INTRODUCTION

Cosmetic surgery is a core discipline of plastic surgery and the demand for cosmetic procedures continues to grow. Resident training in cosmetic surgery has historically been a challenge. Considering most consumers must pay out of pocket, patients have high expectations and little tolerance for complications and revisions. Patients seeking cosmetic surgery consider surgeon reputation, experience, and board certification status, which cannot be achieved until completion of residency. For these reasons, graduating residents often feel less prepared to perform cosmetic surgery. In 2014, Kraft et al found that only 36% of residents felt comfortable integrating aesthetic surgery into their practice after graduation. Later that year, the Accreditation Council for Graduate Medical Education increased the minimum number of required aesthetic cases from 50 to 150 to address resident preparedness. This new requirement prompted programs to enhance cosmetic surgery training using new methods. Among these modalities, resident cosmetic clinics (RCCs) emerged as the frontrunner and were voted the most useful source of aesthetic surgery training by both resident and program directors. As RCCs grew in prevalence, so did resident-reported comfort with aesthetic surgery, from 36% in 2014 to 59% in 2017.

RCCs have been operating for decades and continue to increase in number. Today, an estimated 60%–70% of programs have a dedicated RCC. The structure varies by institution, but most RCCs are held one day a week year-round, and are operated by senior residents (postgraduate year [PGY] 4–6). Residents conduct the initial patient consult, assemble a plan, and then discuss this plan with a supervising faculty member who either oversees or directly assists residents during the procedure. Postoperatively,

Disclosure: The authors have nothing to declare in relation to the content of this article.
patients are scheduled to follow up with their resident plastic surgeon, allowing trainees to monitor patient satisfaction and practice longitudinal care.

RCCs offer unique benefits to both patients and trainees. For residents, they enhance cosmetic surgery training with increased autonomy in patient care, which is associated with a higher degree of resident confidence in performing cosmetic procedures. For patients, they provide cosmetic procedures at discounted rates, often times at 50% of the standard surgeon’s fee. They also provide high patient satisfaction and have consistently proved to be safe, with complication rates comparable to the national standard.

Because RCCs have proved invaluable for resident aesthetic education, continuing to grow this learning modality is important. To do so, it is paramount to consider the point-of-view of the consumer. Although many studies have analyzed resident and attending views on RCCs, none have assessed the opinion of consumers. To our knowledge, this is the first study that explores consumer perceptions of RCCs.

As aesthetic surgery is a “buyer beware” market, wherein many nonplastic surgeons, and even nonsurgeons, continue to market invasive and noninvasive aesthetic procedures, consumer attitudes toward RCCs are important to understand. We hypothesize that plastic surgery consumers are largely unaware of RCCs but receptive toward receiving care at them due to their affordability.

**METHODS**

The primary aim of this study was to assess a priori knowledge of RCCs in a cohort of plastic surgery consumers. After providing a brief description of RCCs, we also assessed consumers’ comfort with receiving cosmetic procedures at RCCs and their beliefs about the safety of RCCs when compared with attending clinics. Secondary aims included identifying the minimum percent discount and the minimum PGY resident provider that consumers deemed acceptable.

This study was approved by the Wake Forest School of Medicine Institutional Review Board (IRB00067931). Potential participants were recruited using mTurk, an online crowdsourcing platform that provides quick, efficient, and reliable workers who complete tasks such as surveys for a nominal fee. Using mTurk, many investigators have gained public insight on topics pertinent to the field of plastic and reconstructive surgery.

Amazon Mechanical Turk workers who lived in the United States were 18 years or older, and had an approval rating of 95% or higher were invited to complete a 30-question survey. Participants were screened by whether they had cosmetic surgery in the past or were interested in getting cosmetic surgery in the future. Additionally, participants were asked two attention-check questions about the current month and year. Responses were excluded if participants incorrectly answered attention-check questions, took the survey more than once, or if the survey was incomplete. Following completion, respondents were compensated $0.15.

