# Is it more beneficial for appetite and weight management to exercise once or twice a day?

Submission date	Recruitment status	[X] Prospectively registered
07/12/2018	No longer recruiting	☐ Protocol
Registration date	Overall study status	Statistical analysis plan
11/12/2018	Completed	Results
Last Edited	Condition category	Individual participant data
16/02/2021	Nutritional, Metabolic, Endocrine	<ul><li>Record updated in last year</li></ul>

# Plain English summary of protocol

Background and study aims

There is a growing amount of literature committed to understanding if being more active will have beneficial effect on health. However, less is known on whether performing exercise twice a day is more beneficial than exercising once when matched for workload. Therefore, the aim of this study is to identify if workload matched exercise split over the day, will result in possible changes in gastrointestinal function, metabolic responses and appetite.

# Who can participate?

Healthy males (age 18-40 years; body mass index <29.9 kg/m2; non-smokers, no history of GI symptoms not consuming prescription medication and subsequently be physically active, in order to complete the trials.

What are the possible benefits and risks of participating?

- 1. Full fitness assessment
- 2. Information about the participants diet
- 3. Knowledge about how gastric emptying may affect exercise
- 4. Experience within a research laboratory

# What does the study involve?

The study involves two non-consecutive test days in a randomised order. After a 24 hour standardisation period and overnight fast. Participants come to the laboratory and exercise; either split over the day (two, 30min cycles) or a one-off bout (60-min cycle) before consuming a milk-shake and a standardised semi-solid meal. Throughout the trial, measurements of subjective feelings of appetite, gastric emptying rate, substrate utilisation and 24-hour energy intake. Blood samples will also be taken regularly throughout the trials.

Where is the study run from?
Manchester Metropolitan University, Manchester (UK)

Who is funding the study? Manchester Metropolitan university When is the study starting and how long is it expected to run for? December 2018 to September 2019

Who is the Main Contact? Mr Lewis Mattin lewis.mattin@stu.mmu.ac.uk

# **Contact information**

# Type(s)

Scientific

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# Additional identifiers

Protocol serial number LRM-1089

# Study information

Scientific Title

The effect of exercising once vs. twice a day on gastrointestinal function, metabolic responses and appetite in healthy males: a randomised cross over trial.

# Acronym

Split exercise

# **Study objectives**

- 1. Exercising twice a day will result in differences in gastric emptying rate and metabolic responses compared to a single workload-matched bout of exercise.
- 2. Exercising twice a day will result in differences in appetite and gut hormone responses compared to a single workload-matched bout of exercise.

# Ethics approval required

Old ethics approval format

# Ethics approval(s)

The Faculty of Science and Engineering Research Ethics and Governance Committee at Manchester Metropolitan University, 11/2018, ref. 1089

# Study design

Interventional, repeated measures with randomised crossover

## Primary study design

Interventional

# Study type(s)

Other

# Health condition(s) or problem(s) studied

Obesity

#### **Interventions**

Participants will complete two 7h experimental trials in a randomised cross-over design, where each participant will complete both trial arms; exercise once and twice a day separated by a minimum of 7 days. One trial will consist of a one off 60-min cycle at 70% peak maximal oxygen uptake. After completion of this single bout of exercise, participants will ingest a milkshake containing 30% of their estimated energy expenditure through the trial. Following a rest period the remaining 70% of their estimated energy expenditure through the trial will be provide as a semi-solid meal. The second trial will consist of a 30-min cycle before participants will ingest a milkshake followed by the same rest period before completing the remaining 30-min cycle and ingestion of a semi-solid meal. There will be no follow up session apart from all participant will record 24-h food intake following both trials.

# Intervention Type

Behavioural

## Primary outcome(s)

- 1. Gastric emptying rate of a semi-solid meal will be measured using the 13C breath test. Breath samples will be collected at baseline and every 15min for a two-hour period.
- 2. Circulating levels of key gut hormones and metabolic markers. Blood samples will be collected at baseline, pre-milkshake, 1h-post milkshake, 2h-post milkshake, pre-semi-solid meal ingestion,

- 1-h post meal ingestion and 2h post meal ingestion
- 3. Substrate oxidation will be measured using a breath-by breath gas analyser at rest, during exercise sessions and every 30 min post food ingestion for 2h
- 4. Visual analogue scales will be used to measure subjective sensations of appetite at rest, premeal ingestion and every 30min post food ingestion for 2h.
- 5. 24h post trial energy intake using weighed food intake dietary record

# Key secondary outcome(s))

1. Ratings of perceived exertion using the Borg scale and heart rate will be recorded pre exercise and every 15min during exercise

# Completion date

30/08/2019

# **Eligibility**

# Key inclusion criteria

- 1. Healthy males
- 2. Age between 18-40 years
- 3. Body mass index =  $<29.9 \text{ kg/m}^2$
- 4. Non-smokers
- 5. No history of GI symptoms
- 6. Not consuming prescription medication, or no other relevant medical conditions assessed by a medical screening questionnaire.
- 7. Subsequently be physically active, in order to complete the trials.

# Participant type(s)

Healthy volunteer

# Healthy volunteers allowed

No

# Age group

Adult

# Lower age limit

18 years

# Upper age limit

40 years

#### Sex

Male

#### Total final enrolment

16

# Kev exclusion criteria

- 1. Lactose Intolerant
- 2. Vegan

# Date of first enrolment 17/12/2018

# Date of final enrolment 10/04/2019

# Locations

# **Countries of recruitment** United Kingdom

England

Study participating centre
Manchester Metropolitan University
John Dalton Building
School of Healthcare Science
Chester Street
Manchester
United Kingdom
M1 5GD

# Sponsor information

# Organisation

Manchester Metropolitan University

#### **ROR**

https://ror.org/02hstj355

# Funder(s)

# Funder type

University/education

#### **Funder Name**

Manchester Metropolitan University

# Alternative Name(s)

Manchester Polytechnic, MMU

# **Funding Body Type**

Government organisation

# Funding Body Subtype

Universities (academic only)

#### Location

**United Kingdom** 

# **Results and Publications**

# Individual participant data (IPD) sharing plan

Participant level data is not expected to be available as this complies with the conditions of the ethical approval grated for this study.

## IPD sharing plan summary

Not expected to be made available

# **Study outputs**

Output type Details Date created Date added Peer reviewed? Patient-facing?

Participant information sheet Participant information sheet 11/11/2025 11/11/2025 No Yes