

# Comparing Gender Congruency in Nonsurgical versus Postsurgical Top Surgery Patients: A Prospective Survey Study

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**Background:** Gender dysphoria can result in reduced quality of life. Treatments include hormone replacement therapy (HRT) and gender-affirming surgery. Our study compared congruency, satisfaction, and discrimination in patients who underwent top surgery and HRT versus HRT alone. We hypothesized improved outcomes in top surgery patients but that lack of access is a common barrier.

**Methods:** Transgender and nonbinary subjects who underwent at least 6 months of HRT were recruited and answered questions on gender congruency, discrimination, and barriers to care. Surgical patients were asked about postoperative satisfaction using the BREAST-Q. A Mann-Whitney test compared survey responses between study arms.

**Results:** One hundred twelve eligible subjects completed the survey. Surgical subjects answered significantly more positively ( $P < 0.001$ ) on all questions regarding gender congruency. The greatest difference was observed in how subjects' physical bodies represented their gender identity, where the surgery group rated higher on the five-point Likert scale by 2.0 points ( $P < 0.001$ ). Surgical patients also reported less violence, verbal abuse, and discrimination ( $P < 0.003$ ). Within the hormone arm, 87.1% stated desire for surgery and 62.5% declared barriers to surgery, with cost and insurance coverage representing the most common barriers. Finally, surgical subjects reported high satisfaction on the BREAST-Q, scoring more than 3.0 in all categories of breast augmentation and more than 2.6 for breast reduction on a four-point Likert scale.

**Conclusions:** Top surgery, in addition to HRT, significantly improves gender congruency and decreases discrimination and abuse, compared with HRT alone. Unfortunately, barriers including cost and lack of insurance continue to be obstacles for care. (*Plast Reconstr Surg Glob Open* 2024; 12:e5925; doi: 10.1097/GOX.0000000000005925; Published online 19 June 2024.)

## INTRODUCTION

The transgender and nonbinary (TGNB) population is rapidly growing, with the estimated prevalence of transgender identity doubling from 2011 to 2016 in the United States.<sup>1</sup> Recent estimates of the prevalence of transgender identity in the United States range from 0.39% to 2.7%. With these estimates continuing to rise due to improved

visibility and increased willingness to self-identify, gender-affirming care must quickly adapt to this population's needs.<sup>2,3</sup>

TGNB individuals experience a higher prevalence of depression, anxiety, and suicidal ideation compared with the cis-gender population.<sup>4-9</sup> Specifically, chest dysphoria causes significant distress and correlates with increased anxiety and depression.<sup>10-12</sup> Nonsurgical care, including hormone replacement therapy (HRT), represents a mainstay of care and has been shown to improve mental well-being.<sup>13-18</sup> Chest reconstruction, also known as top surgery, is increasingly performed to treat chest dysphoria.<sup>19-24</sup> TGNB individuals seeking these interventions may

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Received for publication November 3, 2023; accepted May 1, 2024.

Presented at Plastic Surgery Research Council 2022, and the New England Society of Plastic and Reconstructive Surgeons 2022.

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DOI: 10.1097/GOX.0000000000005925

Disclosure statements are at the end of this article, following the correspondence information.

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receive HRT first and choose to undergo surgery later.<sup>25,26</sup> Of note, this is not the only pathway to transitioning: some TGNB individuals may only choose to pursue HRT and/or surgery, some may undergo surgery before HRT, and some may choose neither option.

Many studies have corroborated the relationship between HRT or top surgery and patient-centered outcomes. However, these studies have been limited in that they only evaluate masculinizing top surgery and/or do not compare surgical patients to a control group without surgery. Thus, it is still not clear whether top surgery has an additive effect on HRT compared with HRT alone. Although it is important to understand that the process of transitioning looks different based on individual goals, our study focused on evaluating the effects of top surgery and HRT compared with HRT alone in an effort to standardize our study groups. We hypothesized that gender congruency is higher in those who have had top surgery and HRT compared with HRT alone.

Additionally, we sought to explore the most common reasons patients choose not to undergo top surgery. It is critical to illuminate any potential barriers to top surgery so that systemic factors may be addressed. We hypothesized that lack of access to care is the most common reason people choose not to undergo top surgery.

Lastly, we planned to assess patient satisfaction with top surgery, specifically using the BREAST-Q, a validated questionnaire that measures patient satisfaction related to breast surgery. The metric was originally developed for cis-gender individuals and has recently been used to study transgender patients who undergo gender-affirming surgery.<sup>27–29</sup>

## METHODS

### Study Design

This was a prospective, multi-site study in Massachusetts based on patients seen at UMass Memorial Medical Center and Baystate Medical Center. The study was approved by both institutions' institutional review board.

