, 1.33)
Graduate	1.38	(0.82, 2.31)	1.20	(0.71, 2.01)	1.01	(0.67, 1.52)	0.80	(0.52, 1.24)
Gender affirming therapy								
None	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Hormone therapy only	0.68	(0.44, 1.03)	0.59	(0.42, 0.82)	0.65	(0.35, 1.21)	0.67	(0.35, 1.28)
Top surgery	0.63	(0.35, 1.14)	0.50	(0.30, 0.85)	0.94	(0.54, 1.66)	0.93	(0.51, 1.69)
Bottom surgery	0.78	(0.51, 1.18)	0.61	(0.44, 0.85)	0.98	(0.55, 1.73)	0.92	(0.50, 1.71)

Table 4. Association between having a sexual partner in the last 12 months and depression

Participant characteristics	Transfeminine (N=288)				Transmasculine (N=297)			
	Crude PR	95% CI	Adjusted PR	95% CI	Crude PR	95% CI	Adjusted PR	95% CI
Sexual partner in the last 12 months								
No	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Yes	0.84	(0.66, 1.07)	0.73	(0.58, 0.92)	0.79	(0.62, 1.02)	0.80	(0.63, 1.02)
Age (years)								
≤30	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
31-40	0.68	(0.46, 0.99)	0.75	(0.51, 1.12)	0.67	(0.50, 0.90)	0.80	(0.57, 1.11)
41-50	0.73	(0.53, 0.99)	0.79	(0.58, 1.08)	0.43	(0.23, 0.79)	0.45	(0.24, 0.85)
51+	0.57	(0.43, 0.76)	0.62	(0.46, 0.84)	0.77	(0.53, 1.11)	0.80	(0.53, 1.19)
Race/ethnicity								
Non-Hispanic Whites	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Minority Groups	1.11	(0.84, 1.47)	1.05	(0.79, 1.40)	1.06	(0.82, 1.38)	0.87	(0.67, 1.12)
Mixed, Other, or Unknown	1.24	(0.89, 1.73)	1.17	(0.83, 1.64)	0.90	(0.59, 1.38)	0.84	(0.56, 1.25)
Education								
High school or less	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Some college	1.32	(0.76, 2.28)	1.45	(0.87, 2.43)	1.20	(0.84, 1.70)	1.31	(0.94, 1.83)
Finished College	1.07	(0.60, 1.91)	1.28	(0.74, 2.21)	0.86	(0.59, 1.27)	1.04	(0.71, 1.52)
Graduate	0.87	(0.47, 1.61)	1.17	(0.65, 2.11)	0.71	(0.45, 1.10)	0.97	(0.61, 1.55)
Gender affirming therapy								
None	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Hormone therapy only	0.71	(0.51, 0.98)	0.70	(0.50, 0.98)	0.86	(0.58, 1.27)	0.89	(0.58, 1.36)
Top surgery	0.81	(0.53, 1.25)	0.90	(0.58, 1.41)	0.50	(0.33, 0.75)	0.56	(0.36, 0.88)
Bottom surgery	0.46	(0.32, 0.67)	0.51	(0.35, 0.77)	0.58	(0.38, 0.87)	0.67	(0.41, 1.08)

Table 5. Association between having a sexual partner in the last 12 months and anxiety

Participant characteristics	Transfeminine (N=291)				Transmasculine (N=287)			
	Crude PR	95% CI	Adjusted PR	95% CI	Crude PR	95% CI	Adjusted PR	95% CI
Sexual partner in the last 12 months								
No	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Yes	2.36	(1.22, 4.56)	1.88	(0.98, 3.62)	0.96	(0.58, 1.59)	1.03	(0.63, 1.67)
Age (years)								
≤30	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
31-40	0.52	(0.21, 1.31)	0.54	(0.21, 1.35)	0.40	(0.22, 0.73)	0.71	(0.36, 1.38)
41-50	0.69	(0.35, 1.37)	0.84	(0.41, 1.71)	0.56	(0.24, 1.28)	0.96	(0.41, 2.24)
51+	0.23	(0.10, 0.54)	0.40	(0.15, 1.01)	0.35	(0.13, 0.90)	0.64	(0.22, 1.82)
Race/ethnicity								
Non-Hispanic Whites	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Minority Groups	1.66	(0.87, 3.17)	1.32	(0.66, 2.62)	1.40	(0.89, 2.21)	1.10	(0.69, 1.73)
Mixed, Other, or Unknown	1.82	(0.82, 4.04)	1.92	(0.88, 4.17)	0.90	(0.41, 1.98)	0.99	(0.45, 2.17)
Education								
High school or less	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Some college	4.81	(0.68, 33.87)	5.80	(0.91, 37.09)	0.84	(0.51, 1.37)	0.85	(0.52, 1.38)
Finished College	3.29	(0.44, 24.44)	5.62	(0.85, 36.96)	0.41	(0.23, 0.76)	0.52	(0.29, 0.96)
Graduate	1.25	(0.14, 11.45)	2.78	(0.36, 21.32)	0.21	(0.08, 0.53)	0.30	(0.11, 0.82)
Gender affirming therapy								
None	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Hormone therapy only	0.72	(0.29, 1.82)	0.67	(0.27, 1.67)	0.54	(0.30, 0.96)	0.63	(0.38, 1.05)
Top surgery	0.64	(0.19, 2.20)	0.73	(0.20, 2.75)	0.29	(0.16, 0.51)	0.39	(0.23, 0.65)
Bottom Surgery	0.24	(0.08, 0.73)	0.30	(0.10, 0.89)	0.21	(0.11, 0.42)	0.33	(0.16, 0.66)

