Footwear for children

B Grueger; Canadian Paediatric Society
, Community Paediatrics Committee
Abridged version: Paediatr Child Health 2009;14(2):120

Shoes are selected for protection, correction, and fashion. Parents are often confused by conflicting advice for appropriate footwear for children. The common practice of using footwear for correction of foot or leg “deformities” in otherwise healthy children has limited evidence of effectiveness. In this article the evidence supporting the use of corrective shoes for otherwise healthy children is reviewed.

Published articles on appropriate footwear were identified from MEDLINE (1980 to 2007), and the Cochrane Database. Authoritative, recognized expert opinion was sought from web sites including the Canadian Paediatric Society, the American Academy of Pediatrics, and Health Canada. A limited number of relevant articles were found and only a few were evidence based studies. Given the paucity of high quality evidence, the recommendations in this statement are largely based on expert opinion.

Historical perspective

Footwear has been used for 10,000 years. Initially shoes were used for protection, but they started to become a status symbol as far back as the Roman Empire. During the 13th century in China, foot binding to shape the foot was used for beautification. In the 16th century in France, heels were added to shoes and indicated social status. Differentiation of left and right shoe shape became common in the 1800’s. The design of shoes during the last century has mostly been influenced by fashion and social status [1].

Over the last 50 years, paediatricians have questioned the necessity of developing shoes for children under the assumption they needed support for the developing muscle and bone structure and help to prevent future gait problems.

Historic reviews in different cultures have compared barefoot walking to the use of shoes. Foot deformities were less common in unshod people [2]. The development of the foot in healthy children shows a physiological progression that does not appear to be modifiable by footwear.

Children’s shoes and fitting

Shoes for children are now made mostly for protection. They have become softer, wider, light weight, and less restrictive. Shock-absorbing soles help to provide protection from overuse syndromes.

Footwear needs to protect a child’s feet, offer some grip on a smooth surface, and ensure comfortable walking on different surfaces [3]. For pre-walkers, shoes are not needed. Ankle boots do not necessarily give more support than low-cut shoes, but are useful because they are harder for toddlers to remove.

A child’s foot size changes rapidly. Before 18 months feet grow more than half a shoe size every two months. Toddler’s feet grow an average of half a size every three months. Until the age of 3 years a child’s foot size increases by one size every 8 months and thereafter every year [4].

Shoes must fit the foot snugly at the heel preventing forward movement while walking. The shoes need to allow enough room for the toes, about 1.25 cm (a thumb width) between the longest toe and the tip of the shoe, measured standing up. All shoes and sandals should have a 5mm space between the footwear rim and all toes. To estimate proper width there should be a small crease in the material when pinching the shoe while the child is standing. The child needs to try the footwear on before purchase [3][4].
Corrective shoes

Corrective shoes are rarely needed in physically normal children. The appearance of the feet and legs will change with growth.

Flatfoot

Longitudinal arch development occurs before the age of six years. Nearly all children younger than 18 months of age have flat feet, because of a fat pad under the foot. Flexible flatfoot is a common finding in children under the age of 6 years and is a developmental variation. A small minority of children will have flat feet by the age 10 years [5]-[7]. Pes Planus rarely leads to gait problems or chronic pain if it persists into adulthood [7].

Studies have demonstrated higher incidences of flatfoot among people who wore shoes in early childhood, are overweight, and have greater laxity of ligaments. A higher prevalence of flatfoot in adults who began wearing shoes before the age of six years was documented [8].

One randomized controlled trial assessed the impact of shoe inserts or corrective shoes versus no treatment (conventional leather shoes) on the development of flatfoot. There was no significant difference in improvement between all groups after three years of follow up. The authors concluded there was no benefit in using treatments for flexible flatfoot in healthy asymptomatic children. They recommended considering treatment of symptomatic children only (those who have pain with walking) to rule out underlying disorders [8].

The natural history of flatfoot is spontaneous improvement with increasing age [5]-[9]-[10]. The development of the arch in walking children under the age of six years is not enhanced by using corrective shoes, inserts, or heel-cups [6]. Treatment of “abnormal” feet can have a negative impact on children’s self esteem [7]-[11].

Intoeing, torsions, knock-knees, bowlegs

The majority of torsional deformities, such as metatarsus adductus, intoeing secondary to tibial torsion, and femoral torsion resolve spontaneously by adulthood. Even consistent in-toeing or out-toeing rarely presents functional problems in adulthood [12].

