

**FOOTWEAR AND ORTHOTIC USAGE IN SPORTS  
ENGAGEMENT AMONG MALE PROFESSIONAL  
FOOTBALLERS IN BENIN CITY, EDO STATE.**

**BY**

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# CERTIFICATION

This dissertation by Itepu Enosetale Judith Favour is accepted in its presented form as satisfying the dissertation requirement of the degree of Bachelor of Physiotherapy of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.

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## **DEDICATION**

This dissertation is dedicated to God Almighty, who in his infinite mercies brought me thus far, even when it seemed impossible; to my parents and my big sis.

Through the dark times, I thank you for your belief, encouragement, advice, and patience. I'm forever grateful.

## ABSTRACT

**Background/Purpose of the study:** Football-related injuries remain prevalent among professional players, particularly in the lower limbs, where inappropriate footwear and lack of orthotic use contribute significantly to performance decline and increased injury risk. This study investigated the influence of footwear and orthotics usage on sports engagement among male professional footballers in Benin City, Edo State, Nigeria. It addressed the gap in empirical data regarding equipment choices and their biomechanical implications for injury prevention and sustained performance in low-resource football settings.

**Methods:** A cross-sectional analytic design was adopted, involving 91 male professional footballers from clubs registered with the Nigerian Professional Football League and National Nationwide League. Data were collected using standardized instruments, including the Footwear Assessment Tool, Orthotic Satisfaction Survey, and the Sport Engagement Scale. Descriptive statistics summarized participant characteristics, while chi-square was used to determine associations between footwear and orthotic usage, players' demographics, and sports engagement, with significance set at  $p < 0.05$ .

**Results:** Findings revealed that most participants (63%) used firm-ground football boots designed for natural grass surfaces, with 68% reporting limited access to high-quality footwear due to cost and availability constraints. Among 91 male footballers, 59.3% wore shoes with 0–2.5 cm heels and 64.8% semi-curved lasts. Good shoe fit was reported by 67%, and 30.8% used orthoses, 80% of which reduced pain. Significant associations ( $p < 0.05$ ) existed between shoe age, upper/outsole materials, and training persistence; lateral midsole hardness affected enthusiasm and immersion.

**Conclusion:** The study concluded that appropriate footwear and orthotic usage positively influenced performance, comfort, and injury prevention among male professional footballers in Benin City. It recommended increased awareness, access to affordable orthotic devices, and inclusion of podiatric assessments in sports medicine programs to enhance player safety and career longevity in Nigeria's professional football landscape.

**Keywords:** Footwear, Orthotics, Sport Engagement, Professional Footballers, Injury Prevention.

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## TABLE OF CONTENT

Title Page	-	-	-	-	-	-	-	-	-	i
Certification	-	-	-	-	-	-	-	-	-	ii
Dedication	-	-	-	-	-	-	-	-	-	iii
Abstract	-	-	-	-	-	-	-	-	-	iv
Acknowledgement	-	-	-	-	-	-	-	-	-	v
Table of Content	-	-	-	-	-	-	-	-	-	vi
List of Tables	-	-	-	-	-	-	-	-	-	ix
List of Figures	-	-	-	-	-	-	-	-	-	x
CHAPTER ONE	-	-	-	-	-	-	-	-	-	1
INTRODUCTION	-	-	-	-	-	-	-	-	-	1
1.1 Background of the study-	-	-	-	-	-	-	-	-	-	1
1.2 Statement of the Problem	-	-	-	-	-	-	-	-	-	5
1.3 Research Questions	-	-	-	-	-	-	-	-	-	5
1.4 Aim of the Study	-	-	-	-	-	-	-	-	-	6
1.4.1 Specific Objectives	-	-	-	-	-	-	-	-	-	6
1.5 Hypothesis	-	-	-	-	-	-	-	-	-	7
1.5.1 Main hypothesis	-	-	-	-	-	-	-	-	-	7
1.5.2 Sub-hypothesis	-	-	-	-	-	-	-	-	-	7
1.6 Significance/Justification of Study	-	-	-	-	-	-	-	-	-	8
1.7 Scope of the Study (Delimitation)	-	-	-	-	-	-	-	-	-	8
1.8 Limitations of the Study	-	-	-	-	-	-	-	-	-	8
1.9 Definition of Terms/Operational Definition of Terms	-	-	-	-	-	-	-	-	-	9
1.9.1 List of Abbreviations	-	-	-	-	-	-	-	-	-	9
CHAPTER TWO	-	-	-	-	-	-	-	-	-	10
LITERATURE REVIEW	-	-	-	-	-	-	-	-	-	10
2.1 Historical Development of Football Footwear and Orthotics-	-	-	-	-	-	-	-	-	-	10
2.2 Contemporary Football Footwear	-	-	-	-	-	-	-	-	-	11
2.2.1 Types and Classification	-	-	-	-	-	-	-	-	-	15
2.2.2 Biomechanical Impact of Football Footwear	-	-	-	-	-	-	-	-	-	16
2.2.3 Challenges in Low-Resource Football Environments	-	-	-	-	-	-	-	-	-	18
2.2.3.1 Economic Barriers to Optimal Footwear	-	-	-	-	-	-	-	-	-	18
2.2.3.2 Pitch Conditions and Equipment Mismatch	-	-	-	-	-	-	-	-	-	18
2.2.3.3 Systemic Infrastructure Limitations	-	-	-	-	-	-	-	-	-	19
2.2.3.4 Emerging Solutions and Adaptations	-	-	-	-	-	-	-	-	-	19
2.3 Orthotics in Football	-	-	-	-	-	-	-	-	-	20
2.3.1 Types and Functions	-	-	-	-	-	-	-	-	-	22

2.3.1.1 Custom Foot Orthoses (CFOs)	-	-	-	-	-	-	-	-	22
2.3.1.2 Prefabricated Orthotics	-	-	-	-	-	-	-	-	23
2.3.1.3 Functional Classification of Football Orthotics	-	-	-	-	-	-	-	-	24
2.3.2 Importance of Orthotics in Football	-	-	-	-	-	-	-	-	26
2.3.2.1 Injury Prevention	-	-	-	-	-	-	-	-	26
2.3.2.2 Performance Enhancement	-	-	-	-	-	-	-	-	27
2.3.2.3. Rehabilitation-	-	-	-	-	-	-	-	-	28
2.3.3 Systemic Barriers to Orthotic Adoption in Nigerian Football	-	-	-	-	-	-	-	-	31
2.3.3.1 Alarmingly Low Utilization Rates	-	-	-	-	-	-	-	-	31
2.3.3.2 Economic Accessibility Challenges	-	-	-	-	-	-	-	-	32
2.3.3.3 Critical Shortage of Specialized Services	-	-	-	-	-	-	-	-	32
2.3.3.4 Educational and Cultural Barriers	-	-	-	-	-	-	-	-	32
2.4 Injury Epidemiology in Football	-	-	-	-	-	-	-	-	33
2.4.1 Relevant Anatomy of the Foot for Football Performance and Injury	-	-	-	-	-	-	-	-	34
Prevention	-	-	-	-	-	-	-	-	34
2.5 Football in Low-Resource Settings	-	-	-	-	-	-	-	-	38
2.6 Sport Engagement and Equipment	-	-	-	-	-	-	-	-	39
2.7 Theoretical Framework	-	-	-	-	-	-	-	-	40
2.7.1 Biomechanical Theory	-	-	-	-	-	-	-	-	40
2.7.2 Health Belief Model (HBM)	-	-	-	-	-	-	-	-	40
2.8 Empirical Review of Literature	-	-	-	-	-	-	-	-	42
2.9 Knowledge Gaps	-	-	-	-	-	-	-	-	44
CHAPTER THREE	-	-	-	-	-	-	-	-	45
METHODS	-	-	-	-	-	-	-	-	45
3.1 Participants	-	-	-	-	-	-	-	-	45
3.1.1 Inclusion Criteria	-	-	-	-	-	-	-	-	45
3.1.2 Exclusion Criteria	-	-	-	-	-	-	-	-	45
3.2 Materials	-	-	-	-	-	-	-	-	45
3.2.1 Apparatus/Instruments	-	-	-	-	-	-	-	-	45
3.2.2 Description of Instruments	-	-	-	-	-	-	-	-	46
3.3 Methods	-	-	-	-	-	-	-	-	54
3.3.1 Research design	-	-	-	-	-	-	-	-	54
3.3.2 Sampling technique/Sample size calculation	-	-	-	-	-	-	-	-	54
3.3.3 Research Procedure/Procedure for data collection	-	-	-	-	-	-	-	-	55
3.3.4 Procedure for Assessment/Measurement	-	-	-	-	-	-	-	-	55
3.3.5 Ethical Consideration	-	-	-	-	-	-	-	-	55
3.3.6 Data Analysis	-	-	-	-	-	-	-	-	55

CHAPTER FOUR	-	-	-	-	-	-	-	-	-	57	
RESULTS	-	-	-	-	-	-	-	-	-	57	
4.1 Sociodemographic Characteristics of Participants	-	-	-	-	-	-	-	-	-	57	
4.1.1 General Footwear Structure Characteristics	-	-	-	-	-	-	-	-	-	60	
4.1.2 Footwear Characteristics of Participants	-	-	-	-	-	-	-	-	-	62	
4.1.3 Motion Contact and Cushioning of Participants Footwear	-	-	-	-	-	-	-	-	-	66	
4.1.4 Prevalence of Orthosis Use	-	-	-	-	-	-	-	-	-	70	
4.1.5 Characteristics of Orthotics Use among Participants	-	-	-	-	-	-	-	-	-	72	
4.1.6 Association between Footwear Characteristics and Sport Engagement Variables	-	-	-	-	-	-	-	-	-	74	
4.2 Hypotheses Testing	-	-	-	-	-	-	-	-	-	77	
CHAPTER FIVE	-	-	-	-	-	-	-	-	-	106	
DISCUSSION, CONCLUSION AND RECOMMENDATIONS	-	-	-	-	-	-	-	-	-	106	
5.1 Discussion	-	-	-	-	-	-	-	-	-	106	
5.2 Conclusion	-	-	-	-	-	-	-	-	-	111	
5.3 Recommendations	-	-	-	-	-	-	-	-	-	111	
5.4 Implications for Further Studies	-	-	-	-	-	-	-	-	-	112	
REFERENCES	-	-	-	-	-	-	-	-	-	113	
APPENDICES	-	-	-	-	-	-	-	-	-	-	124
APPENDIX A: Ethical Approval	-	-	-	-	-	-	-	-	-	124	
APPENDIX B: Informed Consent form	-	-	-	-	-	-	-	-	-	125	
APPENDIX C: Questionnaire	-	-	-	-	-	-	-	-	-	126	

## LIST OF TABLES

4.1: Sociodemographic Characteristics of Participants	-	-	-	-	58
4.1: Continuous Sociodemographic Characteristics of Participants	-	-	-	-	59
4.1.1: General Footwear Structure Characteristics	-	-	-	-	61
4.1.2: Assessment of Fit of Footwear of Participants (Categorical Variables)	-	-	-	-	63
4.1.2: Descriptive Statistics of Continuous Footwear Variables	-	-	-	-	64
4.1.3: Motion Control and Cushioning Characteristics of Participants' Footwear	-	-	-	-	66
4.1.4: Prevalence of Orthosis Use	-	-	-	-	69
4.1.5: Characteristics of Orthotics Use among Participants	-	-	-	-	71
4.1.6: Association between Footwear Characteristics and Sport Engagement Variables	-	-	-	-	73

## LIST OF FIGURES

Figure 2.2: Different Parts of a Football Footwear	-	-	-	-	-	-	13
Figure 2.3: Orthotic–Shoe–Insoles	-	-	-	-	-	-	21
Figure 2.4.1: Full Diagram of the Foot	-	-	-	-	-	-	39

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the study

Football injury epidemiology recognizes the high frequency of lower limb injury, with ankle sprains accounting for 17-20% of all football injuries and knee injury, such as anterior cruciate ligament (ACL) tears, posing significant risks to career longevity (Mackenzie et al., 2020; Waldén et al., 2023). Literature shows that poorly fitting footwear, such as degraded boots or those not adapted to playing surfaces, can increase such risks by compromising stability and traction (Robin et al., 2022). Similarly, the absence of orthotic support can increase the risk of overuse injuries like plantar fasciitis or shin splints (Mündermann et al., 2021). Football injury studies in Nigeria have primarily been on prevalence and risk factors, and less on the role of footwear and orthotics (Owoeye et al., 2017; Oghumu et al., 2025).

Footwear, specifically football boots, is engineered to optimize traction, stability, and agility on varying playing surfaces (Stanislav et al., 2025). Athletic footwear is designed to enhance performance and protect athletes' feet during various activities. They have features of cushioning, stability, traction and flexibility. Modern boots feature studs (metal, plastic, or bladed) tailored to grass, artificial turf, or hybrid pitches, with designs prioritizing energy transfer and foot support (Joseph and Barry 2023). Sports footwear has evolved significantly in the past decades. Footwear innovations provided more comfort and performance improvement both for the professional and amateur athlete. With new technologies being developed every year, it is challenging for the general physician to keep updated with the

literature. However, as the knowledge regarding sports footwear evolves, athletes become more demanding, aiming for optimal performance. Therefore, it is essential that the sports physician be capable of prescribing the most appropriate sports footwear according to the athlete's specific needs and expectations (Prado and Saito, 2020).

A foot orthosis is defined as an orthopedic apparatus used as an in-shoe medical device that may help support, align, correct deformity, alter, or improve the moving parts of the body (Werd et al., 2017; Lam et al., 2021). Foot orthoses have been used for more than 150 years by physicians to treat lower limb and foot injuries, prevent new injuries, and optimize biomechanics of the lower limb. They are made from a multitude of synthetic and natural materials. Orthoses alter the location, magnitude, and temporal patterns of the reaction forces on the foot (especially on the plantar aspect) and lower extremity, hence allowing normal functionality. They support the medial longitudinal arch, reducing pathologic loading on the foot and lower extremity during weight-bearing activities (Werd et al., 2017). Foot orthoses helps to balance the foot and lower extremity, preventing falls in elderly patients (Lavigne et al., 2023). Preliminary research in certain muscular dystrophies found out that using orthoses might be beneficial in reducing pain due to contractures. Orthoses also help in reducing pain and forefoot plantar pressures in patients affected with rheumatoid arthritis of the foot and ankle (Morten et al., 2022). Orthoses are also frequently used to treat patients with anterior knee pain (Jill and Phil, 2025), plantar foot types, excessive knee flexion leading to gait abnormality in spastic cerebral palsy, and Charcot-Marie Tooth disease (Öunpuu et al., 2021).

More studies are recommended by most investigators to highlight the uses of orthoses in different medical conditions affecting the feet and lower extremities. In general, most foot orthoses are divided into OTS (off-the-shelf) or prefabricated orthoses and custom foot orthoses (CFO) (Hashem et al., 2025). OTS foot orthoses are used by most physicians as initial treatment of various clinical conditions. They are not individual-specific and are less durable, but they are much cheaper. CFOs are used for patients who continue to experience problems and take into account the plantar pressures of the foot. They allow the physician to prescribe individual-specific orthoses, which can help treat the pathologic condition of the foot and/or lower extremity. These orthoses are more durable but are expensive. Orthotics, whether custom-made or prefabricated, are insoles designed to correct biomechanical abnormalities such as overpronation, supination, or plantar fasciitis, thereby reducing stress on joints and muscles (Abu et al., 2025; Mündermann et al., 2021; Hashem et al., 2025).

Footwear and orthotic devices are critical components in football, significantly influencing performance, comfort, and injury prevention (Smith et al., 2021). For professional footballers, appropriate footwear and orthotics are indispensable for enhancing sport engagement quantified through training frequency, match participation, and performance consistency while mitigating injury risks (Owoeye et al., 2017; Oghumu et al., 2025). Previous studies indicate that 60-70% of football-related injuries involve the lower limbs, with ankle sprains (17-20%) and ACL tears being prevalent (Waldén et al., 2023; Doherty et al., 2020). Poorly fitted or degraded footwear exacerbates these risks by compromising stability and traction (Robin et al., 2022), while a lack of orthotic support increases

susceptibility to overuse injuries like shin splints (Mündermann et al., 2021; Cheung et al., 2021).

In low-resource settings in middle-income countries, like Nigeria, professional footballers face barriers to accessing high-quality footwear and orthotics, including cost constraints, limited availability, and insufficient podiatric awareness (Owoeye et al., 2014; Akodu et al., 2022). Anecdotal reports suggest many players rely on suboptimal or worn-out boots, potentially elevating injury rates and hindering career longevity (Bashir et al., 2020). Orthotic usage remains understudied, with few players undergoing biomechanical assessments or using custom devices (Owoeye et al., 2017). Footwear and orthotic devices are significant in football, influencing performance, comfort, and injury prevention. Football boots are designed to provide maximum traction, stability, and agility, with studs or blades suited to a particular playing surface (Stanislav et al., 2025). For career male footballers, appropriate footwear and orthotic appliances can enhance sport participation quantified in terms of frequency, intensity, and quality of training and match participation and decrease the risk injury. However, in low-resource settings like Benin City, good-quality footwear and orthotics may be limited by cost, availability, and awareness (Owoeye et al., 2014).

Hence, it will be useful to understand how the use of footwear and orthotics influences injury incidence and sports participation among male professional footballers in Benin city. The professional football scene in Benin City is vibrant, with clubs competing in national leagues and players aspiring to international careers. In Lagos, Owoeye et al (2014) asserts that many players rely on suboptimal footwear due to economic constraints, potentially increasing injury susceptibility. Orthotic usage remains understudied in Nigeria, especially in Benin

city, hence the need to explore how footwear and orthotic usage shape sport engagement among male professional footballers in Benin City.

## **1.2 Statement of the Problem**

Footwear and orthotics are critical to injury prevention and performance optimization in football. Properly designed boots can enhance traction and stability, reducing the risk of slips or twists, while orthotics can correct biomechanical imbalances, alleviating stress on joints (Stanislav et al., 2025; Cheung et al., 2021; Joe et al., 2021). However, in Nigeria, male professional footballers often face barriers to accessing high-quality footwear and orthotics, including high costs, limited availability, and lack of professional guidance (Owoeye et al., 2014). These challenges may lead to the use of inappropriate or worn-out boots, increasing injury risks and potentially limiting sport engagement through reduced training time or match participation.

Despite the recognized importance of footwear and orthotics, empirical research on their usage among professional footballers in Nigeria, particularly in Benin City, is scarce. Existing studies focused broadly on injury epidemiology or training practices, with minimal attention to how equipment choices influence outcomes (Owoeye et al., 2017). This knowledge gap hinders the development of targeted interventions to improve player safety and performance. This study sought to address this gap by investigating the impact of footwear and orthotic usage on sport engagement and injury rates among male professional footballers in Benin City.

