

INTRODUCTION

- Craniofacial and plastic surgery aim to reconstruct facial anomalies to approach “ideal normal” appearance.
- However, facial areas attracting the most visual attention in a variety of craniofacial pathologies are poorly understood, with a limited number of studies employing eye-tracking technology to successfully characterize these areas of interest.
- Hemifacial microsomia (HFM) is ideal for studying gaze patterns due to its predilection for specific facial regions, most commonly the jaws and ear.

OBJECTIVES

- This study aimed to determine lay person visual attention toward pre- and post- jaw reconstruction of HFM patients using eye-tracking technology.
- We hypothesized that visual attention would differ between faces with visible anomalies, such as those pre- and postoperative surgery for jaw correction in HFM.
- Specifically, we predicted that visual attention would be directed toward the affected side before, as compared to after, correction.

METHODS

- Participants in this study viewed seventeen publicly available front-facing pairs of patients pre- and post- corrective jaw surgery for HFM.
- Images were standardized in size and applied to black backgrounds. Images were presented in right-to-left and left-to-right orientation to correct for known left gaze bias and to improve statistical power.
- Participant visual fixations were captured with the Tobii Pro Nano eye tracker. Participants completed two trials of an eye-tracking task with brief calibration (about 60 seconds) performed before each run.

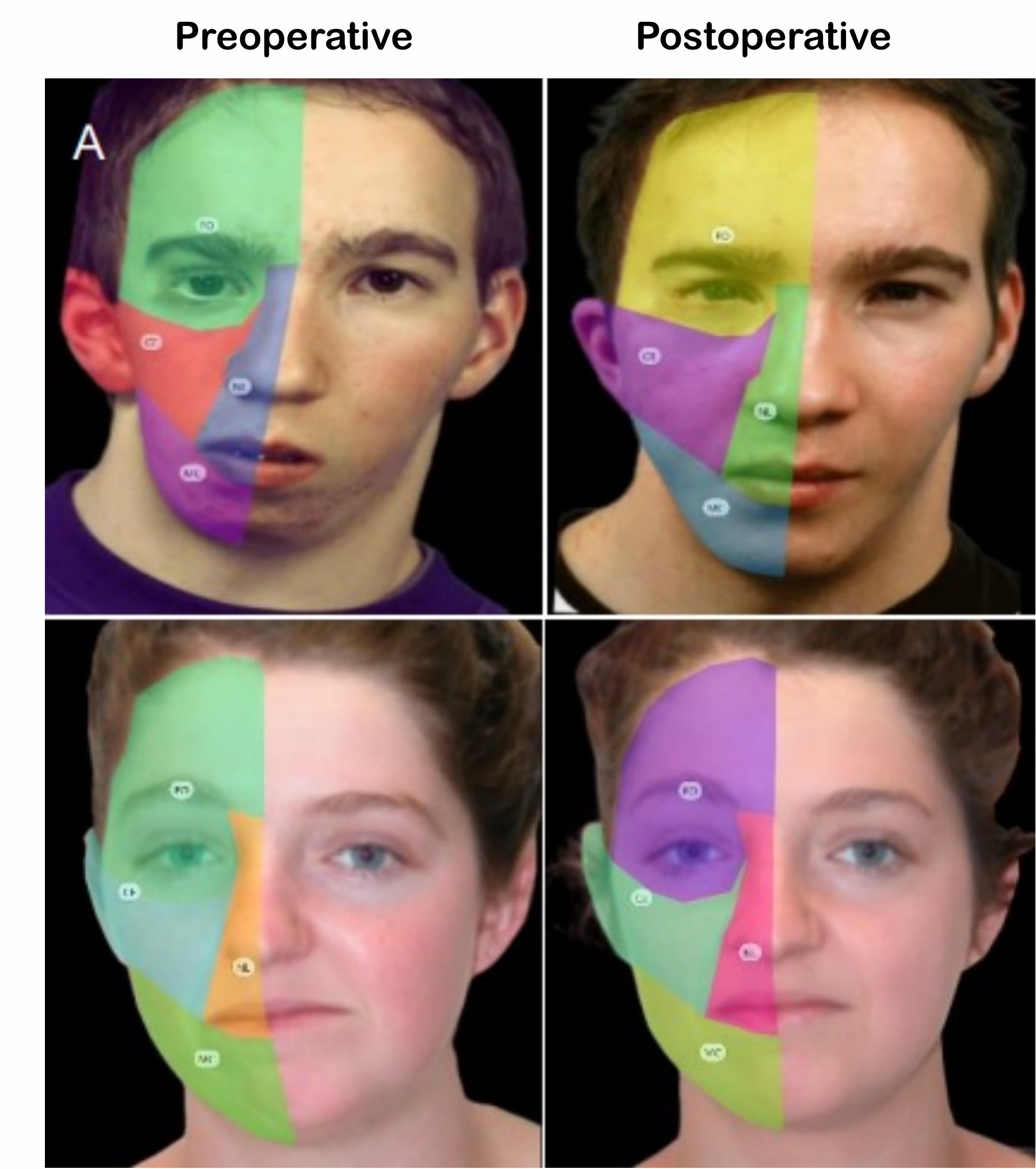


Figure 1. Four areas of interest (AOIs) were defined on each face: cheek and ear (CE), forehead and orbit (FO), mandible and chin (MC), and nose and lips (NL).

