

# Study finds musical agency reduces perceived exertion while working out

15 October 2013, by Bob Yirka



Credit: Wikipedia.

(Medical Xpress)—A team of researchers from Belgium and Germany has found that musical agency (the ability to control musical characteristics with physical movements) causes people to perceive their level of effort as lower when working out on exercise machines. In their paper published in *Proceedings of the National Academy of Sciences*, the team describes lab studies they conducted with volunteers that involved hooking up exercise machines to music producing devices to allow feedback for people while exercising and the impact it had on them.

Most everyone is aware of the impact that [music](#) has on human motivation—a driving steady beat helps keep people moving and when played during exercise, helps divert the mind from the unpleasant aspects of [physical exertion](#) and boredom. In this new effort, the researchers set out to determine if there is more to it than that—more specifically, they wanted to know if allowing people to control aspects of the music they are listening to by modifying their physical activities would impact their workout.

To find out the researchers hooked up three types

of standard [exercise equipment](#) to a computer running software that created music loops and other musical effects, at a tempo set by input from the machines. Thus, a person using the machine could create a song of sorts, simply by using the machine. The faster they worked the machine, the faster the tempo of the music and the more intricate it became. The researchers called this musical agency, as it allows the listener to control how the music sounds via their own actions. Next the researchers enlisted the assistance of 63 male and female volunteers to work out on the machines while listening to the music they were creating (or to a standard music track as a control).

The machines also had monitors on them to measure force exerted by the person using them, and each volunteer was fitted with a device that allowed for monitoring oxygen intake. With everything in place the volunteers took turns working out on the various machines while the researchers monitored everything. After working out, each volunteer was asked to fill out a questionnaire that among other things asked about their level of exertion, how tired they felt afterwards, etc.

In analyzing the results, the researchers found that those volunteers listening with musical agency reported feeling less tired and believed they had exerted less energy than did those that listened to prerecorded music. In addition, the researchers found that those listening with musical agency actually used less oxygen during their workout than did those listening to a standard track, suggesting that they were likely more relaxed during their [workout](#) which in turn meant their muscles really did use less energy.

**More information:** Musical agency reduces perceived exertion during strenuous physical performance, *PNAS*, Published online before print October 14, 2013, [DOI: 10.1073/pnas.1217252110](https://doi.org/10.1073/pnas.1217252110)

## Abstract

Music is known to be capable of reducing perceived exertion during strenuous physical activity. The current interpretation of this modulating effect of music is that music may be perceived as a diversion from unpleasant proprioceptive sensations that go along with exhaustion. Here we investigated the effects of music on perceived exertion during a physically strenuous task, varying musical agency, a task that relies on the experience of body proprioception, rather than simply diverting from it. For this we measured psychologically indicated exertion during physical workout with and without musical agency while simultaneously acquiring metabolic values with spirometry. Results showed that musical agency significantly decreased perceived exertion during workout, indicating that musical agency may actually facilitate physically strenuous activities. This indicates that the positive effect of music on perceived exertion cannot always be explained by an effect of diversion from proprioceptive feedback. Furthermore, this finding suggests that the down-modulating effect of musical agency on perceived exertion may be a previously unacknowledged driving force for the development of music in humans: making music makes strenuous physical activities less exhausting.

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