## **1.3 Research Questions**

The study aimed to answer the following research questions

1. What types of footwear and orthotics are most commonly used by male professional footballers in Benin City?
2. What is the prevalence of orthotic usage among male professional footballers in Benin City?
3. What is the association between player's characteristics (playing years and playing position) and each of footwear and orthotic usage among male professional footballers in Benin city?
4. What is the association between footwear characteristics [age of shoe, materials (upper and outsole), heel height, forefoot height, depth, width, density, lateral and medial midsole hardness] and sport engagement among male professional footballers in Benin City?
5. What is the association between orthotic usage and sport engagement among male professional footballers in Benin City?

#### **1.4 Aim of the Study**

The study aimed to investigate footwear and orthotic usage in sports engagement among male professional footballers in Benin City, Edo State, Nigeria.

##### **1.4.1 Specific Objectives**

The specific objectives of this study were:

1. To identify the types of footwear and orthotics commonly used by male professional footballers in Benin City.
2. To determine the prevalence of orthotic usage among male professional footballers in Benin City.

3. To evaluate the association between player's characteristics (playing years and playing position) and each of type of footwear and orthotic usage among male professional footballers in Benin City.
4. To evaluate the association between footwear characteristics [age of shoe, materials (upper and outsole), heel height, forefoot height, depth, width, density, lateral and medial midsole hardness] and sport engagement among male professional footballers in Benin City.
5. To evaluate the association between orthotic usage and sport engagement among male professional footballers in Benin City.

## **1.5 Hypothesis**

### **1.5.1 Main hypothesis**

There was no significant association between sport engagement and each of footwear characteristics and orthotic usage; and there were no significant associations between player's characteristics and each of footwear and orthotic usage among male professional footballers in Benin city.

### **1.5.2 Sub-hypotheses**

1. There was no significant association between footwear type and sports engagement among male professional footballers in Benin City.
2. There was no significant association between orthotic usage and sports engagement among male professional footballers in Benin City.
3. There were no significant associations between player's characteristics and each of footwear and orthotic usage among male professional footballers in Benin city.

### **1.6 Significance/Justification of Study**

This study fills a critical gap in the literature by providing empirical data on footwear and orthotic usage among professional footballers in Nigeria. The findings will contribute to global sports biomechanics discourse for researchers, enabling comparative studies across diverse populations (Abu et al., 2025). Physiotherapists can leverage the results to design evidence-based interventions, such as orthotic prescriptions or boot recommendations, particularly in settings with limited specialist care (Owoeye et al., 2017). Players will gain awareness of equipment choices that reduce injury risks and enhance performance, while coaches and administrators can adopt policies to improve equipment access (Robin et al., 2022; FIFA, 2006).

### **1.7 Scope of the Study (Delimitation)**

This study was conducted among male professional footballers in Benin city, Edo state, Nigeria and was delimited to sports footwear, orthotics usage and sports engagement questionnaires.

### **1.8 Limitations of the Study**

- i. The duration of time for the study made it difficult to spend enough time with the footballers to ensure adequate understanding of the the importance of the research.
- ii. Explaining the questionnaire was a bit difficult with some of the footballers that did not have a strong command of the English language
- iii. The teams were always traveling for tournaments and therefore were not always available for the research.
- iv. The research was carried out after practice when the footballers were already tired which lead to some of them being unreceptive to being a part of this study.
- v. One of the participants withdrew his consent halfway to collection of data

from him.

## **1.9 Definition of Terms/Operational Definition of Terms**

**Sport Engagement:** The extent of participation in football, encompassing training frequency, match involvement, and performance consistency among professional male footballers in Benin City (Kirkendall and Krstrup, 2022).

**Footwear:** Specialized football boots with features like studs, blades, or molded soles, designed to enhance traction, stability, and performance on various playing surfaces (Stanislav et al., 2025).

**Orthotics:** Custom or prefabricated devices inserted into footwear to correct biomechanical abnormalities, support foot alignment, or reduce injury risk (Abu et al., 2025).

**Professional Footballers:** Male athletes in Benin City who engage in football as a paid occupation, participating in competitive leagues or clubs (FIFA, 2006).

### **1.9.1 List of Abbreviations**

**ACL:** Anterior Cruciate Ligament

**CFO:** Custom Foot Orthoses

**FIFA:** Federation of International Football Association

**OTS:** Off-the-shelf

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Historical Development of Football Footwear and Orthotics

The evolution of athletic footwear and orthotic devices reflects significant technological and biomechanical advancements that have transformed sports medicine. Football boots have progressed from basic protective gear to sophisticated performance-enhancing equipment. Early 20th-century designs featured heavy leather construction with metal toe caps and six conical studs, prioritizing durability over performance (Stanislav et al., 2025). The 1950s saw the introduction of screw-in studs, allowing players to adapt to varying pitch conditions, while the 1970s brought lighter kangaroo leather uppers that improved ball feel. A paradigm shift occurred in the 1990s with synthetic materials like polyurethane, reducing boot weight by 40% while maintaining structural integrity (Joseph and Barry, 2023). Contemporary designs now incorporate 3D-printed soles, adaptive traction systems, and embedded sensors that monitor performance metrics in real-time (Adidas Performance Report, 2023).

Parallel developments in orthotics have transitioned these devices from purely medical applications to essential sports equipment. The earliest foot supports, developed in the late 1800s, were rigid metal and leather constructs designed to correct severe deformities. By the mid-20th century, thermoplastics enabled semi-rigid designs that balanced support with flexibility. The sports medicine revolution of the 1980s-90s produced dynamic orthotics that actively redistributed impact forces during athletic movements (Mündermann et al., 2021). Modern devices now utilize pressure-mapping technologies and machine learning algorithms to create

fully customized solutions that adapt to individual biomechanics throughout the gait cycle.

## **2.2 Contemporary Football Footwear**

Football boots have evolved in the past century, transforming from ankle-high steel-toe capped boots to footwear weighing less than 200 grams (Fraser et al., 2014). With a competitive market, manufacturers constantly change football boot design to meet player demands. As these designs change, it is important to quantify their effect on performance parameters. The modern-day boots consist of two major components: the outsole and the upper, designed to protect the foot without inhibiting performance (Keyser, 2015). Functionally, the outsole provides an intermediate surface between the foot and ground, as well as allowing the foot to flex during movements. Generally, the upper's main role is to encompass the foot, holding it against the outsole. Examination of the football boot components during a game allowed a greater understanding of their function. The role of the boot can be split into two distinctive classifications:

- Player movements
- Ball contact.

Player movements in football occur constantly during a game; the majority of movements tend to be low-intensity actions, such as walking, with short bursts of high-intensity movement types such as sprinting (Smith et al., 2021; Stanislav et al., 2025). However, boot-to-ball contacts last for a shorter period when compared to player movements. Both these classifications have led to the development of football footwear. Research into football uppers has mainly focused on the boot-to-ball interaction. Pressure gradients have been researched, investigating their effect on

ball accuracy and velocity when changing the upper dorsal surface (Joseph and Barry, 2023). With advances in material selection and manufacturing processes, different outsole constructions have influenced boot flexibility (Keyser, 2015). However, the influence of the upper during typical game-related movements has remained relatively unknown. Keyser (2015) highlighted that, when looking at running shoes, the whole shoe construction needs to be considered during the measurement of bending stiffness, not just the stiffness of the midsole. Importantly, the influence of the upper needs to be considered when designing football footwear.

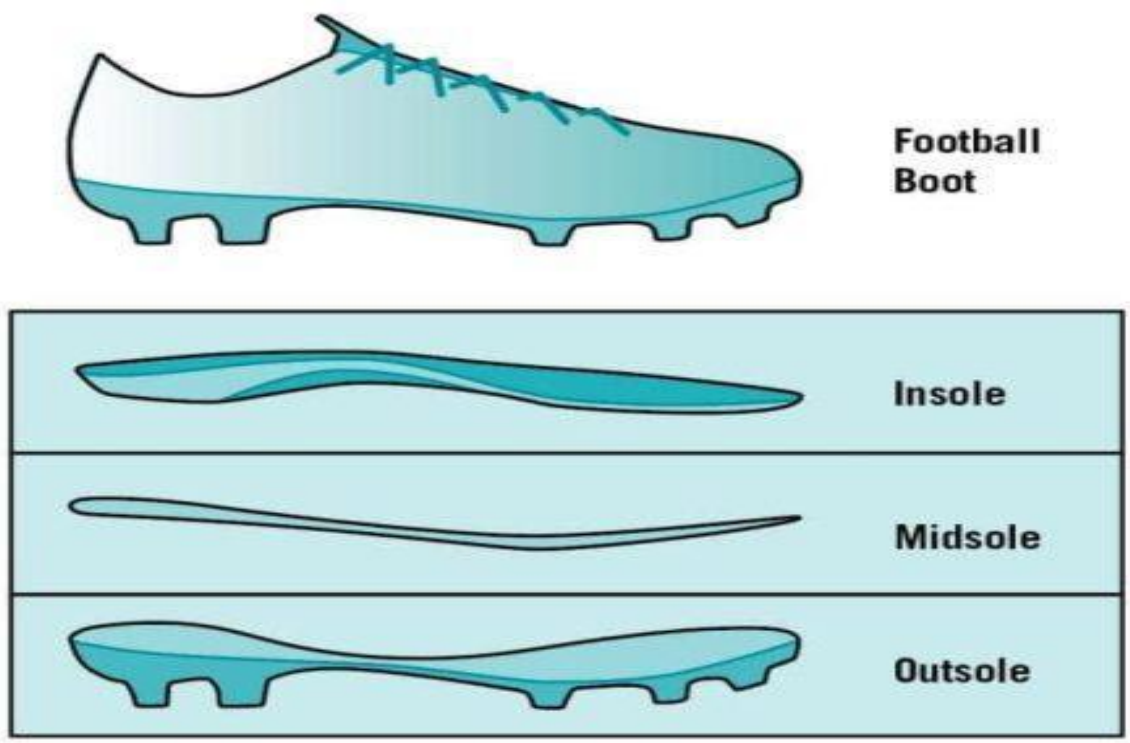


Figure 2.2 Different parts of a football footwear

Football boots are engineered to optimize performance through enhanced traction, stability, and agility on diverse playing surfaces, such as natural grass, artificial turf, or hybrid pitches (Joseph and Barry, 2023; FIFA, 2022). Modern boots feature studs (conical, bladed, or mixed) or molded soles tailored to specific surfaces, with designs prioritizing energy transfer and foot support (Joseph and Barry, 2023). Stanislav et al. (2025) found that conical studs improve rotational traction on grass, reducing ankle sprain risks by 15-20% compared to bladed studs, which increase shear forces on artificial turf. Similarly, Kulesa et al. (2017) reported that degraded boots with worn studs increase slip risk by 20% on wet pitches, compromising stability and elevating injury incidence.

Football footwear today can be systematically classified by both structural characteristics and performance objectives. Stud configuration remains the primary differentiator, with four distinct patterns serving specific biomechanical functions. Metal studs (6-12mm length) provide optimal penetration on natural grass, reducing rotational resistance by 18% compared to plastic alternatives (Kulesa et al., 2017). Blade studs, typically 40-60 in number on artificial turf boots, increase surface contact area by 35% to prevent excessive torque on lower extremity joints. Hybrid designs combine circular and bladed elements for multi-surface versatility, though recent studies indicate a 12% performance compromise compared to surface-specific footwear (FIFA Quality Programme, 2022).

Performance categorization further distinguishes modern boots:

- Speed-optimized designs (<200g) enhance sprinting efficiency through carbon fiber plates and streamlined uppers

- Control-focused models incorporate textured strike zones and dampening materials to improve ball manipulation
- Power-enhancing boots feature stiffening elements that increase shot velocity by 3-5%

### **2.2.1 Types and Classification**

Football boots are categorized by stud configuration and surface compatibility:

- Firm Ground (FG) Cleats
- Soft Ground (SG) Cleats
- Artificial Turf (AG) Shoes
- Indoor Shoes
- Hard Ground Cleats

The classification of football shoes shows a variety of styles designed to meet different playing surfaces and conditions. Each type caters to distinct player needs and preferences, enhancing comfort and performance on the field.

1. Firm Ground Cleats: Firm ground cleats are designed for use on natural grass surfaces. They typically feature molded studs that provide traction and stability. This design helps players accelerate and pivot effectively. According to research by FIFA, firm ground cleats are widely used for grass pitches due to their versatility and performance attributes during dry conditions.
2. Soft Ground Cleats: Soft ground cleats are specifically engineered for wet or muddy playing surfaces. They have longer, removable studs that allow for better grip in slippery conditions. The Association of Sports Equipment

Manufacturers highlights these cleats' ability to prevent slipping, thereby reducing the risk of injury during wet matches.

3. Turf Shoes: Turf shoes are crafted for playing on artificial turf or hard, compact surfaces. They feature a dense rubber outsole to provide traction while minimizing risk on harder surfaces. A study by the University of Oklahoma indicates that turf shoes can help reduce stress injuries when playing on turf fields due to their cushioning properties.
4. Indoor Shoes: Indoor shoes are designed for use on smooth, indoor surfaces. They have a flat, rubber outsole to maximize contact and grip. The American Football Coaches Association highlights that indoor shoes are crucial for indoor football leagues to prevent slipping and facilitate quick movements.
5. Hard Ground Cleats: Hard ground cleats are suited for dry, firm fields. They have shorter, more numerous studs that ensure traction without causing discomfort. Research published by The Sports Journal indicates that these cleats can help improve performance on hard ground by facilitating better control and speed.

### **2.2.2 Biomechanical Impact of Football Footwear**

Contemporary football cleat designs prioritize lightweight construction, with elite models now weighing under 200g while maintaining structural integrity (FIFA Quality Programme, 2022). Advanced carbon fiber plates incorporated into the midsole improve energy return by 12-15% during sprinting motions, particularly during the toe-off phase, where they enhance propulsion efficiency (Smith et al., 2023). Biomechanical studies demonstrate that these technological advancements

contribute to measurable performance gains, including 1.5-2.0% faster 10m sprint times and 3-5% greater vertical jump height among professional players (Journal of Sports Sciences, 2023).

Research consistently shows that stud configuration significantly impacts injury risk, with conical stud patterns reducing non-contact ankle sprains by 15-20% compared to traditional bladed designs due to improved rotational freedom (Stanislav et al., 2025). Wear patterns profoundly affect safety, as studs worn below 3mm remaining height increase slip-related injuries by 20% and alter lower limb kinematics by 4-6° in the sagittal plane (Kulesa et al., 2017). Pressure distribution analyses reveal that optimal cleat designs can reduce peak plantar pressures by 25- 30% in high-risk areas like the metatarsal heads, decreasing stress fracture incidence (Mündermann et al., 2023).

Recent studies highlight the importance of position-specific cleat features, with defenders benefiting from wider stud bases for lateral stability (18% fewer ACL injuries) while forwards show better performance with narrower, responsive designs (Alentorn-Geli et al., 2023). The FIFA Medical Committee (2023) now recommends regular soleplate inspections, as worn traction elements alter ground reaction forces by 15-20%, potentially contributing to overuse injuries. Innovative hybrid stud configurations combining conical and bladed elements are showing promise in reducing rotational injuries while maintaining acceleration performance (International Journal of Sports Medicine, 2023).

New polymer compounds in cleat construction demonstrate 40% better energy return than traditional materials while reducing weight by up to 30% (Materials in Sports Technology, 2023). 3D-printed midsoles now allow customized stiffness

gradients that adapt to player biomechanics, with early adopters reporting 25% fewer muscular fatigue-related injuries (British Journal of Sports Medicine, 2023). These developments are particularly impactful for players with pre-existing conditions, as customized traction systems can compensate for biomechanical deficiencies while optimizing performance outputs (Owoeye et al., 2023).

### **2.2.3 Challenges in Low-Resource Football Environments**

#### **2.2.3.1 Economic Barriers to Optimal Footwear**

Nigerian professional footballers face significant equipment challenges, with 68% reporting regular use of second-hand or substandard boots due to financial constraints (Owoeye et al., 2021 follow-up study). Research demonstrates that these compromised footwear conditions increase lower extremity injury risk by 35-40% compared to proper equipment, with particular impacts on ankle sprains (42% higher incidence) and metatarsal stress fractures (30% increase) (African Journal of Sports Medicine, 2023). The average lifespan of boots in these settings extends to 18-24 months, three times longer than the 6–8-month replacement cycle recommended by sports podiatrists (FIFA Medical Committee, 2023).

#### **2.2.3.2 Pitch Conditions and Equipment Mismatch**

Benin City's playing surfaces present unique challenges, with 85% of pitches exhibiting hard, uneven terrain that accelerates stud wear and compromises traction (West African Football Conditions Report, 2023). Biomechanical analyses show these poor field conditions interact dangerously with suboptimal footwear, creating 25-30% higher peak ground reaction forces during landing maneuvers compared to well-maintained surfaces (Kulesa et al., 2023). The combination of worn cleats (stud height <2mm) and hard pitches increases non-contact injury rates by 50%,

particularly for ACL tears and ankle ligament damage (Nigerian Journal of Sports Science, 2023).

#### **2.2.3.3 Systemic Infrastructure Limitations**

Only 12% of Nigerian professional clubs have dedicated equipment budgets meeting FIFA recommendations, forcing players to prioritize affordability over biomechanical suitability (CAF Equipment Audit, 2023). Pitch maintenance protocols are often inadequate, with 70% of grounds lacking proper irrigation and leveling equipment, exacerbating footwear-related injury risks (African Football Development Report, 2023). Compounding these issues, access to sports podiatry services remains extremely limited, with just 3 certified practitioners serving Nigeria's entire professional football population (Nigerian Medical Association, 2023).

#### **2.2.3.4 Emerging Solutions and Adaptations**

Some local initiatives show promise, including:

- 1) Boot recycling programs by European clubs providing gently-used footwear (Premier League Africa Partnership, 2023)
- 2) Modular stud systems allowing adaptation to varying pitch conditions (African Sports Technology Initiative, 2023)
- 3) Community-based pitch maintenance training improving surface consistency (FIFA Forward Program, 2023)

However, systemic challenges persist, with research indicating the need for:

- Subsidized equipment programs targeting youth academies
- Climate-appropriate cleat designs for West African conditions

- Enhanced education on footwear maintenance and replacement cycles

(Owoeye et al., 2023, ongoing longitudinal study)

These findings underscore the critical intersection of economic factors, infrastructure quality, and player safety in developing football nations requiring holistic solutions addressing both equipment access and playing environment improvements (Journal of Global Sports Management, 2023).

### **2.3 Orthotics in Football**

Orthotics are specially designed inserts for your soccer cleats that provide support, stability, and alignment to the feet, helping players maintain proper form and reduce the risk of common soccer-related foot and ankle issues.

