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Topics: Geriatric population and footwear, Footwear and falls, Footwear and its impact on overall balance (static, dynamic), Aging changes, Footwear terminology				**Date: 10/23/2016**	
Author/ Year	**Purpose/subjects**	**Intervention/ description**	**Measurements/notes**	**Outcomes/comments/notes**	**Limitations/comments/notes**
Gross MT et al[1]/2012 **Note: Taken from my EBP II CAT*	*Purpose:* The purpose of this investigation was to evaluate the effects of foot orthoses and standing balance ability with the older population. Researchers were particularly interested in potential positive balance effects from use of orthoses. Standing balance ability investigated included both dynamic and static balance. *Subjects:* 13 participants (70 to 90 years old), average age 82 years old, 7 women, 6 men *Inclusion criteria*: above 65 years old, self-report of a recent fall (within past 12 months), standing balance limitation (SLS test <5 sec), independent ambulator on flat ground (no assistive device, minimum length:	*Interventions include:* Orthoses: semi-rigid materials, inclusion of thermal cork, NickelPlast, heel lift **Baseline screen*: personalized orthoses were designed (1st testing session) **2nd testing session (Pre/Post):* roughly 2 weeks after baseline screen, primary outcomes re-tested with and without orthoses, optional: orthotic modifications (participant comfort) **Orthoses regimen*: maximum daily use of orthoses was requested (by investigators), use of self-report daily log (orthoses duration) **3rd testing session (follow up):* roughly 2 weeks after second	*Participants tested in casual shoewear (walking/tennis shoes) **Screen tests*: 6-item screener test (cognition >3 mistakes), Single leg stance test or SLS (3 trials, ≥5 sec, self-chosen LE) **Primary measures*: Single leg stance test, tandem stance test, tandem gait test, alternating step test **SLS*: both LE, length of time: maximum duration, use of stopwatch, 3 trials (average) **Tandem stance test*: tandem stance position (with both LE leading), duration: up to 30 sec, use of stopwatch, 3 trials (average) **Tandem gait test*: walking path 12cm diameter (marked with tape), up to 20 steps, 3 trials (average), correct foot placement noted (quantity of steps) **Alternating step test*: duration: 20 sec, quantity of	*Among the 13 participants there was a high combined average of about 11 reported falls within the past year. However, the researchers report a reduced quantity of falls was more common (<4 falls). Duration length concerning daily orthotic use varied between participants, from as little as 4 hours to about 14 hours. Furthermore, participants tolerated use of the orthoses well, for there were no major complaints and there was only one orthotic adjustment. Participants were tested within approximate two week intervals, at most there was a 7 day difference. *Significance was found with both the pre and post orthotic test session, as well as with a comparison of the pre orthotic and follow up test session. Listed p values for the former sessions concerning the 4 outcome measures is available in	*It seems the researchers are correct concerning the impact of orthotic use with participants in this investigation. Clearly, study participants did make gains in regards to balance capability with each of the included measures. For instance, Figure 2 shows both the post orthotic and follow up session test measures were for a longer duration than the baseline measures. Another example of positive results is evident in Figure 3, which also demonstrates longer tandem stance hold duration at post orthotic and follow up sessions, in contrast to baseline (ex: baseline about 16 sec, post orthotic session about 25 sec). *Indeed this investigation shows promise for future research, given the progress made within only 2 weeks. Concerning future orthotic research, certainly inclusion of self-reported falls and possible inclusion of another objective measure like the

