

Laboratory 2: Physiological and perceptual responses to exercise in the heat

Aim/s of the session

To compare the physiological and perceptual responses to exercise in the heat with those observed in temperate conditions.

You will use some of the techniques introduced in the previous laboratory so you may wish to consult that handout again.

Learning outcomes

By the end of this session you should:

- Know how the following variables respond to exercise in hot and temperate conditions (with and without airflow).
 1. Heart rate
 2. Sweat rate
 3. Thermal sensation
 4. Thermal comfort
- Have a greater understanding of the background physiology relating to the measurement

Once the data are collected, please enter them in to the spreadsheet. In your own time, please plot the changes over time observed for each variable.

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This week your participants will undertake 15 min of submaximal cycling (90 – 105 W) in the following three environmental conditions:

1. Temperate (laboratory) conditions
2. Temperate (laboratory) conditions with airflow
3. Hot (40°C, 40% RH) conditions

Two participants will perform each task. Ideally, the same participant will complete all three bouts of exercise but if this is not possible, you may change participants.

I have provided a partially complete data sheet for this week. In future weeks, the data sheets provided will become less and less complete to give you more and more do!

Variables to measure:

Sweat loss and sweat rate Using pre- and post- body masses, you will measure the sweat response to the exercise in each condition. You measured this in the previous laboratory so please refer back to this handout if you are unsure how to measure/calculate sweat loss and rate.

Heart rate You will be very familiar with measuring heart rate during exercise using the Polar chest straps and watches and you will measure heart rate in exactly the same way this week. We will be measuring heart rate to see whether we can observe **cardiovascular drift** during exercise in the heat.

Thermal sensation Thermal sensation quantifies the perception of temperature i.e. “what” (e.g. warm) you feel. You will measure it using the scale created by Young et al. (1987).

Thermal comfort Thermal comfort quantifies “how” (e.g. uncomfortable) you feel. You will measure this using the scale created by Gagge et al. (1967).

Notes *E.g. Definitions for the bold underlined terms; Measurement considerations; Physiological explanation for observations*

Self-check questions:

1. Which responses are involved in autonomic thermoregulation and which are involved in behavioural thermoregulation?

2. Did cardiovascular drift occur? How do you know?

Laboratory 2: Physiological and perceptual data sheet

	To calculate sweat loss/rate			HR responses to exercise				“What” your participant feels				“How” your participant feels			
	Variable?	?	?	Heart rate				Variable?				Variable?			
	kg	kg	kg	bpm	bpm	bpm	bpm	0 – 8	0 – 8	0 – 8	0 – 8	1 – 4	1 – 4	1 – 4	1 – 4
Time (min)	When?	When?	When?	0	5	10	15	0	5	10	15	0	5	10	15
Temperate conditions: Temperature = _____ °C; relative humidity = _____ Units?; Airflow = 0 Units?															
Participant 1 initials															
Participant 2 initials															
Temperate conditions with airflow: Temperature = _____ °C; relative humidity = _____ Units?; Airflow = _____ Units?															
Participant 1 initials															
Participant 2 initials															
Hot conditions: Temperature = 40°C; relative humidity = 40 Units?; Airflow = 0 Units?															
Participant 1 initials															
Participant 2 initials															

- Please complete the table above with the data collected
- Some details are deliberately blank. Please complete these by writing over the grey text.

Laboratory 2: Cycle ergometer data sheet (to facilitate standardisation).

	Cadence (rpm)	Resistance (kg)	Power (W) Equation to calculate this?
Participant 1			
Participant 2			