



Body Sweat Distribution in a Paediatric Population During Exercise in the Heat

Parental / Legal Guardian Information Sheet

Investigators Details:

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What is the purpose of the study?

Thermoregulation is a biological process which happens in the body to maintain a constant body core temperature of approximately 37°C. During warm conditions and/or moderate-to-high exercise intensities body temperature may rise. When this happens, the body activates several mechanisms to cool down. Vasodilation, or the widening of blood vessels, allows more warm blood to come closer to the skin therefore shortening the distance for the heat to be lost from the body to the surrounding air through the skin. This is one reason why your skin goes red when you feel warm. Sweating is however one of the most effective cooling mechanisms. When the skin is hot, sweat is released onto the skin, and when it evaporates (or dries out) it takes heat with it, leaving the skin and overall body cooler. Adults have a fully developed sweating system which means they can cool-down quite effectively by sweating, however children are still developing their sweating system, meaning that they can still sweat but not as much as adults. These differences between age groups have been investigated before but usually on a local level; i.e. by measuring the amount of sweat in a small body area such as the upper back, or as an overall sweat loss value; i.e. by measuring changes in weight and amount of liquid lost via urination or gained via drinks. All this information is extremely valuable however they do not show the sweating patterns in terms of where on the body children sweat more/less, and this is something that has never been done before and which is important information for sport clothes designers.

A technique which allows the measurement of whole body sweating patterns is the "Sweat mapping" technique which uses absorption pads. The body is divided into several segments, and each segment has an absorption pad cut out exactly the same size. These are applied to the body to absorb the sweat made during exercise (please find an example of an adult sweat map below). That way we can find how much sweat is produced in each segment of the body and see where a child sweats more or less.

