



Queensland University of Technology
Brisbane Australia

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Opar, David A., Williams, Morgan, Timmins, Ryan, Hickey, Jack, [Duhig, Steven](#), & [Shield, Anthony](#)

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Eccentric hamstring strength and hamstring injury risk in Australian footballers.

Medicine & Science in Sports & Exercise, 46.

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Table 2. Univariate relative risk of sustain a future hamstring strain injury (HSI) using eccentric strength and imbalance, previous injury and demographic data as risk factors.

Risk factor	n	% from each group that sustained a HSI	Relative risk (95%CI)	p
Start of preseason eccentric strength				
< 256 N	72	23.6	2.7 (1.3 to 5.5)	0.006*
≥ 256 N	114	8.7		
< 3.16 N.kg ⁻¹	66	25.8	3.1 (1.5 to 6.4)	0.002*
≥ 3.16 N.kg ⁻¹	120	8.3		
Start of preseason strength imbalance				
< 10% imbalance	86	12.8	1.3 (0.6 to 2.5)	0.677
≥10% imbalance	100	16.0		
< 15% imbalance	113	14.2	1.0 (0.7 to 1.4)	1.000
≥15% imbalance	73	15.1		
< 20% imbalance	134	13.4	1.1 (0.8 to 1.5)	0.643
≥20% imbalance	52	17.3		
End of preseason eccentric strength				
< 279 N	52	21.2	4.3 (1.7 to 11.0)	0.002*
≥ 279 N	122	5.0		
<3.45 N.kg ⁻¹	47	23.2	5.0 (1.9 to 12.6)	0.001*
≥ 3.45 N.kg ⁻¹	127	4.7		
End of preseason strength imbalance				
< 10% imbalance	110	7.2	2.0 (0.8 to 4.8)	0.185
≥10% imbalance	64	14.1		
< 15% imbalance	129	8.5	1.2 (0.8 to 1.7)	0.385
≥15% imbalance	45	13.3		
< 20% imbalance	149	9.4	1.0 (0.8 to 1.3)	1.000
≥20% imbalance	26	11.5		

Prior injury	210			
HSI	34	23.5		
No HSI	176	11.4	2.1 (1.0 to 4.3)	0.093
ACL	19	26.3		
No ACL	191	12.0	2.2 (0.9 to 5.1)	0.146
Calf strain	15	13.3		
No calf strain	195	13.3	1.0 (0.3 to 3.8)	1.000
Quadriceps strain	8	25.0		
No quadriceps strain	202	12.9	1.9 (0.6 to 6.8)	0.601
Chronic groin pain	18	5.6		
No chronic groin pain	192	14.1	0.4 (0.1 to 2.7)	0.478
Age (years)	210			
≤ 18.9	21	9.5		
> 18.9	189	13.8	1.4 (0.4 to 5.6)	0.747
≤ 20.1	51	11.8		
> 20.1	159	13.8	1.2 (0.5 to 2.7)	0.816
≤ 22.6	105	10.5		
> 22.6	105	16.2	1.5 (0.7 to 3.1)	0.310
≤ 25.5	160	11.9		
> 25.5	50	18.0	1.5 (0.7 to 3.1)	0.339
≤ 28.9	189	13.2		
> 28.9	21	14.3	1.1 (0.4 to 3.3)	1.000
Height (cm)	210			
≤ 183 (reference)	59	20.3	1.0	
184 to 190	81	12.3	0.6 (0.3 to 1.3)	0.242
>190	70	8.6	0.4 (0.2 to 1.0)	0.074
Weight (kg)	210			

≤ 81 (reference)	46	17.4	1.0	
82 to 89	93	17.2	1.0 (0.5 to 2.1)	1.000
≥ 90	71	5.6	0.3 (0.1 to 1.0)	0.060

*indicates significant difference in relative risk of future hamstring strain injury between groups.
95%CI, 95% confidence interval; ACL, anterior cruciate ligament; cm, centimetres; HSI, hamstring strain injury; kg, kilograms; N, Newtons.