### Cohort Selection

Participants were recruited during regular clinic visits from either an endocrine clinic or a plastic surgery clinic at UMass Memorial Medical Center or Baystate Medical Center, between January 2021 and January 2023. Self-reported TGNB subjects who were at least 18 years of age and had undergone at least 6 months of HRT were recruited. Subjects were then divided based on having received HRT alone (hormone arm) or HRT and gender-affirming top (surgery arm). (See figure, Supplemental Digital Content 1, which displays the preoperative and postoperative photographs after mastectomy and augmentation. <http://links.lww.com/PRSGO/D313>.) Only patients at least 6 months out from surgery were recruited into the surgery arm. Patients were excluded from the study if they had gender-affirming bottom or facial surgery, were not on HRT, were unable to consent, or were pregnant. All participants received a \$25 gift card for

### Takeaways

**Question:** Does undergoing top surgery, in addition to hormone replacement therapy (HRT), improve gender congruency and satisfaction, and reduce discrimination compared with HRT alone?

**Findings:** In our survey of 112 transgender and nonbinary individuals, those who underwent top surgery and HRT exhibited significantly better gender congruency and faced less discrimination and abuse than those on HRT alone. Cost and insurance issues, however, remain prevalent barriers to surgery.

**Meaning:** Top surgery alongside HRT greatly enhances gender congruency and reduces discrimination, but financial obstacles persist for many seeking the operation.

completing the questionnaire. Gift card distribution was managed in accordance with ethical guidelines, ensuring it served solely as compensation for their time to complete the survey, without impacting participant responses or research integrity.

### Survey

Participants were given a tablet to complete an anonymous survey administered through the Research Electronic Data Capture system. Each survey included four components: a standardized gender congruency scale (GCS), questions regarding recent discrimination, questions regarding potential barriers to surgery, and the BREAST-Q. (See the following link for the complete survey, <https://arcsapps.umassmed.edu/redcap/surveys/?s=EA4DFA37K8>.)

*Gender Congruency Scale:* This is a 12-item scale that assesses feelings of gender incongruence with responses meant to be independent of gender assigned at birth. The GCS is split into nine questions on gender congruency and three questions on acceptance of gender identity. Respondents rated their responses on a five-point Likert scale (never = 1; rarely = 2; sometimes = 3; often = 4; always = 5). Mean scores were calculated for each subscale. Due to the sensitive questions regarding safety and self-harm in the GCS, participants were provided with resources regarding mental health services before and after the survey.

*Recent discrimination:* This is a four-item scale assessing discrimination within the last 6 months. Participants rated their responses on a five-point Likert scale (never = 1; rarely = 2; sometimes = 3; often = 4; always = 5). Mean scores were calculated for each subscale.

*Barriers to surgery:* A “yes” or “no” question is asked on whether there are barriers to surgery. If a respondent selects “yes,” a subsequent “select all that apply” question is asked to identify the barriers, of which they may select cost; no health insurance; health insurance will not cover the cost of the surgery; cannot take time off from work; difficulty finding a surgeon; lack of social supports; other. Participants can document a specific barrier if “other” is selected.

**BREAST-Q:** Participants in the surgery arm are asked to either fill out the BREAST-Q Augmentation module, if they have had breast augmentation, or the BREAST-Q Reduction module, if they have had a mastectomy. The BREAST-Q was originally intended for cis-gendered individuals and has recently been used to study transgender patients who undergo gender-affirming surgery due to the lack of validated transgender-specific patient-reported outcome measures.<sup>27-29</sup> The language was kept unchanged for standardization and a note preceding the questionnaire specifies this cis-normative language. Responses were recorded on a four-point Likert scale (very dissatisfied = 1; somewhat dissatisfied = 2; somewhat satisfied = 3; very satisfied = 4). Mean scores were calculated for each BREAST-Q module.

### Statistical Analysis

Surveys were de-identified and survey responses were collected and separated by surgery versus hormone arm. A two-tailed Mann-Whitney test was used to compare survey responses between the two study arms. Statistical significance was determined at a *P* value less than 0.05. Mann-Whitney tests were performed with GraphPad Prism v8 (GraphPad Software, Inc., San Diego, Calif.).

## RESULTS

### Cohort Demographics

In total, 112 eligible participants completed the survey (Table 1). Sixty-three (56.3%) participants were found to be female-at-birth, and 49 (43.7%) were male-at-birth.

