

The effect of music on physical exercise performance

Ana Jović



Introduction

Many people listen to music when they exercise.
Does that increase their motivation and energy level?

Thesis

Recorded music during physical exercise gives you energy—both objectively and subjectively.

Bigger effect for untrained individuals

(Mohammadzadeh et al., 2008)

- 12 trained and 12 untrained participants exercised with and without music in a running test performed on a treadmill.
- Time to exhaustion and rating of perceived exertion (RPE) were measured.
- Music had effect on RPE and on time to exhaustion. RPE was lower and performance was longer in the music condition. In both cases music had a bigger effect on untrained participants.



Conclusion

Listening to music during exercise can increase motivation and energy level, presumably because exercising with music is more pleasant and exciting. The influence of music depends on the kind of exercise and the kind of music. Professionals and amateurs respond differently. Objectively, amateurs benefit more from music.

Example

American swimmer Michael Phelps set 5 world records at the 2007 FINA World Championships. He listened hip-hop music before each race to get motivated.



Performance increases with loudness and tempo (Edworthy & Waring, 2006)

- 30 participants did five 10-min sessions on a treadmill.
- Loudness/tempo of background music were manipulated.
- Running speed, heart rate, perceived exertion and feeling was measured.
- Running speed and heart rate increased with loudness and tempo.
- Participants reported better feelings during workout with music, especially with fast/loud music in comparison to no music. RPE was highest in the fast/loud and no music condition, and lowest in slow music condition.

Benefit of music in a national volleyball team (Szabo & Hoban, 2004)

- Nine female players were tested in three training sessions: no music, slow music, fast music.
- State of anxiety, perceived effort and reported enjoyment were measured.
- Participants slowed down when the slow-tempo music was played. They preferred to workout with fast music or without music.
- Perceived effort was lower for fast music than for no music, and lowest with slow music.

Music can slow you down (Brupbacher et al., 2014)

- Participants performed four CrossFit training sessions (two with and two without music). They were asked to complete as many rounds as possible in 20 min (one round = 5 pull-ups + 10 push-ups + 15 air squats).
- Heart rate, perceived exertion, pain intensity level and emotions were measured.
- With music, fewer rounds were completed, because participants tried to synchronize with the music.

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Foreign language learning through singing

Noemi Silvestri

Introduction

(François & Schön, 2011; Koelsch et al., 2004; McMullen & Saffran, 2004; Schön et al., 2004)

Some foreign language teachers use music as a teaching method and encourage their class to sing. Do the students learn more quickly or more effectively this way? Research on the interrelation between music and language suggests that they do.

Both language and music:

- activate similar networks of brain structures;
- are acquired easily in early life;
- are temporally organized rule-based systems;
- are generated from a finite set of sounds;
- have similar acoustic structures (prosody/melody).

Mechanisms

(Calvert & Tart, 1993; Ginsborg & Sloboda, 2007; Kilgour et al., 2000; Paquette & Rieg, 2008; Richards, 1969; Samson & Zatorre, 1991; Wallace, 1994)

If music really facilitates foreign language learning, how does the process work? Empirical studies have suggested that:

- songs make the learning environment more relaxed and entertaining;
- repetition of text and melody in songs promotes both short- and long-term memory;
- lyrics and melody are encoded in association with one another, so that the recall of one facilitates the recall of the other;
- the slower rate of content presentation in songs allows more time for encoding and rehearsal.

Singing improves language learning

(Legg, 2009)

Method: Subjects studied either a sung or a spoken version of a poem in a foreign language. They were then asked to recall and translate key words and phrases from the poem into their mother tongue.

Results: The participants who studied the sung version were better at both recall and translation.

Songs enhance phonological discrimination

(Schön et al., 2008)

Method: Participants listened to a continuous stream of either spoken or sung language and segmented it into words. Their segmentation ability was tested in a recognition task.