**Data Collection**

Demographic information was obtained, and to assess consumer knowledge and comfort with RCCs, respondents were first asked whether they knew the difference between a resident and attending physician, whether they had ever heard of RCCs before, and the minimum PGY trainee from whom they were comfortable receiving cosmetic care.

Next, we provided a brief description of the pathway to becoming a plastic surgeon, highlighting the difference between a resident and attending physician, and RCCs (Fig. 1). After this information was acknowledged by the respondent, we asked about perceptions of clinic safety; percent discount desired when compared with traditional attending clinics; and level of comfort with five categories of cosmetic procedures: breast, body, face and neck, fat reduction, and noninvasive. These categories aligned with the American Society of Plastic Surgeons’ Cosmetic Procedures website, and a link to this website was provided to respondents as a reference. Overall comfort with cosmetic procedures at RCCs was determined by averaging each respondent’s answer to these five categories.

To further evaluate preferences, consumers were asked to choose between receiving cosmetic procedures from residents versus attending physicians in two scenarios, abdominoplasty and Botox injections, which were made realistic by providing cost and wait times consistent with the authors’ institution. All questions were written in Basic English and used laymen terms for cosmetic procedures, as listed on the American Society of Plastic Surgeons Cosmetic website.

**Statistical Analysis**

Responses were compared by using Pearson’s chi-square and Fisher’s exact tests for categorical variables and Mann-Whitney and Kruskal-Wallis tests for continuous variables. Multinomial logistic regression models were then constructed to determine the key predictors of prior knowledge of RCCs, beliefs about RCC safety, comfort with RCCs, and provider preference. All models were adjusted for age, gender, race, education, income, marital status, region of residence, past cosmetic procedures, whether respondent has biological children, and whether respondent works in healthcare. Belief about safety of RCCs was also added as a covariate to models where appropriate. Analyses were performed using R Statistical Software (version 4.0.2; R Foundation for Statistical Computing, Vienna, Austria), and a P-value less than 0.05 was considered significant.

**RESULTS**

After screening for quality, 815 responses were included. On average, consumers were 37.5 years old, predominantly women, White, and graduates of a 4-year or 2-year degree program. Consumers were roughly equally distributed among the five geographic regions of the United States, and the majority earned between $25,000 and $49,999. Sixty percent of consumers had biological children, 37% worked in healthcare, and 65% were married or had a partner (Table 1).
Experience and Interest in Cosmetic Surgery

As shown in Table 2, 409 (50%) consumers had prior cosmetic surgery. The most common prior procedures involved the face and neck (51%). The remaining 406 (50%) consumers were interested in future cosmetic procedures, with the most common being noninvasive (58%) procedures.

Public Knowledge of RCCs and Their Safety

Overall, 703 (86%) of the total consumers knew the difference between a resident and attending. Consumers with children (89% versus 83%, \( P = 0.021 \)) and those who worked in healthcare (90% versus 84%, \( P = 0.012 \)) were more likely to know the difference. No other demographic characteristics were predictive.

When asked if they had ever heard of RCCs before, 365 (45%) consumers answered yes. After adjusting for all covariates, knowledge of RCCs was found to be higher in consumers who were men \([\text{OR} 2.2 (1.5-3.4), P < 0.001]\), married \([\text{OR} 2.6 (1.6-4.3), P < 0.001]\), had children \([\text{OR} 1.8 (1.1-3.0), P = 0.016]\), or worked in healthcare \([\text{OR} 4.6 (3.0-7.1), P < 0.001, \text{Table 3}]\). Additionally, those who had prior cosmetic procedures were more likely to be