**Table 1. Demographics**

	n	%
<b>Assigned sex at birth</b>		
Female	63	56.3
Male	49	43.7
<b>Current gender identity</b>		
Female	44	39.3
Male	50	44.6
Nonbinary or gender nonconforming	18	16.1
<b>Age</b>		
18–20	17	15.2
21–30	42	37.5
31–40	27	24.1
> 40	26	23.2
<b>Race</b>		
White	82	73.2
Black or African American	10	8.9
Asian	4	3.6
Native American	3	2.7
Mixed	13	11.6
<b>Ethnicity</b>		
Hispanic or Latino	19	15.7
<b>Occupation</b>		
Student	16	14.3
Part-time	20	17.9
Full-time	50	44.6
Unemployed	26	23.2

Forty-four (39.3%) participants identified themselves as female sex, 50 (44.6%) identified as male sex, whereas 18 (16.1%) identified themselves as nonbinary or gender nonconforming. Participants had a mean age of 32.5, with most patients (37.5%) falling in the 21- to 30-years category. White made up the majority race (73.2%) in our cohort, followed by Black or African American (8.9%), Asian (3.6%), and Native American (2.7%). Of the participants, 15.7% identified themselves ethnically as Hispanic or Latino. Full-time employed participants made up most of our cohort (44.6%), followed by unemployed participants (23.2%), students (14.3%), and part-time workers (17.9%).

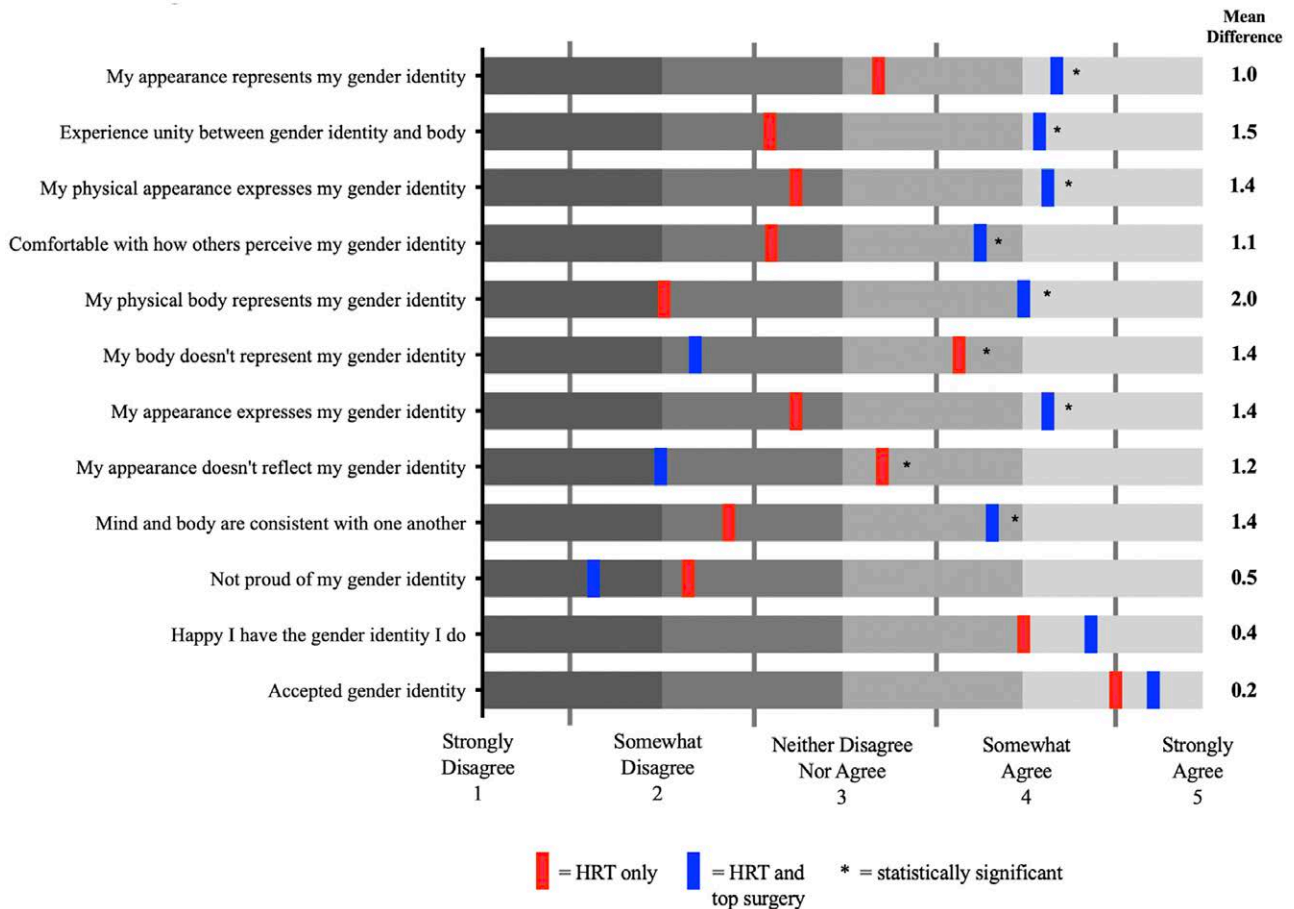
Sixty (53.6%) participants had exclusively received HRT therapy and 52 (46.4%) had received HRT in combination with top surgery (Table 2). For patients who received HRT only, 25 (40.3%) identified themselves as female sex, 25 (40.3%) identified as male sex, and 12 (19.4%) identified as nonbinary. Among patients who received HRT and top surgery, 17 (34.0%) identified themselves as female sex, 30 (60.0%) identified as male sex, and three (6.0%) identified as nonbinary.

