



Cooling During Exercise in the Heat: Changing Perception

<https://youtu.be/XMXm1G8kTz4>

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Perceptual cooling: Why?

Performance is impaired in hot environmental conditions whether this is endurance (Tyler & Sunderland, 2008) or team sport activities (Sunderland & Nevill, 2005). It is desirable to be able to counteract some of the negative effects of heat upon performance by changing a person's perception of the heat strain they are experiencing. Examples of perceptual responses that may change by cooling, include, but are not limited to, thermal comfort, thermal sensation, mood, rating of perceived exertion, feeling (or how good or bad one feels) and arousal (how excited, bored we feel). By altering our perception through practical cooling interventions that can be used before and/or during competition, we can improve performance.

Alliesthesial thermosensitivity: Alliesthesial refers to a sensation or perception and describes the dependent relationship between an internal response of a person and their perception. Therefore, alliesthesial thermosensitivity describes how a person's perception of temperature can change their internal responses, an example being a person runs faster.

Perceptual cooling: How?

Both internal and external cooling methods can be used to alter our perception of the thermal strain we are experiencing. This occurs by the thermoreceptors in the skin or gastro-intestinal tract being stimulated and reducing thermal sensation as an example. External cooling methods are neck cooling, water dousing, ice vests and torso cooling, menthol spray and fanning. Internal cooling methods include ice, ice slurry and cold drink ingestion. In addition, mouth rinses of ice slurry or menthol can be used as thermally sensitive receptors are also found in the oral cavity.

Example study	Method	Perceptual change	Performance effects
Tyler & Sunderland, (2011)	Running 70% VO ₂ max to exhaustion, neck cooling	Decreased thermal sensation	Increased capacity by 13.5%
Chaen, Onitsuka, & Hasegawa, (2019)	Simulated team sport activity, cooling vest at half-time	Decreased TS, TC and RPE	Increased mean power output in the 2 nd half sprints
Jeffries, Goldsmith, & Waldron, (2018)	Cycling 70% VO ₂ max to exhaustion, ice slurry ingestion and menthol mouth rinse	Decreased TS (large effect)	Increased capacity by 6% (menthol) and 7% (ice).

TS – Thermal sensation; TC- Thermal Comfort; RPE – rating of perceived exertion;

Perceptual cooling: Practical considerations

When deciding on the cooling strategy you are going to employ, always work with individual athletes to ensure they tolerate the intervention and it does not have any negative effects. Changing our perception of how hot we feel, can be dangerous, as studies have shown that participants can exercise to higher core temperatures (Tyler & Sunderland, 2011). At the recent World Athletics Championships in Qatar, over 40% of the athletes failed to complete the women's marathon due to heat exhaustion and heat related illnesses, most of whom were employing cooling strategies. It is imperative therefore, that we monitor core temperature where possible and educate athletes about the dangers of changing perception during exercise in the heat.



VIRTUAL ENVIRONMENTAL ERGONOMICS

Questions

1. When and how can you use cooling interventions to change perception? What perceptual changes would you expect to see?
2. Which types of cooling intervention are most appropriate for endurance exercise and team sports in the heat?
3. What are the dangers of using cooling interventions during exercise in the heat?

References

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