Results: The participants in the sung condition performed significantly better. The presence of pitch changes between syllables enhanced phonological discrimination and improved arousal and attention.

Songs improve recall, pronunciation, and comprehension of new words

(Good et al., 2015)

Method: Spanish-speaking children learned either the sung or the spoken version of a poem in English. They then repeated, recalled verbatim, or translated as much of the poem as possible. This was done immediately after exposure and after a six-month delay.

Results: Participants in the sung condition performed better after both short and long delays.



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Thesis

The results of these various studies are consistent with the idea that
FOREIGN LANGUAGE LEARNING BENEFITS FROM SINGING IN THAT LANGUAGE.

Are there negative side effects?

(Kang & Williamson, 2014; Richards, 1969; Wallace, 1994)

If employed the wrong way, songs can also hinder foreign language learning, particularly if:

- melody and words do not match;
- there is insufficient control of pronunciation, grammar and vocabulary;
- the language is not clearly and easily understood;
- the melody does not repeat across verses or is too complex.

The beneficial effect of songs can also depend on students' musical ability. Musically trained individuals may tend to analyze the music and their performance of it rather than analyzing the language.

Implications and suggestions

Language teachers and autodidacts might teach and learn more efficiently by including more musical activities in their teaching and learning routines, particularly singing. For example, they could associate words and sentences of a target language to a familiar tune or practice a song in that language following along a translation in their mother tongue.

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The Effect of Aggressive Music on Behaviour

Nastaran Ghobadi

Does aggressive music make people aggressive?

Violence is still an important issue in the modern western countries (e.g. domestic violence, murder). To know about the factors that cause or increase the aggression can significantly help people to prevent aggression. Music with violent content may be an important factor. This kind of music should be avoided in order to reduce the aggressive behavior.



Thesis: Aggressive music tends to makes people aggressive

Effects on thoughts and feelings

(Anderson & Carnegey, 2003)

Method. Participants

- listened to a pop song,
- completed two psychological tasks,
- answered questions about a non-violent song,
- listened to a violent song,
- completed State Hostility Scale (SHS), and
- completed a longer unrelated task.

The SHS contains 35 sentences describing current feelings (either hostile or friendly). For example, "I feel like yelling at somebody" and "I feel furious." Respondents rate each sentence on a 5-point scale.

Results

- The violent content of rock songs increased feelings of hostility compared with similar nonviolent music.
- The violent-lyrics effect occurred in the absence of any provocation.

Sexual-aggressive song lyrics and aggressive intention

(Fischer & Greitemeyer, 2013)

Method

- Male and female participants were exposed to either misogynous or "neutral" song lyrics.
- Afterwards, in a seemingly unrelated marketing study that followed exposure to the music, they were asked to add hot chili sauce to a sandwich prepared for a male or female fellow participant.

Results

Men who had listened to misogynous music lyrics put more chili sauce on sandwiches intended for women.

Rap and rock music and violent behavior

(Tropeano, 2006)

Method

- 11 participants viewed rap artist DMX (with violent content) and filled in a questionnaire.
- Another 11 viewed rap artist WILL SMITH (non-violent).
- A control group did not watch any music videos, but filled out part of the same questionnaire.

Results

Participants who viewed the violent music video "felt and reacted more violently with regards to responses to questions about fictitious scenarios".

Conclusion

These studies confirm that aggressive music has a negative influence on behavior and makes people more aggressive.

But music may also help to let the anger out and calm emotions. It can be part of a process where the listener first directs anger into harmless activity (here listening to something aggressive) and then redirects the modulated anger to constructive activity such as negotiation (Saarikallio & Erkkilä, 2007).