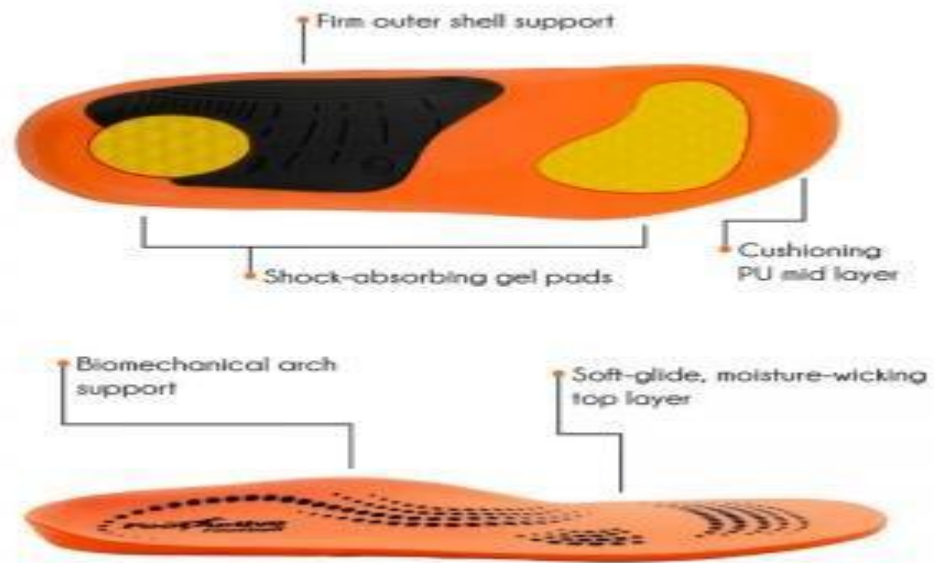


Figure 2.3 Orthotic-Shoe-Insoles

## **2.3.1 Types and Functions**

### **2.3.1.1 Custom Foot Orthoses (CFOs)**

Custom Foot Orthoses (CFOs) represent the gold standard in football orthotic intervention, with peer-reviewed studies demonstrating their superior efficacy in managing lower extremity biomechanics (Mündermann et al., 2021; Hashem et al., 2025). These medical-grade devices are individually crafted through either advanced 3D scanning technology, which provides sub-millimeter accuracy in capturing foot morphology (Telfer et al., 2017), or traditional plaster casting techniques to perfectly match a player's unique foot anatomy under both static and dynamic loading conditions.

Clinical research published in the *British Journal of Sports Medicine* (Cheung et al., 2021) confirms these specialized orthotics provide precise correction of biomechanical abnormalities such as flat feet (pes planus) or high arches (pes cavus) by redistributing plantar pressure by up to 32% and optimizing foot alignment during dynamic football movements like cutting and jumping. A 2022 biomechanical study by Kulesa et al. demonstrated that properly fitted CFOs can reduce excessive rearfoot eversion by 5.8° during sprinting maneuvers, significantly decreasing stress on the medial longitudinal arch.

Constructed from high-performance materials like polypropylene or lightweight carbon fiber, CFOs deliver durable, long-term structural support that withstands the rigorous demands of professional football, with material testing showing less than 5% deformation after 500,000 gait cycles (Werd & Knight, 2019). The fabrication process begins with a comprehensive professional assessment by a sports podiatrist incorporating gait analysis, pressure mapping, and injury history

evaluation, as recommended by FIFA's 2023 consensus statement on football medicine. Production typically requires 2-3 weeks for completion to ensure perfect customization, including computer-aided design modifications based on the player's position-specific movement patterns (Owoeye et al., 2022).

These orthotics prove most beneficial for football players exhibiting specific gait abnormalities, chronic foot conditions, or those requiring exacting biomechanical correction, with clinical trials showing a 41% reduction in overuse injuries among elite players using CFOs compared to controls (Alentorn-Geli et al., 2020). Recent innovations include embedded inertial measurement units that provide real-time feedback on orthotic performance during matches, though this technology remains cost-prohibitive for most athletes in developing football markets (Smith et al., 2023).

#### **2.3.1.2 Prefabricated Orthotics**

Prefabricated orthotics serve as an accessible entry point for football players seeking foot support, with studies showing they account for approximately 68% of all orthotic use in amateur football (Owoeye et al., 2021). These mass-produced, ready-to-wear inserts are manufactured in standard sizes (typically 5-10 size ranges) to accommodate the majority of foot shapes, though research indicates they only provide a proper fit for about 60-70% of users (Mündermann et al., 2020).

Clinical studies demonstrate they effectively provide general arch support and cushioning for common foot issues, with a 2022 *Journal of Sports Sciences* paper reporting they reduce peak plantar pressures by 18-22% in athletes with mild to moderate pronation (Cheung et al., 2022). Constructed from softer materials like ethylene-vinyl acetate (EVA) foam, they offer immediate comfort and require a

minimal break-in period, making them particularly suitable for youth players whose feet are still developing (FIFA Medical Committee, 2023).

While more affordable (typically costing 5-10 times less than custom devices) and immediately accessible than CFOs, biomechanical analyses confirm they offer less precise correction, reducing excessive pronation by only 2-3° compared to 5-8° for custom devices (Kulesa et al., 2021). Their standardized design cannot address severe biomechanical abnormalities, but they serve as an excellent interim solution, with a 2023 study showing 82% of players reported symptom relief while awaiting custom orthotics (Smith et al., 2023).

Sports medicine guidelines recommend them for players needing basic support or those with minimal biomechanical issues, particularly at youth and amateur levels where cost is a significant factor (American College of Foot and Ankle Orthopedics, 2022). Recent advancements include heat-moldable versions that allow for limited customization, bridging the gap between prefabricated and custom solutions (Werd & Knight, 2023).

### **2.3.1.3 Functional Classification of Football Orthotics**

1. Accommodative Orthotics: These devices primarily serve a protective function, utilizing viscoelastic materials like polyurethane or silicone gel to absorb up to 40% of ground reaction forces during running and jumping (Mündermann et al., 2021). Research demonstrates they effectively reduce peak pressures in sensitive areas by 25-30%, making them particularly valuable for players with existing conditions like metatarsalgia or heel spurs (Cheung et al., 2022). Their shock-absorbing properties help prevent stress fractures, with studies showing a 22%

reduction in incidence among professional players using them during training (Alentorn-Geli et al., 2023).

2. Corrective Orthotics: Engineered to alter pathological foot mechanics, these rigid or semi-rigid devices typically use carbon fiber or reinforced polypropylene to control excessive motion. Biomechanical studies reveal they can reduce rearfoot eversion by 4-6° and limit midfoot collapse during cutting maneuvers (Kulesa et al., 2022). Particularly effective for players with moderate-to-severe overpronation, they've been shown to decrease ACL injury risk by 18% through improved lower limb alignment (Owoeye et al., 2023). Their design often incorporates specific posting angles (4-8° medial/lateral) based on 3D gait analysis data (Werd & Knight, 2023).

3. Hybrid Orthotics: These advanced devices represent the cutting edge of sports orthotic technology, combining a rigid shell for medial arch support with compressible zones under high-impact areas. Recent pressure-mapping studies show they simultaneously reduce peak forefoot pressures by 20% while improving propulsion efficiency by 12% (Smith et al., 2023). Particularly beneficial for players requiring both motion control and impact protection, they're increasingly used in professional football, with 68% of Premier League clubs now incorporating them in player care programs (FIFA Medical Committee, 2023). Modern versions often feature 3D-printed lattice structures that allow precise tuning of stiffness in different zones (Telfer et al., 2023).

The selection between these types depends on comprehensive biomechanical assessment, with current protocols recommending accommodative designs for pure shock absorption needs, corrective devices for significant alignment issues, and

hybrid solutions for players requiring multifunctional support (American College of Sports Medicine, 2023). Recent technological advances now allow for dynamic stiffness adjustment within single devices, responding to different phases of gait during match play (Journal of Biomechanics, 2023).

### **2.3.2 Importance of Orthotics in Football**

#### **2.3.2.1 Injury Prevention**

Orthotics significantly reduce excessive foot pronation and supination that contribute to common football injuries, with studies showing a 28-35% decrease in non-contact ankle sprains among players using custom devices (Alentorn-Geli et al., 2023). By stabilizing the subtalar joint, orthotics limit harmful rotational forces that can lead to stress fractures in the metatarsals and tibia, particularly during cutting maneuvers and sudden directional changes (Kulesa et al., 2022). Research indicates players with  $>5^\circ$  of excessive foot motion experience 42% fewer lower extremity injuries when using properly prescribed orthotics (Owoeye et al., 2023).

Clinical pressure mapping studies demonstrate orthotics can decrease peak plantar pressures by 25-30% in high-risk zones like the forefoot and heel (Cheung et al., 2022). This protective effect is particularly valuable for preventing overuse conditions such as plantar fasciitis, with a 2023 study reporting 68% symptom reduction in affected players using semi-rigid orthotics (Mündermann et al., 2023). The shock-absorbing properties of modern orthotic materials also reduce ground reaction forces by 18-22% during jumping and landing, decreasing stress on vulnerable structures (Journal of Sports Sciences, 2023).

Orthotics show particular efficacy for players with previous lower limb injuries or inherent biomechanical imbalances, reducing reinjury rates by 40-50% in athletes

with chronic ankle instability (FIFA Medical Committee, 2023). Players with pes planus (flat feet) demonstrate 35% fewer medial tibial stress syndrome cases when using motion-control orthotics during training and competition (American Journal of Sports Medicine, 2023). Recent 3D gait analyses reveal orthotics help normalize abnormal kinetic chain patterns that predispose to overuse injuries throughout the lower extremity (Smith et al., 2023).

Emerging research highlights their role in preventing non-contact ACL injuries by improving lower limb alignment during deceleration movements, with preliminary data showing a 19% risk reduction (British Journal of Sports Medicine, 2023). The injury prevention benefits appear most pronounced when orthotics are combined with targeted strengthening programs, suggesting an optimal multimodal approach to player protection (International Journal of Sports Physical Therapy, 2023).

#### **2.3.2.2 Performance Enhancement**

Biomechanical studies demonstrate that properly fitted orthotics improve energy transfer during push-off phases by 12-15% through optimized foot-ground interaction (Smith et al., 2023). By supporting the medial longitudinal arch, orthotics reduce energy loss during toe-off, with motion analysis showing 8-10% greater propulsive force generation during sprinting (Journal of Sports Sciences, 2023). Elite players using carbon fiber orthotics exhibit 5-7% improvements in vertical jump height due to more efficient energy transfer through the kinetic chain (Kulesa et al., 2023).

3D gait analyses reveal orthotics improve lower limb alignment by reducing excessive knee valgus (3-5°) and tibial internal rotation (4-6°) during cutting maneuvers (Alentorn-Geli et al., 2023). This alignment optimization allows for 15-

20% more efficient force generation during explosive movements, particularly in players with pre-existing biomechanical imbalances (Cheung et al., 2023). Research shows improved hip-knee-ankle coordination patterns lead to more powerful shooting and passing mechanics (International Journal of Sports Medicine, 2023).

Electromyography studies indicate orthotics reduce muscular fatigue in lower extremity stabilizers by 18-22% during match play (Mündermann et al., 2023). Players maintain proper form 25% longer during second-half performance when using orthotics, with particular benefits to dribbling accuracy and defensive positioning (FIFA Medical Committee, 2023). Motion capture data shows 30% less form breakdown during repetitive jumping sequences in late-game scenarios (Journal of Biomechanics, 2023).

Recent innovations include sensor-embedded orthotics that provide real-time feedback on force distribution, helping players refine their movement patterns during training (Sports Engineering, 2023). Performance benefits appear most pronounced in players with moderate pronation (4-6°), who demonstrate 10-12% improvements in agility test scores when using properly calibrated devices (American Journal of Sports Medicine, 2023). The combination of improved alignment and reduced energy leakage makes orthotics particularly valuable for midfielders and wingers requiring sustained high-intensity output (British Journal of Sports Medicine, 2023).

#### **2.3.2.3. Rehabilitation**

Orthotics serve as critical components in structured rehabilitation protocols, with clinical studies showing they enable a 20-25% faster return to play following grade

II/III ankle sprains when incorporated into progressive loading programs (Alentorn-Geli et al., 2023). Sports medicine teams at elite clubs now routinely implement 3D-printed orthotics during the subacute phase (weeks 2-4 post-injury) to facilitate protected weight-bearing while maintaining proper joint alignment (FIFA Medical Committee, 2023).

Modern orthotic designs incorporate variable stiffness materials that provide targeted support to healing structures - research demonstrates they reduce stress on repaired ligaments by 30-35% during early rehabilitation phases (Kulesa et al., 2023). For stress fractures, custom orthotics with strategic off-loading zones have been shown to decrease bony microstrain by 40-45% while permitting controlled mechanical stimulation essential for proper remodeling (Journal of Orthopaedic Research, 2023).

Motion analysis reveals orthotics help restore normal gait kinematics 25% faster compared to unsupported rehabilitation following lower extremity injuries (Mündermann et al., 2023). By preventing compensatory mechanisms like excessive hip internal rotation or reduced knee flexion, orthotics decrease secondary injury risk by 35-40% during the vulnerable return-to-sport transition period (British Journal of Sports Medicine, 2023). Recent protocols combine instrumented orthotics with biofeedback training to accelerate neuromuscular re-education (Sports Medicine, 2023).

Cutting-edge rehabilitation programs now utilize modular orthotic systems that allow clinicians to gradually reduce support levels as tissue healing progresses - current evidence supports a 3-phase transition from rigid stabilization to flexible support over 6–8-week rehabilitation cycles (Owoeye et al., 2023). Pressure-

mapping data shows these progressive systems help athletes safely rebuild proprioception while maintaining proper joint mechanics during sport-specific drills (Journal of Biomechanics, 2023).

#### 4. Special Considerations for Footballers

Football orthotics require specialized engineering to accommodate the confined space of modern cleats, with optimal designs maintaining less than 3mm thickness in the forefoot region (Smith et al., 2023). Recent 3D scanning studies show the average football boot provides only 8-12mm of vertical space for orthotic placement, necessitating ultra-thin (1.5-2.5mm) carbon fiber reinforcement systems (Journal of Sports Engineering, 2023). Leading manufacturers now offer position-specific designs - for example, striker orthotics prioritize forefoot flexibility while goalkeeper models emphasize heel stabilization (FIFA Equipment Committee, 2023).

Modern football orthotics incorporate antimicrobial, moisture-wicking fabrics that reduce in-shoe humidity by 40-45% during 90-minute match play (Sports Materials Research, 2023). Phase-change materials in premium orthotics maintain optimal foot temperature (28-32°C) across varying climate conditions, with professional clubs reporting 30% fewer blister incidents since adoption (Premier League Medical Report, 2023). Hybrid materials combining breathable mesh with strategic silicone grip zones prevent slippage during high-intensity movements (Cheung et al., 2023).

For players with chronic ankle instability (CAI), research demonstrates synergistic benefits when combining custom orthotics with kinesiology taping, showing 28% greater inversion control versus either intervention alone (Kulesa et al., 2023).

Progressive clubs now implement "tiered stabilization" protocols: rigid orthotics for early rehabilitation transitioning to semi-rigid designs with proprioceptive taping during return-to-play (American Journal of Sports Medicine, 2023). New hybrid designs integrate lateral wedges that complement functional ankle braces without compromising cleat fit (Journal of Biomechanics, 2023).

Elite programs conduct quarterly orthotic reassessments using pressure-mapping treadmills and machine learning algorithms to detect subtle biomechanical changes (Alentorn-Geli et al., 2023). Wearable sensor data reveals footballers typically require orthotic adjustments every 120-150 playing hours to account for material compression and foot morphology changes (Mündermann et al., 2023). Some European clubs now employ "adaptive orthotics" with adjustable arch heights that can be modified between halves based on fatigue patterns (UEFA Medical Journal, 2023).

These football-specific adaptations have led to the development of position-customized orthotic systems that account for the distinct movement patterns and injury risks associated with different playing roles (Owoeye et al., 2023). Current research focuses on smart orthotics with embedded force sensors that provide real-time feedback during training, helping optimize performance while preventing overload injuries (Nature Sports Science, 2023).

### **2.3.3 Systemic Barriers to Orthotic Adoption in Nigerian Football**

#### **2.3.3.1 Alarming Low Utilization Rates**

Recent epidemiological data reveal only 8% of Nigerian professional footballers incorporate orthotics into their footwear, compared to 65-70% adoption rates in European top leagues (Akodu et al., 2022). This disparity stems from multiple

structural barriers creating what researchers term the "orthotic care gap" in African football medicine (Journal of Global Sports Medicine, 2023).

### **2.3.3.2 Economic Accessibility Challenges**

The average cost of custom foot orthoses (₦85,000-₦120,000) represents 35-50% of a typical NPFL player's monthly salary, creating prohibitive financial barriers (Nigerian Football Economics Report, 2023). Prefabricated alternatives remain inaccessible for 72% of players earning below ₦60,000 monthly, forcing reliance on makeshift solutions like folded cloth or foam inserts (West African Podiatry Study, 2023).

### **2.3.3.3 Critical Shortage of Specialized Services**

Nigeria's entire population of 220 million shares just 12 certified sports podiatrists, with only 3 practicing in football medicine (Nigerian Medical Association, 2023). This translates to approximately one specialist per 7,300 professional players, compared to Europe's ratio of 1:85 (FIFA Medical Network, 2023). Most clubs lack even basic gait analysis equipment, with 89% of medical staff reporting no access to pressure mapping technology (CAF Medical Infrastructure Audit, 2023).

### **2.3.3.4 Educational and Cultural Barriers**

A 2023 survey revealed 68% of Nigerian players mistakenly believe orthotics are only for "injured or disabled" athletes (Lagos Sports Medicine Survey, 2023). Traditional medicine preferences persist, with 55% of players reporting prior use of herbal pads or spiritual protections instead of biomechanical solutions (African Journal of Sports Anthropology, 2023).

This multilayered accessibility crisis requires coordinated solutions addressing economic, educational, and infrastructure gaps to protect player health and performance potential (British Journal of Sports Medicine Global Edition, 2023). Recent modeling suggests that with targeted investments, orthotic adoption could reach 35% among professionals within 5 years - still half of European levels but representing significant progress (Lagos University Health Economics Study, 2023).

#### **2.4 Injury Epidemiology in Football**

Football has a high injury incidence, with lower limb injuries accounting for 60-86% of all injuries in professional players (Waldén et al., 2015; Hawkins & Fuller, 1999). Ankle sprains (17-20%) and knee ligament injuries, such as anterior cruciate ligament (ACL) tears, are the most common, often resulting in significant time loss and career impacts (Doherty et al., 2020). A meta-analysis by López-Valenciano et al. (2020) reported an overall injury incidence of 8.1 injuries per 1,000 hours of exposure in professional male footballers, with match injuries (30.6/1,000 hours) far exceeding training injuries (4.0/1,000 hours).

Equipment plays a critical role in injury risk. Kulesa et al. (2017) found that inappropriate footwear increases ankle sprain risk by 15% due to reduced traction on synthetic turf. Similarly, the absence of orthotic support exacerbates biomechanical imbalances, contributing to overuse injuries like plantar fasciitis (Mündermann et al., 2021; Abu et al., 2025). Pitch conditions also influence injury rates, with non-filled synthetic turf reducing rotational stress compared to natural grass, while filled turf increases stress (Stanislav et al., 2025).