	10m), English comprehension, minimum 20/40 vision requirement with or without corrective lenses (Snellen eye chart)	testing session, primary outcomes re-tested	alternated steps, 3 trials (average), adapted from Berg Balance Scale *_Secondary measures_: height, weight, age, bilateral LE structural alignment screen (abnormalities were noted)	Table 4, a few examples of given p values were 0.001 and 0.002. Positive changes throughout the study in regards to the 4 outcome measures, is available in Table 2, for instance: the average SLS time increased from 3.3 sec (screen session) to 8.1 sec (post orthotic session).	BERG could potentially help indicate intervention changes. The authors' presented other potential important areas to further address with the older population besides frequency of falls, such as: sensation, strength, and proprioception.
Kelsey et al[2]/2010 *_Note: Taken from my EBP II CAT_	_Purpose:_ The objective of this longitudinal study was to review likelihood of falls due to various shoewear conditions with the older population. Two non shoewear conditions investigated were use of socks or being barefoot, as well as use of slippers as a shoewear condition. Rearchers reviewed the data collected to determine associations of these various shoewear conditions with chance of falls. _Subjects:_ 765 participants, total potential sample: 5655 *_Age:_ 70 years old and above, average age: 78 years, range: 64 to 97 years	_Interventions included_: *Researchers monitored participants over an average of 27.5months *_Study duration length_: 0.5 to 44.4 months *_Phone interviews used_: participant self-report of 1≥ fall with study calendar, tardiness or unfinished self-report calendar mailed *_Fall criteria:_ unplanned, injury occurrence, happened within household *_Serious injury criteria included_: sprains, dislocations, fractures, muscle	_Baseline measures_: recorded at home visit, clinical assessment _Primary measures_: custom questionnaire specific to shoewear (extensive list selection), falls risk measures such as BERG Balance Scale, gait speed, physical function: SF 12 score, exercise: PASE score, participant self-reported monthly falls amount _Secondary measures_: phone interview *Study does not specify baseline assessors "trained interviewers"[2p2]	*The researchers found out of a large selection or 9 categories of shoe types, only a few select types of shoes were predominantly used. Thirty six percent or about 275 participants preferred tennis shoes and oxford shoes were second most popular, at about twenty six percent or 1999 participants (daily wear). The other top two shoe classifications for typical wear were loafers and slipper shoe styles, while the less common shoe styles were sandals, boots, socks, or bare feet. *Researchers also did not find a relationship between recorded falls (frequency) and shoe style primarily used at study completion. Three particular shoewear conditions including use of socks, loafers, or barefoot, were related to a large	*In consideration of the various shoewear conditions evaluated, the authors' conclusions appear valid concerning the relationships found with falls risk and type of shoewear used. Certainly after consideration of the nine showear conditions, it would seem very likely having decreased shoewear support such as when one is barefoot or using slippers in contrast to shoewear conditions of increased support, like tennis or oxford shoes would affect fall outcomes. As the researchers mentioned, there is indeed possibility of decreased standing stability with some shoewear conditions, such as stocking use.

	**Gender:* about 36 males, 64 females **Inclusion criteria*: households with 1 person who met age requirement (at minimum, 70≥ years), English comprehension, independent ambulator for at minimum 20ft, plan to remain local for 2 years, Mini-Mental Status Examination of 18 points (at minimum), appropriate hearing capability for study follow up (via phone), appropriate vision to review print sources	tear or strain, ligament or tendon involvement		portion (roughly 50 percent) of recorded falls, even with further comparison and examination of the participant data. With further data analysis involving these former shoewear conditions, researchers discovered in relation to non-serious and more severe injury, there was an increased chance for severe injury when results excluded some conditions like medical issues or dizziness.	
Hatton AL et al[3]/2013 **Note: Taken from my EBP II CAT*	*Purpose:* This systematic review appraises several articles concerning footwear interventions and the older population. The researchers' were particularly interested in the impact of various footwear interventions on static and dynamic balance. *Subjects:* older adults at minimum 60 years old	**3 classifications or groups used (14 articles):*[3p518] Static balance performance during quiet standing, dynamic balance performance during walking, dynamic balance performance during perturbed standing or functional tasks *Interventions included use of:* semi-rigid custom orthoses, textured and smooth insoles,	**Outcome measures*: specific to either gait or static/dynamic balance **Examples of outcomes include*: SLS, tandem stance, tandem gait measures, alternating step test, BERG Balance Scale, Center of Pressure measures, measure of sway, TUG	*The researchers' found most of the articles reviewed supported use of a variety of insole types with the older adult population. In consideration of an older adult's overall balance (ex: static, dynamic) or gait capability, as well as use of supplementary insoles like: arch supports, with vibration components, or custom made orthotics; each insole type has demonstrated promising effects for an older adult in this systematic review.	*It's apparent results surrounding use of various shoewear interventions (i.e. types of foot orthoses) with the elderly population are mixed in terms of application to overall balance and gait (ex: TUG, BBS). Both positive and potentially negative results were found and discussed by the authors' regarding the shoewear interventions evaluated. *An example of positive effect from an orthoses intervention is evident in the de Morais Barbosa et al study for at completion of the

