Human wetness perception of textile materials under dynamic skin contact

REPOSITORY RECORD

Raccuglia, Margherita, K. Pistak, S.G. Hodder, and George Havenith. 2019. "Human Wetness Perception of Textile Materials Under Dynamic Skin Contact". figshare. https://hdl.handle.net/2134/23826.

Human wetness perception of textile materials under dynamic skin contact

Introduction

The role of fabric thickness in triggering cutaneous thermal and mechanical cues affecting wetness perception (WP) under static skin contact has been demonstrated (Raccuglia et al. 2016). Under dynamic fabric-to-skin contact higher moisture content increases friction and WP (Kenins 1994). However, it is unknow whether changes in friction, due to different fabric surface properties, will affect WP. The current study aims to examine the contribution of fabric surface texture on WP under dynamic skin contact.

Methods

Eight fabric samples, with different surface texture, were grouped according to (LOW), medium (ME) and high (HI) thickness. LOW included 4 samples: cotton-SMOOTH, polyester-SMOOTH, polyester-ROUGH, Coolmax-ROUGH. Both ME and HI comprised 2 samples: polyester-SMOOTH, polyester-ROUGH. Sixteen participants assessed WP and stickiness of the fabrics using ordinal scales. A motion operator was used to move the samples across the inner forearm at predetermined speed, range of travel and pressure.

Results

In LOW cotton-SMOOTH, polyester-SMOOTH and polyester-ROUGH were perceived as wetter than Coolmax-ROUGH ($p < 0.001$); cotton-SMOOTH was not significantly different from polyester-SMOOTH ($p = 0.5$). In ME, polyester-SMOOTH was perceived significantly wetter than polyester-ROUGH ($p < 0.005$). In HI polyester-ROUGH was not different from polyester-SMOOTH ($p = 0.4$). A linear relation was observed between stickiness and WP ($r^2 = 0.64$); adding thickness improved the prediction model ($r^2 = 0.85$) for WP.

Conclusions

Fabrics with smoother surfaces presented higher WP. Smoother surfaces may form a larger number of contact points with the skin, causing greater friction and skin displacement, sensed as higher stickiness and associated with greater WP. The relation between WP and stickiness indicates that WP can be manipulated through changes in fabric surface parameters (skin mechanical stimulation). The lack of significant difference in WP between some ROUGH and SMOOTH fabrics suggests the interaction of other textile parameters with surface texture in affecting WP.