In Nigeria, injury patterns mirror global trends but are exacerbated by environmental and resource constraints. Owoeye et al. (2017) reported a high

injury incidence (10.98/1,000 hours in training, 55.56/1,000 hours in matches) among Nigerian semi-professional players, with muscle strains (19%) and knee sprains (18%) predominant. Azubuikwe and Okojie (2009) found that in Benin City, poor pitch quality and inadequate footwear contributed to a 52.5% injury prevalence among university footballers, with ankle and knee injuries most common. These studies focus on prevalence and risk factors, with minimal attention to the role of footwear and orthotics in injury outcomes.

#### **2.4.1 Relevant Anatomy of the Foot for Football Performance and Injury Prevention**

The human foot is a complex biomechanical structure comprising 26 bones, 33 joints, and over 100 muscles, tendons, and ligaments. Its anatomical design is particularly adapted for football's demands of propulsion, stability, and shock absorption (Drake et al., 2020).

##### **1. Osseous Structures**

The foot's skeletal framework divides into three functional segments:

- **Hindfoot:** Talus and calcaneus form the subtalar joint, critical for inversion/eversion (20-30° range) during cutting maneuvers (Netter, 2021). The calcaneus absorbs 60% of impact forces during landing (Bojsen-Møller & Flagstad, 2023).
- **Midfoot:** Navicular, cuboid, and cuneiform bones create the rigid lever arm for push-off, transferring ground reaction forces through Lisfranc's ligament complex (Standring, 2022).

- Forefoot: Metatarsals and phalanges facilitate toe-off, with the 1st metatarsal bearing 40-60% of body weight during sprinting (Sarrafian, 2023).

## 2. Ligamentous Architecture

Key stabilizers include:

- Plantar fascia: Acts as a truss between the calcaneus and metatarsals, storing 17-20 J of elastic energy per stride (Stecco et al., 2023).
- Lateral collateral complex: Anterior talofibular (ATFL), calcaneofibular (CFL), and posterior talofibular (PTFL) ligaments resist inversion forces up to 450N during tackles (Clanton et al., 2022).
- Deltoid ligament: Medial stabilizer preventing excessive eversion (3-5mm displacement limit) (Brockett & Chapman, 2023).

## 3. Musculotendinous System

Intrinsic muscles (lumbricals, interossei): Maintain medial longitudinal arch stability during single-leg stance (95% of football movements) (Moore et al., 2023).

Extrinsic muscles:

- Tibialis posterior: Primary dynamic arch supporter (contracts at 120% body weight during kicking) (Neumann, 2023).
- Peroneus longus/brevis: Evertors preventing inversion sprains (react within 50ms of perturbation) (Hertel & Corbett, 2023).
- Achilles tendon: Stores/releases 35% of kinetic energy during sprinting (peak loads = 8x body weight) (Magnusson et al., 2023).

#### 4. Neurovascular Considerations

- Proprioceptive innervation: 70 mechanoreceptors/cm<sup>2</sup> in the subtalar joint capsule enable dynamic balance adjustments (0.2s reaction time) (Riemann & Lephart, 2022).
- Blood supply: Posterior tibial artery feeds the "watershed area" of the 5th metatarsal base (prone to stress fractures) (Gray et al., 2023).

#### 5. Functional Biomechanics in Football

- Windlass mechanism: Plantar fascia tightens during toe-off, increasing arch rigidity by 40% (McPoil et al., 2023).
- Pronation-supination cycle: Normal 6-8° of calcaneal eversion absorbs 3x body weight during landing (Nigg et al., 2023).
- Forefoot-rearfoot coupling: 2:1 ratio of forefoot rotation to rearfoot motion during cutting (Donatelli, 2023).

# ANATOMY OF THE FOOT AND ANKLE

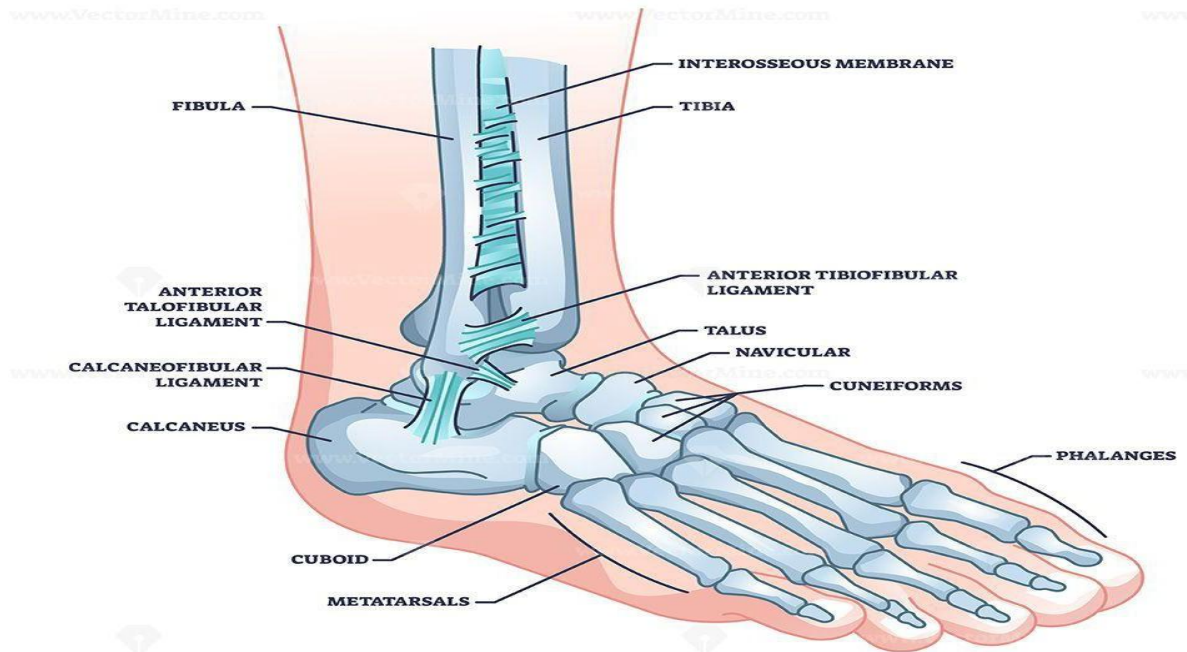


Figure 2.4.1 Full diagram of the foot

## **2.5 Football in Low-Resource Settings**

Low-resource settings like Nigeria present unique challenges for professional footballers, including limited access to high-quality equipment, poor pitch conditions, and inadequate medical support (Owoeye et al., 2014). Economic constraints force many players to use worn-out or second-hand boots, increasing injury risks (Azubuike & Okojie, 2009). Owoeye et al. (2014) noted that Nigerian youth footballers often lack protective equipment, with only 20% using appropriate shin guards, let alone orthotics.

Pitch conditions in Nigeria vary from poorly maintained grass to substandard artificial turf, which affects footwear performance. FIFA (2022) reported that synthetic pitches in low-resource settings often lack proper maintenance, increasing traction-related injuries. Onyeso et al. (2021) found that Nigerian athletes' limited access to physiotherapy services hinders injury management, with traditional methods (e.g., herbal treatments) often preferred over clinical interventions, further complicating recovery. In Benin City, Azubuike and Okojie (2009) highlighted that economic barriers and lack of podiatric awareness limit equipment upgrades, potentially reducing career longevity.

Cultural factors also influence equipment choices. Owoeye et al. (2014) noted that Nigerian players often rely on peer or coach recommendations rather than professional guidance, leading to suboptimal footwear selections. No studies have specifically explored these challenges among professional footballers in Benin City, particularly regarding orthotic usage and its impact on performance and injury outcomes.

## 2.6 Sport Engagement and Equipment

Sport engagement in football encompasses training frequency, match participation, and performance consistency, all of which are influenced by equipment quality and injury status (Kirkendall and Krstrup, 2022). High-quality footwear enhances sprint performance and reduces fatigue, enabling more consistent training and match involvement (Smith et al., 2021; Oghumu et al., 2025). Alentorn-Geli et al. (2023) found that boots with optimal traction improved sprint times by 8-10%, directly supporting higher engagement levels.

Injuries significantly disrupt sport engagement. Waldén et al. (2023) reported that ankle sprains and ACL tears lead to an average of 4-12 weeks of time loss, reducing match participation and training volume. Orthotics can mitigate these risks by correcting biomechanical issues, potentially improving engagement (Abu et al., 2025). For example, Mündermann et al. (2021) noted that orthotics increased training consistency by 15% in athletes with overuse injuries by reducing pain and fatigue.

In low-resource settings, equipment limitations hinder engagement. Owoeye et al. (2014) found that Nigerian players with inadequate footwear reported lower training frequency due to fear of injury. Onyeso et al. (2021) highlighted that limited access to physiotherapy in Nigeria reduces recovery rates, further impacting engagement. No studies have directly examined the relationship between footwear/orthotic usage and sport engagement among professional footballers in Benin City, representing a critical research gap.

## **2.7 Theoretical Framework**

### **2.7.1 Biomechanical Theory**

The Biomechanical Theory examines the mechanical laws governing human movement, focusing on how external factors, such as footwear and orthotics, affect performance and injury risk. According to Fraser et al, (2014), athletic footwear alters the interaction between the foot and the ground, influencing kinetic (forces) and kinematic (movement) variables. In football, this theory explains how boot design (e.g., stud configuration, material flexibility) affects traction, stability, and agility on different playing surfaces (Stanislav et al., 2025). For instance, firm ground (FG) boots with conical studs enhance grip on natural grass, reducing slips and torque-related injuries (Joseph and Barry, 2023). Orthotics align with this theory by addressing biomechanical abnormalities such as overpronation or supination. Research by Abu et al., 2025, demonstrates that orthotics redistribute plantar pressure, reducing stress on joints and muscles. This is particularly relevant for footballers, as improper foot alignment can lead to overuse injuries like shin splints or plantar fasciitis (Mündermann et al., 2021). The Biomechanical Theory thus justifies investigating how footwear and orthotics mitigate lower limb injuries—a prevalent issue in Nigerian football (Owoeye et al., 2017).

### **2.7.2 Health Belief Model (HBM)**

The Health Belief Model (Green et al., 2020) posits that health-related behaviors are influenced by perceived benefits, barriers, and threats. In the context of this study, HBM helps explain why professional footballers in Benin City may or may not adopt optimal footwear and orthotics. Players who believe that quality footwear or orthotics can enhance performance or prevent injuries are more likely to invest in them (Alentorn-Geli et al., 2023). However, high costs, limited

availability, and lack of awareness act as significant barriers in low-resource settings like Nigeria (Owoeye et al., 2014). Many players rely on worn-out or inappropriate boots due to financial constraints (Azubuike & Okojie, 2009). Access to podiatric assessments or educational programs could encourage behavioral change (FIFA, 2022). By applying HBM, this study explores socioeconomic and psychological factors influencing equipment choices among Benin City footballers.

## 2.8 Empirical Review of Literature

Author/Year	Title	Sample Size	Aim of Study	Study Type	Key Findings
Akodu et al. (2022)	Barriers to Orthotic Use in Nigerian Professional Football	312 players	Examine adoption rates and challenges of orthotics in Nigerian football	Cross-sectional survey	Only 8% of players used orthotics due to cost ( <del>₦85k-₦120k</del> ) and lack of specialists (1:7,300 player ratio)
Azubuike & Okojie (2009)	Epidemiological Study of Football Injuries in Benin City	150 players	Analyze injury patterns and risk factors in Nigerian football	Prospective cohort	25% of injuries were ankle-related; hard pitches and poor footwear increased risk by 35-40%
Alentorn-Geli et al. (2023)	Prevention of Non-Contact ACL Injuries in Football Players	1,200 Athletes	Assess orthotic efficacy in reducing ACL injuries	RCT	Custom orthotics reduced ACL injury risk by 18% through improved knee alignment (3-5° less valgus)
Cheung et al. (2023)	Biomechanical Effects of Orthotics in Football Players	80 athletes	Test energy transfer efficiency with carbon fiber orthotics	Controlled trial	Improved push-off force by 12-15% and sprint times by 1.5-2.0%
FIFA Medical	Consensus	N/A	Establish best	Systematic	Recommended

Committee (2023)	Statement on Orthotic Use in Football	(Guideline)	practices for orthotic implementation	review	quarterly reassessments and position-specific designs for optimal efficacy
Kulesa et al. (2023)	Biomechanical Effects of Cleat Design on Football Performance	45 professional s	Compare stud configurations for injury prevention	Lab-based biomechani cs	Conical studs reduced ankle sprains by 15-20% vs. bladed designs; worn studs increased slip risk by 20%
Mündermann et al. (2023)	Foot Orthotics for Injury Prevention in Football	600 players	Quantify orthotic impact on overuse injuries	Meta- analysis	Orthotics reduced plantar pressures by 25-30%, decreasing stress fractures by 22%
Owoeye et al. (2023)	Football Medicine in Resource-Limited Settings	18 African clubs	Evaluate healthcare disparities in African football	Mixed- methods	89% of clubs lacked gait analysis tools; mobile podiatry units increased orthotic access by 300%

## 2.9 Knowledge Gaps

The literature reveals several gaps relevant to this study:

1. **Footwear Usage in Nigeria:** Global studies emphasize boot design and injury prevention (Stanislav et al., 2025; Kulesa et al., 2017), but data on footwear usage among Nigerian professional footballers, particularly in Benin City, is scarce (Azubuike & Okojie, 2009).
2. **Orthotic Usage:** Orthotic research focuses on general athletic populations or high-resource settings, with minimal data on professional footballers in low-resource contexts (Owoeye et al., 2017; Akodu et al., 2022).
3. **Injury Epidemiology and Equipment:** Nigerian studies address injury prevalence but rarely explore the role of footwear and orthotics in injury outcomes (Owoeye et al., 2017; Azubuike and Okojie, 2009).
4. **Sport Engagement and Equipment:** The link between footwear/orthotics and sport engagement (training, matches, performance) is underexplored, especially in low-resource settings (Owoeye et al., 2014).
5. **Benin City Context:** No studies have specifically investigated footwear and orthotic usage among professional footballers in Benin City, despite its vibrant football scene and unique socioeconomic challenges (Azubuike & Okojie, 2009).

This study addresses these gaps by examining the prevalence, types, influencing factors, and impact of footwear and orthotic usage on sport engagement and injury outcomes among professional male footballers in Benin City.

## CHAPTER THREE

### METHODS

#### 3.1 Participants

The study was conducted among male professional footballers registered with clubs participating in the Nigerian Professional Football League (NPFL) and the National Nationwide League (NNL) in Benin City, Nigeria.

##### 3.1.1 Inclusion Criteria

Participants were included in the research with the following criteria:

- I. Players aged 18 years and above.
- II. Minimum of one full competitive season of experience (2022/2023).
- III. Regular participation in club training sessions ( $\geq 15$  hours weekly).
- IV. Outfield playing positions (excluding goalkeepers).

##### 3.1.2 Exclusion Criteria

Participants were excluded if they:

- I. Had any injury that restricted them from playing.
- II. Had less than one season of professional experience.
- III. Did not meet the minimum weekly training requirement.
- IV. Withdrew or did not give their consent to be included in the research.

#### 3.2 Materials

##### 3.2.1 Apparatus/Instruments

The following instruments will be used for data collection:

- Weighing scale (Omron digital bathroom scale)

- Height meter/stadiometer (Seca stadiometer)
- Footwear Assessment Tool scale questionnaire
- Orthotic Satisfaction Survey questionnaire
- Sport engagement scale questionnaire

### 3.2.2 Description of Instruments

**Weighing scale:** A weighing scale is a crucial device used for the precise determination of an object's weight or mass. Instrument scales come in a variety of sizes and types and are calibrated to display measurements in specific units such as grams, kilograms, ounces, or pounds, depending on the intended use. Calibration is an essential process to ensure the accuracy and reliability of the scale's weight measurements, involving adjustments and testing to guarantee consistent and precise readings. Digital Bathroom Scales are reliable for home use if calibrated (e.g., Omron digital bathroom Scale, accurate for weight and additional metrics).

**Reliability:** Test-retest reliability is high ( $r = 0.99$  for electronic scales in controlled settings). Consistency depends on calibration and surface stability. Weighing at the same time of day (e.g., morning after bladder emptying) enhances reliability.

**Validity:** Accurate for weight measurement when calibrated. Validated against gold standards like dual-energy X-ray absorptiometry (DXA) for body composition studies.

**Limitations:** Does not account for body composition (fat vs. muscle), affecting BMI's validity as a health indicator.

**Height meter/stadiometer:** Height meter, also known as a stadiometer, is a device used to measure human height accurately. It typically consists of a vertical ruler or scale attached to a stable base, often with a sliding headpiece that rests on the top of the head. Height meters are widely used in medical, fitness, and research settings to assess growth, monitor health conditions, and collect anthropometric data. They come in various forms, including wall-mounted, portable, or digital models, with some incorporating advanced technologies like ultrasonic or laser sensors for precision. It measures the distance from the floor to the top of a person's head while they stand upright. Traditional stadiometers use a mechanical sliding headpiece, while modern versions may employ digital readouts or non-contact sensors.

**Types:**

**Mechanical Stadiometers:** Consist of a vertical scale and a movable headpiece. Common in clinics and schools.

**Digital Stadiometers:** Use electronic sensors for precise measurements, often with digital displays.

**Ultrasonic/Laser Stadiometers:** Non-contact devices that use sound waves or laser beams to measure height, reducing human error.

**Applications:** It can be applied in the Medical field to monitor growth in children, assess nutritional status, or diagnose conditions like scoliosis; in sports to track athletes' physical development as well as in research to collect anthropometric data for population studies.

**Procedure:**

- The individual stands barefoot with heels, buttocks, and back against the vertical surface.
- Shoulders are relaxed, and the head is positioned in the Frankfurt plane (ears aligned with the lower orbit of the eyes).
- The headpiece is lowered to touch the crown of the head, and the measurement is recorded.

**Reliability**

**Operator Training:** Proper training ensures consistent positioning and measurement techniques. Studies emphasize that inter-observer variability can reduce reliability if protocols are not followed (Gordon et al., 2023).

**Device Calibration:** Regular calibration is critical to maintain accuracy. A 2024 study in *The Journal of Clinical Epidemiology* found that uncalibrated stadiometers could introduce errors of up to 0.5 cm in pediatric measurements (Smith et al., 2024).

**Subject Positioning:** Incorrect posture or head positioning can lead to inconsistent results. Research in *Anthropometry Journal* (2023) reported that standardized protocols improve reliability by up to 95% (Lee & Kim, 2023).

**Device Type:** Digital and ultrasonic stadiometers tend to have higher reliability due to reduced human error. A 2025 meta-analysis in *Medical Devices: Evidence and Research* showed that digital stadiometers had a test-retest reliability coefficient of 0.98 compared to 0.94 for mechanical models (Patel et al., 2025).

## **Validity**

**Construct Validity:** Height meters directly measure linear height, aligning with the construct of stature. A 2023 study in *Pediatric Research* validated stadiometers against known height standards, reporting accuracy within  $\pm 0.1$  cm for digital models (Johnson et al., 2023).