### HRT and Top Surgery Are Associated with Gender Congruency

Subjects in the HRT and top surgery group answered significantly more positively on nine out of nine questions of the GCS (*P* < 0.001; Fig. 1). Although the direction of positivity on the Likert scale varies based on wording of the survey, positive responses (regardless of whether the Likert number was high or low) were defined as more gender congruent. The greatest difference was observed in how the subjects' physical body represented their gender identity, where the surgery group responded more positively and rated higher on the five-point Likert scale by 2.0 points (4.0 versus 2.0, *P* < 0.001). This was followed by the difference in the subjects' experience of unity between their gender identity and their body, where the surgery group rated higher by 1.5 points (4.1 versus 2.6, *P* < 0.001), suggesting a more positive unity between gender identity and their body. When this data was stratified by assigned sex at birth, there was no change in results. In both male-at-birth and female-at-birth groups, the surgery group answered significantly more positively on all questions. For questions regarding acceptance of gender

**Table 2. Treatment Groups**

	n	%
<b>Treatment groups</b>		
HRT only	60	53.6
HRT and top surgery	52	46.4
<b>HRT only</b>		
Female	25	40.3
Male	25	40.3
Nonbinary	12	19.4
<b>HRT and top surgery</b>		
Female	17	34.0
Male	30	60.0
Nonbinary	3	6.0



**Fig. 1.** Effect of top surgery on gender congruency and acceptance of gender identity according to the gender congruency scale.

identity, there was no statistical difference between pride, happiness, or acceptance of the subject’s gender identity between the two study arms ( $P = 0.118, 0.103, \text{ and } 0.082$ , respectively). Again, stratifying the data by assigned sex at birth did not change these results.

**HRT and Top Surgery is Associated with Significantly Less Harassment, Violence, and Discrimination Compared with HRT Alone**

Subjects in the surgical arm demonstrated significantly less harassment or violence due to gender identity, (1.9 versus 2.5,  $P = 0.004$ ), verbal abuse due to gender identity (1.9 versus 2.5,  $P = 0.002$ ), discrimination due to gender identity (2.0 versus 2.7,  $P < 0.001$ ), and problems with getting medical services due to gender identity (1.5 versus 2.0,  $P = 0.041$ ; Fig. 2).

Although surgical patients were less likely to experience recent discrimination, 30 of 50 (60.0%) surgical patients stated at least one instance of harassment or violence based on gender identity in the last 6 months, and an even higher 36 of 50 (72.0%) reported at least one instance of discrimination based on gender identity. Yet, these percentages were still higher in the HRT-only group, where 57 of 62 (91.9%) stated at least one recent instance of harassment or violence and 53 of 62 (85.5%) reported at least one instance of discrimination based on gender identity.

**Most Transgender and Nonbinary People Have a Desire for Top Surgery, but Several Barriers Exist**

Within the HRT-only group, 87.1% (54 of 62 subjects) stated a desire for gender-affirming top surgery (Table 3). Of these subjects, 22 reported barriers related to cost, 14 stated a lack of full health insurance coverage, two stated a lack of health insurance, seven reported an inability to take off time from work, 12 described difficulties finding a surgeon, 11 reported lack of social support, and two described a prohibitive comorbidity.

For patients who had already received HRT and top surgery, initial barriers to surgery were also present. Twenty-eight of these subjects reported barriers related to cost, 18 lacked full health insurance coverage, five lacked health insurance, 19 were unable to take time off from work, 20 stated difficulties finding a surgeon, and 16 lacked social support. Despite barriers, 100% of respondents would recommend this surgery to TGNB patients. Of note, not every respondent who had top surgery completed this question.