- For each AOI, we quantified the number of visual fixations in each image. Visual fixations were defined as a visual gaze in a single location 200 ms or longer.
- A power analysis computed with 1,000 Monte Carlo simulations using data reported in Linz 2016 suggested a sample of 60 participants would provide sufficient power to detect the effects of interest ($1-\beta > 0.8$).
- Linear mixed effect models (LMEMs) in R Studio tested whether locations of participant fixations were affected by surgical correction of HFM.
- For comparison, a null model was estimated with a corresponding Akaike information criterion (AIC) value, an estimation of prediction error.
- Models with higher AIC values relative to the null model were determined to be non-predictive. Statistical significance was defined as $\alpha = 0.05$ (two-tailed).

RESULTS

Table 1. Participant Demographics	
	N (%)
Total Participants	60
Sex assigned at birth	
Female	38 (63.3)
Male	22 (36.7)
Race*	
White	36
Asian	25
Black/African American	11
American Indian	0
Other	1
Prefer not to answer	2
Ethnicity	
Not Hispanic or Latino	54 (90.0)
Hispanic or Latino	6 (10.0)
Average Age (SD)	26.2 (7.3)
Average years of education (SD)	16.6 (2.6)

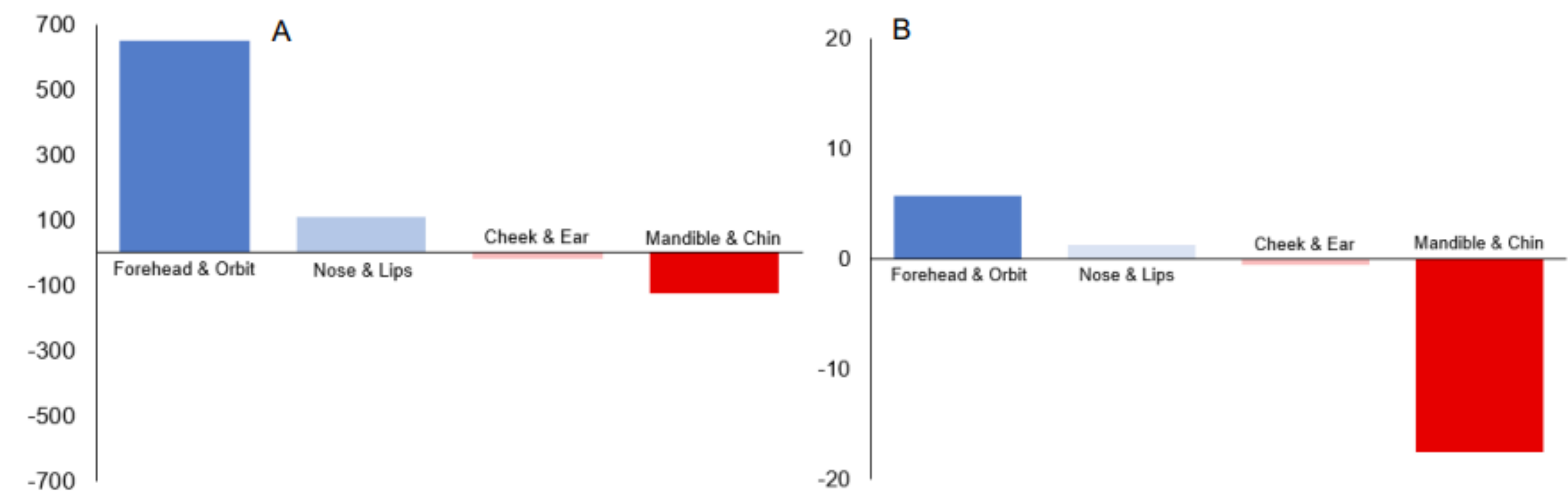


Table 2. Number of Fixations by Areas of Interest					
Area of Interest	Total	Preoperative	Postoperative	Difference	p
Forehead and orbit	23350	11350	12000	650	< 0.00001*
Nose and lips	17031	8460	8571	111	> 0.05
Cheek and ear	5666	2841	2825	-16	> 0.05
Mandible and chin	1307	716	591	-125	< 0.001*
Totals	47354	23367	23987		