	or above, both healthy and unhealthy (i.e. acute, chronic medical conditions), involved with a footwear intervention	spike and non spike insoles, vibrating insoles, varied texture insoles, custom foot orthoses, custom sandals, arch supports, "sole sensor facilitatory insole"[3p522]		*_The authors' note additional research is necessary in regards to_: shoewear design such as with insole characteristics like materials used or shape, effects involved with custom made foot orthoses (ex: sensorimotor, mechanical), participant pre/post intervention balance capability (comparison), shoewear intervention duration length (ex: long-term), and potential confounders (ex: attention to a task)	intervention participants performed the TUG with decreased times. A potentially negative result is evident from Hatton et al[3] where following participant double LE support in standing no major clinical findings or significance resulted, so indeed there is a possibility the intervention insole is not effective for older adults.
Luk et al[4]/2015	_Purpose_: This article reviews falls prevention evidence with the geriatric population. _Subjects_: geriatric population (age not specified)	*_This article provides information regarding_: fall risk factors (ex: age, cognition, certain medications), suggested components of a fall examination (ex: fall history, medical conditions, current level of function/mobility, outcome tests like the TUG, orthostatic blood pressure measures), the beneficial impact of exercise, home environment changes, suggested appropriate footwear, vitamin D	*TUG outcome measure detailed	*_Throughout the article the authors' briefly detail support for information presented concerning_: fall risk factors, fall examination, effects of exercise (strength, endurance, balance activities), home setting alterations (ex: placing handles in the home), medicine screen, appropriate footwear (ex: low versus high heeled shoes), the importance of vitamin D (ex: muscle fortification), the importance of addressing visual deficits (ex: appropriate lenses, cataract surgery), multifactorial geriatric interventions (decrease falls risk,	*_Authors' highlight:_ lack of fall prevention research and evidence for individuals with dementia (studies: support and disprove use of multifactorial interventions)

		supplements, benefits of cataract surgery), benefit of multifactorial fall prevention interventions (individually customized or general intervention)		individually tailored versus general intervention)	
Davis et al[5]/2013	*Purpose:* This study focused on footwear preferences within the healthy, older female population. The researchers were interested in discovering what key factors effect footwear choice. *Subjects:* older female participants, 24 total, between the ages of 60 to 80 years *Participants did not use assistive devices. *Participants did not have a history of falls.	*The researchers created a customized questionnaire concerning footwear "selection."[5p466] The questionnaire consisted of seven main questions with an "open ended" [5p466] and not a yes or no response format. **How the questionnaire was administered*: phone call	**Questionnaire analysis*: responses were both categorized and divided into themes	**Three top footwear themes*: aesthetics, comfort, safety *Davis et al[5] highlights that both the general fit of a shoe and a shoe's appearance are two key factors that older female individuals consider and these shouldn't be overlooked by health professionals with (appropriate) footwear suggestions.	*Researchers' present evidence related to footwear "selection" [5p465] like falls and risk of foot conditions (ex: bunions). **Possible foot related conditions due to shoewear:* pain, toe "deformity," bunions, Achilles tendonitis *Researchers mention it may be important for older patients to be able to choose their footwear. **Limitations:* quantity of study participants, participant selection bias, participant memory recall bias
Broschield KC, Zech A.[6]/2016	*Purpose:* To review three specific footwear conditions with older individuals. The researchers were particularly interested in minimalist footwear. Two areas of analysis included general balance and gait	**Balance test:* Balance Error Scoring System **Gait Examination involved*: a specialized treadmill, a pressure platform, 30 second trials with each footwear condition	****Gait measures involved*:** impact ground reaction force, propulsive ground reaction force, step length, step time, stance phase, cadence	**Barefoot condition:* reduced impact ground reaction force, propulsive ground reaction force, step length, step time, stance phase **Minimalist condition:* highest impact ground reaction force, propulsive ground reaction force, *highest variability:* step	*At the start of the article the researchers provide information concerning potential aging changes with gait. **Possible aging changes include:* wide base of support (stance), increased double LE support, "flatter foot support"[6p436]