**Patients Are Satisfied with Their Top Surgery Based on the BREAST-Q**

Transgender female and nonbinary participants were on average satisfied with all aspects of their breast augmentation surgery. They rated size, firmness, and position of their breasts

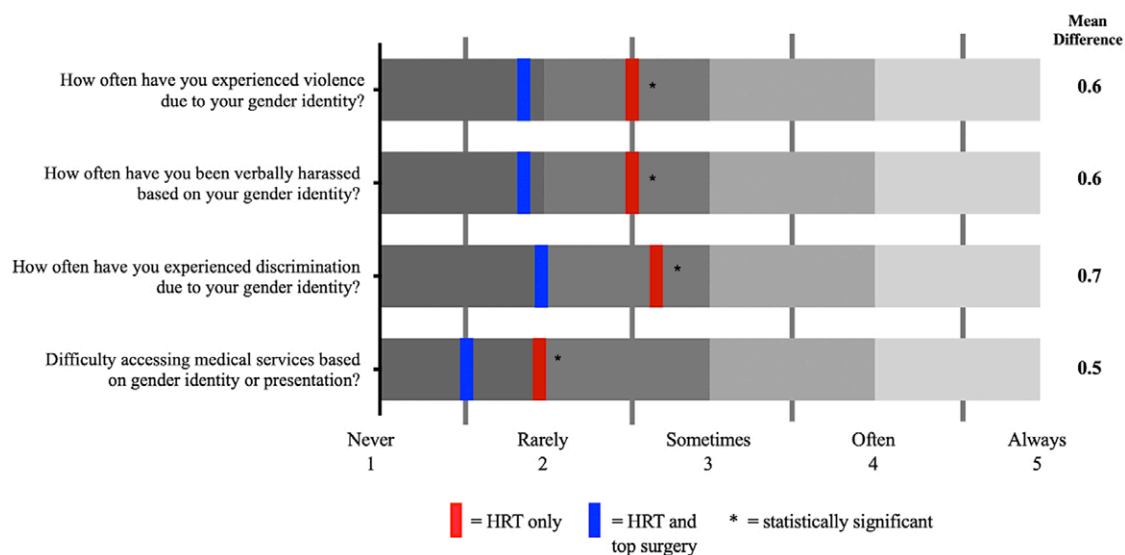


Fig. 2. Participants who underwent top surgery reported significantly less recent discrimination.

Table 3. Top Surgery is Desired and Recommended despite the Major Barriers That Exist

	n	%
<b>HRT only</b>		
<i>Desire top surgery</i>		
Yes	54	87.1
No	8	12.9
<i>Barriers exist</i>		
Yes, cost	22	24.4
Yes, lack of full insurance coverage	14	15.6
Yes, complete lack of insurance	2	2.2
Yes, unable to take off time from work	7	7.8
Yes, unable to find surgeon	12	13.3
Yes, lack of social support	11	12.2
Yes, due to a prohibitive condition	2	2.2
No	20	22.3
<b>HRT and top surgery</b>		
<i>Would recommend top surgery to others</i>		
Yes	33	100.0
No	0	0.0
<i>Barriers exist</i>		
Yes, cost	28	51.9
Yes, lack of full insurance coverage	18	33.3
Yes, complete lack of insurance	5	9.3
Yes, unable to take off time from work	19	35.2
Yes, unable to find surgeon	20	37
Yes, lack of social support	16	29.6
No	3	5.6

\*Percentages for questions related to top surgery barriers do not add up to 100% because these questions were filled out in a “select all that apply” format.

with the highest mean satisfaction scores of 3.4 (Fig. 3). Breast feel, breast shape when not wearing a bra, and breast proximity when not wearing a bra were scored with the lowest satisfaction scores of 3.1. All other questions each had a mean score of 3.3 in the BREAST-Q Augmentation module.

