



Independent Biomechanics Study

Changes in Mechanics Utilizing Blumaka Konnect Insoles

Terms of Use

The enclosed research study was completed by a professional performance biomechanics lab. The purpose was to understand the positive effects on the body's movement with Blumaka's Konnect insoles as the only independent variable. Konnect insoles demonstrated the ability to improve the overall performance of the body in core athletic movements, spanning across all sports. Blumaka has the right to use and distribute the data from this report. Blumaka does not have the right to share or endorse the name of the lab or participating athletes without prior consent.

Date Prepared

September 30, 2022

Purpose

The purpose of this research was to understand potential changes in kinematics and kinetics due to using Blumaka Konnect insoles within the players' cleated turf shoes.

Methodology

190 trials were used for the purpose of this research, with 90 trials in the dataset being those recorded using the Blumaka Konnect insoles. The collections were conducted as the first set using original equipment insoles (OEM), and the second set with Konnect insoles. Intent was monitored throughout to attempt to preserve reliability. Full body movement and force data were collected using 3D marker-based motion capture with integrated force plates. Kinematics and kinetics were calculated for each trial using the Visual3D Pipeline from Bassett Biomechanics. Research statistics were used to understand the effect of the Konnect insoles potential impact on mechanics. The metrics identified for comparisons are those thought to be potentially influenced by the Konnect insoles and are often related to performance.



Research Study Results

Force Production:

- **Back Leg Overall Force Production**
 - Measured the resultant, or total force the drive leg produced
 - 7 out of 10 players saw an increase
- **Back Leg Drive Force Production**
 - Measured linear directional force, generally the most valuable
 - 7 out of 10 players saw an increase
- **Lead Leg Overall Force Production**
 - Measured resultant, or total force the lead leg produced
 - 8 out of 10 players saw an increase

Speed:

- **Linear Body Velocity**
 - Measured how quickly the player moves in a linear direction
 - 9 out of 10 players saw an increase
- **Stride Length Percentage**
 - Measured as a percentage of the player's height
 - 9 out of 10 players saw an increase

Acceleration/Deceleration:

- **Linear Body Acceleration**
 - Measured how quickly the player accelerates in a linear direction
 - 8 out of 10 players saw an increase
- **Lead Leg Braking Force Production**
 - Measured linear directional force, generally the most valuable
 - 8 out of 10 players saw an increase
- **Linear Body Deceleration**
 - Measured how quickly the player decelerates in a linear direction
 - 6 out of 10 players saw an increase

Stability/Efficiency:

- **Front Knee Extension Velocity**
 - Measured how quickly the front knee extends after landing
 - 7 out of 10 players saw an increase
- **Front Knee Instability**
 - Measured how much the front knee collapses after landing
 - 8 out of 10 players saw an increase (in their stability)
 - *This potentially suggests that there was a decrease in loss of energy (Ideally this energy is then continually distributed somewhere up the chain rather than simply being lost)*



Conclusions

It was expected that a majority of the metrics selected would see an improvement due to the Blumaka Konnect Insoles. Throughout all selected metrics, it was observed that a vast majority saw improvements potentially as a result of using the insoles. Furthermore, it was observed that settling time into the front side occurred earlier potentially as a result of the insoles, helping the foot not continue sliding forward into the end range of the shoe. On the subjective side of things, it was visually observed that less slippage was occurring inside of the shoe. Additionally, the players feedback was very positive throughout, and felt they were sticking and braking better. The majority of players that were tested continued to use the Blumaka Konnect Insoles while playing in games.

Additional Notes

Generally, it was observed that the insoles may need to be half sizes larger than that of the shoe size. The reasoning being, if the sole is even slightly smaller than the shoe, the sole actually slips inside of the shoe, so while the foot isn't slipping on the sole, the sole itself could be slipping inside of the shoe. Additionally, the sole must be the only thing inside of the shoe, there cannot be orthotics or another sole in the shoe at the same time or could potentially limit return, and generally makes the foot too tall or too tight inside of the shoe. With a majority seeing improvements in overall back leg force production, the remainder of the metrics could have been influenced by this change, and is harder to prove it was solely a result of the insoles. There is no evidence suggesting that the insoles potentially limit or decrease player performance. It is important to note, that statistically only linear body velocity and stride length percentage were found to be significant improvements as a result.

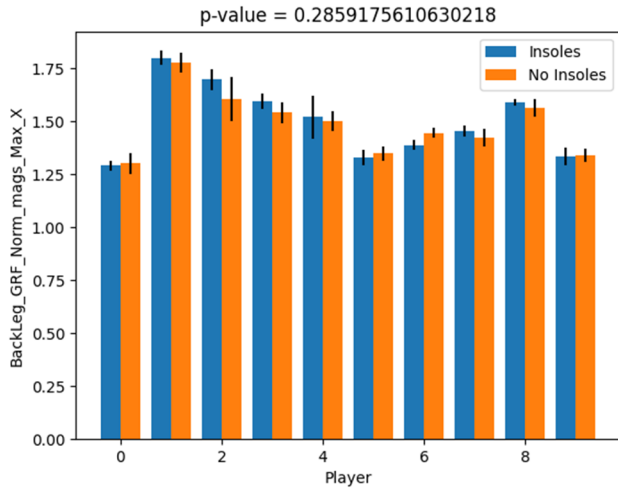
Potential Limiting Factors

This test was performed on turf as opposed to dirt. Naturally, there is going to be more potential slippage on turf from the shoe than spikes on dirt and there could be some variability making finding general trends more difficult. In an attempt to combat this issue, cleated turf shoes were required for this test.