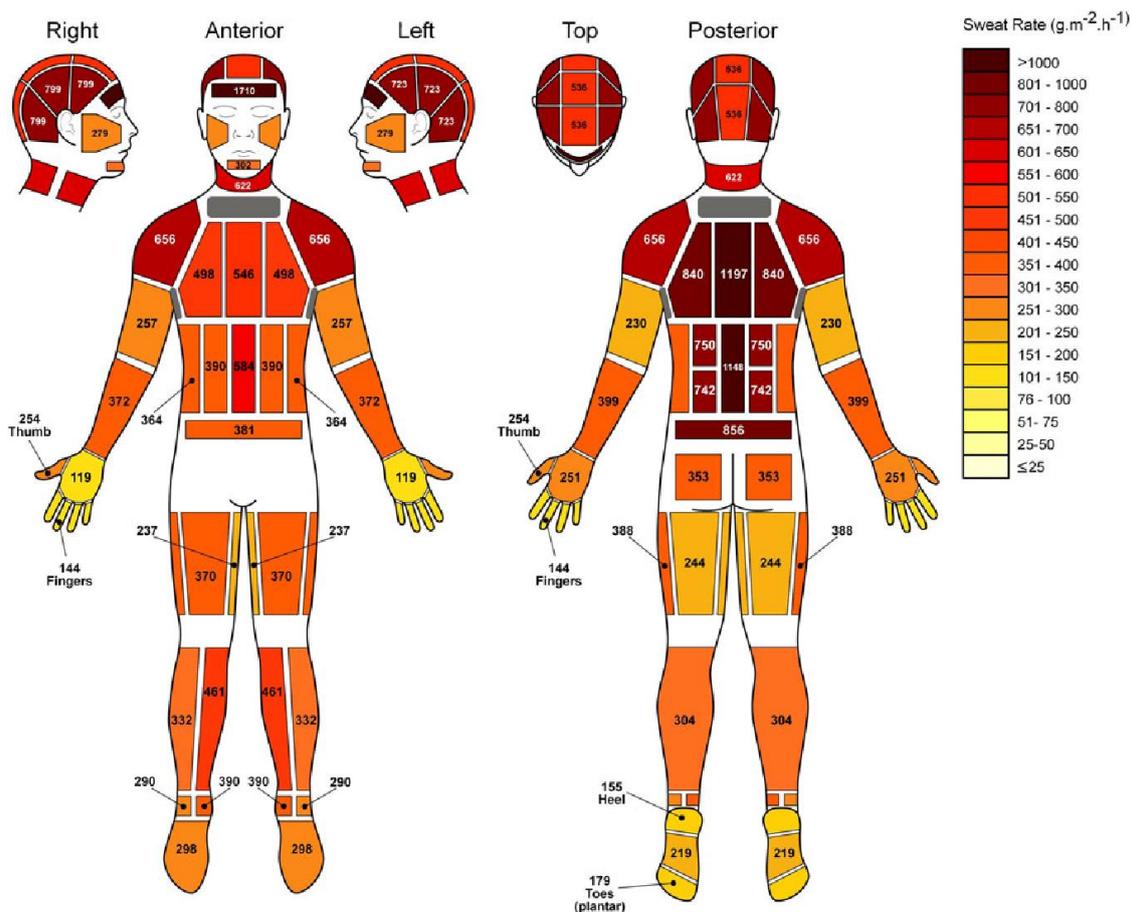


Figure 1. An example of the Sweat Mapping technique as shown in the study by Smith and Havenith, 2011.

Who is doing this research and why?

This research study will be conducted by Leigh Arlegui (BSc, MSc) as part of her PhD in Environmental Physiology at Loughborough University. The staff member and former PhD student at Loughborough University James Smallcombe (BSc, MSc, PhD) and the undergraduate students Mr. Harry Haigh and Miss Rebecca Samuels will assist Leigh Arlegui throughout the study. This study will be supervised by Prof. George Havenith (Professor in environmental physiology and ergonomics, and Director of the Environmental Ergonomics Research Centre) and by Dr. Keith Tolfrey (Reader in Paediatric Exercise Physiology). Leigh Arlegui, who has clearance through the Disclosure and Barring Service (DBS – formerly known as Criminal Records Bureau) and a First Aid Certificate, will supervise all aspects of the study. Both researchers will be present at all times throughout the visits to the university laboratory. This study is part of a PhD student research project supported by Loughborough University and Decathlon, France.

Are there any exclusion criteria?

Parents or legal guardians will be asked to complete a General Health Screen Questionnaire relating to the child's health status. The answers of the questionnaire will be used to determine their eligibility to participate in this study. The child may not be able to participate in the study if he/she:

- Is not 7 – 9 years old
- Suffers from any cardiorespiratory, endocrine or neurological condition (e.g. asthma)
- Has any muscle or bone injury which does not allow her/him to exercise on a treadmill
- Is on any medical treatment or is taking any medication
- Has sustained some major injury 6 months before the start of the study
- Is prone to heat illness

If you have any questions or doubts about whether or not the child can participate in this study, please do not hesitate to contact the main investigator (Leigh Arlegui).

What will the child be asked to do?

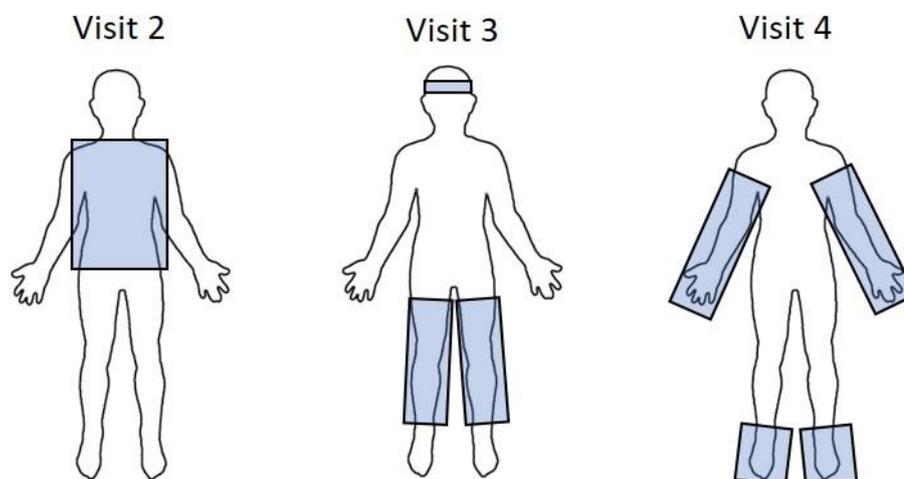
The child will be asked if he/she wishes to take part in the study. This would be a total of 4 separate visits. All visits will be held at the Environmental Ergonomics Research Centre after school and during weekends.

