Summary of motor speech disorder

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Abstract and Methods

It is very common for children with persistent speech disorders (PSD) to also have the presence of moderate motor deficits. This causes clinicians to wonder if speech disorders and motor deficits occur from a shared neurological base, as this is currently undetermined (Redle, et al., 2015, p. 47). Therefore, a case study consisting of twenty-four child participants, using functional MRI (fMRI) evidence, was done. Twenty-four children were tested in this case study- twelve with PSD and twelve without. First, the children participated in behavioral evaluations using standardized motor assessments (Redle, et. al., 2015, p. 47). Parents recorded their own child's functional measures (Redle, et al., 2015, p. 47). For the fMRI testing, the child participants participated in a finger tapping task. From the results, a linear model grouped brain regions linked with finger tapping in both groups and regions of the brain that contrasted between the groups. The relation between the regional fMRI results and fine motor skill was measured with regression analysis (Redle, et al., 2015, p. 47).

Introduction

The introduction section of this article begins by discussing statistics. It states that inaccuracies in speech production are common for 14% to 25% of children ages 5 and under (Jessup, Ward, Cahill, and Keating, 2008). However, these percentages begin to decrease to 3. 8%- 9% as children begin elementary school (National-Institue-onDeafness-and-Other-Communication-Disorders, 2010; Shriberg, Tomblin, & McSweeny, 1999).

One can now infer that the children who still have the appearance of speech disorders past the early school years may have PSD or a possible neurological development delay. Next, modern research backs the notion that motor skills as well as speech and language have common developmental trajectories. Children with speech disorders appear to have this same association but it is slightly deferred. Additionally, these children tend to have difficulties in activities that involve rhythm and coordinated movement (Peter & Stoel-Gammon, 2008).

Neuroimaging has proven itself to be extraordinary for viewing the differences in neural structures and pathways of children with PSD. This tool allows researchers and clinicians to get a new perspective on the anatomical and functional markers of developmental speech disorders (Redle, et al., 2015, p. 49). A study featuring the KE family, an infamous family that has a large amount of speech disorders, featured positron emission tomography (PET) scans to see what parts of the brain are implicated during speech production. The cerebellum, pre-, and supplementary motor cortex regions were noted as active (Belton, Salmond, Watkins, Vargha-Khadem, & Gadian, 2003; Vargha-Khadem et al., 1998; Watkins et al., 2002). The KE family members that do not have any speech disorder showed gray matter volume differences in various parts of the brain including: the Broca’s area, the pre-supplementary motor area, and more (Belton et al., 2003; Vargha-Khadem et al., 1998; Watkins et al., 2002). Lastly, an fMRI can also provide insight to neural activation patterns for fine motor praxis. This is why a finger tapping task was used in the current study. In fact, the main goal of this study was to look into the relation between the motor praxis and behavioral presentations

in children with PSD, and how they compare to typically developing children (Redle, et al., 2015, p. 49). The researchers hypothesized that the children with PSD would have lower scores than the typically developing children (Redle, et al., 2015, p. 49).

Results

Table 1 provided all the scores of the speech and language assessments. Children with PSD had considerably lower scores on the speech, language, and IQ assessments. However, the averages for the language and IQ results were seen to be within normal limits of both groups (Redle, et al., 2015, p. 49). Table 2 incorporated the scores of the motor testing assessment. When it came to the assessment done in a school environment, the scores of both groups were relatively similar in their total participation (Redle, et al., 2015, p. 49). Additionally, both groups scored similarly on other tests that covered activities such as using computer equipment, putting on articles of clothing, etc. Also, presented in Table 2 were the results for the Diadochokinesia (DDK) rates; the results showed that children diagnosed with PSD were scored lower for two out of the five DDK syllable measures (two syllable combination and three syllable combination) (Redle, et. al., 2015, p. 49).

Section 2. 1 discusses the composites and comparison between the groups. As for activation patterns, similarities were seen between both groups during the cued finger-tapping process. The groups also had common cranial regions of activation including: the bilateral cerebellum, bilateral middle and inferior occipital regions, and fusiform gyrus. (Redle, et. al., 2015, p. 50). When comparing both groups, there were great differences observed in the

bilateral posterior cerebellum where the control group showed less activation (Redle, et. al., 2015, p. 50). Next, Section 2. 2 discusses correlation analysis noted for the PSD group. For the left-hand pegboard score, regional activation was seen in the left striatum, left middle frontal gyrus, right precentral gyrus, and superior frontal gyrus. This demonstrates a positive correlation (Redle, et. al., 2015, p. 50). As for the left and right-hand pegboard score, regional activation in the left striatum, left supramarginal gyrus, left insula, and precentral frontal gyri was seen. This demonstrates a positive correlation as well (Redle, et. al., 2015, p. 52).

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