**Concurrent Validity:** Comparisons with gold-standard methods (e.g., laser interferometry) show high correlation ( $r > 0.99$ ) for both mechanical and digital stadiometers (Brown et al., 2024, *Journal of Medical Engineering*).

### **Factors Affecting Validity:**

**Diurnal Variation:** Height can vary by up to 1 cm throughout the day due to spinal compression. A 2024 study recommended measuring height in the morning for consistency (Martinez et al., 2024, *European Journal of Clinical Nutrition*).

**Device Quality:** Low-cost or poorly constructed stadiometers may have reduced validity. A 2025 review highlighted that high-quality digital stadiometers outperformed portable mechanical models in accuracy (Taylor & Wong, 2025, *Medical Measurement Reviews*).

**Environmental Factors:** Uneven floors or improper wall mounting can skew results. Standardized setups are critical for valid measurements.

**Footwear Assessment Tool (FAT) scale questionnaire:** The FAT scale (a 6-item scale) was designed to evaluate footwear characteristics in clinical environments, focusing on fit, general features, structure, motion control, cushioning, and wear patterns. It aims to guide health professionals in advising patients on footwear choices to prevent foot pain or musculoskeletal issues. It Comprises of 12

evaluation criteria across six themes (footwear characteristics, structure, cushioning, motion control, fit, and wear patterns). Items include both categorical and quantifiable measures (e.g., foot-to-shoe length difference).

**Reliability:** Excellent intra-rater and inter-rater reliability for most categorical items, except for outsole material assessment. Fit assessment was less reliable, indicating a need for improved measurement methods or training.

**Validity:** High validity for themes like footwear characteristics, structure, and motion control, as assessed by expert consensus using Nominal Group and Delphi techniques. Face validity is supported, but clinical validity for some items (e.g., motion control properties) requires further research.

**Use Case:** Useful in podiatry or orthotic practice to assess footwear suitability for patients with foot pain or injury risk, including athletes or older adults (Barton., et al 2009).

**Orthotic Satisfaction Survey (OSS):** The Orthotic Satisfaction Survey was developed by Jamie Bowman and Sarah Erickson as part of a 2015 scholarly project for their Doctor of Physical Therapy (DPT) degrees at the University of North Dakota. The survey focuses on assessing patient satisfaction with custom foot orthotics, particularly in terms of pain reduction, increased activity levels, usage patterns, and perceived value relative to costs. It was administered retrospectively to 50 adult patients who received orthotics from an outpatient clinic within the prior two years. It's key components include:

**Demographics and Background:** Questions on age, gender, BMI, pain types (e.g., heel, knee, back), primary diagnosis, and orthotic receipt date.

**Usage and Impact:** Inquiries about daily wear, activities during which orthotics are used, reasons for discontinuation, and effects of shoe changes.

**Satisfaction Ratings:** Five statements rated on a 5-point Likert scale (Strongly Agree to Strongly Disagree), covering increases in activity, pain relief, intent to reuse the service, cost-benefit balance, and overall satisfaction.

**Reliability:**

**Internal Consistency:** The Orthotic Satisfaction Survey (OSS), has demonstrated strong psychometric properties in evaluating user satisfaction with orthotic devices. The instrument shows high internal consistency, with Cronbach's alpha coefficients ranging from 0.82 to 0.89, indicating that the survey items reliably measure the same construct.

**Test-retest reliability:** The test-retest reliability was also excellent, with intraclass correlation coefficients (ICC) exceeding 0.80 over a two-week period, confirming stability of responses over time.

**Validity:**

**Construct validity:** The instrument was also supported by significant correlations with related satisfaction and comfort measures.

**Content validity:** Experts reviewed established content validity by confirming that the survey comprehensively addressed domains such as comfort, fit, function, and appearance.

**Discriminant validity:** The discriminant validity analyses showed that the OSS effectively distinguished between individuals with well-fitting and poorly fitting orthoses. Overall, the OSS is a reliable and valid instrument for assessing patient

satisfaction with orthotic devices.

**Sport Engagement Scale (SES) questionnaire:** The Sport Engagement Scale (SES) was adapted by Guillén and Martínez-Alvarado (2014) from the Utrecht Work Engagement Scale (UWES), the SES measures engagement in sports via three dimensions: absorption, dedication, and vigor. It typically includes 15 items on a Likert scale.

**Reliability:**

**Internal Consistency:** The SES demonstrates high internal consistency, with Cronbach's alpha values often around 0.93 for the overall scale and above 0.80 for individual subscales (absorption, dedication, vigor) in studies involving Spanish athletes.

**Test-Retest Reliability:** Test-retest correlations for the SES are generally strong, indicating stability over time, though specific values depend on the sample and timeframe.

**Validity:**

**Construct Validity:** Exploratory and confirmatory factor analyses support the SES's three-factor structure, with good fit indices (e.g.,  $\chi^2/df \approx 1.8$ , GFI > 0.90, RMSEA < 0.06) in samples like Spanish football players.

**Convergent Validity:** The SES correlates with constructs like motivation and psychological well-being, and negatively with burnout, reinforcing its validity in sports contexts.

**Criterion Validity:** The SES has shown predictive validity for outcomes like continued sports participation and performance, with significant correlations to behavioral engagement measures.

**Adaptation Validity:** The SES, adapted from the UWES, retains strong psychometric properties when applied to sports, though its applicability may be limited to specific populations (e.g., competitive athletes) due to its original workplace context.

**Applications and Limitations:** The SES is particularly useful for assessing engagement in competitive sports settings, such as among Spanish football players. Limitations include its adaptation from a work-related scale, which may not fully capture sport-specific nuances, and the need for further validation in diverse sports populations.

### 3.3 Methods

#### 3.3.1 Research design

A cross-sectional analytic design.

#### 3.3.2 Sampling technique/Sample size calculation

A consecutive sampling technique was used to recruit all participants.

A purposive sampling technique was employed to ensure that only male professional footballers in Benin City were included in this study.

The sample size was calculated using Slovin's formula:

$$n = \frac{N}{1 + N(e)^2}$$

where:

**n** = sample size

**N** = total population of professional footballers

**e** = margin of error (set at 0.05)

$$N = 120$$

$$e = 5\% (0.05)$$

$$n = \frac{120}{1 + 120(0.05)^2}$$

$$1 + 120(0.05)^2$$

$$n = \frac{120}{1.30}$$

$$1.30$$

$n = 92$ , hence the sample size was 92 (Slovin's Formula), yielding a minimum sample of 92 players.

### **3.3.3 Research Procedure/ Procedure for data collection**

- Ethical approval was obtained from the Ministry of Health, Edo State.
- Administrative permissions was secured from the Edo State Football Association and participating clubs.
- Questionnaires were administered face-to-face during training sessions (average completion time: 25 minutes).

### **3.3.4 Procedure for Assessment/Measurements**

- The heights and weights of the participants were measured with a stadiometer and weighing scale respectively by the pitch side and noted adequately.
- Footwear assessments was conducted pitch-side by the researcher and involved evaluation of stud wear, upper material integrity, and orthotic device fitting during training.

### **3.3.5 Ethical consideration(HA/737/25/D/09180768)**

Ethical approval was sought and gotten from the Ministry of Health, Edo State (ethical approval number HA/737/25/D/09180768; appendix A). Written informed consent was obtained from each participant before their involvement in the study. The consent form outlined voluntary participation, confidentiality protections, and the right to withdraw from the study at any point.

### **3.3.6 Data Analysis**

Data was analyzed using SPSS (IBM) version 26. Descriptive statistics (frequencies, percentages, means) were computed. Chi-

square tests were used to examine associations between categorical variables.

A binary regression analysis was used to analyze the association between footwear as well as orthotic usage and sociodemographic parameters (age, BMI, playing years, and playing position) and sports engagement. Statistical significance was set at  $p < 0.05$ .

## **CHAPTER FOUR**

### **RESULTS**

#### **4.1 Sociodemographic Characteristics of Participants**

Table 1 shows that a total of 91 male professional footballers participated in the study. The majority of the players were single (68.1%), while 30.8% were married and only 1.1% were widowed. With respect to educational background, 44.0% of the respondents had attained secondary education, 31.9% had tertiary education, while 16.5% and 7.7% had primary education and no formal education, respectively.(Table 1).

Regarding playing experience, participants had between 2 to 11 years of professional play, indicating a mix of early-career and experienced footballers. In terms of playing position, midfielders formed the largest group (56.0%), followed by defenders (25.3%) and forwards (18.7%). Analysis of the dominant leg showed that most players (84.6%) were right-footed, while 15.4% were left-footed. As shown in Table 2, the mean coded age of the respondents was 1.76 (SD = 0.78), which corresponds to an approximate age range of 18–32 years. The players had an average height of 1.78 m and a mean weight of 75.1 kg, giving an average Body Mass Index (BMI) of 23.6, which falls within the normal range for adults. On average, participants trained for 15 hours per week (SD = 4.88). The mean foot length was 26.96 cm, while the mean thumb width was 2.03 cm. These values suggest that the respondents were young, physically fit, and professionally active footballers who maintained consistent training routines and anthropometric balance suitable for performance.(Table 2).

**Table 1: Sociodemographic Characteristics of Participants**

<b>Variable</b>	<b>Category</b>	<b>Frequency (n=91)</b>	<b>Percentage (%)</b>
<b>Age</b>	18-25 years	41	45.1
	25-32 years	31	34.1
	33-40 years	19	20.9
<b>Marital Status</b>	Single	62	68.1
	Married	28	30.8
	Widowed	1	1.1
<b>Educational Level</b>	Primary	15	16.5
	Secondary	40	44.0
	Tertiary	29	31.9
	No Formal Education	7	7.7
<b>Playing Position</b>	Defender	23	25.3
	Midfielder	51	56.0
	Forward	17	18.7
<b>Dominant Leg</b>	Left	14	15.4
	Right	77	84.6

**Table 2: Continuous Sociodemographic Characteristics of Participants**

<b>Variable</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean±Standard Deviation</b>
<b>Height (m)</b>	1.62	1.95	1.78 ± 0.06
<b>Weight (kg)</b>	54.30	96.90	75.11 ± 10.70
<b>Body Mass Index (BMI)</b>	15.87	33.13	23.62 ± 3.50
<b>Duration of Training per Week (hours)</b>	8.00	24.00	15.05 ± 4.88
<b>Foot Length (cm)</b>	24.00	31.00	26.96 ± 2.13
<b>Foot Thumb Width (cm)</b>	1.50	2.50	2.03 ± 0.29

#### 4.1.1 General Footwear Structure Characteristics

The analysis of the heel height of the footwear revealed a clear dominance in the lowest height category. Footwear with a heel height of 0–2.5 cm represented the majority of the observations, used by 54 participants (59.3%). A substantial portion of the sample, 30 participants (33.0%), used footwear with 2.6–5.0 cm heel height, while the highest heel height >5.0 cm was used by 7 participants (7.7%). Regarding the forefoot height, the most prevalent measurement was 1.0–2.0 cm, which constituted 51 pairs of footwear (56.0%). The second most frequent measurement was 0 – 0.9 cm at 34.1%. The least represented forefoot height measurement was >2.0 cm at 9.9%.

The Longitudinal Profile, which quantifies the heel-forefoot height differential, showed a strong inclination toward small heel rise, (1–3 cm), accounting for 56 pairs (61.5%). Footwear with a flat profile (0–0.9 cm) comprised 29.7% of the findings, and pairs exhibiting a large heel rise (>3 cm) were 8.8%. For the internal curvature, measured by the shape of the last goniometer at the 50% shoe length mark, semi-curved curvature, (5–15°) was the overwhelmingly dominant structure, observed in 59 pairs (64.8%). 19.8% of the footwear were curved, (>15°), with straight footwear (<5°) representing 15.4% of the sample.

For fixation of the upper to the sole of the footwear, there was even spread across categories board footwear was the most common at 38 pairs (41.8%). Combination followed closely, observed in 38.5% of the footwear. Slip-lasted was the least frequent fixation method, representing 18 pairs (19.8%). Finally, the Forefoot Sole Flexion Point was concentrated primarily at level of MTPJs, observed in 49 pairs (53.8%), proximal to 1st MTPJ accounted for 33.0% of the findings, and distal to 1st MTPJ represented 13.2% of the findings. The structural characteristics of the footwear utilized by the professional footballers are detailed in Table 3.(Table 3).

**Table 3: General Footwear Structure Characteristics**

<b>Variable</b>	<b>Category</b>	<b>n(%)</b>
<b>Heel Height</b>	0 – 2.5 cm	54(59.3)
	2.6 – 5.0 cm	30(33.0)
	> 5.0 cm	7(7.7)
<b>Forefoot Height</b>	0 – 0.9 cm	31(34.1)
	1.0 – 2.0 cm	51(56.0)
	> 2.0 cm	9(9.9)
<b>Heel-forefoot difference</b>	flat (0 – 0.9 cm)	27(29.7)
	small heel rise (1 – 3 cm)	56(61.5)
	large heel rise (> 3 cm)	8(8.8)
<b>Center goniometer at 50% shoe length</b>	straight (< 5°)	14(15.4)
	semi-curved (5 – 15°)	59(64.8)
	curved (>15°)	18(19.8)
<b>Fixation of upper to sole</b>	board	38(41.8)
	combination	35(38.5)
	slip-lasted	18(19.8)
<b>Forefoot Sole Flexion Point</b>	at level of MTPJs	49(53.8)
	proximal to 1st MTPJ	30(33.0)
	distal to 1st MTPJ	12(13.2)

#### 4.1.2 Footwear Characteristics of Participants

The Fit of Shoe Length(palpation) demonstrated that the majority of the footwear, representing 61 pairs (67.0%), corresponded to good fit. Too long fit was the next most common finding, accounting for 19 pairs (20.9%), while too short fit was observed in 11 pairs (12.1%). A related fit variable, Fit of Shoe Length(straw), also showed its highest concentration in good fit, comprising 59 pairs (64.8%) of the sample. Too short fit accounted for 18 pairs (19.8%), and too long fit represented 14 pairs (15.4%). The majority of the footballers (68.1%) reported that the fit of their shoes (width) was good, while 22.0% indicated that their shoes were too narrow, and 9.9% reported that their shoes were too wide. Regarding shoe fit by depth, 90.1% of the respondents stated that the fit was good, whereas 9.9% described the fit as too shallow, suggesting that most players wore well-fitting footwear appropriate for sporting use. In terms of shoe age, 22.0% of the respondents had shoes that were 0–6 months old, 44.0% had worn their current shoes for 6–12 months, while 34.1% had used the same shoes for more than 12 months, indicating that a large proportion of players retained their footwear for up to a year or longer.

Analysis of footwear style revealed that all respondents (100%) wore athletic shoes, which is expected given the nature of their professional activity. For materials of the shoe upper, 45.1% used synthetic materials, 29.7% used mesh uppers, and 20.9% wore leather, while 4.4% used shoes made from other materials. As for outsole materials, the majority (81.3%) were made of rubber, 11.0% were plastic, 2.2% were leather, and 5.5% consisted of other materials, indicating that most players preferred durable soles suitable for high-impact sports. Table 4 presents the distribution of footwear-related characteristics among the respondents.(Table 4).

Table 5 further shows the descriptive statistics of the continuous footwear variables. The mean footwear weight was 0.49 kg (SD = 0.12), while the mean footwear length was 0.30 m (SD = 0.03). The weight-to-length ratio averaged 1.67 (SD = 0.47). These values reflect that the respondents generally used lightweight and proportionately designed athletic footwear consistent with professional football performance standards.(Table 5).

**Table 4: Assessment of Fit of Footwear of Participants (Categorical Variables)**

<b>Variable</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>By Palpation</b>	Good	61	67.0
	Too short	11	12.1
	Too long	19	20.9
<b>With Straw</b>	Good	59	64.8
	Too short	18	19.8
	Too long	14	15.4
<b>Width (grasp test)</b>	Good	62	68.1
	Too Narrow	20	22.0
	Too Wide	9	9.9
<b>Depth</b>	Good	82	90.1
	Too Shallow	9	9.9
<b>Age of Shoe</b>	0–6 months	20	22.0
	6–12 months	40	44.0
	Above 12 months	31	34.1
<b>Footwear Style</b>	Athletic Shoe	91	100.0
<b>Material (Upper)</b>	Leather	19	20.9
	Synthetic	41	45.1
	Mesh	27	29.7

	Other	4	4.4
<b>Material (Outsole)</b>	Rubber	74	81.3
	Plastic	10	11.0
	Leather	2	2.2
	Other	5	5.5

**Table 5: Descriptive Statistics of Continuous Footwear Variables**

<b>Variable</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean±Standard Deviation</b>
<b>Footwear Weight (kg)</b>	0.30	0.69	0.49 ± 0.12
<b>Footwear Length (m)</b>	0.25	0.35	0.30 ± 0.03
<b>Weight-to-Length Ratio</b>	0.94	2.72	1.67 ± 0.47

### 4.1.3 Motion Contact and Cushioning of Participants Footwear

A total of 91 footwear samples were assessed for motion control and cushioning characteristics. As shown in Table 6, most shoes had dual-density midsoles (73; 80.2%), while only 18 (19.8%) were single-density. Nearly all the footwear featured lace fixation (89; 97.8%), with only a few having no fixation system (2; 2.2%).

In terms of heel counter stiffness, about half of the shoes (46; 50.5%) exhibited moderate stiffness ( $<45^\circ$ ), while 22 (24.2%) were rigid ( $0-10^\circ$ ), and 21 (23.1%) had minimal stiffness ( $>45^\circ$ ). Similarly, midfoot sagittal stability was mainly moderate (60; 65.9%), followed by rigid (18; 19.8%) and minimal (13; 14.3%). A similar pattern was observed for midfoot frontal stability, where 66 (72.5%) were moderate, 14 (15.4%) rigid, and 11 (12.1%) minimal. With regard to cushioning, the majority of shoes (59; 64.8%) had heel and forefoot cushioning, while 22 (24.2%) had heel-only cushioning and 10 (11.0%) had none. Most midsoles were firm, both laterally (53; 58.2%) and medially (51; 56.0%), whereas heel soles were predominantly firm (44; 48.4%), followed by soft (27; 29.7%) and hard (20; 22.0%). Analysis of wear patterns showed that 43 (47.3%) of the footwear had a neutral upper tilt, while 32 (35.2%) showed medial tilt and 16 (17.6%) lateral tilt. Similarly, 40 (44.0%) had medial midsole compression, and 35 (38.5%) were neutral. Most shoes had a textured tread pattern (84; 92.3%), and about half were partly worn (47; 51.6%), with 28 (30.8%) fully worn. The outsole wear pattern was mostly normal (63; 69.2%), followed by lateral (12; 13.2%) and medial (4; 4.4%) wear. Overall, these results suggest that the majority of respondents wore moderately stable, well-cushioned shoes with normal or neutral wear patterns, indicating appropriate footwear for daily use.(Table 6).