Day 1

During the first visit we will confirm that you have all read and understood the information in the Parent information Pack and you will be given a chance to ask any questions you may have. After that we have a look at the equipment and the facilities, and if you are all happy to take part we will complete the informed consent forms and continue with some body anthropometric measurements. This will consist of taking the child's height, sitting height, weight, skinfold measurements, several body measurements using a tape measuring technique and a specialised scale. After that the child will be asked to perform a short 20-minute walk-run on the treadmill.

Days 2, 3 and 4

The child will then be asked if he/she wishes to return for the next 3 visits. One visit will consist of sweat collection of the torso area, another of the legs and forehead, and another of the extremities (arms, hands and feet). These sessions are set in a randomised manner, meaning that the sweat collection area for each visit may not necessarily be in the order shown in the diagram below.



On arrival, we will ask parents to help the child get changed into shorts and a t-shirt (as well as a two-piece swimming suit for girls) provided by the researchers. Body weight will be taken, and the heart monitor watch will be put on. The child will then be asked to sit for 15 minutes at room-temperature during which he/she will be allowed to play on a tablet or watch child-friendly films for entertainment. During these 15 minutes we will be measuring heart rate, ear temperature and we will ask the child to rate their thermal sensation, thermal comfort and wetness perception by pointing at the scales. After that we will enter the warm chamber (25°C - 35°C) to perform the

exercise protocol. The child will have a 5-minute warm-up on the treadmill before performing the exercise protocol. The exercise protocol is a combination of walking and running for very short periods of time over a 25-minute period. After the 25-minute exercise the child will be asked to dismount the treadmill and he/she will dry himself/herself down with a towel to remove any sweat on the skin. T-shirts are briefly removed for a quick thermal image to measure skin temperature, and then the sweat absorption pads will be applied to the torso, legs and forehead, or extremities (depending on the session as shown in the diagram above). Then either a long-sleeved t-shirt or long trousers will be worn over the clothes and pads to keep the pads in place. He/she will return to the treadmill for a 5-minute run for sweat collection. In the case of the girls the top part of the swim suit is taken off when the pads are applied to the torso area (this will be done by female researchers only in a private area in the room covered by a medical screen). After the run the extra clothing and the sweat absorption pads will be removed and the child will exit the warm chamber to sit for at least 15 minutes at room-temperature to cool down. The child will be given cool water to drink and will have access to an electric fan and a wet towel to dampen the skin to cool down if they wish. Again, heart rate, ear temperature and ratings of their thermal sensation, thermal comfort and wetness perception will be asked and monitored until the child returns to a comfortable body temperature. Finally, the heart rate monitor will be removed, and their weight taken.

Note: Two researchers will be present at all times throughout the duration of each visit. Sweat pads will be applied in a private area in the chamber covered by a medical screen. If the child is a girl, two female researchers will be present to apply the clothing and pads. In the case of a boy a male researcher will attend to the clothing and pad application whilst the female researcher waits on the other side of the screen in the chamber.

Can I be present throughout the experimental sessions?

You will be invited to be present throughout the experimental sessions. On arrival we will ask you to help the child get changed into the test clothing (i.e. shorts, t-shirt and 2-piece swimming suit for girls) in the changing room. During the exercise protocol you will be invited to watch from the seating area outside the chamber for comfort, although you are welcome to remain in the climatic chamber if you wish but we advise to wear appropriately light clothing to avoid undue heat-stress. Conversely, if you and the child agree to the arrangement, you may also watch the experimental session from the lounge area in the laboratory, or drop-off and pick-up the child at the end of each testing session.

Once I take part, can I change my mind?

Yes. After you and the child have read this information and asked any questions you may have, if you are happy to participate, we will ask you and the child to complete a Parental Informed Consent Form and a Child Assent Form. Nevertheless, if at any time before, during or after the sessions you wish to withdraw from the study please just contact the main investigator (Leigh Arlegui). You can withdraw at any time, for any reason and you will not be required to explain your reasons for withdrawing. However, once the results of the study are published, it will not be possible to withdraw your individual data from the research.

Will the child be required to attend any sessions and where will these be?

The child will be asked to visit the Environmental Ergonomics Research Centre, James France Building, Loughborough University, LE11 3TU for every session of the study.