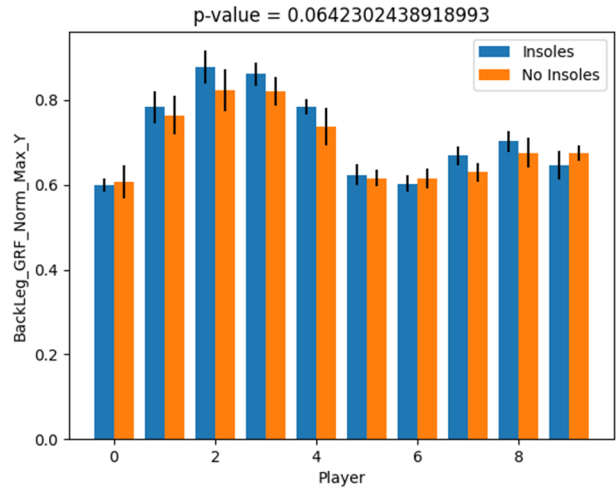
Potential Follow up Testing

Monitoring in game changes in kinematics potentially as a result of the Blumaka Konnect Insoles by utilizing KinaTrax and observing any potential similar trends. Potentially creating customizable insoles for the player to ensure proper fitting within their shoe / cleat.

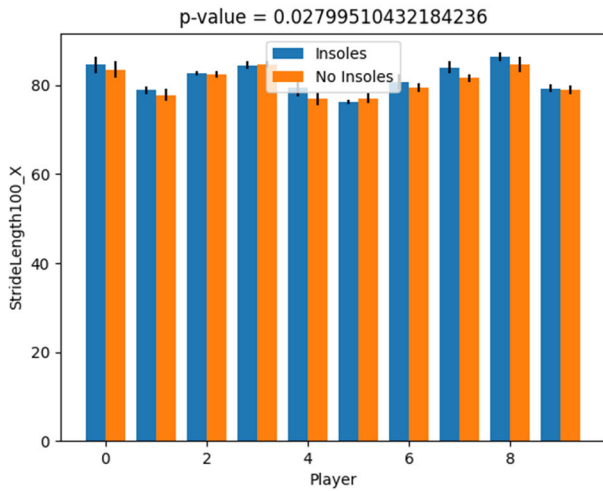
Back Leg Overall Force Production



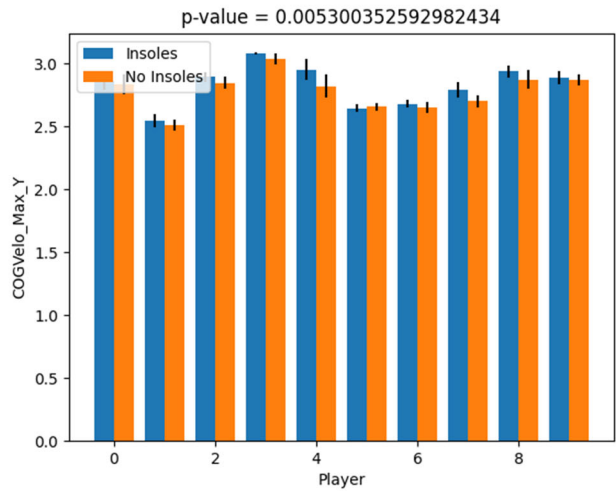
Back Leg Drive Force Production



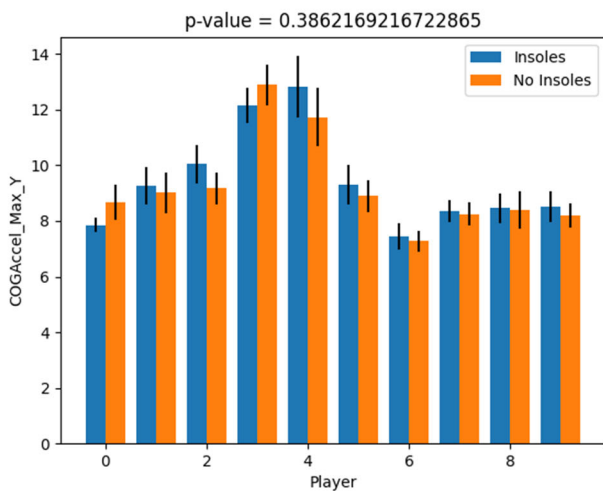
