

Effects Of Minimalist Footwear On Anaerobic Testing Metrics Of Collegiate Lacrosse, Ice Hockey, And Volleyball Athletes

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INTRODUCTION

- Minimalist footwear (MFW) is defined as thin and flexible shoes that allow for natural foot mechanics, such as toe splay, to occur.
- Most of the research on minimalist footwear has analyzed aerobic outcomes (Linares-Martín & Rico-González, 2023).
- Walking in minimalist footwear has been shown to increase intrinsic and extrinsic foot musculature strength, which could have effects on anaerobic performance and stability (Ridge et al., 2019).
- Minimalist footwear has been indicated to improve running economy via a shorter stride length and reduction of support time, which could have effects on change of direction (Warne et al., 2014; Kasmer et al., 2016).
- Effects on anaerobic testing metrics of lacrosse, ice hockey, and volleyball are relatively unknown.

PURPOSE

- The purpose was to compare the effects of MFW to conventional running shoes (RS) in terms of stability, change of direction, peak force, and time to peak force.

METHODS

- Participants: Five club sports teams ($n_{total} = 59$)
 - Men's lacrosse (n = 18)
 - Women's ice hockey (n = 9)
 - Men's ice hockey (n = 19)
 - Women's beach volleyball (n = 4)
 - Men's volleyball (n = 9)
- A randomized crossover design was used.
 - Each participant tested at two different testing sessions, one week apart, and were randomly assigned an order of MFW or RS.
- Testing battery
 - Limits of Stability Assessment
 - Explosive Deadlift
 - Pro Agility
 - 100% bodyweight for men
 - Modified T-test
 - 80% bodyweight for women
 - Vertical Jump
- A paired samples T-Test was used to compare the differences between RS and MFW (Make: Xero Shoes; Model: HFS).

RESULTS

- Limits Of Stability

Measure 1	Measure 2	Test	p	Effect Size
Combined Data				
Overall MFW	Overall RS*	Student	0.036	-0.282
L MFW	L RS*	Student	0.05	-0.262
BW MFW*	BW RS	Wilcoxon	0.039	0.318
Lacrosse				
Time MFW*	Time RS	Wilcoxon	0.036	0.603
FW MFW	FW RS*	Student	0.03	0.558
FWL MFW*	FWL RS	Student	0.024	0.582
Men's Hockey				
Overall MFW	Overall RS*	Student	0.025	-0.563
FWL MFW	FWL RS*	Student	0.023	-0.572
Women's Hockey				
BW MFW*	BW RS	Student	0.036	0.912
R MFW	R RS*	Wilcoxon	0.024	-0.917
Women's Volleyball				
L MFW	L RS*	Student	0.024	-2.114
FWL MFW	FWL RS*	Student	< .001	7.37

- Pro Agility

Measure 1	Measure 2	p	Cohen's d
Men's Hockey			
MFW T1	RS T1*	0.028	0.547
Women's Hockey			
MFW T2*	RS T2	0.033	-0.858
Men's Volleyball			
MFW T1*	RS T1	0.011	-1.088
MFW Best*	RS Best	0.005	-1.269

- Modified T-Test

Measure 1	Measure 2	p	Cohen's d
Combined Data			
MFW T2*	RS T2	0.016	-0.322
Men's Hockey			
MFW T1*	RS T1	0.014	-0.626
MFW T2*	RS T2	< .001	-1.194
MFW Best*	MTT RS Best	< .001	-1.308
Women's Hockey			
MFW T2*	RS T2	0.021	-0.96

- Vertical Jump

Measure 1	Measure 2	Test	p	Effect Size
Combined Data				
Peak Force MFW T2 L*	Peak Force RS T2 L	Wilcoxon	0.001	0.486
Lacrosse Data				
Peak Force MFW T1 R*	Peak Force RS T1 R	Wilcoxon	0.048	0.532
Peak Force MFW T2 R*	Peak Force RS T2 R	Wilcoxon	0.035	0.573
Men's Hockey				
TPF MFW T2 L*	TPF RS T2 L	Student	0.011	-0.677
Peak Force MFW T2 L*	Peak Force RS T2 L	Student	0.003	0.825
Women's Hockey				
Peak Force MFW T2 L*	Peak Force RS T2 L	Student	< .001	2.86

- Deadlift

Measure 1	Measure 2	Test	p	Effect Size
Combined Data				
TPF MFW T2 L*	TPF RS T2 L	Wilcoxon	0.004	-0.47
Men's Hockey				
Peak Force MFW T2 R*	Peak Force RS T2 R	Student	0.029	0.543
Women's Hockey				
TPF MFW T1 R*	TPF RS T1 R	Student	0.039	-0.898
TPF MFW T2 L*	TPF RS T2 L	Student	0.017	-1.229
TPF MFW T2 R*	TPF RS T2 R	Student	0.028	-1.085
Men's Volleyball				
Peak Force MFW T1 L*	Peak Force RS T1 L	Student	0.031	0.872

* Indicates the variable that performed better

Key: MFW: minimalist footwear; RS: conventional running shoes; L: left; FW: forward; FWL: forward left; BW: backward; R: right; T1: trial 1; T2: trial 2; TPF: time to peak force

DISCUSSION

- Many of the results were not statistically significant
- Despite the lack of significance, there were some clear trends that emerged
- Acute wear of MFW may not influence stability
- Acute wear of MFW may positively influence the ability to change direction, time to peak force, and maximal force production
- There is likely a greater effect when the exposure to MFW is chronic rather than acute

PRACTICAL APPLICATION

- Minimalist footwear may provide an immediate improvement to athletes by giving them an improved ability to change direction and produce more force, at a quicker rate
- While there was a trend in the data, many of the results were not statistically significant
- There may be more of a benefit to athletes over time as training adaptations occur due to the stimulus from MFW

REFERENCES



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