Transgender male and nonbinary participants were also satisfied with all aspects of their bilateral mastectomies

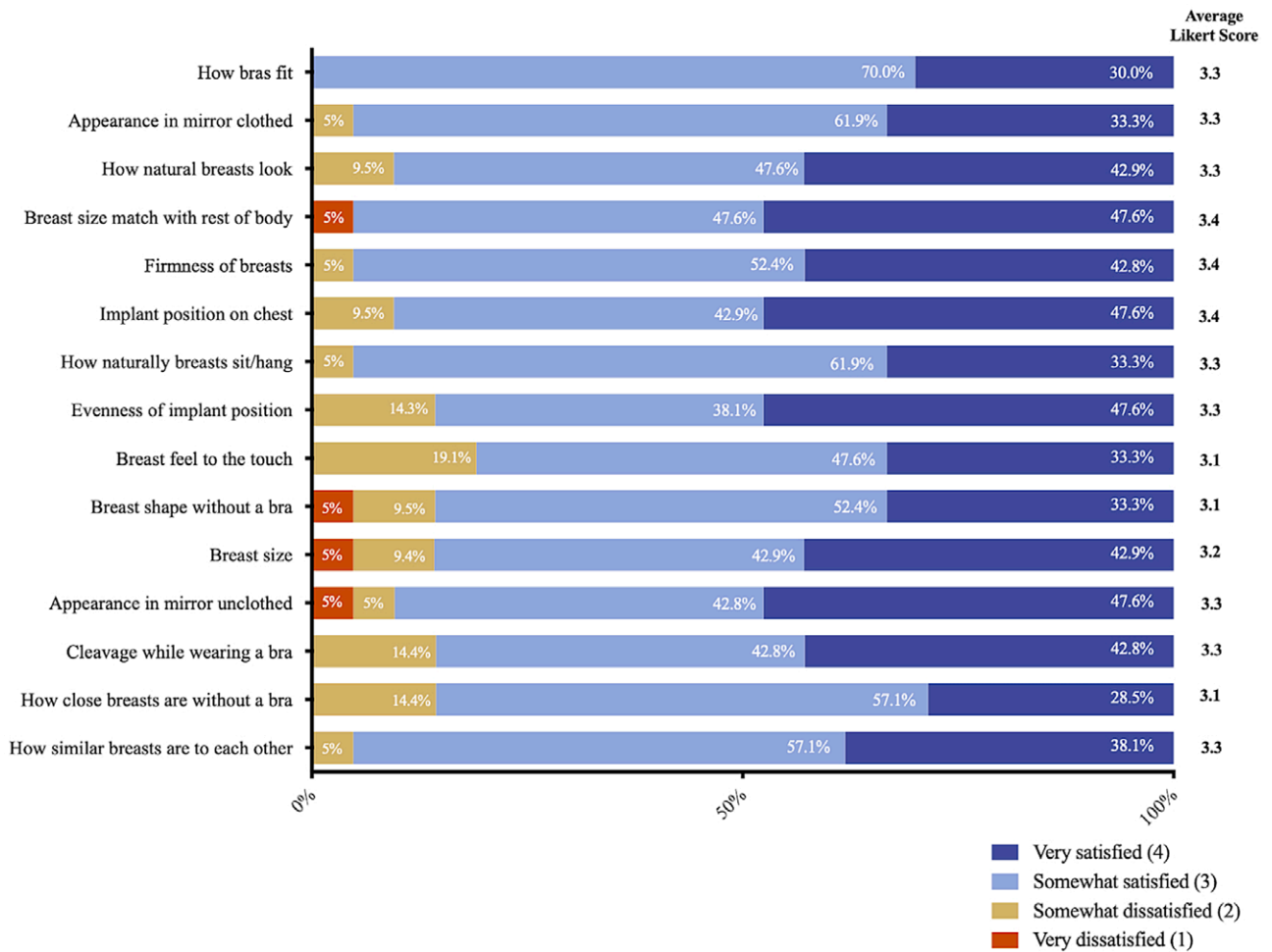
(Fig. 4). Breast shape when not wearing a bra was rated with the highest satisfaction score of 3.6, followed by breast appearance when clothed, overall appearance in the mirror when clothed, and scar location, which received scores of 3.5 each. Breast shape when wearing a bra received the lowest score of 2.6, followed by bra comfortability which received a score of 2.7. These questions, however, were retained from the cis-normative language of the original BREAST-Q Reduction module.

## DISCUSSION

This study provides insight into the experiences of TGNB individuals seeking top surgery and HRT. Our results suggest that top surgery with HRT significantly improves gender congruency and decreases harassment and discrimination when compared with those who received HRT alone.

Several studies have indicated the importance of top surgery and HRT on gender congruency.<sup>21-24</sup> However, these studies are limited in several ways. Ascha et al<sup>24</sup> found improvements in gender congruency after top surgery; however, the population was limited to female-at-birth adolescents and young adults. Poudrier et al<sup>23</sup> assessed quality of life and patient-reported satisfaction in masculinizing top surgery in broader age ranges but was also limited to female-at-birth patients. Lane et al<sup>30</sup> found that gender-affirming mastectomy improved quality of life but was limited to only transmasculine patients. A large prospective cohort study by Owen-Smith et al<sup>26</sup> was able to assess transmasculine and transfeminine individuals, yet did not include a control group. Our study is the first to show improved gender congruency in those who receive top surgery in addition to HRT compared with HRT alone in both female-at-birth and male-at-birth patients.

