Talking about childhood music: A twin study

To what extent do childhood experiences of music practice influence thinking about music later in life? We could get an idea about this if we talk about childhood music memories while physiological recordings are made concomitantly. If we observe that there are clear physiological reactions during talk about childhood music we can assume that this topic has an important meaning for that person. But it is impossible to know to what extent the differences are genetically determined. In this study we had the unique possibility of eliminating genetic explanations by examining nine monozygotic (identical) twin pairs from the Swedish Twin Registry when they were 27-54 years old. A difference within these twin pairs was that throughout their lives one of them had practiced piano playing whereas the other twin had not. In twin research terminology this means that they were *discordant* with regard to piano practice. The estimated intra-pair difference in number of piano-practice in life was at least 1300 hours. The twins in this age group had participated in a large research program entitled *Humans Making Music: an Interplay between Culture and Nature*. There were 11 000 participants (among those there were 1302 complete monozygotic pairs) in the total study which comprised a number of musicality tests and standardized questionnaires.

Interviews were performed separately with each one of the twins by one of the authors after a period of silence (“baseline”). They were focused on four main questions: (1) the twin´s own thoughts about why one had played while the other one had not; (2) memories regarding music; (3) strong music experiences; (4) the significance of music in life and health. There was also a fifth “neutral” question about interest in languages.

ECG was recorded continuously during the baseline period and then throughout the five interview periods – thus altogether six periods were recorded. By means of a standardized computerized procedure, mean heart rate and two different aspects of heart rate variability, “high frequency” (HF) and “low frequency” (LF) variation in heart rate, were analysed during each period. HF mirrors the activity in the parasympathetic nervous system which slows down, decelerates, several functions in the body. LF corresponds to a mixture of activity in the parasympathetic and sympathetic (the latter winding up, accelerating) systems. The non-playing twin spent more time (2.2 versus 1.3 minutes) than the playing twin discussing the first question about why the co-twin chose to play the piano.

In general, there was a striking similarity between the identical twins in physiological patterns during the interview. The heart rate was almost identical throughout all periods in the two twins and the same observation was made for the HF. For LF, however, there was a significant and striking difference – LF was on average doubled in the non-playing twin versus the playing twin during this part of the interview whereas during the other periods there were no pair differences in LF. It should be added that the continuous ECG recordings also provided indirect data about breathing and that no differences in breathing patterns were observed which could explain the LF difference.

The arousing sympathetic nervous system in the heart has two components, one *chronotropic*

regulating speed (heart rate) and one *inotropic* regulating force of the beat. The parasympathetic system in the heart (the vagus nerve) is also of importance but there was no evidence of a difference in parasympathetic activity (HF). Also, there was no difference in chronotropic regulation since heart rate did not differ in the twin pairs during the interview. Accordingly, the LF difference during the first part of the interview is probably due to a reaction in the inotropic part of the sympathetic nerve activity in the heart. In simpler words: The heart´s contractions became more forceful in the non-playing twin when he/she was struggling with the question why piano playing was not liked by him/her in early childhood. According to the interview responses the subsequent player “became more interested” or was favored in one way or the other by a parent or a teacher during the first playing trials in life. The conclusion is that musical experiences during childhood could be of importance for psychological development and that disappointment or frustration related to them could be evoked by a reminding discussion much later in adult life – resulting in forceful heart beats. We have no reason to believe that this would not apply to non-musical strong childhood experiences. However, our observations confirm that music experiences could give lasting emotional imprints.

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