Effect of drifting temperature on thermal perception and health

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To evaluate the effect of a drifting ambient temperature versus a fixed ambient temperature on subjective comfort and sensation, and thermo-physiological parameters. Additionally, the effect of different activity levels on the location of the...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Other condition
Study type	Interventional

Summary

ID

NL-OMON48623

Source
ToetsingOnline

Brief title
Effect of drifting temperature on thermal perception and health

Condition

- Other condition

Synonym
N/a

Health condition

Geen

Research involving
Human

Sponsors and support

Primary sponsor: Universiteit Maastricht
Source(s) of monetary or material Support: Europese Unie

Intervention

Keyword: Environmental Temperature, Health, Metabolism, Thermal perception

Outcome measures

Primary outcome

Difference in thermal sensation as indicated by the maximal difference in

finger temperature between the two ambient temperature conditions

Secondary outcome

energy expenditure

heart rate

blood pressure

skin temperature

core temperature

sweat rate (only in experiment 2)

Study description

Background summary

Humans tend to spend most of their time indoors. Nowadays temperatures in many buildings such as dwellings and offices are controlled very tightly determined by the ASHRAE Standard 55 and ISO Standard 7730. However, these standards are calculated around the assumption of an 'average occupant' to maximize thermal comfort and minimize health risks. Whereas, in reality there is a large individual variation with respect to comfort and sensation. Additionally, due to the application of these standards there is little to no variation in indoor climate and thus the human thermoregulatory system is less challenged to maintain a constant temperature. Therefore, it is likely to assume that

occupants become more vulnerable to sudden fluctuations in temperatures.

Study objective

To evaluate the effect of a drifting ambient temperature versus a fixed ambient temperature on subjective comfort and sensation, and thermo-physiological parameters. Additionally, the effect of different activity levels on the location of the thermal neutral zone will be investigated.

Study design

The study will consist of two different experiments. In experiment 1 subjects will be exposed to drifting ambient temperatures and compared with a normal constant ambient temperature under laboratory conditions. In experiment 2 participants will be engaged in different physical activity levels and the ambient temperature will be set to 21 degrees. Measurements include thermal perception and sensation, heart rate, blood pressure, body temperatures and energy expenditure.

Intervention

In experiment 1, participants will reside in the respiration chamber for two measurement days (9.5 hours each). During these measurement days participants will be exposed to either a drifting temperature protocol or a fixed temperature.

Drifting temperature protocol: upon entering the respiratory chamber (± 8:15 AM) the temperature will be at 17 degrees celsius. After 45 minutes room-temperature will gradually increase to 25 degrees celsius (± 2.3 degrees C/Hour) and reach the temperature at about 12:30 PM. after 30minutes of remaining at 25 degrees the temperature will gradually decrease again to 17 degrees celsius (±2.3 degrees C/hour) and reaches 17 degrees at about 16:30 PM. The temperature will remain at 17 degrees for 45minutes after which the experiment ends (17:15PM).

Constant temperature protocol: upon entering the chamber the temperature will be 21 degrees celsius and remain at this temperature throughout the full day. (from 8:15 AM until 17:15 PM)

In experiment 2, participants will be instructed to perform several activities (lying down in bed, sitting, standing and walking at 3km/h). Environmental temperatures will be kept constant at 21 degrees celsius.

Study burden and risks

This study carries no benefits for the subjects. It is not a therapeutic

research and carries minor risks for the subjects. The major burdens consist of recurrent study visits, a moderate time commitment and exposure to warmer and cooler environments than usual. Subjects will perform several activities within the respiratory research units of the MRUM and are not allowed to leave the room throughout the measurements. Furthermore, subjects are asked to regulate their eating and exercise habits 1 day before each measurement day of the study to limit external influence on the measurement of energy expenditure. This may be a small social and psychological burden.
The study will lead to novel insights into the relationship between drifting ambient temperatures during several activities and various health-related parameters such as blood pressure, heart rate and energy expenditure.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Male gender
Caucasian race
Age 20-40 years
BMI between 18 and 27.5 kg/m2
Non-smoking
Steady dietary habits
Generally healthy, no medication use that interferes with metabolism.

Exclusion criteria

Cardiac problems and cardiovascular diseases, such as angina pectoris, cardiac infarction and arrhythmias
Any medical condition requiring treatment and/or medication that might interfere with
the investigated parameters.
Unstable body weight (weight gain or loss >3kg in the past month)
Participation in another biomedical study within 1 month prior to screening visit
Participants, who do not want to be informed about unexpected medical findings, or
do not wish that their treating physician will be informed, cannot participate in this
study
Presence of Raynaud's phenomenon

Study design

Design

Study type:	Interventional
Intervention model:	Crossover
Allocation:	Randomized controlled trial
Masking:	Open (masking not used)

Primary purpose: Basic science

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	13-06-2018
Enrollment:	18
Type:	Actual

Ethics review

Approved WMO Date:	05-04-2018
Application type:	First submission
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)
Approved WMO Date:	14-03-2019
Application type:	Amendment
Review commission:	METC academisch ziekenhuis Maastricht/Universiteit Maastricht, METC azM/UM (Maastricht)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL64793.068.18