

Investigating the associations between musical abilities and precursors of literacy in preschool children

Franziska Degé,^{*1} Gudrun Schwarzer^{*2}

^{*}*Department of Developmental Psychology, Justus-Liebig-University Giessen, Germany*

¹franziska.dege@psychol.uni-giessen.de, ²gudrun.schwarzer@psychol.uni-giessen.de

ABSTRACT

Background

It was shown that specific music perception abilities are related to reading and phonological awareness, an important precursor of literacy (Anvari, Trainor, Woodside, & Levy, 2002; Lamb & Gregory, 1993). Anvari and colleagues (2002) demonstrated that only part of the association between music perception and reading was explained by phonological awareness, which indicates that the nature of the association between musical abilities and literacy is not fully understood. Therefore, the relationship between other precursors of literacy and musical abilities need further investigation. Additionally the contribution of music production abilities to this relationship remains unclear, because previous studies have rarely investigated the relation between music production abilities and precursors of literacy.

Aims

The aim of our study was twofold. Firstly, we investigated the relation between four precursors of literacy (phonological awareness, working memory, selective attention, rapid automatized naming) and musical abilities. Secondly, we extended previous findings by including not only music perception abilities but also music production abilities in our analyses.

Method

We tested 55 (28 girls) preschoolers (*mean age* = 75.13 months, *SD* = 4.02 months). We assessed precursors of literacy with a well established test battery (BISC, Jansen, Mannhaupt, Marx, & Skowronek, 2002) which comprises four subtests measuring phonological awareness (rhymes, synthesis of phonemes, segmentation of words, and phoneme recognition in words), one subtest on working memory (recall of nonsense words), one on selective attention (word comparison task), and one on rapid automatized naming (speeded naming of fruits). Musical abilities (production and perception) were tested with a music screening by Jungbluth and Hafen (2005) that contained comparisons of melody, pitch, rhythm, metre, and tone length as well as the reproduction of a given rhythm, metre, and song. As control variables intelligence (CFT, Weiß & Osterland, 1977) and socioeconomic status (SES) measured by parents' education were assessed.

Results

Partial correlations that controlled for gender, intelligence, and SES revealed a significant positive association between the aggregated score of phonological awareness and music perception and production abilities (overall scores).

Furthermore, significant positive associations were revealed between working memory and the overall scores of music perception and production. In more detailed analyses we found positive associations between phonological awareness and pitch perception, rhythm perception, and tone length perception. Regarding music production abilities and phonological awareness, detailed analyses revealed positive associations between phonological awareness and song reproduction as well as positive associations between phonological awareness and rhythm reproduction. Working memory was related to rhythm abilities. Interestingly, working memory was associated to both rhythm perception and rhythm reproduction.

Conclusions

We conclude that phonological awareness and working memory, which are both precursors of literacy, are associated with musical abilities. Furthermore, we demonstrated that both music perception and music production abilities are related to phonological awareness and working memory. These results support the idea that music might be useful to promote literacy in children. In particular, music might be a promising possibility to promote precursors of literacy prior to explicit reading instruction. However, in order to successfully implement these research findings into educational programs the causal relation needs to be established and the neuropsychological underpinnings underlying the association between musical abilities and reading should be understood. With respect to the causal relation Degé and Schwarzer (2011) showed that a music training program enhances phonological awareness. Regarding neuronal underpinnings, recent research showed that common neuronal mechanisms such as subcortical adaptation processes might explain part of these associations (Strait, Hornickel, & Kraus, 2011). However, future research is needed to deepen our understanding of the association between musical abilities and literacy to allow a successful implementation into educational settings.

Keywords

musical abilities, literacy, phonological awareness, children,

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