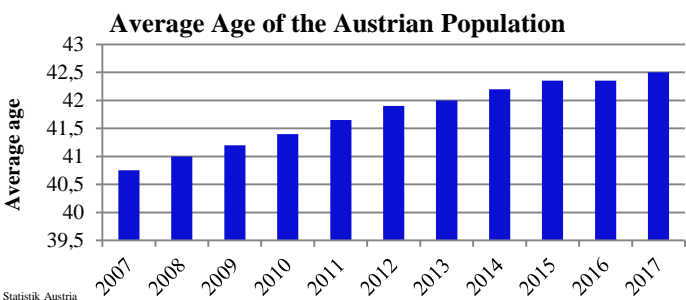
Further research is needed on the impact of long-term listening to aggressive music.

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Introduction

As people live longer and enjoy better quality of life (QOL), there is a corresponding increase in senior recreational music making. Reading music and playing a musical instrument are complex activities that uniquely involves motor and multisensory integration. Music also positively influences emotional state, motivating musical activity.



Thesis

Playing music enhances older people's well-being.

Music and Brain Plasticity

(Seinfeld & Figueroa, 2013)

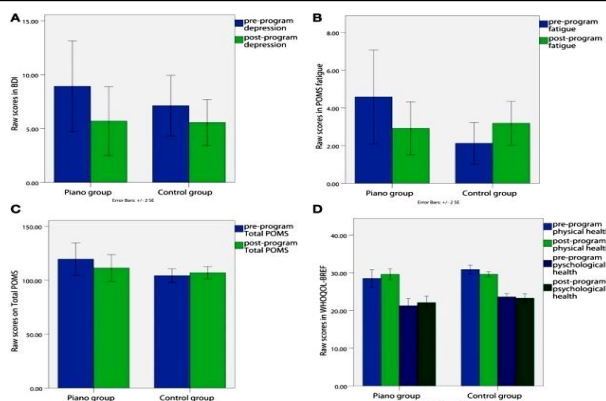
The aim of this experiment was to study effects of musical training vs. other leisure activities in elderly people.

Method: An experimental group practiced piano daily for 4 months. An age-matched control group participated daily in other leisure activities.

Result: Neuropsychological tests and mood/QOL questionnaires showed that playing and reading music promoted general cognitive performance and subjective well-being more than comparable leisure activities.



<https://litarium.com/wp-content/uploads/2015/05/cic1.jpg>



Playing Music and Subjective Well-Being

(Crech & Hallam, 2013)

Method: Participants completed questionnaires and psychological needs scales related to autonomy, competence, relatedness, and self-realization before and after a substantial period of active engagement with music.

Result: Making music was linked to:

- subjective well-being
- a sense of purpose
- feeling in control and autonomous
- receiving social affirmation, respect, and status



<http://dvoicestudio.com/wp-content/uploads/2016/09/oldpeopleband.jpg>

Learning for Self-Fulfilment

(Taylor, 2011)

Method: Qualitative analysis of semi-structured interviews with 21 participants over a 2.5-year piano course, plus researcher observation, field notes, informal conversations, telephone calls, written communications, and teaching records.

Result: The interaction of music learning, motivation and musical identity construction can foster the personal growth needed to achieve self-fulfilment as a mature adult.

Caveats

(Schuppert, 2014)

For amateurs, learning an instrument is a challenge. Music performance can cause disappointment and stress. Common problems among older amateur musicians include

1. Functional restrictions of the hand
2. Cardiovascular disease (performance anxiety, performance stress)
3. Dental and orthodontic problems (wind instruments)
4. Hearing impairment

Conclusion

Learning a musical instrument and participation in music groups can enhance older people's well-being including positive mood states and psychological and physical QOL.

This finding has applications in **music therapy, music education, and social integration.**

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Music and the Development of Emotion Recognition

Cari Moll

Introduction

Does exposure to formal music making improve one's ability to recognize vocal emotion and therefore interact socially?

- Vocal emotion is recognized through pitch patterns and intensity changes in voice. If someone says "It's raining outside", it is usually possible to infer how the speaker feels about the rain.
- This suggests that music education might also improve social skills—a form of skill transfer.



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Thesis

Exposure to and participation in music in an educational setting can improve one's ability to recognize vocal emotion in speech prosody.

