CHAPTER 4

4. RESULTS

In this chapter the demographics and training history of the subjects, as well as the effect of music on change in lactate, heart rate, Borg scale ratings and subjects' overall perception of the submaximal cycling sessions are described.

4.1. DEMOGRAPHIC DATA

Table 4.1 shows the physical characteristics (means and standard deviations) of all the subjects in groups A & B.

	GROUP A (Females n= 6 Males n= 9)	GROUP B (Females n= 5 Males n= 10)	p VALUE (Group A vs Group B)	GROUP A AND B COMBINED (n= 30)
AGE (y)	28.3 ± 3.8	30.4 ± 6.1	0.16	29.3 ± 5.1
HEIGHT (cm)	175.1 ± 7.1	173.4 ± 7.3	0.53	174.3 ± 7.1
WEIGHT (kg)	70.9 ± 10.4	69.8 ± 11.2	0.82	70.4 ± 10.6
VO ₂ max (ml/min.kg)	51.1 ± 7.0	52.8 ± 10.1	0.60	52.0 ± 8.6
CATEGORY CYCLIST	A = 1 $B = 6$ $C = 5$	A = 4 B = 5 C = 2		A = 5 B = 11 C = 7
	C = 5 $D = 3$	C = 2 $D = 4$		C = 7 D = 7

Table 4.1-Physical characteristics of subjects (mean ± SD) and cyclist categories

There were more male than female subjects (19-male; 11-female). However, this is a good representation of the gender ratio with regard to cycling in South Africa (according

to the Pedal Power Association of South Africa). When combining all subjects, most of the subjects were B category cyclists. Group B had more A category cyclists than group A, but group B had more B and C category cyclists. There were no significant differences between group A and B with regard to age, height, weight and maximal oxygen consumption ($V0_2max$).

4.2. TRAINING HISTORIES

Table 4.2.1 shows the training histories of the subjects, which was obtained from the pretest questionnaire.

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DISTANCE CYCLED PER WEEK (km)	0-20	20-40	40-60	60 -80	80-100	>100	
NUMBER OF SUBJECTS	1	1	0	2	1	10	

TRAINING FREQUENCY (sessions per week)	1	2	3	4	5	6	7
NUMBER OF SUBJECTS	2	1	5	3	3	1	0

Table 4.2.2-Training history of subjects in group I

DISTANCE CYCLED (per week) (km)	0-20	20-40	40-60	60 -80	80-100	>100	
NUMBER OF SUBJECTS	1	1	1	1	0	11	

TRAINING FREQUENCY (sessions per week)	1	2	3	4	5	6	7
NUMBER OF SUBJECTS	2	2	4	2	2	1	2

Table 4.2.3Training	history	of all the	subjects	combined
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DISTANCE CYCLED (per week) (km)	0-20	20-40	40-60	60-80	80-100	>100
NUMBER OF SUBJECTS	2	2	1	3	1	21

TRAINING FREQUENCY (sessions per week)	1	2	3	4	5	6	7
NUMBER OF SUBJECTS	4	3	9	5	5	2	2

Altogether most subjects cycled more than 100 km per week, and most cycled, on average, on 3 different occasions during the week. On the whole, subjects in group A and B had very similar training histories.

4.3. OXYGEN CONSUMPTION

Table 4.3 shows the mean values of oxygen consumption $(V0_2)$ at 20 minutes and on average during the 20 minutes, in group A and B respectively.

Table 4.3-Oxygen consumption of group A and B (mean ±SD) with music and without music

WITH MUSIC			WITHOUT MUSIC			
p VALUE			p VALUE			
GROUP A n = 15	GROUP B n = 15	P VALUE	GROUP A n = 15	GROUP B n = 15	P VALUE	
41.0 ± 6.4	42.4 ± 8.3	0.60	41.8 ± 5.8	42.1 ± 7.9	0.90	
41.4 ± 5.9	42.1 ± 8.0	0.79	41.1 ± 5.6	42.4 ± 8.0	0.62	

There were no significant differences between group A and B with regard to $V0_2$: neither at 20 minutes nor on average during the entire submaximal cycling session. During the study, the subjects pedaled at a predetermined percentage of their maximal oxygen consumptions (V0₂ max) for both the cycling sessions. Table 4.3 indicates that V0₂ was similar (p > 0.05) with music and without music. This meant that the work intensity was not significantly different for the two different treatment conditions.

4.4. SUBMAXIMAL CYCLING

Tables 4.4.1, 4.4.2 and 4.4.3 show the comparisons of submaximal cycling with and without music, with respect to change in blood lactate concentration, heart rate and Borg scale, at different time periods. The mean values, confidence intervals, significance level (p-value) and coefficient of determination (CoD) are given.

