

Original Research Article

## Psychophysical effects of Music in Exercise

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**Abstract:** For years researchers have investigated the effects of music on exercise performance. Humans respond to rhythmical qualities of music by synchronizing movement pattern to tempo. Synchronous music has shown to produce an ergogenic effect. Music has a positive effect on performance. This study is to know the psychophysical effects of music in exercise domain and to study the influence of lyrics of music on exercise. In present study 30 female medical students of age group between 18 - 20years were chosen. Each subject underwent 4 sessions of exercise. Sessions without music, slow melody music of familiar language, fast beat music with familiar language lyrics and fast beat music with unknown language lyrics. In each session Duration of exercise, Distance covered and Rating of perceived exertion (RPE) were recorded. Exercise performance was better when subjects exercised with music. The duration of exercise and distance covered was more for fast beat music compared to slow melody. There was no significant difference in the effect of lyrics of familiar local language or unknown language on work done. But the Perceived exertion was less during exercise with musical lyrics in known local language compared to lyrics in unknown language. Lyrics seem to convey the meaning and generate thoughts and feelings with its wordings. The motor co-ordination is better when body is in sync with the tempo of music and not much influenced by the lyrics.

**Keywords:** Lyrics, Music, Perceived exertion.

### INTRODUCTION

Music is a major part of our environment. Music is often referred to as "The International Language". We may not understand the words to a particular song, but we do understand the beauty of music. Music has influenced human beings since the dawn of civilization. It can calm & revitalize us in a variety of ways. It can elevate our moods & even reduce the stress and pain. Soft & soothing music can help to unwind & Fast music for exercising. Szabo and colleagues [1] studied the effects of slow-rhythm and fast-rhythm classical music on progressive cycling to voluntary physical exhaustion. Every person would have enjoyed music at some point in life. It is impossible to hold the body still when music is playing.

The interplay between Music and Exercise is not of recent origin. There are many historical evidences of people singing while doing labor & field work. Music or sound has been used to enhance

performance in team exercises or sports from ancient times, like in traditional snake boat race in Kerala. Music can reduce perception of exhaustion during a moderate work & boost physical output.

Syncing movements with musical beats increases stamina, co-ordination & improves the work outcome. "Music is like a legal drug for Athletes" says Costas Karageorghis [2]. Components of music from the lyrics to tempo can affect performance by changing a person's mind set or distracting from discomfort.

Music has been widely recommended as a technique to enhance the psychophysical state of participants in sport and exercise. Listening to music during exercise can delay both fatigue and lessen the subjective perception of fatigue. It can increase physical capacity, improve emergency efficiency and influence mood. The increased interest in the potential physiological and psychological properties of music in

exercise physiology had stimulated us to do this study. The aim of the study is to know the psychophysical effects of music in exercise domain and to study the influence of lyrics of music on exercise.

#### MATERIAL AND METHODS:

The present study was carried out on 30 healthy female medical students of age group between 18-21 years at Government Medical College, Ananthapuramu, Andhrapradesh. Prior approval from Institutional Ethical committee was obtained. Study was explained and Informed consent was taken from all selected population.

Inclusion criteria being clinically healthy without any chronic respiratory disease, musculoskeletal illness, cardiac or neurological problem or hearing disorders. Subject were informed of the experimental procedure, equipment & it's function. The subjects were made to run on Tread mill before the actual test session so as to overcome anxiety. Records of age, height, weight & calculation of BMI of each subject was done at the first visit. Parameters like BP, Heart rate, Respiratory rate were assessed prior to the exercise. All the exercises were performed on a exercise testing Treadmill instrument. All subjects were instructed to refrain from eating for 4 hours prior to testing. Each testing session took place at approximately same time of day (8am - 9am).

