Research on the Influence of Basketball Shoes Traction, Center of Gravity Position and Midsole Hardness on Court Feel

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Summary

Basketball shoes court feel refers to the overall subjective feeling during basketball. Traction, center of gravity and midsole hardness were considered to be the top influence factors of court feel. Therefore, this study aims to explore the impact of the three factors mentioned above at three levels on court feel through orthogonal design. A total of 9 shoes were designed and evaluated for their court feel during basketball using a 100mm visual analog scale among 37 male college basketball enthusiasts. The result indicate that court feel is mainly affected by midsole hardness and traction. The specific requirements for these factors vary depending on the type of movement being performed.

Introduction

When purchasing basketball shoes, consumers often make decisions based on personal experience or by considering others' feedback after actual use. This sensation is commonly referred to as "court feel" among sneaker reviewers. Despite frequent discussions of court feel on various sports forums, its precise definition has yet to be clearly established. In previous research, our team used the Delphi method to reach an expert consensus on the definition of court feel the court feel is the overall subjective feeling during basketball. Additionally, the previous study identified traction, center of gravity, and midsole hardness as key factors influencing court feel.

Currently, most research on traction and midsole hardness has focused on their individual effects [1,2], with little attention given to their interaction. As for studies on center of gravity, they generally investigate the impact of its movement along the forward-backward direction of the shoe [3], without considering the effects of its changes in the vertical directions.

Therefore, this study aims to explore the impact of the combination of traction, center of gravity and midsole hardness at three levels on court feel through orthogonal design.

Methods

This study used an orthogonal design to create 9 pairs of basketball shoes, combining three factors—traction, center of gravity, and midsole hardness—each at three levels. The three levels of traction were 1.1, 1.0, and 0.9; the three levels of center of gravity were 2.5 cm, 3.0 cm, and 3.5 cm above the ground; and the three levels of midsole hardness were 45 Shore, 50 Shore, and 55 Shore.

A total of 37 male college basketball enthusiasts were recruited, with the following criteria: age between 18 and 25 years, body mass index (BMI) < 25, right-leg dominance, shoe size 9.5, and at least three years of basketball experience.

After learning the consensus definition of court feel, the participants performed a 45° sidestep cutting and vertical jump. They then rated the court feel using a 100mm visual analog scale.

Range analysis were then conducted to determine the impact of traction, center of gravity, and midsole hardness on court feel.

Results and Discussion

By analyzing the effect of 9 pairs of basketball shoes on the scores of court feel after exercise, it was found that:

For the 45 °sidestep cutting motion, the degree of influence of each factor on court feel is as follows: traction > center of gravity > midsole hardness. The optimal combination for court feel is a traction level of 1.1, a center of gravity height of 3.5 cm, and a midsole hardness of 55 Shore. This indicates that sufficient traction prevents slipping, thereby enhancing safety and stability during movement and contributing to a better court feel.

For the vertical jump motion, the degree of influence of each factor on court feel is as follows: midsole hardness > traction > center of gravity. The optimal combination for court feel is a traction level of 1.0, a center of gravity height of 3.0 cm, and a midsole hardness of 45 Shore. This suggests that a softer midsole provides better cushioning and comfort, which in turn leads to a better court feel.

Conclusions

The court feel of basketball shoes is primarily influenced by midsole hardness and traction. However, the specific requirements for these factors vary depending on the type of movement being performed.

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