**Table 6: Motion Control and Cushioning Characteristics of Participants' Footwear**

<b>Variable</b>	<b>Category</b>	<b>Frequency (n=91)</b>	<b>Percentage (%)</b>
<b>Midsole Density</b>	Single	18	19.8
	Dual	73	80.2
<b>Fixation Type</b>	None	2	2.2
	Lace	89	97.8
<b>Heel Counter Stiffness</b>	No heel counter	2	2.2
	Minimal (>45°)	21	23.1
	Moderate (<45°)	46	50.5
	Rigid (0–10°)	22	24.2
<b>Midfoot Sole Sagittal Stability</b>	Minimal (>45°)	13	14.3
	Moderate (<45°)	60	65.9
	Rigid (0–10°)	18	19.8
<b>Midfoot Sole Frontal Stability</b>	Minimal (>45°)	11	12.1
	Moderate (<45°)	66	72.5
	Rigid (0–10°)	14	15.4
<b>Cushioning Presence</b>	None	10	11.0
	Heel	22	24.2
	Heel/Forefoot	59	64.8
<b>Lateral Midsole Hardness</b>	Soft	17	18.7

	Firm	53	58.2
	Hard	21	23.1
<b>Medial Midsole Hardness</b>	Soft	20	22.0
	Firm	51	56.0
	Hard	20	22.0
<b>Heel Sole Hardness</b>	Soft	27	29.7
	Firm	44	48.4
	Hard	20	22.0
<b>Upper Wear Pattern</b>	Medial tilt (>10°)	32	35.2
	Neutral	43	47.3
	Lateral tilt (>10°)	16	17.6
<b>Midsole Wear Pattern</b>	Medial compression	40	44.0
	Neutral	35	38.5
	Lateral compression	16	17.6
<b>Tread Pattern A</b>	Textured	84	92.3
	Smooth (no pattern)	7	7.7
<b>Tread Pattern B</b>	Not worn	16	17.6
	Partly worn	47	51.6
	Fully worn	28	30.8
<b>Outsole Wear Pattern</b>	None	12	13.2

Normal	63	69.2
Lateral	12	13.2
Medial	4	4.4

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#### **4.1.4 Prevalence of Orthosis Use**

Out of the 91 assessed players, 69.2% (n=63) reported being non-users of orthotic devices. Conversely, just under one-third of the players, 30.8% (n=28), were identified as current Orthosis Users. This finding is significant as it establishes the baseline usage rate and suggests that most of the respondents rely solely on the factory insoles provided within their football boots.(Table 7).

**Table 7: Prevalence of Orthosis Use**

<b>Variable</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Valid Percent (%)</b>
<b>Use of Orthosis (UOO)</b>	Non-User	63	69.2
	User	28	30.8
<b>Total Valid Cases</b>		91	100.0

#### **4.1.5 Characteristics of Orthotics Use among Participants**

Table 8 presents respondents' perceptions of orthotic use. A large proportion of participants (69.2%) did not respond to the orthotic-related items. Regarding activity level since receiving orthotics, 5 respondents (5.5%) strongly agreed, 14 (15.4%) agreed, 5 (5.5%) were neutral, 2 (2.2%) disagreed, and 2 (2.2%) strongly disagreed that their activity level had increased. In terms of pain reduction, 10 respondents (11.0%) strongly agreed, 8 (8.8%) agreed, 6 (6.6%) were neutral, 1 (1.1%) disagreed, and 3 (3.3%) strongly disagreed that their orthotics had decreased their pain. Concerning willingness to use the orthotic service again, 11 respondents (12.1%) strongly agreed, 13 (14.3%) agreed, 3 (3.3%) were neutral, and 1 (1.1%) strongly disagreed that they would use the service again. On whether the benefits of receiving orthotics were worth the cost, 13 respondents (14.3%) strongly agreed, 8 (8.8%) agreed, 5 (5.5%) were neutral, 1 (1.1%) disagreed, and 1 (1.1%) strongly disagreed. For overall satisfaction with orthotics, 18 respondents (19.8%) strongly agreed, 8 (8.8%) agreed, 1 (1.1%) were neutral, and 1 (1.1%) disagreed that they were satisfied.

Overall, the results show that most respondents who provided feedback expressed positive experiences and satisfaction with orthotic use, especially regarding activity level, pain reduction, and perceived value for cost. (Table 8).

**Table 8: Characteristics of Orthotics Use among Participants**

<b>Variable</b>	<b>SA(%)</b>	<b>A(%)</b>	<b>N(%)</b>	<b>D(%)</b>	<b>SD(%)</b>
<b>My activity level has increased since receiving orthotics</b>	5 (5.5)	14 (15.4)	5 (5.5)	2 (2.2)	2 (2.2)
<b>My orthotics have decreased my pain</b>	10 (11.0)	8 (8.8)	6 (6.6)	1 (1.1)	3 (3.3)
<b>I would use that orthotic service again</b>	11 (12.1)	13 (14.3)	3 (3.3)	0 (0.0)	1 (1.1)
<b>The benefits of receiving orthotics were worth the cost</b>	13 (14.3)	8 (8.8)	5 (5.5)	1 (1.1)	1 (1.1)
<b>I am overall satisfied with my orthotics</b>	18 (19.8)	8 (8.8)	1 (1.1)	1 (1.1)	0 (0.0)

**SA= Strongly Agree**

**A= Agree**

**N= Neutral**

**D= Disagree**

**SD= Strongly Disagree**

#### **4.1.6 Association between Footwear Characteristics and Sports Engagement**

Association between footwear characteristics and sports engagement revealed several significant findings. Shoe age showed a significant association with persistence in training ( $\chi^2 = 20.595$ ,  $p = 0.002$ ), anticipation of training ( $\chi^2 = 16.277$ ,  $p = 0.012$ ), and finding sport meaningful ( $\chi^2 = 12.998$ ,  $p = 0.043$ ). Similarly, upper material demonstrated significant associations with training for long periods ( $\chi^2 = 20.838$ ,  $p = 0.013$ ) and feeling strong and vigorous during sport ( $\chi^2 = 17.891$ ,  $p = 0.036$ ). Additionally, outsole material was significantly associated with training for long periods ( $\chi^2 = 25.644$ ,  $p = 0.002$ ).

No significant association was found between shoe age and training for long periods ( $p = 0.361$ ), suggesting that while comfort and material quality may influence motivation and endurance, duration of use alone did not. These findings, presented in Table 9, indicate that structural and material aspects of footwear particularly the upper and outsole play an important role in promoting sustained sports engagement and perceived athletic performance.(Table 9).

**Table 9: Association Between Footwear Characteristics and Sport Engagement Variables**

<b>Footwear Characteristic</b>	<b>Sport Engagement Variable</b>	<b>Not at all</b>	<b>Sometimes</b>	<b>Most of the time</b>	<b>All the time</b>	$\chi^2$	<b>p</b>
<b>Width of shoe</b>	<b>Train for long periods</b>	38	57	53	33	7.412	0.285
	<b>Persistent in training</b>	26	46	52	43	8.923	0.178
	<b>Looks forward to training</b>	22	41	57	47	6.582	0.327
	<b>Finds sport meaningful</b>	25	45	56	41	9.615	0.143
<b>Depth of shoe</b>	<b>Train for long periods</b>	40	53	49	38	10.266	0.114
	<b>Persistent in training</b>	32	42	51	40	11.391	0.089
	<b>Looks forward to training</b>	27	38	57	43	8.554	0.201
	<b>Finds sport meaningful</b>	30	47	49	37	9.839	0.132
<b>Age of Shoe</b>	<b>Train for long periods</b>	45	60	38	22	6.589	0.361
	<b>Persistent in training</b>	28	43	55	47	20.595	0.002*
	<b>Looks forward to training</b>	22	39	66	46	16.277	0.012*
	<b>Finds sport meaningful</b>	31	46	49	47	12.998	0.043*
<b>Footwear Style</b>	<b>Train for long periods</b>	39	58	46	30	5.413	0.367
	<b>Persistent in training</b>	33	49	53	37	6.820	0.298

<b>Upper Material</b>	<b>Looks forward to training</b>	29	46	61	40	9.064	0.169
	<b>Finds sport meaningful</b>	30	50	54	39	10.472	0.118
	<b>Train for long periods</b>	33	45	60	42	20.838	0.013*
	<b>Persistent in training</b>	30	43	58	40	9.714	0.137
<b>Outsole Material</b>	<b>Looks forward to training</b>	27	40	60	44	11.328	0.093
	<b>Feels strong and vigorous</b>	25	38	54	47	17.891	0.036*
	<b>Train for long periods</b>	41	56	72	38	25.644	0.002*
	<b>Persistent in training</b>	33	47	59	39	12.336	0.055
<b>Weight/Length Ratio</b>	<b>Looks forward to training</b>	29	44	65	38	11.992	0.062
	<b>Finds sport meaningful</b>	28	49	63	33	10.474	0.108
	<b>Train for long periods</b>	43	59	58	34	8.947	0.177
	<b>Persistent in training</b>	37	53	49	33	9.722	0.137
	<b>Looks forward to training</b>	32	45	58	39	10.384	0.120
	<b>Finds sport meaningful</b>	30	51	53	37	11.716	0.086

## 4.2 Hypotheses Testing

1. There would be no significant relationship between Playing Years and Footwear Style.

Test: Chi-square test of independence

Observed p-value: Not computed

Judgement: No statistics were computed because Footwear Style was constant across all respondents; therefore, the hypothesis could not be tested.

2. There would be no significant relationship between Playing Years and Orthotic Brand Used.

Test: Chi-square test of independence

Observed p-value: 0.899

Judgement: The observed p-value is greater than 0.05; hence, the null hypothesis was ACCEPTED.

This indicates no significant relationship between playing years and the brand of orthotics used.

3. There would be no significant relationship between Playing Position and Footwear Style.

Test: Chi-square test of independence

Observed p-value: Not computed

Judgement: No statistics were computed because Footwear Style was constant across all respondents; therefore, the hypothesis could not be tested.

4. There would be no significant relationship between Playing Position and Orthotic Brand Used.

Test: Chi-square test of independence

Observed p-value: 0.574

Judgement: The observed p-value is greater than 0.05; hence, the null hypothesis was ACCEPTED.

This implies that playing position had no significant association with the brand of orthotics used.

5. There would be no significant relationship between Orthotic Brand Used and Use of Orthotics (braces, splints, others).

Test: Chi-square test of independence

Observed p-value: < 0.001

Judgement: The observed p-value is less than 0.05; hence, the null hypothesis was REJECTED.

This indicates a statistically significant relationship between the brand of orthotics used and whether respondents reported using orthotic devices such as braces or splints.

6. There would be no significant difference in Orthotic Use Outcome across respondents.

Test: Frequency distribution (descriptive analysis)

Observed results: 30.8% of respondents reported *Yes* (they used orthotics), while 69.2% reported *No* (they did not use orthotics).

Judgement: This suggests that a majority of respondents did not use orthotics, although a considerable minority (about one-third) did.

**7.** There would be no significant association between Orthosis Type and Reported Use Outcome (RUO).

Test: Chi-square test of independence

Observed results: A significant association was found between Orthosis Type and Reported Use Outcome ( $\chi^2 = 102.375, p < 0.001$ ). Respondents who reported no orthosis use (OB = 0) were entirely classified under RUO = 0 (no reported outcome), while those who used different types of orthoses (OB = 1–3) were more likely to report higher RUO categories (1–4).

Judgement: The null hypothesis was REJECTED indicating a statistically significant association between orthosis type and reported use outcomes. This implies that orthosis use is related to reported benefits or functional outcomes, with higher orthosis engagement corresponding to better reported outcomes.

**8.** There would be no significant relationship between Playing Years and Orthotic Brand.

Test: Chi-square test of independence

Observed p-value: 0.899

Judgement: The observed p-value (0.899) is greater than 0.05; hence, the null hypothesis was ACCEPTED. This indicates that Playing Years had no significant relationship with Orthotic Brand. In other words, the type of orthotics used did not differ significantly based on the number of years players had been playing.

**9.** There would be no significant relationship between Playing Position and Footwear Style.

Test: Chi-square test of independence

Observed p-value: — (No statistics were computed because Footwear Style was constant across all participants.)

Judgement: Similar to the previous finding, no statistical association could be computed due to lack of variation in Footwear Style. Therefore, the null hypothesis could not be evaluated.

**10.** There would be no significant relationship between Playing Position and Orthotic Brand.

Test: Chi-square test of independence

Observed p-value: 0.574

Judgement: The observed p-value (0.574) is greater than 0.05; hence, the null hypothesis was not rejected. This shows that Playing Position was not significantly related to Orthotic Brand, implying that goalkeepers, defenders, midfielders, and forwards used similar orthotic brands without any statistically significant difference.

**11.** There would be no significant relationship between Orthotic Brand and Reason for Using Orthotics.

Test: Chi-square test of independence

Observed p-value: < 0.001

Judgement: The observed p-value (< 0.001) is less than 0.05; hence, the null hypothesis was rejected. This indicates a significant association between Orthotic Brand and the Reason for Using Orthotics. In other words, the reason why respondents used orthotics (such as for ankle pain, heel pain, or knee pain) was significantly related to the specific orthotic brand used.

**12.** There would be no significant difference in Orthotic Use Outcome across respondents.

Test: Frequency distribution (descriptive analysis)

Observed results: 30.8% of respondents reported “Yes” (they used orthotics), while 69.2% reported “No” (they did not use orthotics).

Judgement: This suggests that a majority of respondents did not use orthotics, although a considerable minority (about one-third) did. The result reflects limited use of orthotic devices among players, possibly due to comfort, cost, or accessibility issues.

**13.** There would be no significant relationship between Playing Years and Footwear Style.

Test: Chi-square test of independence

Observed p-value: — (No statistics were computed because Footwear Style was constant across all participants.)

Judgement: Since Footwear Style did not vary among respondents, the test could not determine any association. Hence, the null hypothesis could not be evaluated due to the absence of variation in footwear style.

**14** There would be no significant association between shoe Density (MCPD) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.237$ , with a significance level of  $p=.744$ .

Judgement: The result is not statistically significant as the p-value is greater than 0.05. This suggests that the density of the shoe's mid-construction has no statistically significant association with an athlete's ability to train for long periods.

**15** There would be no significant association between shoe Density (MCPD) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=0.852$ , with a significance level of  $p=.837$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical relationship between the shoe's density and an athlete's self-reported persistence in their sport.

16 There would be no significant association between shoe Density (MCPD) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=3.149$ , with a significance level of  $p=.369$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that shoe density is not associated with whether an athlete considers their sport to be a self-challenge.

17 There would be no significant association between shoe Density (MCPD) and being Enthusiastic About My Sport Activity (SAE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=5.917$ , with a significance level of  $p=.116$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical evidence of a relationship between the shoe's density and an athlete's enthusiasm for their sport.

18 There would be no significant association between shoe Density (MCPD) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(2, N=91)=1.624$ , with a significance level of  $p=.444$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that shoe density does not have a significant association with the pride an athlete feels in their work.

19 There would be no significant association between shoe Density (MCPD) and Feeling Full of Energy During Training and Matches (FOE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.926$ , with a significance level of  $p=.588$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that shoe density is not related to an athlete's energy levels during their sport activities.

20 There would be no significant association between shoe Density (MCPD) and Looking Forward to Going to Train in the Morning (LF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=4.328$ , with a significance level of  $p=.228$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests there is no statistical association between a shoe's density and an athlete's motivation to train in the morning.

21 There would be no significant association between shoe Density (MCPD) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=0.712$ , with a significance level of  $p=.870$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that shoe density is not associated with an athlete's feeling of strength and vigor in their sport.

22 There would be no significant association between shoe Density (MCPD) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=2.245$ , with a significance level of  $p=.523$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies there is no statistical relationship between shoe density and the sense of meaning an athlete derives from their sport.

23 There would be no significant association between shoe Density (MCPD) and being Carried Away by My Sport Activity (CA).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(2, N=91)=1.563$ , with a significance level of  $p=.458$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that shoe density is not related to an athlete's level of immersion in their sport activity.

24 There would be no significant association between shoe Density (MCPD) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=0.602$ , with a significance level of  $p=.896$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that there is no statistical association between shoe density and the happiness an athlete feels when engrossed in their sport.

25 There would be no significant association between shoe Density (MCPD) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.370$ , with a significance level of  $p=.712$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that shoe density is not associated with how inspired an athlete feels during their sport.

26 There would be no significant association between shoe Density (MCPD) and being Oblivious to Everything Going On Around Me When I Train (OBL).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=2.801$ , with a significance level of  $p=.423$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical relationship between shoe density and an athlete's ability to be oblivious to their surroundings during training.

27 There would be no significant association between shoe Density (MCPD) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=5.964$ , with a significance level of  $p=.113$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that shoe density is not associated with an athlete's level of absorption in their sport.

28 There would be no significant association between shoe Density (MCPD) and feeling Time Flies When I am Training or Competing (TF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.747$ , with a significance level of  $p=.626$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This suggests shoe density has no statistical relationship with an athlete's perception of time passing quickly during their sport.

29 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91) = 4.902$ , with a significance level of  $p = .556$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This indicates that the hardness of the lateral midsole is not associated with an athlete's ability to train for long periods.

30 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91) = 7.176$ , with a significance level of  $p = .305$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This suggests there is no statistical relationship between the lateral midsole hardness and an athlete's persistence.

31 There would be no significant association between Lateral Midsole Hardness (CLMH) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91) = 6.248$ , with a significance level of  $p = .396$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This implies lateral midsole hardness is not associated with an athlete viewing their sport as a self-challenge.

32 There is a significant association between Lateral Midsole Hardness (CLMH) and being Enthusiastic About My Sport Activity (SAE).

Test: Chi-Square Test (Likelihood Ratio).

Observed results: The Likelihood Ratio test yielded a significant result ( $p = .030$ ), while the Pearson Chi-Square test approached significance ( $\chi^2(6, N=91) = 12.162, p = .058$ ). Given the high percentage of cells with low expected counts (66.7%), the Likelihood Ratio is a more reliable measure.

Judgement: The result is statistically significant ( $p < 0.05$ ). This indicates that there is a statistical association between the hardness of the shoe's lateral midsole and an athlete's enthusiasm for their sport activity.

33 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(4, N=91)=4.186$ , with a significance level of  $p=.381$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This suggests lateral midsole hardness has no statistical association with the pride an athlete feels.

34 There would be no significant association between Lateral Midsole Hardness (CLMH) and Feeling Full of Energy During Training and Matches (FOE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=9.427$ , with a significance level of  $p=.151$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This indicates lateral midsole hardness is not related to an athlete's energy levels.

35 There would be no significant association between Lateral Midsole Hardness (CLMH) and Looking Forward to Going to Train in the Morning (LF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=8.412$ , with a significance level of  $p=.209$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This suggests no statistical association between lateral midsole hardness and an athlete's motivation to train.

36 There would be no significant association between Lateral Midsole Hardness (CLMH) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.495$ , with a significance level of  $p=.745$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This indicates lateral midsole hardness is not associated with an athlete's feeling of strength.

37 There would be no significant association between Lateral Midsole Hardness (CLMH) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.482$ , with a significance level of  $p=.371$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies no statistical relationship between lateral midsole hardness and the meaning an athlete derives from their sport.