Table 6. Association between having a lifelong partner and depression

Participant characteristics	Transfeminine (N=288)				Transmasculine (N=297)			
	Crude PR	95% CI	Adjusted PR	95% CI	Crude PR	95% CI	Adjusted PR	95% CI
Lifelong partner								
No	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Yes	0.70	(0.55, 0.90)	0.74	(0.58, 0.95)	0.70	(0.55, 0.89)	0.72	(0.56, 0.91)
Age (years)								
≤30	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
31-40	0.68	(0.46, 0.99)	0.75	(0.50, 1.11)	0.67	(0.50, 0.90)	0.84	(0.60, 1.17)
41-50	0.73	(0.53, 0.99)	0.82	(0.60, 1.13)	0.43	(0.23, 0.79)	0.49	(0.26, 0.92)
51+	0.57	(0.43, 0.76)	0.72	(0.52, 0.99)	0.77	(0.53, 1.11)	0.85	(0.56, 1.28)
Race/ethnicity								
Non-Hispanic Whites	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Minority Groups	1.11	(0.84, 1.47)	1.02	(0.77, 1.37)	1.06	(0.82, 1.38)	0.87	(0.68, 1.13)
Mixed, Other, or Unknown	1.24	(0.89, 1.73)	1.11	(0.79, 1.56)	0.90	(0.59, 1.38)	0.81	(0.55, 1.19)
Education								
High school or less	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Some college	1.32	(0.76, 2.28)	1.46	(0.86, 2.47)	1.20	(0.84, 1.70)	1.33	(0.96, 1.83)
Finished College	1.07	(0.60, 1.91)	1.35	(0.77, 2.36)	0.87	(0.59, 1.27)	1.01	(0.69, 1.46)
Graduate	0.87	(0.47, 1.61)	1.22	(0.67, 2.24)	0.71	(0.45, 1.10)	0.94	(0.59, 1.50)
Gender affirming therapy								
None	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Hormone therapy only	0.71	(0.51, 0.98)	0.68	(0.48, 0.97)	0.86	(0.58, 1.27)	0.80	(0.55, 1.18)
Top surgery	0.81	(0.53, 1.25)	0.86	(0.54, 1.37)	0.50	(0.33, 0.75)	0.52	(0.34, 0.78)
Bottom surgery	0.46	(0.32, 0.67)	0.49	(0.32, 0.74)	0.58	(0.38, 0.87)	0.63	(0.40, 0.97)

Table 7. Association between having a lifelong partner and anxiety

Participant characteristics	Transfeminine (N=291)				Transmasculine (N=287)			
	Crude PR	95% CI	Adjusted PR	95% CI	Crude PR	95% CI	Adjusted PR	95% CI
Lifelong partner								
No	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Yes	1.24	(0.69, 2.23)	1.54	(0.86, 2.75)	1.06	(0.69, 1.64)	1.14	(0.75, 1.71)
Age (years)								
≤30	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
31-40	0.52	(0.21, 1.31)	0.55	(0.21, 1.39)	0.40	(0.22, 0.73)	0.69	(0.39, 3.19)
41-50	0.69	(0.35, 1.37)	0.82	(0.40, 1.68)	0.56	(0.23, 1.28)	0.93	(0.40, 2.20)
51+	0.23	(0.10, 0.54)	0.33	(0.13, 0.83)	0.35	(0.13, 0.90)	0.62	(0.22, 1.76)
Race/ethnicity								
Non-Hispanic Whites	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Minority Groups	1.66	(0.87, 3.17)	1.43	(0.73, 2.81)	1.40	(0.89, 2.21)	1.09	(0.69, 1.73)
Mixed, Other, or Unknown	1.82	(0.82, 4.04)	1.96	(0.90, 4.27)	0.90	(0.41, 1.98)	1.00	(0.46, 2.19)
Education								
High school or less	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Some college	4.81	(0.68, 33.87)	5.43	(0.88, 33.35)	0.84	(0.51, 1.37)	0.84	(0.52, 1.36)
Finished College	3.29	(0.44, 24.44)	4.84	(0.78, 30.08)	0.41	(0.23, 0.76)	0.53	(0.29, 0.97)
Graduate	1.25	(0.14, 11.45)	2.29	(0.32, 16.46)	0.21	(0.08, 0.53)	0.30	(0.11, 0.83)
Gender affirming therapy								
None	1.00	Reference	1.00	Reference	1.00	Reference	1.00	Reference
Hormone therapy only	0.72	(0.29, 1.82)	0.71	(0.28, 1.79)	0.54	(0.30, 0.96)	0.64	(0.38, 1.08)
Top surgery	0.64	(0.19, 2.20)	0.81	(0.22, 2.96)	0.29	(0.16, 0.51)	0.39	(0.23, 0.66)
Bottom surgery	0.24	(0.08, 0.73)	0.33	(0.11, 1.00)	0.21	(0.11, 0.42)	0.33	(0.16, 0.66)