Short-Term Music Education

Lavidor and Mualem (2015) studied the effect of short-term music programs on participants' ability to recognize emotion in speech.

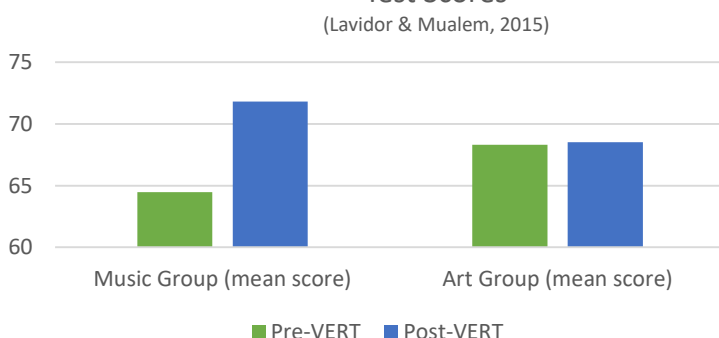
Method:

Two groups of participants attended either music or art sessions that focused on how emotion is portrayed through both mediums. There was a pre- and post-test consisting of voice recordings depicting certain emotions (VERT).

Results:

Showed an increase in ability to recognize emotion after the short-term music intervention.

Improvement of Vocal Emotion Recognition
Test Scores
(Lavidor & Mualem, 2015)



Musical Expertise

Castro and Lima (2011) examined how musical expertise improved the recognition of emotions in speech.

Methods:

Musicians and non-musicians were instructed to assign one of six emotions (anger, disgust, fear, happiness, sadness, surprise, and neutrality) and an intensity judgement to pre-recorded sentences.

Results:

On average, musicians can better recognize emotion from speech prosody than non-musicians. Also, empirical evidence was found favoring a direct interplay between language and music.

Social Behavior in Children

Kirschner and Tomasello (2010) studied how 4-year-old children's social behavior changed after active, group music-making. They assumed emotion recognition was a prerequisite for positive social interactions.

Methods:

One group participated in a musical group activity; the other in a non-musical group activity.

Each group then took part in a second non-musical activity. Social interactions were observed.

Results:

Children in the first music group were more likely to interact socially (in a group) in the second part.

Group music activities improved prosocial behavior.

Conclusion

All three studies support the thesis. Formal music training, whether in brief lessons or through years of training, can help people recognize emotion(s) in voice. Social interaction is promoted by this ability.

- Implications for music therapy: group music activities may improve social skills in students with developmental disabilities.
- However, Cuddy and Trimmer (2008) found that emotional intelligence and not music training determined the ability to recognize emotion in speech prosody.

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Acoustic co-requisites for music-induced chills

Julien Bauer

Introduction

Most people know the feeling of suddenly experiencing a physical response to special music.

Music can induce chills (goosebumps, shivers/tingles down the spine). Brain areas associated with positive emotions are activated; with negative and painful emotions, inhibited.

Different sounds and characteristics of music must be responsible for this phenomenon. Here I consider the music as an acoustic trigger.



Thesis

Chills are determined in part by specific acoustic features in music.

Voice entries

Grewe, Nagel, Kopiez and Altenmüller (2007) studied body reactions and subjective feelings during music listening.

Method:

Diverse participants heard different pieces of music and pressed a button when they got chills. Later, they answered questions about the music and their socio-cultural backgrounds.

Results:

- Voice entries and volume increases often trigger chills.
- Chills become less frequent when the music is repeated.
- Not all participants got chills.
- Chills depend on age and music experience.

Slow movements and solos

Guhn, Hamm and Zentner (2007) investigated chills in connection with the exact temporal sequence of classical music.