Although the previously mentioned studies did evaluate gender dysphoria under limited circumstances, none addressed the effect of surgery on patients’ experience of

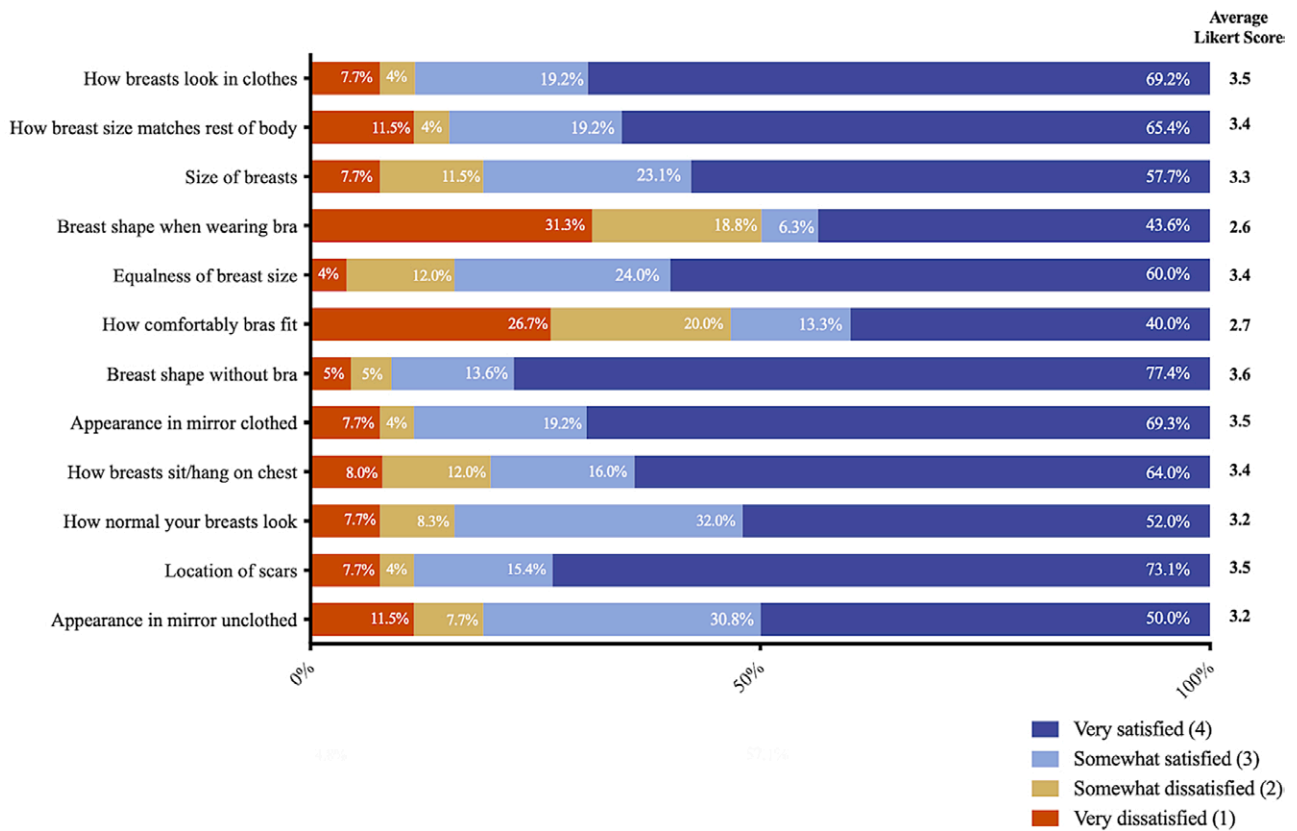


**Fig. 3.** Male-at-birth patients were satisfied with their top surgery according to the BREAST-Q Augmentation module.

discrimination or harassment. Our results show that those who received top surgery in addition to HRT reported significantly less harassment or violence, verbal abuse, and discrimination, and experienced fewer problems with accessing medical services. This suggests that top surgery not only improves gender congruency but also influences the treatment of TGNB individuals in society.