How long will it take?

The study will run from October 2018 to December 2019. The study is divided as shown below:

Day 1 – 1.5 hours

Day 2 – 1.5 hours

Day 3 – 1.5 hours

Day 4 – 1.5 hours

Whole study total hours – 6 hours

What personal information will be required from me?

Basic information such as name, age, date of birth, height, weight, medical history, questions relating to physical activity, clothing sizes and parent contact details to arrange each visit. With your assistance, we will ask you to determine at what stage of biological development the child is at. To do this, we will send you a self-assessment sheet with scientific medical diagrams showing different stages of physical maturation based on secondary sexual characteristics (pubic hair and/or breast development). In the privacy of your home we will ask you to help the child to compare his/her-self with the scientific medical diagrams to determine at what stage of development they are at. All this and all other pieces of personal information will be kept confidential and secure. Personal data will be processed on the public task basis under General Data Protection Regulations (GDPR). Some of the personal data which will be collected from you and your child is categorised as “sensitive data”. The processing of this data is necessary for scientific research in accordance with safeguards. This means that study has gone through an ethical committee to ensure that the appropriate safeguards are put in place with respect to the use of your personal data.

Are there any risks in participating?

The child will be asked to perform a short walk-run on a treadmill in a neutral environment and in a warm environment. All sessions will be supervised at all times and participants will receive familiarisation on the treadmill.

Will the child’s taking part in this study be kept confidential?

All the data will be password-protected in a computer database or in a locked drawer in the Environmental Ergonomics Research Centre. Participants will be assigned a code number and no documents will contain their name to ensure anonymity. This data will be used to present findings in scientific journals and/or at conferences. Numerical and statistical data will be stored for at least 5 years at the Environmental Ergonomics Research Centre.

What will happen to the results of the study?

The results of the study will hopefully be published in a scientific journal and presented at scientific conferences, and a report with the results and conclusions of the study will be presented to Decathlon at the end of the study. Participant names will be kept strictly anonymous and will not be present in any pieces of data. Once the study has been completed the child will receive a summary of their results, however it may take a few months for him/her to receive it.

What does the child get from participating?

A summary of all their individual results, including health and fitness information as well as a valuable, first-hand educational experience of how research is conducted at the Environmental Ergonomics Research Centre. Additionally, the child will be reimbursed via Decathlon gift vouchers, which can be used in store or online: www.Decathlon.co.uk. The value of the gift vouchers is set according to the total number of hours participated, therefore even if the child only takes part in one visit (e.g. 1.5hrs) they will be reimbursed for the 1.5 hours.

Is there anything the child needs to do before the sessions?

Before the start of the testing sessions parents will be asked to complete a Health Screening Questionnaire relating to the child’s health status, and after the Participant Information Sheet has been read and understood, informed consent and assent forms will be signed. Participants will be

asked to continue with their regular eating habits and will be asked to be well hydrated for each visit.

What type of clothing should the child wear?

The child will be asked to wear comfortable sports clothing, i.e. a short-sleeved t-shirt, underwear, shorts, socks and sport shoes. The lab has a changing room where the child can get changed into their sports clothing. During the experimental sessions the child's t-shirt may be removed and special long-sleeved and long trousers will be worn over the clothes during the sweat absorption pad application. Again, if necessary, the female researcher will attend to the girls whilst the male researcher waits on the other side of the screen, and vice versa for the boys.

I have some more questions; who should I contact?

Ms Leigh Arlegui, l.a.arlegui@lboro.ac.uk

Alternatively, you may contact:

Prof. George Havenith, g.havenith@lboro.ac.uk, 01509223031

Dr. Keith Tolfrey, K.Tolfrey@lboro.ac.uk

What if I am not happy with how the research was conducted?

If you are not happy with how the research was conducted, please contact the Secretary of the Ethics Approvals (Human Participants) Sub-Committee, Research Office, Hazlerigg Building, Loughborough University, Epinal Way, Loughborough, LE11 3TU. Tel: 01509 222423. Email: researchpolicy@lboro.ac.uk

The University also has policies relating to Research Misconduct and Whistle Blowing which are available online at <http://www.lboro.ac.uk/committees/ethics-approvals-human-participants/additionalinformation/codesofpractice/>.