Treadmill exercise protocol with an inclination of 2% was maintained. Initial speed was 3 kph for first 3 minutes, which was increased to 4.5 kph in next 3 minutes. At the end of 6 minutes speed was increased to 6 kph& this was maintained throughout the session. This speed coincided with 70-80% of the HR max for that subject.

Four exercise sessions were conducted. One control session (without music) and 3 experimental sessions were applied to each subject (slow melody music of familiar language , fast beat music of familiar language lyrics & fast beat music of unknown language

lyrics). All these sessions were taken 2 days apart at the same time of the day for each subject. The music was played from android with head phones. In no music session head phones were worn but no music was played. For slow melody music a classical song with lyrics in known local language was taken. Here Telugu song was played as the subject's mother tongue was Telugu. For Fast beat music a local language with known lyrics, Telugu song was chosen. For Fast beat music with lyrics of unknown language, Malayalam song was played.

The duration for which the subjects walked was decided by themselves till their exhaustion. The subjects were not made aware of the distance & the time they walked to prevent goal setting. Post exercise parameters like Heart rate, Blood pressure & Respiratory rate, Rating of Perceived Exertion with Borg scale [3] were recorded. Statistical analysis was analyzed by percentages, numbers, Z test and the p value <0.05 was considered as significant.

#### RESULTS:

All the 30 volunteers recruited for the study completed the study. The duration of exercise and the distance covered during exercise was maximum with fast music, followed by slow music and least with no music condition. There is no significant difference in the duration and the distance covered during exercise while exercising with fast music with lyrics in known local language and fast music with lyrics in foreign language.

#### Rating of Perceived Exertion (RPE):

The subjective feeling of exertion is measured with Borg scale [3] at the end of exercise. The exertion levels were significantly lower with music than without music (Table 3). There was no significant difference in the exertion levels between the fast and slow rhythm music (Table 4). Exercising with fast music with lyrics in known local language and fast music with lyrics in foreign language did show significant difference in Rating of perceived exertion (Table 5).

**Table 1: Anthropometric profile of study subjects :**

PARAMETERS	SUBJECTS (Mean±SD)
Age in Years	18.42 ± 0.8
Body weight ( kgs )	52.6 ± 6.28
Height ( cms )	162 ± 4.73
BMI ( Kg/m <sup>2</sup> )	20.34 ± 2.68

**Table 2: Resting basal parameters :**

PARAMETERS	SUBJECTS (Mean±SD)
Heart rate (beats /min )	72.8 ± 2.2
Respiratory rate ( resp/ min )	17 .3 ± 1.1
Systolic BP ( mm Hg )	114 ± 2.2
Diastolic BP ( mm Hg )	74 ± 1.34

**Table 3: Comparison of Duration of exercise, Distance covered, RPE of no music and slow music among participants:**

PARAMETERS	NO MUSIC	SLOW MUSIC	P value	SIGNIFICANCE
Duration of exercise (minutes)	7.24 ± 2.01	8.96 ± 4.32	0.048	significant
Distance covered (Km )	0.9 ± 0.37	1.2 ± 0.52	0.01	significant
Rating of Perceived Exertion ( RPE )	14.81 ± 2.56	13.08 ± 0.12	0.0002	significant

**Table 4: Comparison of Duration of exercise, Distance covered, RPE under influence of slow and fast music among participants:**

PARAMETERS	SLOW MUSIC	FAST MUSIC	P value	SIGNIFICANCE
Duration of Exercise(minutes)	8.96 ± 4.32	11.86 ± 3.341	0.0036	significant
Distance covered (Km )	1.2 ± 0.52	1.6 ± 0.86	0.0293	significant
Rating of Perceived Exertion (RPE)	13 . 08 ± 0.12	10 . 08 ± 1.21	0.05	Just significant