However, our data also show that top surgery certainly does not eliminate discrimination and harassment. Although surgical patients experienced significantly less discrimination overall, 55.6% of these patients stated at least one instance of harassment or violence based on gender identity. This is higher than the estimates by Prunas et al,<sup>31</sup> who reported that 36% of patients in Italy receiving any gender-affirming surgery experienced at least one episode of harassment, violence, or discrimination. However, given the difference in cultural normal between countries, it should not be inferred that the rate of discrimination would be equivalent. Literature from the United States specifically focusing on the effect of top surgery on discrimination is sparse, so future studies should explore societal biases and develop solutions to address this problem.

Despite top surgery having a significant positive impact on TGNB patients in our study, barriers to surgery persist. Cost barriers included lack of health insurance coverage, difficulty finding a surgeon, lack of social support, and prohibitive comorbidities; cost and insurance issues were the most commonly reported. Despite Massachusetts’ policies mandating insurance coverage for gender-affirming procedures like top surgery, 23.9% of HRT-only patients and 42.6% of top surgery plus HRT patients still cited insurance issues as a barrier to surgery.<sup>32,33</sup> Thus, even in states with supportive legislation, challenges persist in the implementation of these policies. A study by LaValley et al<sup>34</sup> showed that the Northeast had the greatest proportion of insurance preauthorization for top surgery; thus, compared with other regions with less comprehensive support for transgender health rights, we can assume that cost becomes a more prohibitive factor. Despite lacking data from other states, the contrast seen in Massachusetts’ legal framework and the reported barriers highlights the complexity of healthcare access across the United States and underscores the need for ongoing policy evaluation and adaptation to ensure support for TGNB individuals. Local representatives



**Fig. 4.** Female-at-birth patients were satisfied with their top surgery according to the BREAST-Q Reduction module.

should implement supportive community initiatives, states should align and refine healthcare policies, and national organizations (such as the National Center for Transgender Equality) must lead in advocacy and policy development, ensuring TGNB individuals receive equitable healthcare. Insurance coverage is just one of the several barriers reported by survey respondents. These findings align with conclusions drawn by Puckett et al,<sup>35</sup> who found that “financial issues” were the most reported barrier to gender-affirming care.

Patients who had top surgery scored highly on satisfaction metrics based on the BREAST-Q for both gender-affirming mastectomy and augmentation. Other studies have adapted the BREAST-Q for TGNB individuals receiving top surgery; though, none have focused on patients already receiving HRT. These studies were also limited in their focus on either male-at-birth or female-at-birth individuals.<sup>23,27,28,36</sup> Despite other studies using the BREAST-Q for TGNB individuals, it is essential to recognize that these questions are designed for cis-gender people. A recent work by Klassen et al<sup>37</sup> has gone into the development of the GENDER-Q, a validated questionnaire for individuals receiving gender-affirming treatment. This will be a critical step in obtaining accurate patient-reported outcomes on an already vulnerable patient population.

Additionally, our data are congruent with recent literature regarding the documented psychosocial benefits of facial feminization surgery, which include improvements in anxiety, affect, depression, and social isolation.<sup>38</sup> The

impact of visible physical changes from facial feminization surgery on social interactions aligns with the positive psychosocial benefits from our study; however, the lack of standardized reporting for gender-affirming procedures complicates direct comparisons.

This study has several limitations. Our study relied on self-reported data, which may be subject to recall bias. Furthermore, our study was limited to a cross-sectional design, therefore causality cannot be determined and long-term outcomes cannot be evaluated. Our study’s sample size restricts the ability to conduct covariate-adjusted analyses, potentially leaving unmeasured confounding by factors. The nonparticipation of all eligible individuals introduces the possibility of selection bias. Additionally, our study’s focus on the combined effects of HRT and top surgery compared with HRT alone was chosen to standardize research parameters, not to suggest a universal model of gender transition. We acknowledge the diversity of transition goals and that some may not pursue both or either of these interventions as part of their journey. Despite these limitations, this study provides valuable insight into the experiences of transgender individuals who have undergone hormone therapy with and without top surgery and highlights the need for further research in this field.

## CONCLUSIONS

Our results suggest TGNB individuals on HRT have improved gender congruency, experience less

discrimination, and report high satisfaction after receiving top surgery. However, significant barriers to surgery still exist. Thus, it is crucial for healthcare providers and policymakers to address these barriers and ensure that all individuals have access to the surgical interventions they need to align their bodies with their gender identity.

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### DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

### ACKNOWLEDGEMENTS

*We would like to thank Dr. Janice Lalikos for her mentorship. We would also like to thank Dalton Mourao and Dr. Victoria Prete for their help with consenting, survey distribution, and IRB communication. This study has been conducted in accordance with all established ethical guidelines and requirements.*

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