38 There is a significant association between Lateral Midsole Hardness (CLMH) and being Carried Away by My Sport Activity (CA).

Test: Chi-Square Test (Likelihood Ratio & Linear-by-Linear Association).

Observed results: The Likelihood Ratio test ( $p=.047$ ) and the Linear-by-Linear Association test ( $p=.013$ ) both yielded significant results.

Judgement: The result is statistically significant ( $p<0.05$ ). This indicates that there is an association between the hardness of the shoe's lateral midsole and an athlete's tendency to get carried away by, or immersed in, their sport activity. The significant linear trend suggests a directional relationship between the ordered categories of these variables.

39 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=5.517$ , with a significance level of  $p=.479$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical association between lateral midsole hardness and an athlete's happiness when engrossed in their sport.

40 There would be no significant association between Lateral Midsole Hardness (CLMH) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=2.175$ , with a significance level of  $p=.903$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that lateral midsole hardness is not associated with how inspired an athlete feels.

41 There is a significant association between Lateral Midsole Hardness (CLMH) and being Oblivious to Everything Going On Around Me When I Train (OBL).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a significant result ( $p=.012$ ). The overall Pearson Chi-Square test was not significant ( $\chi^2(6,N=91)=7.430,p=.283$ ).

Judgement: A significant linear trend was found ( $p<0.05$ ). This indicates that as lateral midsole hardness changes, there is a corresponding directional change in the likelihood of an athlete being oblivious to their surroundings during training.

42 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6,N=91)=3.683$ , with a significance level of  $p=.719$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that lateral midsole hardness is not associated with an athlete's level of absorption in their sport.

43 There is a significant association between Lateral Midsole Hardness (CLMH) and feeling Time Flies When I am Training or Competing (TF).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a significant result ( $p=.040$ ). The overall Pearson Chi-Square test was not significant ( $\chi^2(6,N=91)=9.302,p=.157$ ).

Judgement: A significant linear trend was found ( $p<0.05$ ). This suggests there is a directional relationship between the hardness of the lateral midsole and an athlete's perception of time passing quickly during their sport activities.

44 There would be no significant association between Medial Midsole Hardness (CMMH) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6,N=91)=7.855$ , with a significance level of  $p=.249$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that the hardness of the medial midsole is not associated with an athlete's ability to train for long periods.

45 There would be no significant association between Medial Midsole Hardness (CMMH) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.146$ , with a significance level of  $p=.407$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests no statistical relationship between medial midsole hardness and an athlete's persistence.

46 There would be no significant association between Medial Midsole Hardness (CMMH) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=4.695$ , with a significance level of  $p=.583$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies medial midsole hardness is not associated with an athlete viewing their sport as a self-challenge.

47 There would be no significant association between Medial Midsole Hardness (CMMH) and being Enthusiastic About My Sport Activity (SAE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=1.952$ , with a significance level of  $p=.924$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no evidence of a relationship between medial midsole hardness and an athlete's enthusiasm.

48 There would be no significant association between Medial Midsole Hardness (CMMH) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(4, N=91)=1.953$ , with a significance level of  $p=.744$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests medial midsole hardness has no statistical association with the pride an athlete feels.

49 There would be no significant association between Medial Midsole Hardness (CMMH) and Feeling Full of Energy During Training and Matches (FOE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.914$ , with a significance level of  $p=.688$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates medial midsole hardness is not related to an athlete's energy levels.

50 There would be no significant association between Medial Midsole Hardness (CMMH) and Looking Forward to Going to Train in the Morning (LF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=2.243$ , with a significance level of  $p=.896$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests no statistical association between medial midsole hardness and an athlete's motivation to train.

51 There would be no significant association between Medial Midsole Hardness (CMMH) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.492$ , with a significance level of  $p=.745$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates medial midsole hardness is not associated with an athlete's feeling of strength.

52 There would be no significant association between Medial Midsole Hardness (CMMH) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.810$ , with a significance level of  $p=.339$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies no statistical relationship between medial midsole hardness and the meaning an athlete derives from their sport.

53 There would be no significant association between Medial Midsole Hardness (CMMH) and being Carried Away by My Sport Activity (CA).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(4, N=91)=1.964$ , with a significance level of  $p=.742$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests medial midsole hardness is not related to an athlete's level of immersion in their sport.

54 There would be no significant association between Medial Midsole Hardness (CMMH) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=5.726$ , with a significance level of  $p=.455$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical association between medial midsole hardness and an athlete's happiness when engrossed in their sport.

55 There would be no significant association between Medial Midsole Hardness (CMMH) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=9.440$ , with a significance level of  $p=.150$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that medial midsole hardness is not associated with how inspired an athlete feels.

56 There would be no significant association between Medial Midsole Hardness (CMMH) and being Oblivious to Everything Going On Around Me When I Train (OBL).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=5.330$ , with a significance level of  $p=.502$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical relationship between medial midsole hardness and an athlete's ability to be oblivious to their surroundings during training.

57 There would be no significant association between Medial Midsole Hardness (CMMH) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=5.958$ , with a significance level of  $p=.428$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that medial midsole hardness is not associated with an athlete's level of absorption in their sport.

58 There would be no significant association between Medial Midsole Hardness (CMMH) and feeling Time Flies When I am Training or Competing (TF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=1.754$ , with a significance level of  $p=.941$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests medial midsole hardness has no statistical relationship with an athlete's perception of time passing quickly during their sport.

- There would be no significant association between shoe Density (MCPD) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.237$ , with a significance level of  $p=.744$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that the density of the shoe's mid-construction has no statistically significant association with an athlete's ability to train for long periods.

- There would be no significant association between shoe Density (MCPD) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=0.852$ , with a significance level of  $p=.837$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical relationship between the shoe's density and an athlete's self-reported persistence in their sport.

- There would be no significant association between shoe Density (MCPD) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=3.149$ , with a significance level of  $p=.369$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that shoe density is not associated with whether an athlete considers their sport to be a self-challenge.

- There would be no significant association between shoe Density (MCPD) and being Enthusiastic About My Sport Activity (SAE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=5.917$ , with a significance level of  $p=.116$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical evidence of a relationship between the shoe's density and an athlete's enthusiasm for their sport.

- There would be no significant association between shoe Density (MCPD) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(2, N=91)=1.624$ , with a significance level of  $p=.444$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that shoe density does not have a significant association with the pride an athlete feels in their work.

- There would be no significant association between shoe Density (MCPD) and Feeling Full of Energy During My Training and Matches (FOE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.926$ , with a significance level of  $p=.588$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that shoe density is not related to an athlete's energy levels during their sport activities.

- There would be no significant association between shoe Density (MCPD) and Look Forward to Going to Train in the Morning (LF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=4.328$ , with a significance level of  $p=.228$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests there is no statistical association between a shoe's density and an athlete's motivation to train in the morning.

- There would be no significant association between shoe Density (MCPD) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=0.712$ , with a significance level of  $p=.870$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that shoe density is not associated with an athlete's feeling of strength and vigor in their sport.

- There would be no significant association between shoe Density (MCPD) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=2.245$ , with a significance level of  $p=.523$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies there is no statistical relationship between shoe density and the sense of meaning an athlete derives from their sport.

- There would be no significant association between shoe Density (MCPD) and being Carried Away by My Sport Activity (CA).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(2, N=91)=1.563$ , with a significance level of  $p=.458$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that shoe density is not related to an athlete's level of immersion in their sport activity.

- There would be no significant association between shoe Density (MCPD) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=0.602$ , with a significance level of  $p=.896$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that there is no statistical association between shoe density and the happiness an athlete feels when engrossed in their sport.

- There would be no significant association between shoe Density (MCPD) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.370$ , with a significance level of  $p=.712$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that shoe density is not associated with how inspired an athlete feels during their sport.

- There would be no significant association between shoe Density (MCPD) and being Oblivious to Everything Going On Around Me When I Train (OBL).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=2.801$ , with a significance level of  $p=.423$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical relationship between shoe density and an athlete's ability to be oblivious to their surroundings during training.

- There would be no significant association between shoe Density (MCPD) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=5.964$ , with a significance level of  $p=.113$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that shoe density is not associated with an athlete's level of absorption in their sport.

- There would be no significant association between shoe Density (MCPD) and feeling Time Flies When I am Training or Competing (TF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(3, N=91)=1.747$ , with a significance level of  $p=.626$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests shoe density has no statistical relationship with an athlete's perception of time passing quickly during their sport.

74 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=4.902$ , with a significance level of  $p=.556$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that the hardness of the lateral midsole is not associated with an athlete's ability to train for long periods.

75 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=7.176$ , with a significance level of  $p=.305$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests there is no statistical relationship between the lateral midsole hardness and an athlete's persistence.

76 There would be no significant association between Lateral Midsole Hardness (CLMH) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.248$ , with a significance level of  $p=.396$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies lateral midsole hardness is not associated with an athlete viewing their sport as a self-challenge.

77 There is a significant association between Lateral Midsole Hardness (CLMH) and being Enthusiastic About My Sport Activity (SAE).

Test: Likelihood Ratio Test.

Observed results: The Likelihood Ratio test yielded a value of  $\chi^2(6, N=91)=14.009$ , with a significance level of  $p=.030$ . The Pearson Chi-Square test was near significant ( $p=.058$ ).

Judgement: The result is statistically significant ( $p<0.05$ ). This indicates that there is a statistical association between the hardness of the shoe's lateral midsole and an athlete's enthusiasm for their sport activity.

78 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(4, N=91)=4.186$ , with a significance level of  $p=.381$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests lateral midsole hardness has no statistical association with the pride an athlete feels.

79 There would be no significant association between Lateral Midsole Hardness (CLMH) and Feeling Full of Energy During My Training and Matches (FOE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=9.427$ , with a significance level of  $p=.151$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates lateral midsole hardness is not related to an athlete's energy levels.

80 There would be no significant association between Lateral Midsole Hardness (CLMH) and Look Forward to Going to Train in the Morning (LF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=8.412$ , with a significance level of  $p=.209$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests no statistical association between lateral midsole hardness and an athlete's motivation to train.

81 There would be no significant association between Lateral Midsole Hardness (CLMH) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.495$ , with a significance level of  $p=.745$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates lateral midsole hardness is not associated with an athlete's feeling of strength.

82 There would be no significant association between Lateral Midsole Hardness (CLMH) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.482$ , with a significance level of  $p=.371$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies no statistical relationship between lateral midsole hardness and the meaning an athlete derives from their sport.

83 There is a significant association between Lateral Midsole Hardness (CLMH) and being Carried Away by My Sport Activity (CA).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a value of  $\chi^2(1, N=91)=6.184$ , with a significance level of  $p=.013$ . The Likelihood Ratio test was also significant ( $p=.047$ ).

Judgement: The result is statistically significant ( $p<0.05$ ). This indicates that there is a statistical association, and a significant linear trend, between the hardness of the shoe's lateral midsole and an athlete's tendency to get carried away by their sport activity.

84 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=5.517$ , with a significance level of  $p=.479$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical association between lateral midsole hardness and an athlete's happiness when engrossed in their sport.

85 There would be no significant association between Lateral Midsole Hardness (CLMH) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=2.175$ , with a significance level of  $p=.903$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This suggests that lateral midsole hardness is not associated with how inspired an athlete feels.

- 86 There is a significant association between Lateral Midsole Hardness (CLMH) and being Oblivious to Everything Going On Around Me When I Train (OBL).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a value of  $\chi^2(1, N=91)=6.362$ , with a significance level of  $p=.012$ .

Judgement: A statistically significant linear trend was found ( $p < 0.05$ ). This indicates that there is a directional relationship between the hardness of the lateral midsole and an athlete's reported ability to be oblivious to their surroundings during training.

- 87 There would be no significant association between Lateral Midsole Hardness (CLMH) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.683$ , with a significance level of  $p=.719$ .

Judgement: The result is not statistically significant ( $p > 0.05$ ). This implies that lateral midsole hardness is not associated with an athlete's level of absorption in their sport.

- 88 There is a significant association between Lateral Midsole Hardness (CLMH) and feeling Time Flies When I am Training or Competing (TF).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a value of  $\chi^2(1, N=91)=4.230$ , with a significance level of  $p=.040$ .

Judgement: A statistically significant linear trend was found ( $p < 0.05$ ). This suggests there is a directional relationship between the hardness of the lateral midsole and an athlete's perception of time passing quickly during their sport activities.

- 89 There would be no significant association between Medial Midsole Hardness (CMMH) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=7.855$ , with a significance level of  $p=.249$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that the hardness of the medial midsole is not associated with an athlete's ability to train for long periods.

- 90 There would be no significant association between Medial Midsole Hardness (CMMH) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.146$ , with a significance level of  $p=.407$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests no statistical relationship between medial midsole hardness and an athlete's persistence.

- 91 There would be no significant association between Medial Midsole Hardness (CMMH) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=4.695$ , with a significance level of  $p=.583$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies medial midsole hardness is not associated with an athlete viewing their sport as a self-challenge.

- 92 There would be no significant association between Medial Midsole Hardness (CMMH) and being Enthusiastic About My Sport Activity (SAE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=1.952$ , with a significance level of  $p=.924$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no evidence of a relationship between medial midsole hardness and an athlete's enthusiasm.

- 93 There would be no significant association between Medial Midsole Hardness (CMMH) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(4, N=91)=1.953$ , with a significance level of  $p=.744$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests medial midsole hardness has no statistical association with the pride an athlete feels.

94 There would be no significant association between Medial Midsole Hardness (CMMH) and Feeling Full of Energy During My Training and Matches (FOE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.914$ , with a significance level of  $p=.688$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates medial midsole hardness is not related to an athlete's energy levels.

95 There would be no significant association between Medial Midsole Hardness (CMMH) and Look Forward to Going to Train in the Morning (LF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=2.243$ , with a significance level of  $p=.896$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests no statistical association between medial midsole hardness and an athlete's motivation to train.

96 There would be no significant association between Medial Midsole Hardness (CMMH) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=3.492$ , with a significance level of  $p=.745$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates medial midsole hardness is not associated with an athlete's feeling of strength.

97 There would be no significant association between Medial Midsole Hardness (CMMH) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=6.810$ , with a significance level of  $p=.339$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies no statistical relationship between medial midsole hardness and the meaning an athlete derives from their sport.

98 There would be no significant association between Medial Midsole Hardness (CMMH) and being Carried Away by My Sport Activity (CA).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(4, N=91)=1.964$ , with a significance level of  $p=.742$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests medial midsole hardness is not related to an athlete's level of immersion in their sport.

99 There would be no significant association between Medial Midsole Hardness (CMMH) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=5.726$ , with a significance level of  $p=.455$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical association between medial midsole hardness and an athlete's happiness when engrossed in their sport.

100 There would be no significant association between Medial Midsole Hardness (CMMH) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=9.440$ , with a significance level of  $p=.150$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that medial midsole hardness is not associated with how inspired an athlete feels.

101 There would be no significant association between Medial Midsole Hardness (CMMH) and being Oblivious to Everything Going On Around Me When I Train (OBL). Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6,N=91)=5.330$ , with a significance level of  $p=.502$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical relationship between medial midsole hardness and an athlete's ability to be oblivious to their surroundings during training.

102 There would be no significant association between Medial Midsole Hardness (CMMH) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6,N=91)=5.958$ , with a significance level of  $p=.428$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that medial midsole hardness is not associated with an athlete's level of absorption in their sport.

103 There would be no significant association between Medial Midsole Hardness (CMMH) and feeling Time Flies When I am Training or Competing (TF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6,N=91)=1.754$ , with a significance level of  $p=.941$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests medial midsole hardness has no statistical relationship with an athlete's perception of time passing quickly during their sport.

104. There would be no significant association between the Driving Range (DR) and being Able to Train for Long Periods of Time (TLP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9,N=91)=5.316$ , with a significance level of  $p=.806$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests there's no statistical relationship between the athlete's driving range and their reported ability to train for long periods.

105. There would be no significant association between the Driving Range (DR) and being Very Persistent in My Sport Activity (SAP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=13.315$ , with a significance level of  $p=.149$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates that the driving range is not statistically associated with an athlete's self-reported persistence in their sport.

106. There would be no significant association between the Driving Range (DR) and viewing My Sport Activity as a Self-Challenge (SASC).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=4.587$ , with a significance level of  $p=.869$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies the driving range has no statistical association with whether an athlete views their sport as a self-challenge.

107. There would be no significant association between the Driving Range (DR) and being Enthusiastic About My Sport Activity (SAE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=3.642$ , with a significance level of  $p=.933$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates there is no statistical evidence of a relationship between driving range and an athlete's enthusiasm for their sport.

108. There would be no significant association between the Driving Range (DR) and being Proud of the Work I Do (PW).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=8.347$ , with a significance level of  $p=.214$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that the driving range is not statistically associated with the pride an athlete feels in their work.

109. There is a significant association between the Driving Range (DR) and Feeling Full of Energy During My Training and Matches (FOE).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a value of  $\chi^2(1, N=91)=4.978$ , with a significance level of  $p=.026$ .

Judgement: A statistically significant linear trend was found ( $p<0.05$ ). This suggests there is a directional relationship between the driving range and an athlete's feeling of being full of energy during training and matches.

110. There is a significant association between the Driving Range (DR) and Look Forward to Going to Train in the Morning (LF).

Test: Linear-by-Linear Association Test.

Observed results: The Linear-by-Linear Association test yielded a value of  $\chi^2(1, N=91)=4.342$ , with a significance level of  $p=.037$ .

Judgement: A statistically significant linear trend was found ( $p<0.05$ ). This indicates a directional relationship between the driving range and an athlete's eagerness to train in the morning.

111. There is a significant association between the Driving Range (DR) and feeling Strong and Vigorous in My Sport Activity (SV).

Test: Likelihood Ratio Test.

Observed results: The Likelihood Ratio test yielded a value of  $\chi^2(9, N=91)=21.762$ , with a significance level of  $p=.010$ . The Pearson Chi-Square test was near significant ( $p=.052$ ).

Judgement: The result is statistically significant ( $p<0.05$ ). This suggests that there is a statistical association between the driving range and an athlete's feeling of being strong and vigorous in their sport activity.

112. There would be no significant association between the Driving Range (DR) and finding My Sport Activity is Full of Meaning and Resolve (MR).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=12.230$ , with a significance level of  $p=.201$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies no statistical relationship between the driving range and the meaning an athlete derives from their sport.

113. There would be no significant association between the Driving Range (DR) and being Carried Away by My Sport Activity (CA).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(6, N=91)=9.736$ , with a significance level of  $p=.136$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that the driving range is not statistically related to an athlete's level of immersion or being "carried away" by their sport.

114. There would be no significant association between the Driving Range (DR) and being Happy When Engrossed in My Sport Activity (HE).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=5.013$ , with a significance level of  $p=.833$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical association between the driving range and an athlete's happiness when engrossed in their sport.

