



Article

Effects of different heel heights on lower extremity joint loading in experienced and in-experienced users: A musculoskeletal simulation analysis

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Table 1: Joint and external loading parameters (Mean & standard deviations) as a function of experience and heel height.

	Experienced								In-Experienced								MCI D	
	High		Medium		Low		Trainer		High		Medium		Low		Trainer			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Step length (m)	0.65 _{BC}	0.06	0.69	0.07	0.70	0.05	0.77 _{ABC}	0.10	0.66 _{BC}	0.06	0.69	0.07	0.70	0.05	0.79 _{ABC}	0.09	0.03	*
External vertical load rate (BW/s)	60.22 _{BCD}	20.29	49.88	12.67	45.61	10.81	28.28 _{BC}	6.99	59.55 _{BCD}	22.92	49.15	18.31	45.15	21.08	29.27 _{BC}	13.95	7.65	*
Peak hip force (BW)	5.07	2.05	5.01	1.77	4.95	1.64	5.14	1.61	4.41	1.20	4.50	1.26	4.71	1.27	4.94	1.19	0.71	
Hip load rate (BW/s)	66.06	37.76	58.79	27.54	65.91	32.97	49.56	19.40	48.55	20.48	40.49	13.28	44.14	13.08	43.43	15.80	11.12	
Hip force per mile (BW·mile)	8008.51	1655.1 ₂	7788.40	1902.9 ₁	7773.23	1826.9 ₅	7408.18 _{4C}	2236.4 ₀	7506.38	1136.5 ₂	7156.67	1192.5 ₉	7230.56	1126.2 ₃	6698.93 _{4C}	1669.7 ₃	762.77	*
Peak medial tibiofemoral force (BW)	3.06	1.01	3.15	0.85	3.28	1.00	2.99	0.83	2.99	0.37	3.12	0.49	3.38	0.58	3.16	0.67	0.36	
Medial tibiofemoral load rate (BW/s)	36.66 _{CD}	19.90	32.49	20.66	33.14	19.05	29.05	13.06	32.49 _{CD}	9.98	27.31	5.05	27.99	4.81	23.16	7.86	6.51	*
Medial tibiofemoral force per mile (BW·mile)	4115.82	780.40	4059.91	894.17	4172.71	958.03	3798.79 _{ABC}	1062.3 ₆	4299.44	409.01	4158.87	505.61	4318.15	598.48	3820.65 _{ABC}	744.20	330.78	*
Peak lateral tibiofemoral force (BW)	1.73	0.69	1.50	0.72	1.63	0.67	1.72	0.81	1.46	0.50	1.45	0.55	1.46	0.46	1.39	0.41	0.29	
Lateral tibiofemoral load rate (BW/s)	33.05	16.42	26.75	14.45	30.72	13.70	29.35	15.05	25.09	14.39	25.49	6.28	22.64	10.87	23.53	8.49	6.00	
Lateral tibiofemoral force per mile (BW·mile)	1633.65 _{BCD}	680.42	1385.59	819.22	1381.56	775.06	1484.53	866.59	1351.96 _{BCD}	531.53	1070.94	593.30	1070.73	532.28	1037.01	476.54	315.72	*
Peak patellofemoral force (BW)	1.31 _{BC}	0.41	1.09	0.42	0.92	0.42	0.80 _{ABC}	0.39	1.43 _{BC}	0.51	1.07	0.33	1.10	0.52	0.84 _{ABC}	0.45	0.20	*
Peak patellofemoral stress (KPa/BW)	4.43 _{BC}	0.83	3.92	1.00	3.46	1.10	3.22 _{ABC}	1.08	4.68 _{BC}	1.03	3.91	0.75	3.87	1.20	3.31 _{ABC}	1.27	0.49	*
Patellofemoral load rate (BW/s)	22.06 _{BC}	6.11	18.17	6.94	16.21	5.33	11.77 _{ABC}	3.85	22.48 _{BC}	7.38	17.04	4.54	17.74	6.47	13.03 _{ABC}	5.35	2.73	*
Patellofemoral force per mile (BW·mile)	1278.93 _{BCD}	525.99	851.68 _{4CD}	317.26	613.28 _{ABD}	424.42	437.08 _{ABC}	323.54	1449.11 _{BCD}	865.90	870.11 _{4CD}	545.22	705.21 _{ABD}	382.23	456.52 _{ABC}	287.60	219.77	*
Peak ankle force (BW)	3.62 _{BCD}	1.88	4.42 _{4CD}	1.74	4.89 _{ABD}	1.62	5.13 _{ABC}	0.67	3.01 _{BCD}	0.64	3.78 _{4CD}	0.70	4.31 _{ABD}	0.47	4.78 _{ABC}	0.52	0.53	*
Ankle load rate (BW/s)	45.83	49.67	48.43	51.42	50.68	46.82	39.77	29.08	31.97	11.90	27.43	11.68	31.35	9.41	31.04	13.19	15.23	
Ankle force per mile (BW/s)	4708.05 _{BCD}	679.73	5536.47 _{CD}	1082.7 ₁	5802.58	769.05	6005.06	1231.3 ₀	4300.37 _{BCD}	609.00	4804.56 _{CD}	435.32	5400.81	537.32	5248.77	585.61	363.62	*
Peak Achilles tendon force (BW)	1.95 _{BCD}	0.87	2.66 _{4CD}	0.70	3.03 _{ABD}	0.70	3.75 _{ABC}	0.47	1.69 _{BCD}	0.63	2.23 _{4CD}	0.58	2.76 _{ABD}	0.45	3.44 _{ABC}	0.45	0.29	*
Peak Achilles tendon load rate (BW/s)	19.76	21.51	22.83	20.14	24.02	17.52	23.10	11.17	12.56	6.48	14.18	5.73	15.20	5.91	16.19	4.54	6.14	
Achilles tendon force per mile (BW.s)	1610.45 _{BCD}	314.85	2317.79 _{4CD}	375.50	2599.02 _{ABD}	370.01	3236.02 _{ABC}	590.51	1630.99 _{BCD}	716.03	2050.85 _{4CD}	282.44	2605.17 _{ABD}	392.53	2968.13 _{ABC}	412.71	208.47	*

Key
 * = main effect of FOOTWEAR
 A = significantly different from high
 B = significantly different from medium
 C = significantly different from low
 D = significantly different from trainer