

Compromised text on Lei

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Intro

- Small, short women do not experience a regular size office chair as being simply uncomfortable, they do however report feeling more tired after a period of sitting.
- Larger/ taller women experience greater comfort in the office chairs currently available on the market (Helander and Zhang, 1997).

Sitting behaviour differences

- Females remain more upright when sitting, i.e. the female pelvis rotates less posteriorly and females better keep their lordosis when sitting (Bridger et al., 1992; Gregory et al., 2005; Dunk and Callaghan, 2005).
- Over time females tend to increase their forward tilt of the upper body, in contrast to men who tend to do the opposite (Beach et al., 2005).
- The differences are even greater when a backrest is present (Dunk and Callaghan, 2005).
- Females tend to position their centre of mass and hip joints anterior to the chair pivot point, i.e. at the front edge of the chair seat. Males, on the other hand, tend to place their centre of mass and hip joint posterior to the chair pivot point. Men also tend to use the backrest more. (Dunk and Callaghan, 2005).
- Females are more static in their sitting behaviour with less variation in the lumbar and trunk angles (Dunk and Callaghan, 2005).

Physiological differences

- Studies made on the characteristics of the back muscles indicate that female back muscles are weaker but more enduring (Umezumi et al. 1998; Kankaanpää et al., 1998; Larivière et al., 2006).
- Erector Spinae contain a higher frequency of type 1 muscle fibres which are characterized by a greater endurance (Kankaanpää et al., 1998).
- The patterns of muscle activation also differ. The female back muscles tend to distribute and alternate the load between the different muscles intermittently. (Larivière et al., 2006).
- Females experience a greater discomfort when their joints deviate from their neutral postures than males, especially in the hip joint in their joints (Kee and Karwowski, 2004).
- Females tend to become more agile in their lumbar backs after sitting as opposed to men (Beach et al., 2005).
- The muscles acting on the hip joint affect the position of the pelvis and the ability to keep a lumbar lordosis. According to studies on the male gender the findings indicate that the stiffer the hamstrings and hip flexors the less lordosis. For females the findings are contradictory yet

suggest the opposite. (Link et al., 1990; Yasukouchi and Isayama, 1995; McCarthy and Betz, 2000; Granata et al, 2002).

- Females better manage the pressure under the ischial tuberosities than males as the pressure is less and more centred to the tuberosities. Male pressure distribution is higher and more diffuse.
- The broader pelvis also better distributes the weight of the upper. (Dunk and Callaghan, 2005; Vos et al., 2006; Caracone and Kieir, 2007; Moes, 2007).
- For males the pressure under the ischial tuberosities decreases linearly as the back increases its recline. For females this relieving quality is only experienced up to 110° recline (Vos et al., 2006; Moes, 2007).

Chair design governed by ergonomic criteria

- Females are smaller than males
 - The Office chair dimensions must be smaller and be based on the curve of normal distribution for solely females
- Females sit more upright and thereby put more stress on the back muscles
 - The chair must relieve and counteract overexertion of the back muscles
- Females experience greater discomfort when their joints deviate from their neutral postures which results in a more upright posture and the tendency to place themselves at the front edge of the seat pan
 - The chair must have a smaller seat pan depth and an front edge which creates the ability to fold the legs under the chair
- Females are not relieved by a greater recline than 110°
 - The backrest recline needs not exceed 110°
- Females tend to sit more upright and the armrests are important in order to relieve the load of the upper back; the armrests must thereby not become an obstacle in getting close to the desk
 - The chair must have short armrest that gives support under the shoulder.
- A lumbar support is essential when aiming to reduce back problems (Chen et al., 2005)
 - The chairs back support must give support even in the reclined posture.