

Supplemental Material S10. Sex- and race-associated differences in impairment profiles and effects.

Sex- and Race-Associated Differences in Impairment Profiles

Sex and race were primarily included as control variables in the present study. Nonetheless there were significant differences across sexes and races for many of the MBSImP components. Supplemental Material S11 shows the p values of each sex- and race-associated odds ratio for each MBSImP component, and Supplemental Material S12 shows the corresponding odds ratios and confidence intervals. For sex, Male patients had significantly worse odds of having worse impairment than Female patients for Lip Closure (C1) and Bolus Hold (C2) in the Oral Domain, for all Pharyngeal components (with the exception of Soft Palate Elevation – C7 [$p = .46$]), and for Esophageal Clearance (C17) and Penetration/Aspiration [all $ps < .02$]. For race, one consistent finding was that in the Oral Domain, Black/African American patients had significantly higher odds of having worse impairment than Asian patients for all components except Mastication (C3) [all $ps < .05$]. In addition, in the Pharyngeal Domain Black/African American and White patients, as well as patients all other patients (i.e. “Other” and Not Reported) had significantly higher odds of having worse impairment than Asian patients for Soft Palate Elevation (C7), Tongue Base Retraction (C15), and Pharyngeal Residue (C16) [all $ps < .02$].

Sex- and Race-Associated Effects

Sex and race were also included in the present study as control variables. However, the present analysis revealed sex- and race-associated differences in impairment. In particular, female patients had consistently less severe impairment than male patients, especially in the pharyngeal domain, and Black patients had more severe impairment than Asian patients in the Oral, but not Pharyngeal domains. These findings are consistent with studies that have found worse pharyngeal impairment in male patients (in PD: Dumican et al., 2023; in the general dysphagic population: Kassem et al., 2022), and found worse oral but not pharyngeal impairment in Black patients with stroke (Daniels et al., 2017). These differences are likely not simply due to differences in the prevalence of particular diagnoses because diagnosis was controlled for when examining effects of sex and race, and thus these domain-specific sex and race related differences are the effects when diagnosis is held constant. However, these apparent physiologic differences may reflect differences across sex and race in prevalence *subtypes* of particular diagnoses. There is already evidence that there are racial disparities in dysphagia prevalence, therefore it is possible that there are also disparities among diagnosis subtypes within dysphagia (Bussell & González-Fernández, 2011; Gonzalez-Fernandez et al., 2008; Krekeler et al., 2024; Zaghloul et al., 2024; Zheng et al., 2023). In addition, outside of dysphagia, there is substantial evidence that race-related disparities are often connected with social determinants of health (Babatunde et al., 2021; Dalsania et al., 2022; Norton et al., 2016; Wesselman et al., 2021). We could not test the extent to which these apparent differences in physiology across race and sex were caused by social determinants of health given that no such variables were entered into the present dataset with sufficient frequency to be used in the present analysis. Thus, although the present study shows that there are apparent differences in the physiology of dysphagia across

race and sex, the causes of these differences are unknown, and any speculation about their sources, should be taken simply as speculation until additional studies can be completed. Future studies that attempt to understand the causes of these race- and sex-associated disparities should likely do so in more diagnostically homogeneous and controlled populations, while also should including social determinants in their analyses.