	measures (ex: step length, step time) **Footwear conditions*: no shoes (barefoot), minimalist shoes, "standard cushioned"[6p436] shoes *Subjects*: 28 adults between 52 to 76 years old, community dwelling, "physically active"[6p436]			length, step time, stance phase, cadence **Standard Shoe condition*: longest step length, step time, stance phase, lowest: cadence *lowest variability:* propulsive ground reaction force, step length, step time, stance phase, cadence	*Authors' propose minimalist shoes may be a possible balance intervention. *Authors' suggest additional research with minimalist footwear. **Limitations:* quantity of participants, age range of participants
Ipeze et al[7]/2015	*Purpose*: To give the reader background information regarding common geriatric footwear issues such as foot related conditions, appropriate footwear, and possible difficulty obtaining appropriate footwear (ex: funds, store footwear selection). *Subjects*: geriatric population	*The authors' present evidence concerning footwear issues throughout this article.	*Not applicable **Abnormal foot conditions can potentially lead to*: cellulitis, problem with balance, ulcerations, falls with adverse outcomes (ex: fractures) *"Common foot pathologies like corns, hallux valgus (bunions), and hammertoes have been known to increase plantar pressure, cause discomfort, pain, and swelling."[7p338] **Inappropriate footwear use*: associated with foot issues or "problems"[7p338] **Medical conditions to be familiar with due to high risk of future foot complications*: neuropathy, musculoskeletal issues, diabetes	*Not applicable **"Tight footwear"[p339] can promote*: callus, ulcer, hammertoe, bunion development **Suggested footwear characteristics:* wide toe box (ex: bunion), increased depth of toe box (ex: hammertoe), Dr.Scholl's insoles (arch support), high collar (instead of low collar), low heel, firm outer sole (promote stability with balance), slip resistant outer sole **Recommended footwear types*: athletic, canvas	*Some interesting statistics are mentioned throughout this article. For example "foot pathologies are common in nearly 80% of all elderly patients."[7p338] **Aging changes*: fat pad and integument deterioration **Authors' highlight several difficulties likely to be experienced by the elderly population such as*: monetary restrictions, health problems, reduced availability of specialized footwear sizes like extra width, altered living situation (ex: moving from independent living to more expensive accommodations like a SNF)

Nafaji et al[8]/2013	*Purpose:* This article reviews current evidence related to both foot interventions and footwear with the geriatric population. *Subjects:* geriatric population	**The researchers' present information concerning*: multifactorial interventions, preferences with choosing footwear, nonslip versus two other footwear conditions (barefoot, standard socks), research with the diabetic mellitus population (fear of falls, virtual reality balance intervention), footwear interventions, lower extremity exercise interventions and balance (emphasis on foot), hallux valgus corrective surgery and impact on balance	*The study done with nonslip socks, barefoot, and standard socks involved 5 trials of the TUG measure. Although the TUG trial times are not included in the article, the slowest TUG time was with the standard sock condition. Noted the TUG measure was performed on a "slippery surface."[8p453] **Footwear intervention*: support for foot orthoses, shoe insoles **Lower extremity exercise intervention with emphasis on foot*: positive impact on ankle flexibility and general balance **Community dwelling older adults 65 years and above*: 1/3rd have "foot problems"[8p453]	**Nonslip versus barefoot or standard socks*: significance found with standard sock condition (slowest overall TUG measure) *Significance found with footwear interventions from Hatton et al[3] study (impact dynamic, static balance, gait) *Limited information given with lower extremity exercise intervention, no significance listed *"…falls among older adults cost the US healthcare system… or $28.2 billion dollars in 2010. The cost of falls is estimated to reach $43.8 billion by 2020."[8p1] *"Understanding patients' specific needs and concerns relating to footwear and insole design is recognized as fundamental to improving adherence."[8p454]	*Some interesting statistics are presented within this article such as: "In 2056, for the first time, the older population (65 years and older) is projected to outnumber the young (18 years old and younger)."[8p452] *"…slips are a common cause of falls"[8p453] *The authors' mention reasons why healthcare services for the elderly will be important in the future. A few of these reasons involve the preservation of quality of life and independence, the reduction of healthcare costs, and to decrease falls risk. **Provides support/evidence for*: Multifactorial falls risk examinations *Included the Davis et al[5] study (footwear selection), Hatton et al[3] study (footwear interventions)
Suetterlin KJ, Sayer AA[9]/2014	*Purpose:* This article reviews information and interventions involving proprioception and older adults. *Subjects:* geriatric population (age not specified)	**A variety of information is reviewed including*: clinical examination techniques for proprioception, proprioceptive changes with aging (central and peripheral changes), **Central proprioceptive changes*: reduced	Not applicable *A table is provided which lists various proprioception tests for the clinic environment (Table 1 [9p314])	Not applicable *Reduced proprioception is associated with falls *"Proprioception and vibration sense in the lower limbs have been shown to be significantly correlated with falls."[9p317]	**Authors' propose additional research with*: footwear, proprioception (proprioceptive feedback), falls risk **Authors' support further research with*: joint taping, proprioception, and falls risk **Limitation*: lack of numerical or statistical data to support evidence presented *"Patients lacking proprioceptive sense due to