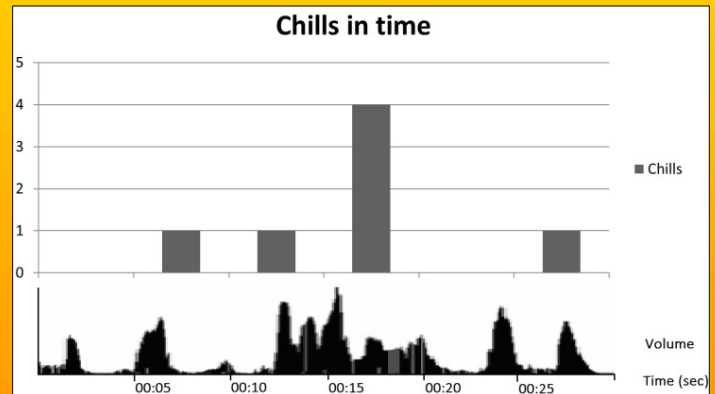
Method:

Participants heard different pieces of music. Their heart rate, skin conductance and chills were monitored by AG/AgCl electrodes and with a self-pressing button when chills came.

Results:

Chills happened:

- in slow movements
- at voice entries and crescendos
- when a solo instrument alternated with the orchestra
- when the loudness or frequency range suddenly increased
- when the harmony was ambiguous



Effect of loudness on chills.

Upper graph: self-reported chills as a function of time.
Lower graph: Intensity of music signal. After Guhn et al. (2017)

Neurocognitive foundation

Ellis, Loui, Sachs and Schlaug (2016) studied the correlation between white mass in the brain and chills.

Method:

Participants heard their own and given music. Chills were measured by AG/AgCl electrodes. A tractograph was used to measure white matter connectivity.

Results:

The greater the white matter connectivity, the stronger chill experience.

Conclusion

Identifiable acoustic features in music are linked to chills, suggesting the existence of chill- and emotion-causing mechanisms that are triggered by acoustic features.

These include increases in loudness, changes of solo instruments, and voice entries.

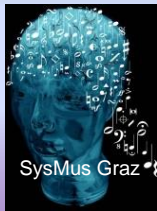
Nevertheless, socio-cultural and biological factors also influence chills.

Applications:

- Composers might create music meeting specific criteria.
- Music therapists could try to trigger special emotions and feelings in patients.
- The idea could help psychologists and musicologists to understand music in general—here and now, in history, and in other cultures.

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Music listening and adolescent depression



musikologie
graz

Barbara Haspl

Introduction

How do young depressed people interact with music?
Previous studies have shown:

- Music must be understood in relation to social environment and the individual (Blacking, 1973).
- Music is often used for mood regulation.
- Music is especially important for adolescents.
- Music listening is motivated both socially (peer groups) and individually (mood regulation).
- Both depression and the use of mood regulation strategies is increasing in adolescence (Halle, 2003)

Styles of coping and depression

Miranda and Claes (2009) examined how styles of coping by music listening are related to adolescent depression.

Method

Self-report questionnaire

Results

Music listening as a regulation strategy was related to high depression levels. Further music preference and depression level are related in peer groups.



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Music in adolescents' lives

Saarikallio and Erkkilä (2007) studied the role of music in the mood regulation of adolescents.

Method

Two groups of participants attended two group interview sessions concerning their musical situations including the experienced affect and energy level.

Results

Adolescents suffering from depression were more likely to listen to music to regulate their current mood in daily life. Music had to fit to the energy level of a person to produce a change of the mood.

Thesis

Adolescents who use recorded music to release and regulate negative moods are more likely to suffer from depression.

Conclusion

All three studies empirically support the thesis. But there are exceptions:

- Adolescents listen to music for several other reasons (Saarikallio & Erkkilä, 2007).
- Music can be background for most activities, such as travelling, workout, learning or visiting friends.

Mood regulation and depression

Thomson et al. (2014) investigated music-related mood regulation, depression, anxiety, and stress in adolescents.

Method

Online questionnaire

Results

Music listening allows young depressed people to release negative emotions. Depressed people do not use music to maintain or intense positive mood.

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