

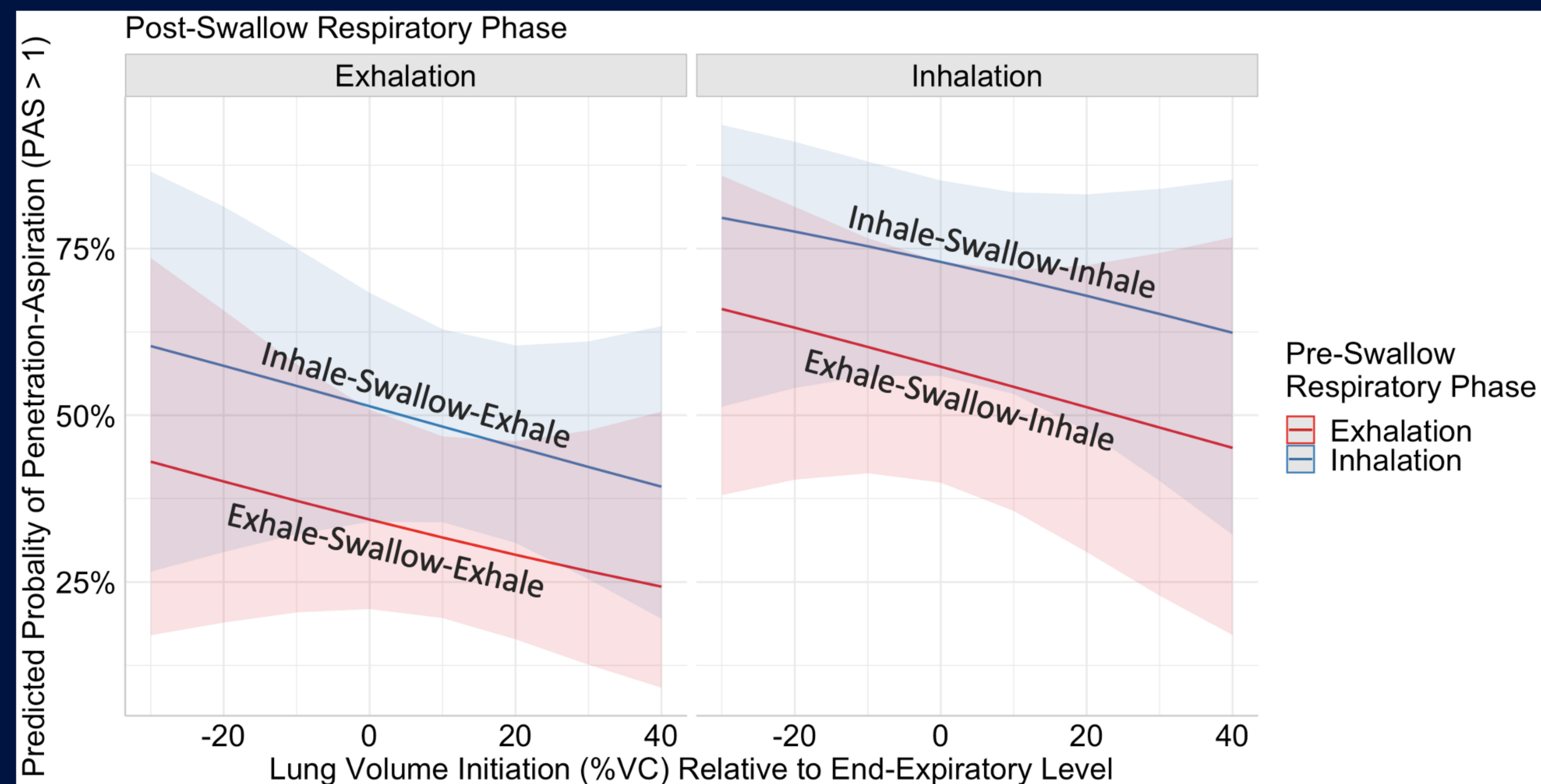
## BACKGROUND

- Respiratory-swallow coordination (RSC) is thought to be important for safe and efficient swallowing and is often impaired in people with Parkinson's disease (PD)<sup>1-5</sup>
- Limited empirical evidence exists demonstrating a direct relationship between RSC and swallowing in PD<sup>6</sup>
- The aims of this study were to assess the relationship between RSC with pharyngeal residue, penetration and aspiration in PD

## METHODS

- RSC was assessed in 24 people with PD across 11 swallowing tasks
- RSC outcomes included pre- & post-swallow respiratory phase, lung volume initiation, and pause duration
- FEES was used to assess swallowing outcomes during each swallowing task
- The PAS<sup>7</sup> and a 100-point visual analogue scale were used to judge the presence and severity of penetration-aspiration and residue filling/covering the oro- and hypo-pharynx, epiglottis, vestibule, vocal folds, and subglottis
- Oropharyngeal, hypopharyngeal, and epiglottic residue were considered 'present' if scored rated  $\geq 4/100$ ; vestibular, vocal fold, and subglottic residue were considered present if rated  $\geq 1/100$ ; penetration-aspiration was considered present if PAS was  $\geq 2$
- Mixed effects models were used to statistically analyze if RSC significantly predicted the presence and severity of pharyngeal residue, penetration, and aspiration, and if so, post-hoc analyses were used to determine which RSC variables contained within the full statistical model were most related to the functional swallowing outcomes

# Respiratory-swallow coordination is related to the presence and severity of pharyngeal residue, penetration, & aspiration in people with Parkinson's disease



**Figure 1:** Relationship between the presence of penetration-aspiration and the pre-swallow respiratory phase, post-swallow respiratory phase, and lung volume initiation at the onset of swallowing

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## RESULTS

Respiratory-Swallow Coordination		
	p-value	Effect Size
"Presence" of Residue, Penetration, Aspiration		
Oropharynx	< .0005*	0.206
Hypopharynx	0.176	0.025
Epiglottis	0.693	0.009
Laryngeal Vestibule	< .0005*	0.087
Vocal Folds	< .0005*	0.099
Subglottis	< .0005*	0.118
PAS	< .0005*	0.096
"Severity" of Residue, Penetration, Aspiration		
Oropharynx	0.419	0.005
Hypopharynx	0.352	0.022
Epiglottis	0.575	0.005
Laryngeal Vestibule	0.019	0.054
Vocal Folds	0.065	0.085
Subglottis	0.015	0.166
PAS	< .0005*	0.096

Note: "\*" represents a significant difference after applying a Holm-Bonferroni adjustment to correct for multiple comparisons

**Post-Hoc Results:** Post-swallow inhalation predicted six of the fourteen swallowing outcomes, compared to three outcomes for pre-swallow inhalation, one for lower lung volume initiation, and one for longer pause durations

## CONCLUSIONS

- The pathophysiology of residue, penetration, and aspiration in PD is multifactorial in nature
- While the effects of RSC on swallowing function were small but significant, results from this study support the hypothesis that RSC plays an important role in functional swallowing impairments in PD
- Exhalations before and after the swallow were associated with a higher likelihood of safe and efficient swallows in PD (figure 1), providing support for researching the effects of training exhale-swallow-exhales as a way to improve swallowing in PD<sup>8-10</sup>