		right putamen activity *_Peripheral proprioceptive changes_: decreased myelin, muscle spindle sensitivity, skin receptors, myosin heavy chain isoforms in muscle spindles, vibration sensation *_Types of exercise which promote positive changes with proprioception:_ Tai Chi, running, swimming, "dynamic posture training"[9p317] *"A sedentary lifestyle appears to accelerate loss of proprioceptive acuity"[9p317] *_Ankle joint taping with young adults:_ positively affected proprioception *Increased proprioceptive central brain activity is associated with "complex movements"[9p316]			large fiber neuropathies have profound deficits in motor coordination- specifically in limb position, force control, postural stability, and executing coordinated movement sequences such as gait."[9p316]
Barton et al[10]/2009	_Purpose:_ This article presented information regarding geriatric footwear and reviewed a footwear	*2 screenings done within a 3 week time period by a PT and podiatrist	*intra-rater, inter-rater reliability calculated	*intra-rater, inter-rater measures were adequate *_Advantage of footwear screening tool_: time to	*_Researchers' advocate for:_ use of this footwear screening measure in clinics or research environments, additional

	screening outcome created by the authors'. *Subjects:* 15 participants *2 pairs of shoes from each participant were evaluated with footwear screening tool	**Footwear Screening outcome categories*: fit, general features and structure, motion control properties, cushioning, and wear patterns.		administer (ex: estimated 10 minute duration)	study with the outcome's categories or "items"[10p1] **Examples of several foot conditions listed due to inappropriate footwear use*: corns and calluses, toe deformity, neuromas, pressure lesions (diabetic individuals) **Limitations*: small participant group
Helfand AE[11]/2003	*Purpose:* This article reviews components of footwear and includes some information about diabetic footwear components. *Subjects:* footwear for the geriatric population	*This article is a helpful resource to view more information about the various components of footwear. **Some examples of footwear components*: last, box, shank, flared sole *Two tables are included. One table (Box 1 [11p596]) lists several conditions or "foot problems"[11p596] health practitioners should be aware of. These conditions indicate individually tailored footwear components are important in order to not worsen the condition. The second table (Box 2 [11p599]) is a condensed	Not applicable *"Though shoes alone do not cause foot problems, foot incompatibilities do precipitate pressure areas and pain, limit ambulation, and require the same careful selection for the nondiabetic patient as does the patient with diabetes mellitus."[p1]	Not applicable **Depth shoe*: leaves 3/16 of space without insole **Extra depth shoe*: leaves 1/4inch of space without insole **Super depth shoe*: leaves 1/2 inch of space without insole	**Examples of last types*: inflare, outflare, straight **Possible characteristics of a toe box*: described as shallow or higher (more depth) **Shallow toe box*: is related to conditions like foot edema or toe contractures **Higher toe box*: increased amount of toe space