Table 1. Demographics

| Characteristic            | Total (N = 815) |
|---------------------------|----------------|
| Age, mean ± SD            | 37.5 ± 11.3    |
| Gender, n (%)             |                |
| Women                     | 468 (57.7%)    |
| Men                       | 334 (41.2%)    |
| Other                     | 9 (1.1%)       |
| Race/ethnicity, n (%)     |                |
| White                     | 606 (74.4%)    |
| African American          | 77 (9.4%)      |
| Asian                     | 46 (5.6%)      |
| Multiracial               | 39 (4.8%)      |
| Hispanic                  | 27 (3.3%)      |
| Other                     | 20 (2.5%)      |
| Education, n (%)          |                |
| High school graduate      | 47 (5.8%)      |
| Some college              | 104 (12.8%)    |
| 2-year or 4-year degree   | 467 (57.3%)    |
| Graduate (Master’s or     | 197 (24.2%)    |
| Professional) degree      |                |
| Geography, n (%)          |                |
| Midwest                   | 183 (22.5%)    |
| Northeast                 | 161 (19.8%)    |
| Southeast                 | 242 (29.7%)    |
| Southwest                 | 139 (17.1%)    |
| Northwest                 | 90 (11.0%)     |
| Income, n (%)             |                |
| < $10,000                 | 40 (5.0%)      |
| $10,000–$24,999           | 86 (10.8%)     |
| $25,000–$49,999           | 262 (32.0%)    |
| $50,000–$74,999           | 219 (27.5%)    |
| $75,000–$99,000           | 113 (14.2%)    |
| ≥$100,000                 | 75 (9.4%)      |
| Has children              | 492 (60.4%)    |
| Works in healthcare       | 501 (60.9%)    |
| Marital status            |                |
| Married                   | 533 (65.4%)    |
| Unmarried                 | 282 (34.6%)    |

Table 2. Past Experience and Future Interest in Cosmetic Procedures

| Procedure type          | Total (N = 815) |
|-------------------------|----------------|
| Past Ever had cosmetic procedures? | 409 |
| Breast                  | 119 (29%)      |
| Body                    | 133 (33%)      |
| Face and neck           | 207 (51%)      |
| Fat reduction           | 190 (47%)      |
| Noninvasive             | 115 (28%)      |
| Other                   | 32 (8%)        |
| Future Interested in future cosmetic procedures? | 406 |
| Breast                  | 117 (29%)      |
| Body                    | 130 (32%)      |
| Face and neck           | 155 (38%)      |
| Fat reduction           | 150 (37%)      |
| Noninvasive             | 237 (58%)      |
| Other                   | 15 (4%)        |

Categories were defined using the American Society of Plastic Surgeons’ web page on cosmetic procedures, which was available to respondents during the survey. The categories were as follows: Breast (augmentation, reduction, implants, lifts); Body (tummy tuck, arm lift, thigh lift, body lift, buttock enhancement, body contouring, mommy makeover); Face and Neck (nose surgery, eyelid surgery, chin surgery, ear surgery, brow lift, face lift, neck lift, cheek reduction or enhancement); Fat reduction (liposuction, nonsurgical fat reduction); Noninvasive (Botox, laser hair removal, dermabrasion or microdermabrasion, chemical peel, dermal fillers, skin rejuvenation, spider vein treatment); and Other (not specified above).
aware of RCCs [OR 13.3 (8.8-20.7), P < 0.001]. Geography was also associated with knowledge of RCCs: consumers living in the Northwest were more likely to know about RCCs [OR 2.5 (1.2–5.3), P = 0.018].

When asked about safety at RCCs, 616 (76%) of consumers believe RCCs are equally as safe as attending clinics. Consumers who were men [OR 1.7 (1.1–2.5), P = 0.009], married [OR 2.3 (1.5–3.5), P < 0.001], or worked in healthcare [OR 2.1 (1.4–3.4), P = 0.001] were more likely to believe that RCCs are safe after adjusting for all other variables (Table 3). This belief was also shared by consumers who had prior cosmetic procedures [OR 1.9 (1.3–2.9), P = 0.001]; however, those who were in the highest income bracket (> $100,000) were less likely to believe that RCCs are safe [OR 0.3 (0.1–0.8), P = 0.019].

