

The Effects of Minimalist Footwear on Anaerobic Performance and Stability

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INTRODUCTION

- Majority of research done on minimalist footwear has analyzed aerobic outcomes (Linares-Martín & Rico-González, 2023)
- Walking in minimalist footwear has been shown to strengthen intrinsic and extrinsic foot muscle strength, which could have effects on anaerobic performance and stability. (Ridge et al., 2019)
- Minimalist footwear has been shown to improve running performance via a shorter stride frequency and reduction of support time which increases running economy. (Warne et al., 2014) (Kasmer et al., 2016)
- Effects on anaerobic performance and stability are relatively unknown

PURPOSE

- The present study's purpose was to analyze the effects of minimalist footwear compared to regular running shoes in terms of rate of force development, peak power, change of direction, and stability.

METHODS

- Participants
 - 18 Men's Collegiate Lacrosse Association (MCLA) Division 1 male lacrosse athletes were assessed.
- A randomized crossover design was used.
 - Each participant tested at two different testing sessions, one week apart, and were randomly assigned an order of minimalist footwear (MFW) or running shoes (RS)
- Testing battery
 - Biodex Stability Assessment
 - 5-10-5
 - Modified T-test
 - Vertical Jump
 - Explosive Deadlift (1 time bodyweight was used)
- A paired samples T-Test was used to compare the differences between minimalist footwear and regular running shoes.
- Minimalist Footwear was provided by Xero Shoes (Make: Xero Shoes; Model: HFS)

RESULTS

- Biodex Stability Assessment
 - Significant differences were found between forward, and forward left
 - Forward MFW (47.33 ± 23.89), forward RS (62.94 ± 17.18) ($p = 0.01$)
 - Forward left MFW (56.94 ± 17.35), forward left RS (45.17 ± 17.52) ($p = 0.02$)
 - No statistically significant difference between time, overall, backward, right, left, forward right, backward right, and backward left
- 5-10-5 and Modified T-Test
 - No significant differences were found between the two conditions
- Vertical Jump
 - Significant differences were found in peak force for the second trial of the right foot
 - No significant differences were found in rate of force development.
- Deadlift
 - There was no significant difference in peak force between the two conditions.
 - On average MFW did produce higher peak force than RS (1235.27 ± 311.81) and (1119.18 ± 213.77) respectively, but it was not significant.

Statistically Significant	
Biodex Condition	Mean ± SD
Forward MFW	47.33 ± 23.89
Forward RS	62.94 ± 17.18
Forward Left MFW	56.94 ± 17.35
Forward Left RS	45.17 ± 17.52
Shows a Trend but Not Statistically Significant	
Deadlift Peak Force	Mean ± SD
MFW Trial 1 Left	1286.82 ± 289.28
RS Trial 1 Left	1144.56 ± 226.26
MFW Trial 1 Right	1212.89 ± 284.45
RS Trial 1 Right	1116.06 ± 215.25
MFW Trial 2 Left	1225.59 ± 299.50
RS Trial 2 Left	1127.08 ± 184.20
MFW Trial 2 Right	1215.79 ± 374.03
RS Trial 2 Right	1089.01 ± 229.38

DISCUSSION

- In the Biodex assessment during the forward portion, the RS condition performed better than the MFW condition, this could be potentially attributed to the heel-to-toe drop in the RS already causing a slight forward lean. However, this theory falls apart upon examining the forward left data in which the MFW condition performed superiorly. Likewise, the forward right data showed no difference, so the most plausible explanation is that it was a coincidence.
- Minimalist shoes may not make a difference in anaerobic performance and stability immediately.
- One limitation of the present study is that there was no long-term intervention in which more differences between the conditions would appear.
- Despite the lack of difference between the two testing conditions, there is evidence that walking in minimalist footwear can increase intrinsic and extrinsic foot muscle strength.

PRACTICAL APPLICATION

- Due to the lack of difference in performance between running shoes and minimalist footwear coaches can choose based on their personal preferences or let their athletes decide.
- Longitudinal research is needed to determine if strengthening the feet via wearing minimalist footwear has any effects on anaerobic performance and stability
- The observed differences in peak force but not speed and agility may show that minimalist footwear is more influential in the weight room and less influential on the field

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