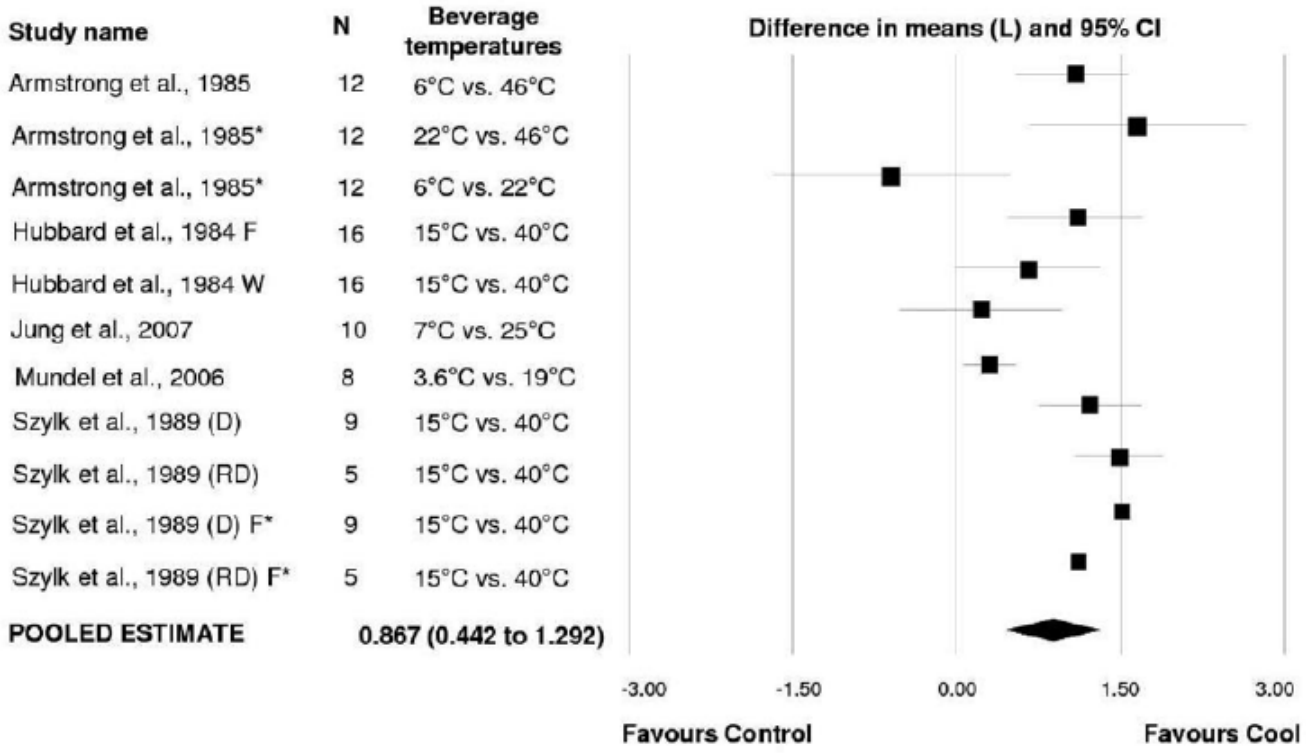
Korey Stringer Institute
University of Connecticut
Preventing sudden death in sport

CAMELBAK®

The *Beverage Temperature* and Influence on Hydration

Summary of Findings

- Beverage temperature has been shown to increase palatability and fluid ingestion. A review of the literature found a 50% increase in consumption when colder beverages were used during exercise and resulted in a smaller change in body mass (a hydration state equaling ~1.3% body mass loss) than warmer fluids.[1]
- Evidence indicates that ingestion of fluids between 10-21°C (50-69°F) is optimal for palatability and fluid ingestion.[1–4]
- Pre-cooling is a popular strategy that is used before exercise competition to reduce core body temperature and evidence has shown that ingestion of cold beverages is able to reduce core body temperature.[5] Results, although mixed, has shown that ingestion of cooler beverages attenuates the rise in core temperature and increases exercise performance during exercise in the heat.[6]
- It is theorized that ingestion of cold fluid or an ice slurry mixture acts as a heat-sink which yields a larger heat-storing capacity in the body and has the potential to reduce core temperature during exercise.[5,7] It has also be postulated that with ingestion of cool fluid, sensory systems in the body are activated and in turn affect central drive thus improving performance, especially in the heat.[6]



The influence of beverage temperature on fluid ingestion.[1]

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Practical Applications

- Maintaining an appropriate level of hydration is optimal for maximizing exercise performance. Further, maintaining an appropriate level of hydration during exercise in the heat will not only assist in maximizing exercise performance, but will also increase the body's ability to dissipate heat and enhance cardiovascular function.
- Evidence shows that maintaining a beverage between the temperatures of 10-20°C will enhance fluid consumption, which will assist in maintaining an appropriate level of hydration.
- Consuming fluids prior to, during, and post exercise will promote an appropriate level of hydration for an exercising athlete. Fluid consumption is individualistic, however, during exercise in the heat, the amount of fluids that need to be consumed to minimize fluid losses during exercise needs to be increased.
- In order to increase fluid consumption during exercise, athletes should have a plan to keep beverages cold such as using the Camelbak® Podium Chill water bottle.

Looking Ahead

- Further research examining the influence of cold drinks prior to the start of exercise and if they assist in thermoregulatory control upon the commencement of exercise.
- Due to the limited research available, additional research examining various durations, intensities, and environmental conditions of exercise and the fluid ingestion of beverages at various temperatures is warranted to form more concrete evidence.
- Determining the exact mechanisms by which cool beverages enhance fluid ingestion during exercise is warranted.
- Further research to determine the temperature of fluid favored prior to exercise is warranted due to the limited research available.
- Further research examining core temperature and performance measures with drinking cold beverages during exercise in the heat is needed due to the limited evidence available.

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