

The effect of intermittent cycle training time and intensity on aerobic capacity and metabolic health

Location:

School of Sport and Exercise Sciences, Liverpool John Moore University

Investigators:

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You are being invited to participate in a research project. However, before you give consent to participate in this study, it is important that you completely understand why this research is being completed and what will be required of you. Please ensure that you take time to read through this information sheet. If there are any areas that are not clear, or that you would like more information on, feel free to contact the researchers who will be happy to provide this information for you.

What is the purpose of the study?

Regular physical activity is known to improve health; as such public health authorities recommend that we do at least 150 minutes of moderate intensity exercise per week. However, most people fail to meet these recommendations and undertake too little exercise to achieve health benefits. "Lack of time" is the most common barrier to exercise participation.

This is where intermittent cycle training (ICT) comes in. ICT uses short intense bursts of activity interspersed with rest periods to reduce the amount of time you need to exercise each week (30 minutes a week rather than 150 minutes a week, as recommended). Despite this considerable time saving research has shown that ICT is still effective at improving a number of health related variables, but further research is required to understand how to achieve optimal results.

This study therefore aims to identify the ideal time and intensity of ICT in order to improve health.

Who can take part?

You are likely to be eligible for this study if you fulfil the following criteria.

- Male aged 18-45 or Female aged 18-55
- BMI < 32 kg.m⁻² (if you don't know this we can work it out for you)
- No known cardiovascular or metabolic disorders
- Not currently meeting the recommended exercise guidelines (150 min of moderate intensity exercise per week).
- Not pregnant or breast feeding
- Not intending to get pregnant during the study

Do I have to take part?

No. Taking part in this study is entirely voluntary. If you would like to participate you will be given this information sheet to keep and be asked to sign a consent form. You are still free to withdraw at any time and without giving a reason. A decision to withdraw will not affect your rights, or any future

treatment or service you receive.

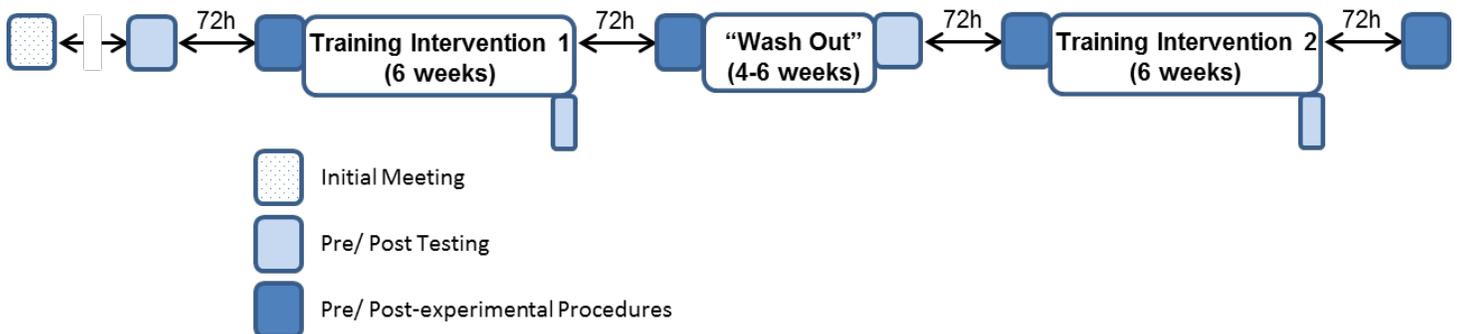
Benefits of taking part:

During the testing we will measure a number of health related variables, including fitness, body composition and cardiovascular disease risk. We will also assess your diet and physical activity. Information on these factors will then be used to design a personalised training programme for you. Although we can't guarantee it we do expect this to improve a number of health related outcomes.

What will happen to me if I take part?

If you agree to taking part in this study you will be asked to attend the lab on 8 occasions spread over 18 weeks (the longest visit will be no longer than 2.5h). During the study you will complete 2 different ICT interventions split by a period of 4-6 weeks.

Procedures: Details of the overall protocol are presented to you diagrammatically below.



Initial meeting: Consent and pre-screening

You will be asked to attend a meeting so that you can ask any questions about the study. If you are happy to participate in the study we will ask you to give consent for the study.

If consent is gained we will measure your blood pressure and complete an electrocardiogram (ECG). A finger prick blood sample will also be taken to measure HDL cholesterol and total cholesterol. Your current physical activity levels will also be checked with a questionnaire. The ECG is a test to check for problems with your heart. There is a chance this test will pick up an unexpected finding. Should this occur our study cardiologist (Dr Joseph Mills) will contact you to arrange a suitable course of action.

Visit 1: Pre testing 1 (Maximum 45 min)

You will be asked to attend the laboratory to undergo a short fitness test (VO_2 max test) on a stationary bicycle. This test will involve cycling through increasing levels of resistance. Prior to the test you will be fitted with a heart rate and blood pressure monitor. The test will comprise an initial three minute period of easy cycling, and the resistance will increase every 3 min until fatigue. Throughout the test, breath samples and blood pressure will be taken. On completion we will continue to measure your heart rate for 2 minutes. Body composition will then be measured using dual-energy X-ray absorptiometry scanning (DXA). Finally, you will be given an activity monitor and food diary. You will then use these for the following 7 days to record your normal physical activity levels and your normal diet (we will provide instructions on how this is done at the time).

Visit 2: Pre-experimental procedures 1 (maximum 2.5h)

You will need to attend the lab having completed an overnight fast, without caffeine, alcohol or vigorous exercise the day before testing. We will then conduct a number of tests to assess your

health.