**Cost Preference**

When asked about the minimum percent discount desired at an RCC, the mean was 54.7% ± 20.6% off an attending clinic’s price.

**Hypothetical Scenarios**

When given a choice between a resident with lower cost and wait time or an attending with higher cost and wait time in two scenarios, consumers predominantly chose residents (Figs. 3, 4). Consumers were more likely to choose residents for noninvasive Botox injections versus abdominoplasty (60% versus 46%, P < 0.001).

For abdominoplasty, 46% of consumers chose residents, 37% chose attendings, and 17% were indifferent (Fig. 3). After accounting for all other variables, having biological children or belief that RCCs are safe were predictive of choosing a resident or being indifferent. However, female gender was predictive of choosing an attending.

### Table 3. Results of Multivariable Logistic Regression

|                        | Knowledge of RCCs* | Safety of RCCs* | Comfort with RCCs† |
|------------------------|-------------------|----------------|-------------------|
| **OR 95% CI**          | **OR 95% CI**     | **OR 95% CI** |
| **Gender‡**            |                   |                |                   |
| Men                    | 2.2 (1.5–3.4)     | 1.7 (1.1–2.5)  | 1.9 (1.3–2.7)     |
| **Geography¶**         |                   |                |                   |
| Northwest              | 2.5 (1.2–5.3)     | 0.3 (0.1–0.8)  | 0.3 (3.3–7.1)     |
| **Income∥**            |                   |                |                   |
| > $100,000             | 13.3 (8.8, 20.7)  | 1.9 (1.3–2.9)  | 1.9 (1.3–2.7)     |
| Has children           | 1.8 (1.1–3.0)     | 2.1 (1.4–3.4)  | 2.1 (1.4–3.4)     |
| Works in healthcare    | 4.6 (3.0–7.1)     | 2.3 (1.5–3.5)  | 2.3 (1.5–3.5)     |
| Married                | 2.6 (1.6–4.3)     | —              | 4.8 (3.3–7.1)     |
| Believes RCCs are safe | —                 | —              |                   |

*Demographic and clinical variables entered into multivariate regression were: age, gender, race, education, income, marital status, region of residence, past cosmetic procedures, whether respondent has biological children, and whether respondent works in healthcare.

†All of the above variables and whether respondent believes RCCs are as safe as attendings’ clinics.

‡Reference variable: women.

¶Reference variable: Southeast.

∥< $10,000.

OR, odds ratio; CI, confidence interval.

The overall comfort with receiving cosmetic surgery at RCCs was mixed: 215 (26.4%) consumers were comfortable, 318 (39%) were neutral, and 282 (34.6%) were uncomfortable. Using multivariate regression, predictors were identified for those who were comfortable or neutral with receiving cosmetic procedures at RCCs (Table 3). Consumers who were men [OR 1.7 (1.1–2.5), P = 0.009], married [OR 2.3 (1.5–3.5), P < 0.001], or worked in healthcare [OR 2.1 (1.4–3.4), P = 0.001] were more likely to believe that RCCs are safe after adjusting for all other variables (Table 3). This belief was also shared by consumers who had prior cosmetic procedures [OR 1.9 (1.3–2.9), P = 0.001]; however, those who were in the highest income bracket (> $100,000) were less likely to believe that RCCs are safe [OR 0.3 (0.1–0.8), P = 0.019].

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Consumers were most comfortable receiving noninvasive and fat reduction procedures at RCCs and least comfortable getting face, body, and breast procedures at RCCs (P < 0.001, Fig. 2).

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**Fig. 2.** Level of comfort by different procedure. Mean comfort with receiving different types of cosmetic procedures at RCCs with error bars denoting SD. Kruskal-Wallis test was used to compare the respondent’s comfort with receiving care at RCCs by procedure type, P < 0.001.
For Botox injections, 60% of consumers chose residents, 26% chose attendings, and 14% were indifferent (Fig. 4). Interestingly, in this scenario, female gender was predictive of choosing residents or being indifferent. Being unmarried and belief that RCCs are safe were also predictive of choosing residents or being indifferent. Having a history of past cosmetic procedures was predictive of choosing an attending.

