

Abstract

Emergence and Refinement of Respiratory Chest Wall Intermuscular Coherence Associated with Speech and Non-speech tasks in Younger and Older Children

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Purpose: The present study was designed to advance our understanding of neuromuscular modulation of voluntary breathing, as assessed by chest wall muscle activation patterns and chest wall intermuscular coherence, for non-speech and speech tasks, in typically developing children and adolescents. **Method:** Fifteen children (6-9 years) and 15 adolescents (13-16 years) participated. Respiratory kinematics using variable inductance plethysmography along with intercostal and oblique muscular activity derived from surface electromyography were acquired. Tasks completed varied on lung volume and tracheal-oral pressure (e.g., vital capacity, maximum phonation duration varying in loudness, phrase repetition varying in loudness, expiratory threshold loading). **Results:** Preliminary analyses showed that kinematics derived from both younger and older participants were similar to one another. Younger children used greater muscular effort than older children for tasks requiring larger lung volume excursions and higher tracheal-oral pressures. On average, younger children exhibited lower intermuscular coherence. **Conclusions:** Initial results indicated that whereas breathing patterns were similar between the two groups of children, neuromuscular control differed on tasks requiring increased vocal loudness and maximum expiratory pressures. Younger children may have employed a distributed neural control network whereas older children used a single organizing common cortical drive for neuromuscular control of chest wall.