Simple metatarsus adductus in infants initially may be treated with passive stretching exercises. If the metatarsus adductus is not reducible, meaning that the forefoot does not return to a neutral position, splints and/or cast treatment in early infancy may be required. It is recommended to discourage children from sitting in a W-position – it might exacerbate the torsional deformity.

Intoeing with tibial torsion tends to improve with age. Patients with persistent intoeing and tibial torsion leading to functional impairment should be referred to a paediatric orthopedic surgeon. Gait plates might help to reduce symptoms such as tripping related to intoeing [13].

A randomized controlled trial comparing no treatment and two different types of orthosis for flexible excess pronation of the feet found no significant differences between groups in regards to resolution or function. The severity of the pronation did not impact on mobility over the 1 year study period. Treatment did not change reported pain [14].

Bowlegs and knock-knees are expected variants of lower leg development and tend to resolve over time (usually by age 8). Assessment for pathological conditions leading to genu varum and valgum might be necessary for some children. If the condition persists beyond age 8 and causes functional impairment, assessment by an orthopaedic surgeon should be initiated. Corrective shoes or insoles have no beneficial effects on the resolution of developmental bowlegs and knock-knees [2][10].

Unless significant functional impairment is present or develops at the age of 8 or 10 years, corrective shoes or other interventions are not necessary. They do not influence the natural development and expected spontaneous correction of torsional deformities in the majority of otherwise healthy children [2][12][10][15].

Very few randomized controlled trials have assessed the effectiveness of corrective footwear on the long term development of chronic gait problems in healthy children with foot or leg “deformities”. The available studies suggest that children’s feet do not need treatment. Prescribing shoes or insoles to attempt to ‘correct’ physiological flat feet, knock knees or bow legs is not useful for the child and is expensive for the family. Observational studies have documented the
possibility that these interventions can be potentially harming. They can decrease the normal muscle activities of the feet leading to weakening and perpetuating the problem. The associated costs, stigma of disease, and possible impact on self-esteem cannot be justified based on the available data. Doctors can avoid overtreatment of mild to moderate variations by providing parents with a reassuring explanation of the above.

**Recommendations**

See Table 1 for a description of the levels of evidence.

1. Infants do not need shoes until they are walking (Level III-A)
2. Shoes are necessary for protection. They should be well fitting, soft, light weight, and have cushioned soles (Level III-A)
3. Orthotics are not beneficial in the management of physiological flexible flatfoot (Level I-B), developmental in-toeing, and mild torsional deformities (Level III-B).
4. Orthopaedic referral is necessary when a child experiences functional disability or pain in association with foot or lower leg abnormalities (Level III-B).

**TABLE 1**

Levels of evidence and strength of recommendations

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Evidence obtained from at least one properly randomized controlled trial.</td>
</tr>
<tr>
<td>II-1</td>
<td>Evidence obtained from well-designed controlled trial without randomization.</td>
</tr>
<tr>
<td>II-2</td>
<td>Evidence obtained from well-designed cohort or case-controlled analytical studies, preferably from more than one centre or research group.</td>
</tr>
<tr>
<td>II-3</td>
<td>Evidence obtained from comparisons between times and places, with or without the intervention. Dramatic results in uncontrolled experiments could also be included in this category.</td>
</tr>
<tr>
<td>III</td>
<td>Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>There is good evidence to recommend the clinical preventive action.</td>
</tr>
<tr>
<td>B</td>
<td>There is fair evidence to recommend the clinical preventive action.</td>
</tr>
<tr>
<td>C</td>
<td>The existing evidence is conflicting and does not allow a recommendation to be made for or against use of the clinical preventive action; however, other factors may influence decision-making.</td>
</tr>
<tr>
<td>D</td>
<td>There is fair evidence to recommend against the clinical preventive action.</td>
</tr>
<tr>
<td>E</td>
<td>There is good evidence to recommend against the clinical preventive action.</td>
</tr>
<tr>
<td>F</td>
<td>There is insufficient evidence to make a recommendation; however, other factors may influence decision-making.</td>
</tr>
</tbody>
</table>

**References**


COMMUNITY PAEDIATRICS COMMITTEE

Members: Minoli Amit MD; Carl Cummings MD; Barbara Grueger MD; Mark Feldman MD (chair); Mia Lang MD; Janet Grabowski MD (board representative)

Liaison: David Wong MD, Community Paediatrics Section, Canadian Paediatric Society

Principal author: Barbara Grueger MD

The Canadian Paediatric Society gives permission to print single copies of this document from our website. For permission to reprint or reproduce multiple copies, please see our copyright policy.

Disclaimer: The recommendations in this position statement do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate. Internet addresses are current at time of publication.