

# Brain

- [Oxford Journals](#)
- [Medicine](#)
- [Brain](#)
- [Volume 131, Number 3](#)
- Pp. 866-876

◀ [Previous Article](#) | [Next Article](#) ▶

**Brain Advance Access originally published online on February 20, 2008**

Brain 2008 131(3):866-876; doi:10.1093/brain/awn013

© 2008 The Author(s)

This is an Open Access article distributed under the terms of the [Creative Commons Attribution Non-Commercial License](#)

(<http://creativecommons.org/licenses/by-nc/2.0/uk/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## Music listening enhances cognitive recovery and mood after middle cerebral artery stroke

Teppo Särkämö<sup>1</sup>, Mari Tervaniemi<sup>1</sup>, Sari Laitinen<sup>2</sup>, Anita Forsblom<sup>2</sup>, Seppo Soinila<sup>3</sup>, Mikko Mikkonen<sup>1</sup>, Taina Autti<sup>4</sup>, Heli M. Silvennoinen<sup>4</sup>, Jaakko Erkkilä<sup>2</sup>, Matti Laine<sup>5</sup>, Isabelle Peretz<sup>6</sup> and Marja Hietanen<sup>3</sup>

<sup>1</sup>Cognitive Brain Research Unit, Department of Psychology, University of Helsinki, and Helsinki Brain Research Centre, Helsinki, <sup>2</sup>Department of Music, University of Jyväskylä, Jyväskylä, <sup>3</sup>Department of Neurology and <sup>4</sup>Department of Radiology, Helsinki University Central Hospital, Helsinki, <sup>5</sup>Department of Psychology, Åbo Akademi University, Turku, Finland and <sup>6</sup>Department of Psychology, University of Montreal, Montreal, Canada

Correspondence to: Teppo Särkämö, MA, Cognitive Brain Research Unit, Department of Psychology, PO Box 9 (Siltavuorenpenger 20 C), FIN-00014 University of Helsinki, Finland E-mail: [teppo.sarkamo@helsinki.fi](mailto:teppo.sarkamo@helsinki.fi)

We know from animal studies that a stimulating and enriched environment can enhance recovery after stroke, but little is known about the effects of an enriched sound environment on recovery from neural damage in humans. In humans, music listening activates a wide-spread bilateral network of brain regions related to attention, semantic processing, memory, motor functions, and emotional processing. Music exposure also enhances emotional and cognitive functioning in healthy subjects and in various clinical patient groups. The potential role of music in neurological rehabilitation, however, has not been systematically investigated. This single-blind, randomized, and controlled trial was designed to determine whether everyday music listening can facilitate the recovery of cognitive functions and mood after stroke. In the acute recovery phase, 60

**This Article**

- ▶ **Full Text** FREE
- ▶ **FREE Full Text (PDF)** FREE
- ▶ **OA All Versions of this Article:**  
131/3/866 most recent  
[awn013v1](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)

**Services**

- ▶ [Email this article to a friend](#)
- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in ISI Web of Science](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Add to My Personal Archive](#)
- ▶ [Download to citation manager](#)
- ▶ [Disclaimer](#)

**Google Scholar**

- ▶ [Articles by Särkämö, T.](#)
- ▶ [Articles by Hietanen, M.](#)

**PubMed**

- ▶ **PubMed Citation**
- ▶ [Articles by Särkämö, T.](#)
- ▶ [Articles by Hietanen, M.](#)

**Social Bookmarking**



[What's this?](#)

patients with a left or right hemisphere middle cerebral artery (MCA) stroke were randomly assigned to a music group, a language group, or a control group. During the following two months, the music and language groups listened daily to self-selected music or audio books, respectively, while the control group received no listening material. In addition, all patients received standard medical care and rehabilitation. All patients underwent an extensive neuropsychological assessment, which included a wide range of cognitive tests as well as mood and quality of life questionnaires, one week (baseline), 3 months, and 6 months after the stroke. Fifty-four patients completed the study. Results showed that recovery in the domains of verbal memory and focused attention improved significantly more in the music group than in the language and control groups. The music group also experienced less depressed and confused mood than the control group. These findings demonstrate for the first time that music listening during the early post-stroke stage can enhance cognitive recovery and prevent negative mood. The neural mechanisms potentially underlying these effects are discussed.

**Key Words:** stroke; rehabilitation; music; cognition; emotions

**Abbreviations:** FLAIR, fluid-attenuated inversion recovery; MCA, middle cerebral artery; MRI, magnetic resonance imaging; QOL, quality of life; RT, reaction time

Received September 18, 2007. Revised January 9, 2008. Accepted January 14, 2008.

 CiteULike  Connotea  Del.icio.us [What's this?](#)

**Disclaimer:**

Please note that abstracts for content published before 1996 were created through digital scanning and may therefore not exactly replicate the text of the original print issues. All efforts have been made to ensure accuracy, but the Publisher will not be held responsible for any remaining inaccuracies. If you require any further clarification, please contact our [Customer Services Department](#).

Online ISSN 1460-2156 - Print ISSN 0006-8950

[Copyright © 2007](#) Guarantors of Brain

**Oxford Journals** *Oxford University Press*

- [Site Map](#)
- [Privacy Policy](#)
- [Frequently Asked Questions](#)

Other Oxford University Press sites: [Oxford University Press](#)