Stride Length Percentage



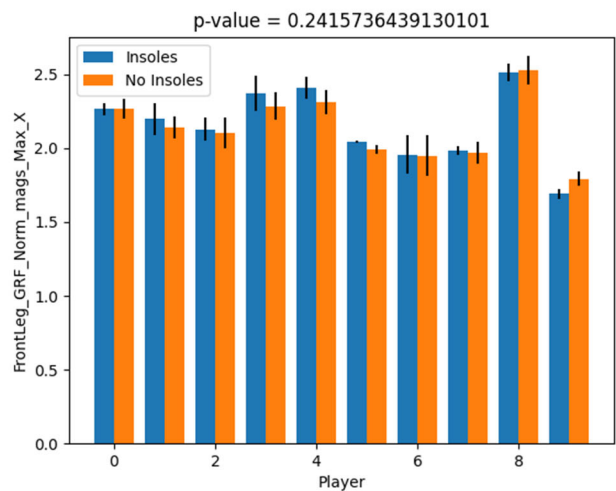
Linear Body Velocity



Linear Body Acceleration

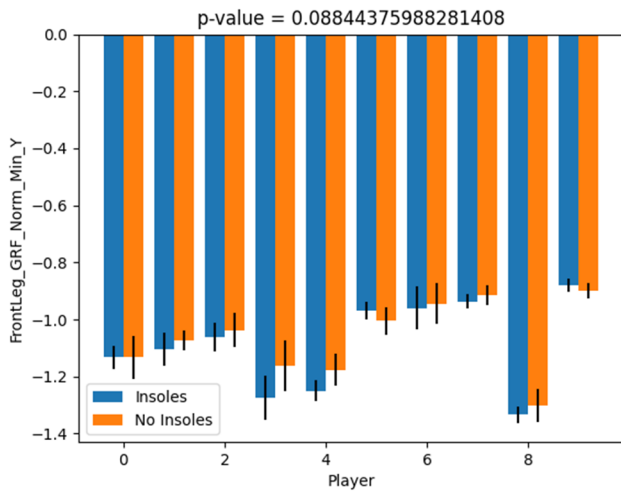


Lead Leg Overall Force Production

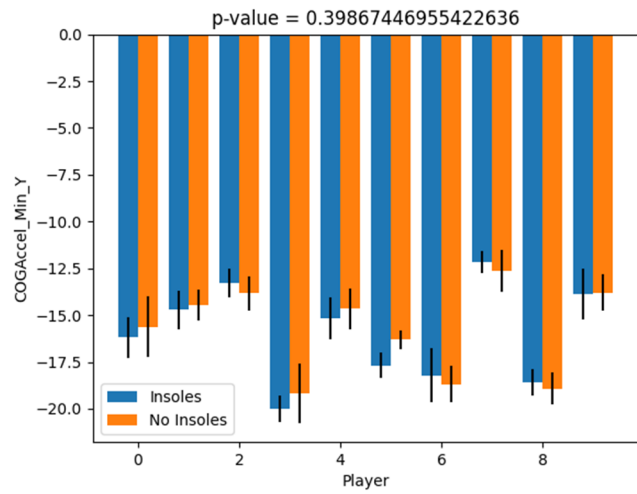


■ Insoles = blumaka Insoles
■ No Insoles = OEM Insoles

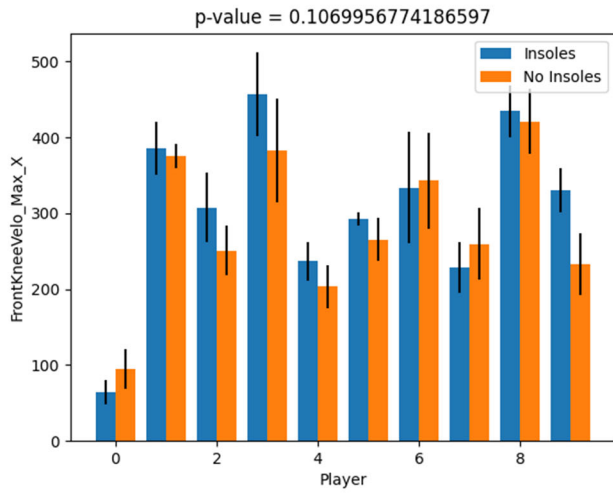
Lead Leg Braking Force Production



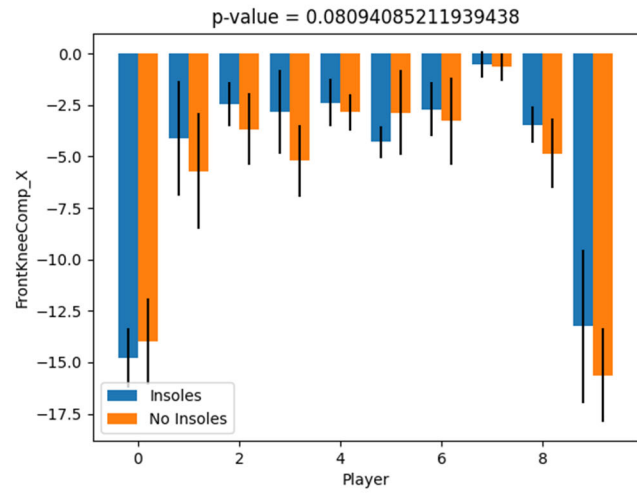
Linear Body Deceleration



Front Knee Extension Velocity



Front Knee Instability



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