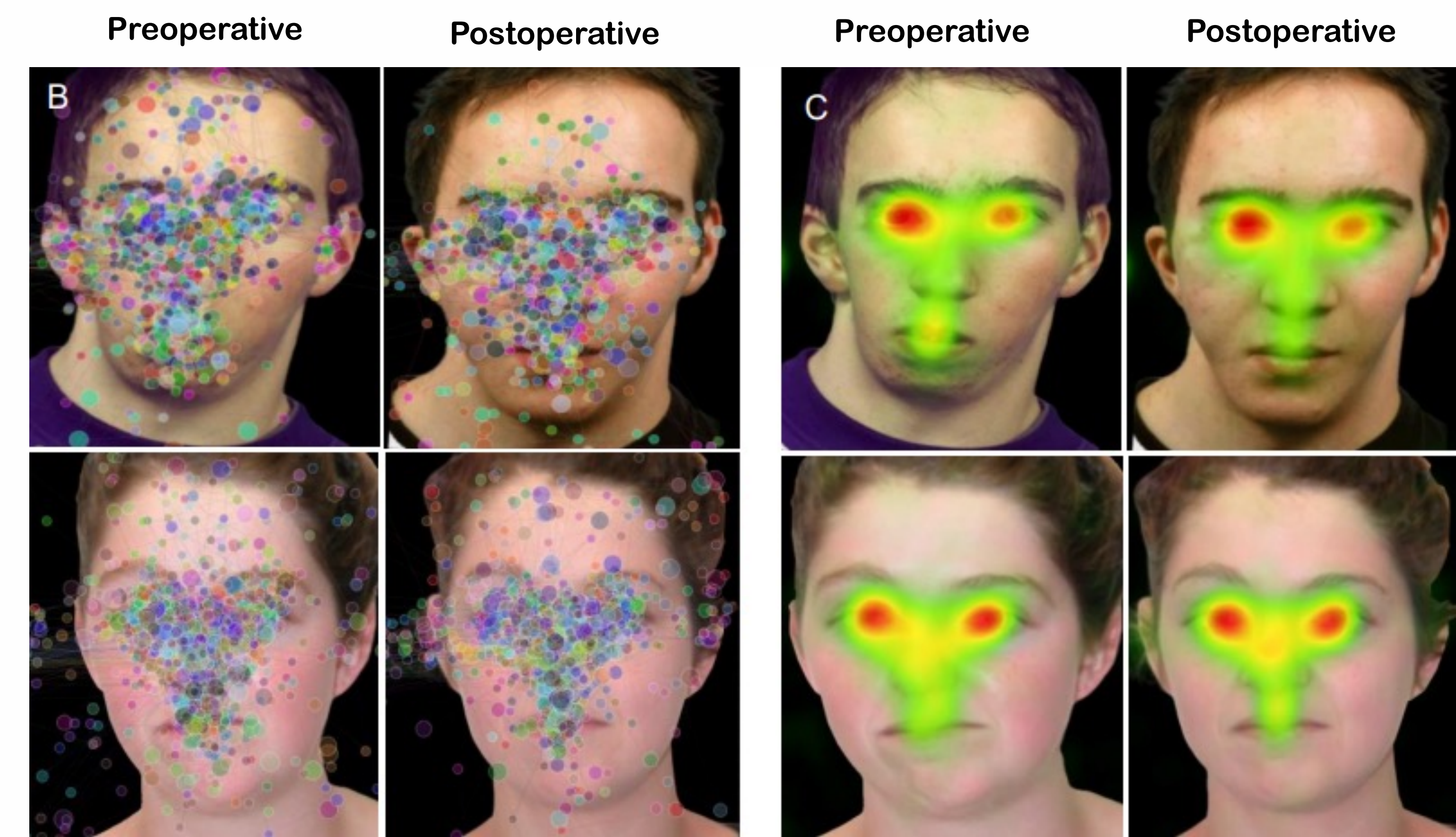


Figure 1: Mapping of visual fixations. A: Example areas of interest (AOIs) demarking forehead and orbit, cheek and ear, nose and lips, and chin and mandible; B: heatmaps representing density of fixations across all participants; C: gaze plot demonstrating gaze order and duration of fixation (represented by circle diameter) across all participants.

CONCLUSION

- Following corrective jaw surgery for HFM, laypersons demonstrated significantly less visual attention to the mandible and chin and increased visual attention to the forehead and orbit.
- These findings suggest postoperative improvement towards aesthetic normalcy may reduce visual attention to previously anomalous anatomy.

ACKNOWLEDGEMENTS

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