

## Accepted Manuscript

Title: Neural correlates of phonological processing: Disrupted in children with dyslexia and enhanced in musically trained children

Authors: Jennifer Zuk, Meaghan Perdue, Bryce Becker, Xi Yu, Michelle Chang, Nora Maria Raschle, Nadine Gaab



PII: S1878-9293(17)30264-5  
DOI: <https://doi.org/10.1016/j.dcn.2018.07.001>  
Reference: DCN 586

To appear in:

Received date: 23-12-2017  
Revised date: 27-6-2018  
Accepted date: 13-7-2018

Please cite this article as: Zuk J, Perdue M, Becker B, Yu X, Chang M, Maria Raschle N, Gaab N, Neural correlates of phonological processing: Disrupted in children with dyslexia and enhanced in musically trained children, *Developmental Cognitive Neuroscience* (2018), <https://doi.org/10.1016/j.dcn.2018.07.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Neural correlates of phonological processing:  
Disrupted in children with dyslexia and enhanced in musically trained children**

Jennifer Zuk<sup>1,2</sup>, Meaghan Perdue<sup>1</sup>, Bryce Becker<sup>1</sup>, Xi Yu<sup>1</sup>, Michelle Chang<sup>1</sup>, Nora Maria Raschle<sup>1,3</sup>, Nadine Gaab<sup>1,2,4\*</sup>

<sup>1</sup> Laboratories of Cognitive Neuroscience, Division of Developmental Medicine, Department of Medicine, Boston Children's Hospital, Boston, MA 02115, USA

<sup>2</sup> Harvard Medical School, Boston, MA 02115, USA

<sup>3</sup> Department of Child and Adolescent Psychiatry, University of Basel, Psychiatric University Hospital, Basel, Switzerland

<sup>4</sup> Harvard Graduate School of Education, Cambridge, MA 02138, USA

\*Address correspondence to:

Dr. Nadine Gaab

1 Autumn Street #643

Laboratories of Cognitive Neuroscience

Department of Medicine, Division of Developmental Medicine

Boston Children's Hospital/Harvard Medical School

Boston, MA, 02115, USA

Email: Nadine.gaab@childrens.harvard.edu

**Abstract**

Phonological processing has been postulated as a core area of deficit among children with dyslexia. Reduced brain activation during phonological processing in children with dyslexia has been observed in left-hemispheric temporoparietal regions. Musical training has shown positive associations with phonological processing abilities, but the neural mechanisms underlying this relationship remain unspecified. The present research aims to distinguish neural correlates of phonological processing in school-age typically developing musically trained children, musically untrained children, and musically untrained children with dyslexia utilizing fMRI. A whole-brain ANCOVA, accounting for gender and nonverbal cognitive abilities, identified a main effect of group in bilateral temporoparietal regions. Subsequent region-of-interest analyses replicated temporoparietal hypoactivation in children with dyslexia relative to typically developing children. By contrast, musically trained children showed greater bilateral activation in temporoparietal regions when compared to each musically untrained group. Therefore, musical training shows associations with enhanced bilateral activation of left-hemispheric regions known to be important for reading. Findings suggest that engagement of these regions through musical training may underlie the putative positive effects of music on reading development. This supports the hypothesis that musical training may facilitate the development of a bilateral compensatory neural network, which aids children with atypical function in left-hemispheric temporoparietal regions.

**Highlights:**

- First fMRI investigation of phonological processing in musically trained children
- Greater bilateral activation with music training in regions disrupted in dyslexia
- Implications for music training to support compensatory neural network in dyslexia

**Keywords:** music training, fMRI, children, dyslexia, phonological processing

**1. Introduction**

Download English Version:

<https://daneshyari.com/en/article/8838213>

Download Persian Version:

<https://daneshyari.com/article/8838213>

[Daneshyari.com](https://daneshyari.com)