

## **Abstract**

**Title:** Neuromuscular control of vocal loudness in adults and children as a function of cue

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**Purpose:** This study examined the neuromuscular modulation of speech breathing, as measured by chest wall intermuscular coherence, during different cues for vocal loudness. **Methods:** Fifteen healthy young adults (20-32 yrs) and fifteen typically-developing children (6-10 yrs) participated. Peak coherence between the intercostal and oblique muscles was analyzed during maximum phonation and speech in three cue conditions: 1) Conversational loudness; 2) Verbal instruction to speak at perceived twice conversational loudness, and 3) In multi-talker babble noise. Acoustic, respiratory kinematics, and electromyographic recordings were obtained for each task and condition. **Results:** In children and adults, different cues for increasing vocal loudness produced similar increases to vocal sound pressure level. Adults produced comparable intermuscular coherence values across cue and task in both the low frequency (15-59 Hz) and the high frequency (60-110 Hz) bandwidths. However, significant cue-related differences were observed among children, such that significantly greater 15-59 Hz coherence occurred during speech at conversational loudness compared to both cued conditions. **Conclusion:** We observed significant cue-related changes to neuromuscular modulation of speech breathing in children, but not in adults, indicating that the respiratory control circuits involved in vocal loudness adjustment undergo change across the lifespan and become stable against perturbation in adulthood.