**DISCUSSION**

Prior studies show that consumers care most about surgeon reputation, experience, and board certification status, which cannot be achieved until completion of residency.6,7 Our results conflict with this finding: while most consumers knew the difference between a resident and attending, nearly two-thirds were still comfortable receiving care from senior residents. Interestingly, this did not translate to overall comfort with RCCs, despite them being run primarily by PGY-6s, as consumers were mostly neutral (39%) and only a minority were comfortable (26%) with receiving care at RCCs.

Despite this low self-reported “comfort” with RCCs, in two hypothetical scenarios, consumers predominantly chose residents over attendings. This demonstrates that lower cost and wait time may be just as, or even more, important to patients than the provider’s level of training. Furthermore, consumers were more likely to choose residents for noninvasive procedures.

Most RCCs offer a variety of invasive and noninvasive procedures. Walker et al showed that 81% of procedures performed at an RCC over a 13-year period were major procedures, with the most common being abdominoplasties, liposuction, and breast augmentation. Less than 20% of procedures were minor.16 However, minor cosmetic procedures dominate the total case load in the United States: of the 18.1 million cosmetic procedures reported in 2019, 90% were minimally invasive. This was a 2% increase from 2018, and a 237% increase from 2000.27 With minor procedures growing in popularity, it is not surprising that our results show consumers are most comfortable receiving minor procedures at RCCs.

Multiple studies have demonstrated RCC safety, showing complication and revision rates comparable to those of attendings.14-17 After describing resident clinics and the training process to become a chief resident to our consumers, the majority felt that RCCs are just as safe as attending clinics. Importantly, those who believe RCCs are safe were more likely to feel comfortable or neutral receiving care from RCCs. Better advertising data on the safety of RCCs may help promote consumer confidence and interest in resident clinics. A recent study showed that fewer than 11% of programs have a website for their RCC, and of those, none share before/after photographs, a list of procedures, or prices.28 Because surgeon reputation is important to patients, lack of this
information may stymie consumer confidence and interest in RCCs.6,7

Most RCCs provide some form of financial incentive to attract consumers. The most frequently reported is a 50% discount from the standard surgeon’s fee (± cost of facility, anesthesia, and supplies).11 Our study shows that on average, consumers would want a 55% discount to receive cosmetic surgery at an RCC, which is largely consistent with many clinics’ existing billing models.

Limitations

Although mTurk is a powerful crowdsourcing tool with results comparable to traditional surveys, this study is not without limitations.29,30 First, this study is inherently biased in that the survey was only available to those with internet access and mTurk accounts. Additionally, reports show that mTurk workers are often younger and more educated.31 We are also unable to determine how many workers viewed the survey and chose not to participate and whether there were significant demographic differences between those who did and did not participate.

Furthermore, our study did not comment on consumer preferences on other aspects of RCCs, such as clinic organization, level of attending involvement, and payment structure. Further studies are needed to elucidate consumer preferences on these important topics.

CONCLUSIONS

Nearly a third of residency programs do not have an RCC; thus, an understanding of consumer opinion can help those programs design an RCC that is palatable to consumers.3,11 For programs with existing RCCs, understanding of consumer opinion can reveal mechanisms for increasing patient volume and improving the delivery of care.

Consumers who believe RCCs are safe are more comfortable with receiving cosmetic procedures at an RCC. For programs who are considering opening RCCs or expanding their influence, emphasizing RCC safety is a must as it shapes consumer behavior. Furthermore, knowing that more than two-thirds of consumers are comfortable receiving care from senior residents, but less than a third are comfortable with junior residents, can help in structuring RCCs. Lastly, that the price point of 55% off standard price is acceptable to consumers can help RCCs decide what prices to offer. The findings of this study can be used to design and improve RCCs to better prepare the next generation of plastic surgeons.

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