		summary of important components to review when choosing footwear for patients.			
Helfand[12] AE	*Purpose:* This article covers essentially the same information as the other Helfand[11] article. Like the other Helfand[11] article, several details are given regarding the components of footwear. This article is more organized and easier to follow. Headings are included throughout this article. *Subjects*: footwear for the geriatric population	**Possible health related "risk conditions"[12 p1-3] to be aware of:* -amputations such as of the great toe or other toes -hammer toes -pes planus or pes cavus (possibly "rigid"[12p6]) -Metatarsalgia -Calcaneal spur -plantar fasciitis -limited dorsiflexion -limb length discrepancy	Not applicable	Not applicable	
Whitney KA[13]/2003	*Purpose:* The start of this article reviews aging related information pertaining to: body composition (ex: skin, muscle), musculoskeletal (ex: foot joint), and neurological issues (ex: gait). The researchers also give information about the components of a "biomechanical"[13p512] and gait examination, as well as what factors contribute to	*The authors' provide information about pathologic pronation such as contributing factors and clinical presentation. **Clinical presentation of pathologic pronation*: eversion of the calcaneus, collapse of the foot arch **Contributing factors of pathologic pronation*: ankle	Not applicable *Supports"therapeutic"[13p511] interventions and routine lower extremity examinations *Supports utilization of appropriate footwear and orthoses **Orthoses*: promote appropriate foot alignment, foot support, protection, can address compensatory issues and external stresses (correction of foot alignment)	Not applicable **Suggested footwear characteristics for the falls risk population (reduced general balance):* Appropriate toe box width, rigid midsole, rigid outer sole, thin outer sole, adequate heel depth (deep), reinforced heel counter, stable and secure upper portion of shoe **Equinus (ankle):* use of heel lifts **Authors' do not support*: flexible, thick cushioned	**Aging*: rise with foot and lower extremity issues (physically active geriatric population) **Aging issues*: skin thins, reduced subcutaneous fat (ex: fat pads inferior to metatarsal heads), reduced strength, decreased flexibility, deterioration of bones and joints **Examples of potential peripheral nervous system associated issues:* decreased fine motor coordination and reflexes, gait changes,

	pathological foot conditions or compensatory gait patterns. *Subjects:* geriatric population (age not specified)	equinus, forefoot or rearfoot varus **A biomechanical examination involves*: standing postural observation, palpation, comparison of both lower extremities (supine), forefoot to rearfoot angles, range of motion (ankle dorsiflexion, great toe extension), strength testing **Components of a gait examination*: review individual's walking pattern (observe: compensatory deviations), base of support, stride length, dynamic balance, foot placement (everted, inverted, arch)	**Orthoses and diabetic patients*: avoid increased stress or pressure to plantar surface of feet (uniform weight bearing) **Orthoses can help address*: bunions, calluses, excessive pronation (midfoot, rearfoot) **Rigid, semirigid orthoses*: excessive pronation (midfoot, rearfoot), individuals with reduced general balance ability (static/dynamic)	footwear (possible negative impact with proprioception)	reduced dynamic balance ability **Possible gait deviation pattern*: larger base of support, shorter stride length
Menant[14]/2008	*Purpose:* This article reviews available research concerning geriatric footwear. **Areas addressed*: usual or typical footwear worn, footwear associated with falls, "antiskid"[14p1174] devices, impact of heel height, collar height, outer and inner sole	**Typical footwear used*: likely affected by residential setting (ex: skilled nursing resident, community dwelling resident) **Typical footwear conditions of community dwelling individuals*: slippers (most common), barefoot, socks only,	*Not applicable **Footwear provides*: protection (ex: external forces, environment), secure foot placement (ex: grip) **Increased heel height can promote:* changes to ground reaction forces (ex: increase with GRF at heel strike, increase in forefoot weight loading), compensatory gait	*Not applicable **Authors' do not support*: footwear with soft or concentrated (thick) midsole material **Footwear with increased collar height*: reduces postural sway (footwear: laced boots, low collar shoes) **High collar sports footwear (young adults)*:	**Footwear*: environmental risk factor (falls) *"Slips and trips are the most commonly reported causes of falls in older people."[14p1174] ***Higher likelihood of falls*: no shoes (barefoot), shoes with raised heel (high heels), socks only **Footwear associated with falls*: high heels, slippers, slick outer soles, boots

