

Heel height limits for older people

French consulting, research and testing organisation CTC has been working with the French Footwear Federation on ADOCS, a programme of projects to improve the suitability of footwear on offer to older consumers. One of the studies so far concerns heel height and makes specific recommendations on the heel-heights that women can continue to wear safely and comfortably in their senior years.

A programme to try to find ways of making shoes available that better meet the particular physical needs of older consumers has been under way in France for five years now. Called ADOCS (Amelioration de l'Offre Chaussure Senior), the idea came from the French Footwear Federation and from Lyon-based technical research and testing organisation CTC.

The starting point was a detailed set of studies that CTC began to carry out in 2010, analysing the biomechanics of the steps that older people take when walking. Aims included working out the modifications that older people feel forced to make to their steps to maintain their posture while wearing different types of shoe. Other strands of ADOCS have included new ergonomic studies of older people's feet and of trends and fashions in footwear for this age group. Around 15 French footwear manufacturers have taken an active part in the studies so far.

A total of 36 men and women have participated in formal tests in CTC laboratories, wearing different sorts of shoes and having their walking patterns analysed with

each one. The tests also took measurements when the subjects were walking barefoot to draw contrasts between the performance of shod and unshod feet. This group has comprised 24 women with an average age of almost 68, an average height of 1.59 metres, an average weight of 63.6 kilos and an average shoe size of 38. There are 12 men in the group, the averages for whom were 68.3 years, height of 1.74 metres, weight of 80.4 kilos and shoe size of 42.

CTC's analysis focused on measuring pressure points to see how well balanced subjects were when walking in different types of shoe, always under the same test conditions, with measurements taking place both during periods in which the subjects stood still (with their eyes closed) for a minute at a time, and during sessions of



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walking on a specially adapted treadmill fitted with sensors. These sensors allowed CTC to measure data such as the angle at which each subject was holding knees and ankles at the moment of foot-strike. They were also able to measure flex movements at different points of the walking-step cycle. Special sensors were also placed on the heel and on the leg at the level of the tibia to measure the shock waves imparted to each person's limbs by their heel-strike. Participants also completed a questionnaire about comfort at the end of each test, asking them to give each type of shoe a comfort rating ranging from 1 to 20, which, when all the results were examined together, allowed CTC to give each type of shoe an overall score for comfort.

Arch height was a critical factor throughout, with a height of 3 centimetres (between the highest point of the sole of the shoe and the ground) emerging as the recommended limit, owing to CTC's conviction, based on "numerous studies", that walking rhythm and balance start to suffer with heel heights of 5 centimetres and above. It concluded that similar negative effects might be visible from 3 centimetres onwards in older people. In presenting the results, CTC said it wanted to show measurements for each shoe style, drawing comparisons between a Derby style shoe, a similar shoe but with a 3 centimetre heel, a shoe with a high upper and finally barefoot walking. Women scored the (almost flat) Derby at 16.4 out of 20 for comfort while giving only a slightly less positive score (15.6 out of 20) for the shoe with the 3 centimetre heel.

CTC's conclusion from all of this analysis is that older people lose nothing in terms of stability and balance if they wear heels, as long as the heel is no higher than 3 centimetres. According to the study, heels of a height above 3 centimetres make it difficult for older consumers to adjust their ankle movements sufficiently to be able to keep walking comfortably. CTC has even said that women who are used to wearing heels can find heels of 2 or 3 centimetres more beneficial than heels of a lower height, although it points out that long-term use of heels can also make people



Varying heel heights.



Varying upper heights.



Measuring joint angles.

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more susceptible to health issues, such as Achilles' heel problems.

On the whole, though, CTC concludes that senior women with good foot health can continue wearing heels of 3 centimetres or less

without any great difficulty. Its studies show, however, that 3 centimetres is a cut-off height for arches and that older people who want to avoid foot health issues should avoid going beyond this limit. 📌