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The Effect of Music Tempo on Cycling Performance in Female College Students

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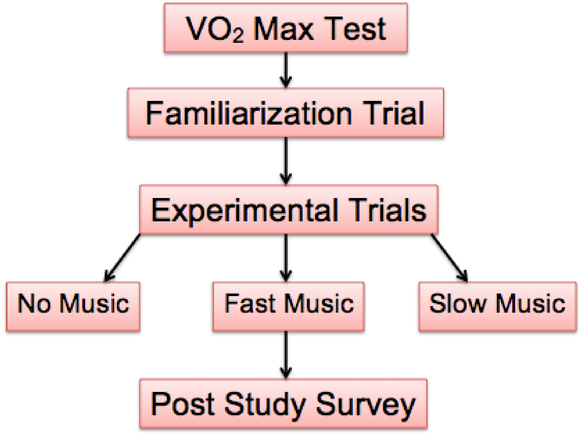
Abstract

Studies have demonstrated that fast tempo music improves performance on the treadmill, however there is a lack of research on this topic using cycle ergometers. This study was designed to determine the effects of music tempo on cycling performance. Participants (n=12) were recruited through word of mouth and completed a maximal oxygen consumption test (VO2 max) on a cycle ergometer. VO2 max results were used to determine resistance for the following trials using 65% of the power output which was converted to kiloponds. Subjects then completed a familiarization trial that was 18 minutes including a three minute warm up. Subjects were told to cover as much distance as possible in the allotted time. The participants completed one trial each week for three weeks, each trial was 18 minutes including a three minute warm up, with either fast music (FM), slow music (SM) or no music (NM) playing. Every three minutes throughout the trials heart rate (HR), distance covered, and rate of perceived exertion (RPE) were measured. It was hypothesized that the FM would yield the best performance (the most distance covered). There was no significant difference in distance covered (p=0.431) or HR (p=0.180) at the end of the trials, however SM yielded a significantly lower RPE than FM or NM (p=0.015). The average distance covered in NM was 8.01km±1.43, SM 8.28km±1.54, FM 8.33km±1.38. The average HR in NM was 172.5bpm±19.45, SM 169.58bpm±19.08, FM 159.75bpm±21.77. The average RPE at the end of the trial in NM was 15.33±1.68, SM 14.67±1.61, FM 16±1.68. It was concluded that SM resulted in a lower perception of effort when covering a similar distance compared to NM or FM.

Study Design



Methods

PARTICIPANTS:
12 female Hope College students (mean age 21yrs)
Moderately active
Recruited by word of mouth

VO2 maximum test determined resistance for trials
65% of power output (wattage)

Familiarization trial
15 minutes
No music

3 experimental music trials
Fast tempo, slow tempo, no music
Counterbalanced
3 minute warm up, 15 minute trial
RPE, HR and distance covered measured every 3 minutes

Post study survey
Preferred and easiest trial

Music Selection

Fast music (150< bpm)
- All I Do is Win (DJ Khaled)
- Good Life (Kanye West)
- ET (Katy Perry)
- Paper Planes (MIA)
- Everybody Talks (Neon Trees)

Slow music (100> bpm)
- Babel (Mumford and Sons)
- Alejandro (Lady Gaga)
- Tonight Tonight (Hot Chelle Rae)
- Mean (Taylor Swift)
- Unwritten (Natasha Bedingfield)

Subject Demographics

Participant	VO2 max (mL/kg/min)	Resistance (kp)	Height (cm)	Weight (kg)	RHR (bpm)	BP (mmHg)
1	29.9	1	170.5	76.8	62	120/78
2	30.2	1.5	173.5	66	90	110/64
3	37.5	1.5	163	63	110	110/68
4	40.8	2	176	65.5	59	102/68
5	30.4	1	171.5	66.2	104	118/64
6	--	--	--	--	--	--
7	41.6	1.5	170.5	61.5	74	108/68
8	37.2	1.5	165.5	55.5	60	120/68
9	42.5	1.5	160.5	50.8	70	122/78
10	34.1	1	165.5	70.7	68	118/80
11	33.3	1	163.8	56	76	120/78
12	23.1	1	161.1	48.8	64	98/70
13	31.9	1.5	179.5	75	70	122/74
mean	34.38	1.33	168.42	62.98	77.3	114/72
SD	5.76	0.33	6.09	8.93	17.90	7.83/5.55

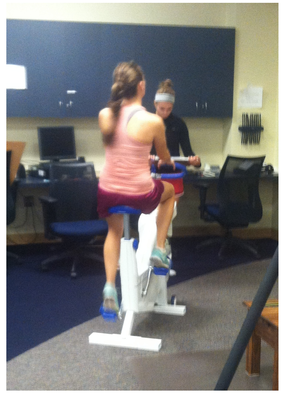
Participant VO2 max, cycle ergometer resistance, height, weight, resting heart rate, and resting blood pressure. Means and standard deviations are also shown. Subject 6 withdrew prior to testing due to conflicts.