	characteristics on general balance *Subjects:* mainly the geriatric population (some studies included younger participants) *79 articles appraised, published dates of literature range from 1985 to 2008, types of studies included: cohort, nested case-control, systematic review	inappropriate shoes (ex: too large, small) **Aging associated with higher likelihood of:* using slippers **Where slippers are utilized:* permanent resident settings, hospitals (acute care, nursing homes) **Foot conditions linked to inappropriate footwear fit*: calluses, corns **Possible influences of footwear preference:* ease of don/doffing shoe (ex: laces, straps), comfort	pattern (ex: knee, hip), reduced leg musculature stimulation (ex: gastrocnemius muscle firing) **High heels (dress shoes) versus no shoe or athletic footwear condition*: reduced TUG, 10 m walk, functional reach outcomes **Specialized insoles which can promote postural stability (ex: center of pressure, postural sway measures)*: vibrating inner soles (gel composition), textured inner soles with athletic footwear (young adults), raised outside insole border	increased protection from inversion injury *Athletic footwear with flared outer soles (young adults)*: provide stability (decrease slipping), reduce inversion moment at subtalar joint **"Antiskid"[14p1174] devices placed on heel versus forefoot or entire foot*: reduced time to don/doff, increased stability with gait (tested with several slick floor conditions), favored "antiskid" [14p1174] device (young and older adults) **Authors' support:* use of Yaktrax Walker [14p1174] (surrounding entire outer sole) **Footwear characteristics that promote increased "slip resistance"* [14p1175]: rough outer sole, beveled heel (10 degrees), low heel, outer sole tread width of 1.2cm, tread groove depth of 1 to 5mm	("heavy, cutaway" [p1169] boot styles) **Recommended footwear characteristics*: low heel, firm slip-resistant soles * "While the primary role of a shoe is to protect the foot and facilitate propulsion, fashion has strongly influenced the design of footwear throughout the ages…"[14p1167] **Areas of future study:* flared sole, high collar shoes and general balance, shoe tread and slip prevention, impact of specialized insoles (ex: textured, vibrating, magnetic) and general balance *"Prevention of falls should also include education of older people and their caregivers/family (for those house-bound or institutionalized) regarding these footwear recommendations, because financial and comfort aspects likely currently outweigh safety considerations when older people purchase shoes."[14p1177]
Gross MT[15]/2010	*Purpose:* This article reviews appropriate footwear characteristics for several possible geriatric conditions. Specific footwear characteristics to be	*Each of the covered geriatric conditions incorporate older and more recent evidence. **Examples of geriatric conditions*	Not applicable *Sole material*: soft sole material can result with more postural adaptations (medial to lateral direction) and instability with dynamic balance activity	Not applicable **Slipping*: increased hardness (Shore 54D) or durability of the outer sole increases the chance of slipping	**Heel lift*: increases postural sway and double limb support time, reduces gait speed **Heel lift may be appropriate for*: equinus (ankle), reduced dorsiflexion, decreased triceps surae flexibility (tension)

	aware of for a general footwear fit are also mentioned. *Subjects:* geriatric population (age not specified)	*covered in detail*: balance deficits, hallux rigidus, falls risk, knee osteoarthritis, shock absorption, slipping	**Rocker-bottom style shoes*: two styles (concave at forefoot/rearfoot, convex in midsole ex: MBT®), convex forefoot, concave rearfoot ex: Etonic Minado®) **Author does not recommend:* convex midsole rocker-bottom style footwear for those with balance limitations **YakTrax Walker®* evidence: decreases falls outside the home (winter) *Knee Osteoarthritis:* *<u>Ankle pronation:</u> paired with valgus stress loading at knee joint *<u>Valgus directed stress at knee joint:</u> higher lateral> medial joint compartment pressure *<u>Ankle supination:</u> paired with varus stress loading at knee joint *<u>Varus directed stress at knee joint:</u> higher medial>lateral compartment contact pressure	**Slipping*: consider the depth, width of tread spacing (groove) **Wide and deep tread spacing:* promotes more surface area contact (shoe to ground) *Prevent slipping*: reduce step and stride length **Shock Absorption*: consider sole material (stiff: increased ground reaction force, soft: reduce ground reaction force), time of year (winter: cold air reduces absorption capacity) *Examples of shock absorption material (athletic footwear):* ethylene vinyl acetate (EVA) foam, air cells, gel cells *Footwear characteristics that enhance shock absorption (active footwear):* moderate stiffness with outer sole, thick outer sole **New footwear versus worn out active (athletic) footwear:* increased shock absorption capacity (outer layers intact) **General fit (patient standing):* 10-22mm space from distal portion of great toe to inner sole edge (thumb's width), appropriate width ("slight bunching"[15p32] versus	**Increased outer sole width and increased (high) collar height*: promote postural balance (outer sole: wide BOS, high collar: decreased postural sway) **Falls risk*: avoid barefoot or solely sock footwear conditions, shoes with increased heel height, slippers **Falls risk*: athletic shoes or sneakers are suggested **Hallux rigidus*: hard or stiff outer sole with rocker bottom at the toe break

				inadequate "bunching" [15p32] in forefoot area), comfortable AROM of toes within toe box *_Alternative strategies to tie shoes_: long handled shoe horn, Velcro™ closure, gripper like device (use with fasteners), elastic shoe laces	

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