<u>TABLE 4.4.1- Change in plasma lactate concentration (mean, 95%</u> <u>confidence interval, p- value and coefficient of determination) before</u> <u>and after submaximal (80% VO₂ max) cycling with and without music</u> (baseline adjusted to two minutes) n = 30

Change in pl concentration (Lactate af lactate before	asma lactate (mmol/l) fter minus exercise)		
		p-VALUE	
MUSIC	WITHOUT		CoD
	MUSIC		
5.4	5.8	0.32	86.28%
(3.3-7.5)	(3.7-7.9)		

CoD = Coefficient of Determination

The change in blood lactate concentration (obtained by subtracting the lactate value before cycling session from the lactate value obtained after the cycling session) yielded

no significant changes when comparing the cycling session with music to the cycling session without music (p = 0.32).

TABLE 4.4.2- Heart rate (mean, 95% confidence intervals, p-value and <u>coefficient of determination) at two minute intervals during submaximal</u> (80% VO₂ max) cycling with and without music (baseline adjusted to

two minutes) n =30

	HEART RATE			
	(Beats/min)			
TIME (min)	MUSIC	WITHOUT	* p-VALUE	CoD
		MUSIC		
4	150.9	151.0	1.0	91.0%
	(143-158.9)	(143- 159)		
6	163.8	162.2	0.14	91.1%
	(167-169.7)	(156.2-168.3)		
8	161.5	160.4	0.29	93.4%
	(155.3-167.7)	(154.2-166.6)		
10	159.3	159.9	0.64	90.0%
	(151.6-167)	(152.1-167.6)		
12	165.4	165.3	0.92	87.5%
	(156.3-174.5)	(156.1-174.4)		
14	164.4	163.9	0.72	86.6%
	(154.8-174)	(154.2-173.5)		
16	164.8	164.8	0.97	91.8%
	(158-171.7)	(157.9-171.7)		
18	167.1	165.2	0.18	90.2%
	(158.7-175.5)	(156.8-173.7)		
20	169.7	167.7	0.07	92.8%
	(162.9-176.6)	(160.8-174.5)		

CoD = Coefficient of Determination

Analysis of the subject's heart rate failed to produce any significant differences for the two conditions.

TABLE 4.4.3-Borg scale (mean, 95% confidence intervals, p-values and coefficient of determination) at two minute intervals during submaximal (80% VO₂ max) cycling with and without music (baseline adjusted to two minutes) n = 30

	BORG SCALE		p-VALUE	CoD
TIME (min)	MUSIC	<u>WITHOUT</u>		
		<u>MUSIC</u>		
4	3.36	3.40	0.67	80.0%
	(2.6-4.2)	(2.6-4.2)		
6	3.53	3.43	0.74	72.5%
	(2.5-4.6)	(2.4-4.5)		
8	3.82	3.63	0.35	76.2%
	(2.8-4.8)	(2.6-4.7)		
10	4.00	4.01	0.88	87.1%
	(3.2-4.8)	(3.2-4.9)		
12	4.42	4.27	0.28	92.5%
	(3.7-5.1)	(3.5-5.0)		
14	4.61	4.72	0.50	90.9%
	(3.8-5.4)	(3.9-5.5)		
16	4.33	4.38	0.79	87.0%
	(3.4-5.3)	(3.4-5.4)		
18	4.50	4.40	0.64	90.7 %
	(3.4-5.5)	(3.5-5.4)		
20	4.79	4.59	0.32	89.6%
	(3.8-5.8)	(3.5-5.6)		
Average (0 -20	4.08	4.05	0.90	86.7%
minutes)	(3.3-4.8)	(3.3-4.8)		

CoD = Coefficient of Determination

The 10-point Borg Scale was used to obtain rating of perceived exertion at the commencement of the cycling session; at 20 minutes (the completion of the cycling session) and at 2 minute intervals during the cycling sessions. Table 4.4 illustrates the Borg Scale values for the cycling sessions with music and without music. The average, as well as the 2 minute intervals of Borg Scale responses in the music cycling session had no significant differences when compared to the cycling sessions without music

In order to compare the results, a baseline value of 2 minutes was included as a covariate. Both the covariate and the carry over effect were nonsignificant in every case. In this study there were large coefficients of determination (CoD) -see tables 4.4.1; 4.4.2 and 4.4.3, which indicate that the models for analysis that were used filled the data well.

The 2-way ANOVA indicated that no significant differences were observed between any of the variables, during the cycling session with music and that without music.

Figure 4.3 illustrates the subjects' perception of effort, during the submaximal cycling sessions.



Figure 4.1 Subject's perception of which cycling session was easier

The subject's perception of the cycling session with music and without music was inconsistent with the objective findings. Most subjects were able to identify the cycling session with music to be the easier of the two cycling sessions. Of the subjects, 66.7% indicated that they found the cycling session with music to be the easier cycling session, while 16.7% of the subjects found it easier to cycle without music. A further 16.7% indicated that they found both the cycling sessions to be the same.

Figure 4.4 shows the subjects' classification of the music. They found the music to be either: stimulating, relaxing, both or other.



Figure 4.2-Subjects' classification of music

Most (56.7%) of the subjects found the music to be stimulating, while 26.7% indicated that the music was relaxing. Fewer (6.7%) said that they found the music to be a combination of stimulating and relaxing and another 10% denoted that the music evoked some other sensation.

In the post-test questionnaire, subjects were asked if they liked the music that was played. All subjects, except for one, liked the music