

Melody modulates choir members' heart rate

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When people sing in a choir their heart beats are synchronised, so that the pulse of choir members tends to increase and decrease in unison. This has been shown by a study from the Sahlgrenska Academy at University of Gothenburg that examined the health effects for choir members.

In the research project "Kroppens Partitur" (The Body's Musical Score), researchers at the Sahlgrenska Academy are studying how music, in purely biological terms, affects our body and our health. The object is to find new forms where music may be used for medical purposes, primarily within rehabilitation and [preventive care](#).

In the latest study, published in the open-access journal *Frontiers in Neuroscience*, the research group is able to show how the [musical structure](#) influences the [heart rate](#) of choir members.

In December 2012, Björn Vickhoff and his research group brought together fifteen 18-year-olds at Hvitfeltska High School in Gothenburg and arranged for them to perform three different choral exercises: monotone humming, singing the well-known Swedish hymn "Härlig är Jorden" (Lovely is the Earth) as well as the chanting of a slow mantra. The heart rhythm of the choir members was registered as they performed in each case.

The results from the study show that the music's melody and structure has a direct link is linked to the cardiac activity of the individual choir member; to sing in unison has a synchronising effect so that the heart

rate of the singers tends to increase and decrease at the same time.

"Singing regulates activity in the so-called vagus nerve which is involved in our [emotional life](#) and our communication with others and which, for example, affects our vocal timbre. Songs with long phrases achieve the same effect as [breathing exercises](#) in yoga. In other words, through song we can exercise a certain control over [mental states](#)," explains Björn Vickhoff, lead author of the study.

Choral singing's positive effects on health and well-being are testified by many, although it has only been studied scientifically to a lesser extent. The researchers' hypothesis is that the health effects arise through singing "imposing" a calm and regular breathing pattern which has a dramatic effect on heart rate variability – something that, in its turn, is assumed to have a favourable effect on health.

"In the case of controlled breathing, the heart rate or pulse decreases when breathing out during exhalation in order to then increase again when breathing in during inhalation. This is due to breathing out. Exhalation activates the vagus nerve that lowers the heart rate which slows down the heart. The medical term for this fluctuation in heart rate the connection between breathing and heart rate is RSA and it is more pronounced with young people in good physical condition and not subject to stress. Our hypothesis is that song is a form of regular, controlled breathing, since breathing out exhaling occurs on the song phrases and breathing in inhaling between these," says Björn Vickhoff.

"We already know that choral singing synchronises the singers' muscular movements and neural activities in large parts of the body. Now we also know that this applies to the heart, to a large extent."

The research group now wishes to investigate whether the biological synchronising of the choral singers also creates a shared mental

perspective which could be used as a method for strengthening the ability to collaborate.

Wherever acting and singing in unison takes place there is a link. Collective acting and singing is often an expression of a collective will, according to Björn Vickhoff. "One need only think of football stadiums, work songs, hymn singing at school, festival processions, religious choirs or military parades. Research shows that synchronised rites contribute to group solidarity. We are now considering testing choral singing as a means of strengthening working relationships in schools," he says.

More information: Music determines heart rate variability of singers, *Frontiers in Neuroscience* , DOI: [doi: 10.3389/fpsyg.2013.00334](https://doi.org/10.3389/fpsyg.2013.00334)
[www.frontiersin.org/Auditory_C2013.00334/abstract](http://www.frontiersin.org/Auditory_C...2013.00334/abstract)

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