Background

Karageorhis et al., 2006:
A songs tempo stimulates a selected physiological response

Birnbaum et al., 2009:
No change in RPE between trials

Waterhouse et al., 2010:
Participants worked harder (HR & RPE) and enjoyed trial more with fast tempo music



Purpose

The purpose of the study is to determine the effects of music tempo on cycling performance. There have been studies showing that fast tempo music improves performance on the treadmill, however there is a lack of research on this topic using cycle ergometers. Overall, this study could provide individuals a greater understanding of the effect that music tempo has on cycle performance, specifically distance covered.

Results

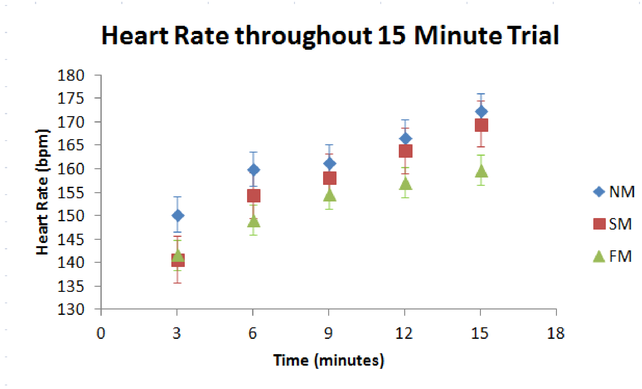


Figure 1. Comparison of Heart Rate throughout the Cycling Trial. Heart rate was recorded every three minutes. Values are recorded for each tempo of music in beats per minute. Heart rates increased in all three trials as the test duration continued. No significant differences were found among the various heart rate measurements (p=.180).

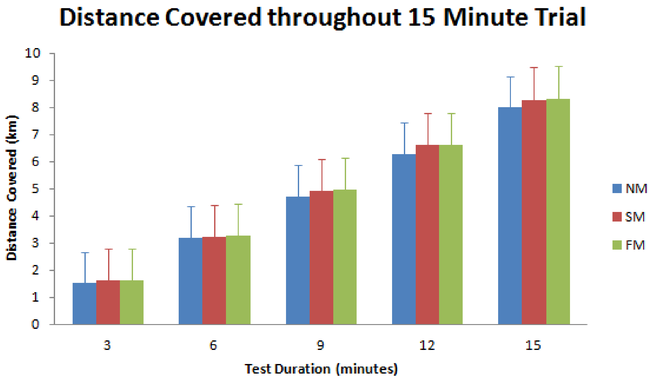


Figure 3. Comparison of Distance throughout the 15 Minute Trial. Distance was recorded in kilometers every three minutes. Distance increased as the test duration increased. No significant difference was found in distance covered among the three trials (p=.431).

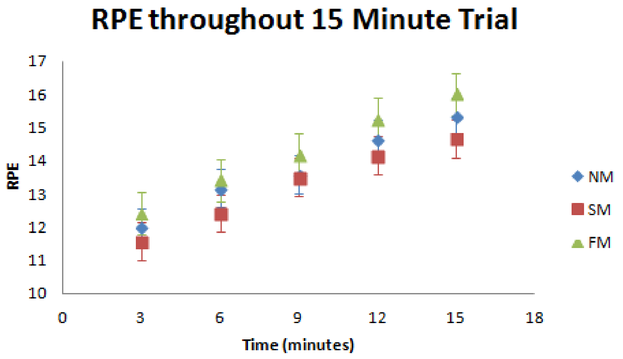


Figure 2. Comparison of RPE throughout the 15 Minute Trial.
RPE values are based on the Borg Scale ranging from 6-20 and were recorded every three minutes. As the test duration continued, RPE values increased. SM values were significantly lower than FM and NM at the end of the 15 minute trial (p=.015). Significance was noted by an asterisk (*).

	Preferred Music	Easiest Condition
No Music	1 (8.33%)	0 (0%)
Slow Music	1 (8.33%)	1 (8.33%)
Fast Music	9 (75%)	10 (83.33%)
Don't Remember	1 (8.33%)	1 (8.33%)

Survey results for subject preference and easiest trial. Most participants (75%) preferred the FM trial and 83.33% found the FM trial the easiest to complete.

Conclusion

•Music with a slower tempo yields a lower RPE when a similar heart rate and performance levels are achieved when compared to no music or music with a fast tempo.

•Distance covered and heart rate were not significantly different among the three trials

•People use music with slower tempos to cover similar distances with improved inner feelings.

Thank You

Hope College Exercise Science Department
Research Advisors: Dr. Cole and Dr. Dunn
Participants