

2. Cardiac Rhythms Synchronize With Music

Music, particularly pieces that contain crescendos or gradual increases in volume, elicits synchronized cardiovascular and respiratory responses in young people that are similar in both musicians and nonmusicians, according to new research.

It is well-known that music can elicit strong positive or negative emotions, but this new research shows that music is also linked to unconscious physiological responses. The researchers show, probably for the first time, that there is a continuous interaction between the music dynamics and cardiovascular system, whether there are conscious emotions or not. These findings could have implications for the potential use of music as a therapeutic tool. The research was published online June 22 and in the June 30 issue of *Circulation*.

Researchers tracked the cardiovascular and respiratory profile of 24 healthy subjects aged 24 to 26 years old, of whom 12 were experienced choristers and 12 were age- and sex-matched controls with no musical training.

Hooked up to an electrocardiogram (ECG) and with their eyes closed, the subjects listened to various pieces of music with headphones. The subjects were also exposed to 2 minutes of silence. Researchers selected certain pieces that contain several changes in music dynamics — for example, crescendos, decrescendos, pianos, and fortes, etc.

While subjects listened to the music, researchers monitored their ECG, blood pressure, cerebral blood flow, respiration, and skin vasoconstriction. They collected individual data as well as averages for each of the 2 groups separately as well as all 24 subjects together. To measure conscious emotional arousal, subjects were asked to rate the intensity of emotion and the novelty and pleasantness of the musical pieces on a 5-point scale.

The researchers found that there was little or no emotional involvement in the music, but the investigators did find subconscious reflex autonomous responses. Almost every musical crescendo induced progressive skin vasoconstriction along with increases in blood pressure and heart rate. Conversely, during the slower or silent phases, there was progressive skin vasodilation and reductions in heart rate and blood pressure, indicating progressive relaxation.

As for respiration, there tended to be a correlation between music and breathing. For certain pieces, the respiratory signal closely tracked the amplitude of the music "envelope," indicating that the depth of respiration could be influenced tightly by music, at least during crescendos, said the authors. Musicians had a somewhat higher correlation for some musical pieces than nonmusicians.

Researchers have shown that music reduces stress, boosts athletic performance, and enhances motor skills in people with neurological impairments. Music can also provide physical benefits by acting as a distraction so patients may be able to exercise for longer periods of time.

Bernardi L, et al. Circulation. 2009;119:3171-3180.