**Table 5: Comparison of Duration of exercise, Distance covered, RPE under influence of lyrics of different languages:**

PARAMETERS	FAST MUSIC with lyrics in unknown foreign language	FAST MUSIC with lyrics in known local language	P value	SIGNIFICANCE
Duration of exercise (minutes)	11.70 ± 2.38	11.86 ± 3.341	0.8308	Not significant
Distance covered (Km)	1.4 ± 0.67	1.6 ± 0.86	0.315	Not significant
Rating of Perceived Exertion (RPE)	12.04 ± 2.98	10 . 08 ± 1.21	0.0008	Significant

**DISCUSSION:**

In this study an attempt is made to understand the relationship between the physical and psychological stimulus of music and the responses that enable the exerciser to achieve better results. Various features of music are rhythm, tempo, loudness and lyrics. Research suggests that music directly affects exercise motivation by many ways:

1) Music reduces feeling of fatigue and motivates them [2].

2) Music increases mental arousal and helps to perform exercise better [2].

3) Improvement of motor co-ordination when body is in sync with music and boosts self confidence.

4) A physiological relaxation response: by products of exercise such as acidosis & elevated hormones may be suspended by music thus enhancing performance [4].

In present study Tempo of music boosted participant's speed in a predictable manner. The results confirm that the distance covered and the duration of exercise was more when the subject was exposed to slow or fast music, than exercise without music. The distance covered was more with fast music than with slow music.

In this study it was observed that exercise performance was better when subjects were exercising with music (slow melody or fast beat) compared to no music and also observed that there was significantly less Perceived Exertion during music with lyrics in known local language compared to lyrics in unknown language.

Several studies have shown that exercising while listening to music decreased the Perceived Exertion levels and improved the exercise performance when compared to exercising in silence [5, 6].

Exercising with fast music had greater arousal effect and greater work accomplishment [1]. Music acts as a distracter to bodily awareness and also as mood enhancer. Music facilitates exercise performance by reducing the sensation of fatigue, increasing psychological arousal, dissociation, promoting relaxation and improving motor co-ordination [1].

Listening to music while exercising can release feel good chemicals in brain (Dopamine & Opioids ) that boost up mood and makes less tired. Release of endogenous  $\mu$  - opioids and other mood enhancing chemicals raises the pain threshold. Brain neurons can even synchronize with the Tempo of the music and help to perform repetitive motions more quickly [7].

Listening to music while working out can help regulate and maintain an exercise pace and regimen [2, 5, 8]. Music motivates the exercisers and also distracts them from the sensation of fatigue and helps to focus on the music thus making it possible to exercise for longer duration [1, 2].

Well selected music enhances positive dimensions of mood like vigor and excitement while reducing tension and fatigue [9]. Studies have shown that fast loud music has greater arousal effect and better exercise performance than slow - quiet music [10-12]. Fast tempo and Strong rhythm are inherently stimulated and thus create greater arousal [13]. Tempo boosted participants speed and heart rate in a predictable manner. Fast beat music results in the subject selecting a faster treadmill pace than slow and quiet music [10].

The second aspect in this study was, the effect of lyrics in music on exercise is studied. The Lyrics have an additional effect of language, the meaning it conveys and the thoughts and feelings it generates with its wordings. Here we chose to play music with lyrics in known local language and music with lyrics of unknown language, both of fast tempo tracks. The perceived exertion was less during music with lyrics of known local language compared to lyrics in unknown language. The lyrical content of music during fast- beat exercise had no significant influence on duration of exercise, whether it is in familiar language or foreign language. It appears to be the back ground beat and rhythm that is influencing the exercise rather than the meaning of its lyrics.

#### CONCLUSION:

In the present study, it was observed that exercise performance was better when subjects were exercising with music (slow melody or fast beat) compared to no music. Music reduces feeling of fatigue. The duration of exercise and the distance covered were more for fast beat music compared to slow melody. However there seems to be no significant difference in the effect of lyrics of familiar local language or unknown foreign language on the duration of exercise and the distance covered. The motor co-ordination is better when body is in sync with the tempo of music and not much influenced by the lyrics.

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