Firstly, your blood vessel health will be measured non-invasively using a commercial system (SphygmoCor) at your wrist, neck and groin. Your blood sugar levels will then be measured through an oral glucose tolerance test (OGTT). A cannula (small flexible tube) will be placed into a forearm vein of one arm to allow us to obtain blood samples at various time-points. After the first blood sample you will be asked to drink a sugary drink. Following this, further small blood samples will be collected every 15, 30, 45, 60, 90 and 120 minutes. The cannula will then be removed. During the OGTT you will be asked to complete a number of questionnaires to assess your psychological well-being.

Training intervention 1:

Your first training programme will then begin. You will be asked to train 3 times per week for 6 weeks.

Visit 3: Post testing 1

In the final week of the training period post testing will occur. This visit will be identical in all respects to visit 1.

Visit 4: Post experimental procedure 1

This will take place 72 hours following the final training session. It will be identical in all respects to visit 2.

Wash Out period:

You will be asked to complete a 4-6 week period of no exercise. Following the “wash out” period you will complete the same tests as before.

Visit 5: Pre testing 2

Will be identical in all respects to visit 1

Visit 6: Pre experimental procedure 2

Will be identical in all respects to visit 2

Training intervention 2:

Your second training programme will then begin. You will be asked to train 3 times per week for 6 weeks

Visit 7: Post testing 2

In the final week of the training period post testing will occur. This visit will be identical in all respects to visit 1.

Visit 8: Post experimental procedure 2

This will take place 72 hours following the final training session. It will be identical in all respects to visit 2.

What will the 2 6 week training interventions be?

30 seconds intermittent cycle training (30ICT):

You will perform repeated 30 second bouts of high intensity cycling interspersed with 2 minutes of rest. The intensity of the exercise bouts will be self-selected, but we will encourage you to cycle at a high intensity. During the first week of training you will complete 4 intervals. This will rise to 8 by the end of the 6 weeks.

60 seconds intermittent cycle training (60ICT):

You will perform repeated 1 minute bouts of high intensity cycling interspersed with 1 minute of rest. The intensity of the exercise bouts will be self-selected, but we will encourage you to cycle at a high intensity. During the first week of training you will complete 6 intervals. This will rise to 10 by the end of the 6 weeks.

Where will I complete the study?

All sessions will take place in the laboratory of the School of Sport and Exercise Sciences at Liverpool John Moore University (Tom Reilly Building, Byrom street campus).

Are there any risks?

The most obvious risks to you will involve blood sampling, body composition measurement and high intensity exercise.

Exercise: You will experience fatigue during the fitness tests and training sessions. This will be short lived and you should have fully recovered within hours of the process. However, during such vigorous exercise there is a very minimal risk of unforeseen heart failure. Unfortunately there is very little data about the risk of cardiac event during/ following high intensity intermittent cycling (ICT) in healthy people like yourself. However, in people with heart disease the risk of a cardiovascular event during/ following high intensity ICT is the same as for traditional moderate intensity training, with the overall risk being low. As you are a healthy participant this risk is extremely small and these procedures are regularly conducted within the laboratory without having had any adverse events. All experimenters will also be first aid trained.

Blood Sampling: Blood samples will be taken on several occasions. You will feel a sharp pain when the needle is inserted but this will be short-lived. The researchers are also experienced in this technique so the pain experienced will be minimal. You may also develop a small bruise on your arm, which can be prevented by applying pressure on the arm when the cannula has been taken out (the researcher will remind/instruct you to do this). A finger prick blood sample will be taken from one finger. You may experience some sensitivity where the blood sample is taken, but this will be short-lived and normally only last ~24 hours.

Body composition (DXA Scan): Body composition will also be assessed using a DXA scan. The scan will expose you to a minimal amount of X-ray radiation. The radiation will be less than a chest X-ray (4.2 μ Sv), which is less than you would be exposed to on a flight to New Zealand. All risks will be minimised by safe practise and conducted by trained members of the research team.

Finally, if at any point during the protocol you feel uncomfortable or unable to continue, testing will be ceased immediately.

Confidentiality:

All data and samples will be labelled with a code, not with your name. Only the research team which is in contact with you has access to the link between the code and your name. The results of this study are expected to be published in a scientific journal, but names of participants will never be published.

Rights:

It is your choice whether or not you wish to take part in this study. If you wish to take part in this study, you will be given this information sheet to read and be asked to sign a consent form. You are reminded that if you decide to take part in the study, you are still free to withdraw at any time without provision of reason. Requests for a copy of the results attained will be honoured following study completion and publication in a scientific journal.

What happens if something goes wrong on the day of the trials?

All procedures have been included within Liverpool John Moores University Liability Insurances and if you are harmed in any way by taking part in this research project your normal rights apply and you may have grounds for legal action.

Complaints procedure:

If you have any complaints regarding the way you have been treated or anything else relating to the study you can write to Dr Dave Harriss who is independent from the research team and will investigate the matter fully.

Dr Dave Harriss
Fourth Floor, Kingsway House
Hatton Gardens
Liverpool
L32AJ
T: 0151 9046236
E: D.Harriss@ljmu.ac.uk

What happens now?

You will be asked to complete an informed consent form to confirm that you are happy to participate in this study. You will be asked to keep a copy of this information sheet and the signed consent forms. We will then inform your GP that you have decided to take part in this study.

Thanks for your time. If you have any further questions or want to participate in the study please contact Katie Hesketh

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If you would like an independent source of information and advice on the study please contact Dr Dave Harriss (see above for contact details)