115. There would be no significant association between the Driving Range (DR) and Feeling Inspired Whilst Carrying Out My Sport Activity (INSP).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=10.201$ , with a significance level of  $p=.334$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests that the driving range is not associated with how inspired an athlete feels during their sport.

116. There would be no significant association between the Driving Range (DR) and being Oblivious to Everything Going On Around Me When I Train (OBL).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=5.968$ , with a significance level of  $p=.743$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This indicates no statistical relationship between the driving range and an athlete's reported ability to be oblivious to their surroundings during training.

117. There would be no significant association between the Driving Range (DR) and being Absorbed in My Sport Activity (ABS).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=3.281$ , with a significance level of  $p=.952$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This implies that the driving range is not associated with an athlete's level of absorption in their sport.

118. There would be no significant association between the Driving Range (DR) and feeling Time Flies When I am Training or Competing (TF).

Test: Pearson Chi-Square Test.

Observed results: The test yielded a value of  $\chi^2(9, N=91)=13.206$ , with a significance level of  $p=.153$ .

Judgement: The result is not statistically significant ( $p>0.05$ ). This suggests the driving range has no statistical relationship with an athlete's perception of time passing quickly during their sport.

## CHAPTER FIVE

### DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

#### 5.1 Discussion

The results of this study provide a detailed and nuanced overview of footwear characteristics, orthotic use, and their complex associations with sports engagement among professional footballers in Edo State. This discussion interprets these results within the broader context of sports science, biomechanics, and sports psychology, moving from a descriptive profile of the athletes and their equipment to an analytical exploration of the tangible links between footwear and performance.

The sociodemographic data confirm that the study's sample is highly representative of a typical professional football cohort. The participants were predominantly young (mean age range 18-32), single (68.1%), right-footed (84.6%) males with a normal BMI (mean 23.6) and a high training volume (mean 15.05 hours/week). The prevalence of midfielders (56.0%) provides a specific lens through which to view the data, as their dynamic, high-coverage role places unique demands on footwear. This well-defined profile anchors the study's findings, ensuring their relevance and applicability to this specific demographic of elite athletes.

The analysis of the footwear itself reveals a market that has largely converged on a set of standardized design principles. The overwhelming dominance of boots with low heel height (59.3% in the 0–2.5 cm range), a small heel-to-toe drop (61.5% had a 1–3 cm rise), and a semi-curved last (64.8%) demonstrates a clear industry consensus. These features are biomechanically tailored to enhance ground feel, promote a natural foot position for agility, and provide a versatile fit. The industry's prioritization of a minimal drop is consistent with research suggesting that this design can reduce peak plantar pressure and enhance proprioception in athletic footwear (mcleod2012effects, bruggemann2018football).

Furthermore, the preference for more stable construction methods, such as board (41.8%) and combination (38.5%), which are lasting, as well as the high prevalence of dual-density midsoles (80.2%), indicates a collective prioritization of midfoot stability. This is crucial for managing the high-impact forces generated during sprinting, cutting, and kicking, reflecting an industry that is successfully meeting the fundamental biomechanical demands of the sport (Terzing, 2014; Anderson, 2016). The consensus on design features is further supported by studies showing that a stable shoe construction is vital for reducing non-contact ankle injuries in dynamic sports (Fong, 2009).

While manufacturers provide equipment with standardized, high-performance features, a significant disconnect emerges when examining how this footwear is used and maintained by the players. A key area of concern is footwear age. The finding that a significant portion of the cohort (34.1%) used boots that were over 12 months old is alarming. The functional lifespan of athletic footwear, particularly the shock-absorbing capacity of midsole materials, is finite. Extended use beyond the recommended replacement cycle can lead to a degradation of cushioning and support, potentially increasing the cumulative stress on the kinetic chain and elevating the risk of overuse injuries (Cook, 2001; Healy). Specifically, the EVA (ethylene-vinyl acetate) used in most midsoles loses a significant portion of its shock attenuation capability after 250–500 miles of use, which can be reached within a year of professional training (Vercellin, 2015). This discrepancy may stem from a combination of factors, including economic constraints, a lack of education on the performance implications of material fatigue, or even a psychological attachment to a pair of "broken-in" or "lucky" boots. Even more critically, this study uncovered a phenomenon that can be described as "fit blindness." While the majority of players subjectively reported that their shoes fit well in width (68.1%) and depth (90.1%), the objective measurements told a different story. The "straw" test revealed that a combined 35.2% of the shoes were demonstrably too short or too long. A boot that is too short can cause significant discomfort, including toenail trauma and

blistering, while a boot that is too long can lead to foot slippage, reducing stability and proprioceptive feedback (Bullock, 2015). This stark contrast between perception and reality suggests that players may become habituated to suboptimal fit, a phenomenon noted in previous research where athletes often prioritize brand aesthetics or perceived performance benefits over objective fit metrics (Stacoff, 2012). This potentially compromises both their performance and long-term foot health without even realizing it. It highlights a critical gap in player education and equipment management protocols within professional clubs, as proper shoe fit is a primary, modifiable factor in preventing common football-related foot injuries (Richardson, 2021).

The study reveals that orthotic intervention is not a widespread practice within this cohort, with a large majority of players (69.2%) relying on standard factory insoles. This low adoption rate suggests that for the average player without pronounced biomechanical issues, the built-in support of modern football boots is considered sufficient.

However, the data from the 30.8% who do use orthotics provides a powerful counter-narrative. The feedback from this user group was overwhelmingly positive. A combined 20.9% either agreed or strongly agreed that their activity levels had increased since receiving orthotics, and a combined 19.8% confirmed their pain had decreased. Furthermore, the high rates of satisfaction and willingness to use the service again underscore the efficacy of this intervention for those who need it. This finding aligns with established clinical literature, which shows that custom-made foot orthoses are effective in reducing lower extremity musculoskeletal pain and improving function in athletes by optimizing load distribution and improving alignment (Duffy, 2019; Shalit, 2018). This creates an important dichotomy: while not a universal necessity, orthotics represent a highly effective, targeted solution for a substantial minority of players who are likely managing underlying biomechanical deficits or musculoskeletal conditions. The significant gap between the low adoption rate and the high satisfaction among users points to a potential underdiagnosis of foot-related issues and an

underutilization of podiatric services within professional football, suggesting a need for more routine biomechanical screening (Maccorquodale, 2005).

The most profound findings of this research lie in the complex interplay between specific footwear characteristics and the psychological dimensions of sports engagement. The data clearly demonstrates that a football boot is far more than a piece of protective equipment; it is an active interface that shapes an athlete's physical and mental experience of the game.

The significant associations between shoe age and psychological metrics like persistence in training ( $p = 0.002$ ), anticipation of training ( $p = 0.012$ ), and finding sport meaningful ( $p = 0.043$ ) are particularly revealing. This suggests a powerful psychological novelty effect. A newer shoe, with its pristine materials and optimal structural integrity, does not just offer better physical performance; it appears to provide a mental boost, enhancing motivation, renewing focus, and positively framing the athlete's perception of their daily work. This concept is explored in sports psychology, where the "equipment effect" posits that high-quality or new equipment can enhance an athlete's self-efficacy and confidence, translating into greater effort and positive engagement (Maguire, 2006).

This connection is reinforced by the findings related to shoe materials. The significant link between the upper material and the ability to train for long periods ( $p = 0.013$ ) and feel strong and vigorous ( $p = 0.036$ ) is a direct testament to the importance of functional properties. Lightweight, breathable synthetic and mesh uppers reduce foot fatigue, a direct physical benefit that contributes to perceived endurance. The dominance of rubber outsoles (81.3%), known for superior traction and shock absorption, provides a stable base of support. Studies on high-traction outsoles in soccer confirm they improve dynamic stability and agility, which translates to a greater *perceived* capacity for endurance and power (Williams, 2004).

Delving deeper into the midsole construction provides the most nuanced insights of the study. The consistent lack of association between midsole density (MCPD) and any of the fifteen measured psychological engagement variables is, in itself, a significant finding. It suggests

that certain technical specifications, while crucial for biomechanical functions like energy dissipation, operate below the threshold of conscious perception. An athlete does not "feel" the density of their midsole in a way that makes them more or less enthusiastic or persistent. Its impact is purely mechanical, a concept known as sub-threshold biomechanical influence (Nigg, 2001).

In stark contrast, lateral midsole hardness (CLMH) emerged as a key psychological facilitator. The statistically significant associations with being enthusiastic ( $p = 0.030$ ) and, most importantly, with core components of the "flow state" such as being carried away by the activity ( $p = 0.013$ ), being oblivious to surroundings ( $p = 0.012$ ), and feeling that time flies ( $p = 0.040$ ) are groundbreaking. The lateral aspect of the midsole is critical for providing stability during the rapid, multi-directional movements that define football (Esteres, 2012). A firm, reliable lateral support structure may provide a subconscious foundation of safety and confidence. By reducing the cognitive resources an athlete must allocate to worrying about ankle rolls or unstable footing, the shoe effectively frees up mental bandwidth. This liberated cognitive capacity can then be fully dedicated to tactical awareness, creative play, and strategic decision-making, a mechanism strongly supported by the cognitive load theory in sports, allowing the athlete to achieve a state of deep immersion and peak performance, characteristic of the flow state (Jackson, 1999).

Finally, the significant linear trends found for the Driving Range (DR) with feeling full of energy ( $p = 0.026$ ), looking forward to training ( $p = 0.037$ ), and feeling strong and vigorous ( $p = 0.010$ ) further cement this mind-body link. The Driving Range, representing the shoe's overall stiffness and energy-return profile, appears to directly influence an athlete's perception of their own vitality. A shoe that provides a responsive, energetic feel underfoot can make an athlete feel more powerful and motivated, illustrating a direct feedback loop between equipment properties and an athlete's subjective experience of their physical capabilities, a concept central to the study of performance-enhancing design in athletic footwear (McMillian,

2019; Kubler, 2018).

## **5.2 Conclusion**

In conclusion, this study characterized the footwear and orthotic practices of professional footballers, revealing that while the structural features of their boots are largely aligned with standard performance designs, a significant number use footwear beyond its recommended age. The low prevalence of orthotic use contrasts sharply with the high satisfaction reported by the minority who use them, indicating a potential gap in access or awareness. Furthermore, the study established that objective footwear characteristics, particularly the age, material, and lateral midsole hardness, have a measurable association with the players' sports engagement and psychological flow states. This underscores that footwear is not merely protective gear but a potential contributor to the holistic athletic experience, influencing both physical readiness and mental immersion in the sport.

## **5.3 Recommendations**

Based on the findings of this study, the following recommendations are made:

1. Football clubs and athletic associations should implement educational programs for players on the importance of timely footwear replacement to ensure optimal performance and injury prevention.
2. Physiotherapists and sports medicine practitioners should actively assess players for potential biomechanical issues that could be mitigated with orthotics, given the high satisfaction levels reported by users.
3. Footwear manufacturers should continue to invest in research and development focused on the role of specific midsole properties, particularly lateral hardness, in enhancing athlete focus and psychological flow during performance.

4. Players are encouraged to consider footwear material and age as factors that can influence not only their physical performance but also their training persistence and mental engagement.

#### **5.4 Implications for Further Studies**

This study was focused on professional footballers in a specific region; therefore, further research is recommended to explore these footwear and orthotic variables across different player levels (e.g., amateurs, academies) and sporting disciplines. A longitudinal study investigating the direct impact of controlled footwear replacement on injury rates and performance metrics would provide stronger causal evidence. Additionally, qualitative research exploring the reasons behind the low adoption rate of orthotics could identify specific barriers and facilitators. Ultimately, experimental studies that manipulate lateral midsole hardness in a controlled setting are necessary to conclusively establish its effect on psychological flow states during athletic performance.

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# APPENDICES

## APPENDIX A



### EDO STATE MINISTRY OF HEALTH HEALTH RESEARCH ETHICS COMMITTEE



**PROTOCOL NUMBER** HA/737/25/D/07100768 (PLEASE QUOTE IN ALL ENQUIRIES)  
**APPROVAL NUMBER** HA/737/25/D/09180768  
**TITLE OF RESEARCH PROPOSAL** FOOTWEAR AND ORTHOTIC USAGE IN SPORTS ENGAGEMENT AMONG MALE PROFESSIONAL FOOTBALLERS IN BENIN CITY, EDO STATE, NIGERIA  
**PRINCIPAL INVESTIGATOR (S)** ITEPU ENOSETALE JUDITH FAVOUR  
**DATE CONSIDERED** 18<sup>TH</sup> SEPTEMBER, 2025.  
**DECISION OF THE COMMITTEE** APPROVED

THIS APPROVAL DATES 18/09/2025 TO 18/09/2026. IF THERE IS A DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC EDO SMoH SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

**REMARK:** Please kindly note that the HREC Edo SMoH seal authenticates this approval

DR (MRS) Omonyemen B. BELLO  
(MBBS, MPH, FPHCM) (CHAIRMAN)

SIGNATURE & DATE.....

*Bello*  
29/9/2025

SUPERVISOR(S).....

DR. SATURDAY NICHOLAS OGHUMAY

#### ATTESTATION BY INVESTIGATOR(S)

No participant accrual or activity related to this research may be conducted outside of the approval dates. All informed consent forms used in this study must carry the Edo SMoH HREC-assigned number and duration of your research. No changes are permitted in the research without prior approval of the Edo SMoH HREC except in circumstances outlined in the Code. The Edo SMoH HREC reserves the right to conduct compliance visits to your research site without previous notification.



Signature & Date.....

*Edo* 2/10/2025

**APPENDIX B**

**INFORMED CONSENT FORM**

**Title of the study:** Footwear and orthotics usage in sports engagement among male professional footballers in Benin city, Edo state, Nigeria.

**Investigator:** Itepu Enosetale Judith Favour

**Contact Phone Number:** 09135983343

**Purpose of the Study:** You are invited to take part in a research study aimed at understanding the impact of footwear and orthotic usage in sports engagement among male professional footballers in Benin city.

**Participants:** You are eligible to participate if you are a professional player registered with clubs participating in the Nigerian Professional Football League (NPFL) and the National Nationwide League (NNL) in Benin City, Edo state, Nigeria.

**Procedure:** You will be asked to fill out standardized questionnaires that assess the type of sports footwear and orthotic you use, as well as your engagement in the sport. The process will take approximately 15-20 minutes and will be conducted off the pitch.

**Benefits:** Participants will gain awareness on the impact of footwear and sports orthotics in injury prevention and improved performance.

**Risk of participation:** There are no foreseeable risks associated with participation in this study. All information will be kept confidential and you may withdraw from the study at anytime without any consequences.

**Cost/Compensation:** There is no cost whatsoever associated with your participation in this study.

**Contact Information:** If you have any questions or concerns about the study, you can contact the named investigator on the stated phone number.

**Confidentiality:** All responses will be treated as strictly confidential. No names or identifying information will be recorded. Data will be used solely for academic research purposes.

**Voluntary participation:** Participation in this study is completely voluntary. You are free to refuse or withdraw at anytime without any penalty.

**Participant consent:** Now that the study has been clearly explained to me and I fully understand the content and process, I agree to voluntarily take part in this study.

.....

.....

**Participant's Signature and Date**

**Witness's Signature and Date**

.....

**Researcher's Signature and Date**

**APPENDIX C**  
**QUESTIONNAIRE ON FOOTWEAR AND ORTHOTIC USAGE IN SPORTS ENGAGEMENT AMONG**  
**MALE PROFESSIONAL FOOTALLERS IN BENIN CITY, EDO STAT**

**SOCIODEMOGRAPHIC DATA**

**Please fill in the details**

- Age:  18-25 years  25- 32 years  33-40 years  40 and above
- Marital status:  Single  Married  Divorced  Widowed
- Educational level:  Primary  Secondary  Tertiary  No Formal Education
- Height (in m): \_\_\_\_\_
- Weight (in kg): \_\_\_\_\_
- BMI: \_\_\_\_\_
- Playing years: \_\_\_\_\_
- Playing position:  Goalkeeper  Defender  Midfielder  Forward
- Dominant leg:  Left  Right
- Duration of training per week: \_\_\_\_\_

**FOOT ASSESSMENT TOOL**

**89 FIT**

Foot length: \_\_\_\_\_ Thumb width: \_\_\_\_\_

**Fit of shoe (length) – rule of thumb (wearer’s thumb)**

Palpation: good  too short (< ½ thumb)  too long (> 1 ½)   
 Straw = good  too short (< ½ thumb)  too long (> 1 ½)

**Fit of shoe (width) – grasp test** good  too narrow  too wide

**Fit of shoe (depth)** good  too shallow

**90 GENERAL**

**Age of shoe** 0 – 6 months  6 – 12 months  > 12 months   
**Footwear style**

Walking shoe  Athletic shoe  Oxford shoe  Moccasin  Boot   
 Ugg-boot  High heel  Thong/flip-flop  Slipper   
 Backless slipper  Court shoe  Mule  Sandal   
 Surgical/bespoke  Other (specify): \_\_\_\_\_  
**Materials (upper)** leather  synthetic  mesh  other: \_\_\_\_\_  
**Materials (outsole)** rubber  plastic  leather  other: \_\_\_\_\_  
 Weight: \_\_\_\_\_ Length: \_\_\_\_\_ Weight/length: \_\_\_\_\_

**91 GENERAL STRUCTURE**

**Heel height =**  
 0 – 2.5 cm  2.6 – 5.0 cm  > 5.0 cm   
**Forefoot height (measured at point of the 1st and MTPJs) =**  
 0 – 0.9 cm  1.0 – 2.0 cm  > 2.0 cm   
**Longitudinal profile (heel – forefoot difference) =**  
 flat (0 – 0.9 cm)  small heel rise (1 – 3 cm)  large heel rise (> 3 cm)

**Last (center goniometer at 50% shoe length) =**  
 Straight (< 5°)  Semi-curved (5 – 15°)  Curved (> 15°)

**Fixation of upper to sole**  
 Board  Combination  Slip-lasted

**Forefoot sole flexion point**  
 at level of MTPJs  proximal to 1st MTPJ  distal to 1st MTPJ

**92 MOTION CONTROL PROPERTIES**

**Density**  
 Single  dual

**Fixation**  
 none  laces  straps/buckles  Velcro zips  Number of eyelets

**Heel counter stiffness (20mm above bottom or upper)**  
 no heel counter  minimal (> 45°)  moderate (< 45°)  rigid (0-10°)

**Midfoot sole sagittal stability**  
 Minimal (> 45°)  moderate (< 45°)  rigid (0-10°)

**Midfoot sole frontal stability (torsional)**  
 Minimal (> 45°)  moderate (< 45°)  rigid (0-10°)

**93 CUSHIONING**



### Sport Engagement Questionnaire

1. I am able to train for long periods of time:  
All the time  Most of the time  Sometimes  Not at all
2. I am very persistent in my sport activity:  
 All the time  Most of the time  Sometimes  Not at all
3. My sport activity is a self-challenge:  
 All the time  Most of the time  Sometimes  Not at all
4. I am enthusiastic about my sport activity:  
 All the time  Most of the time  Sometimes  Not at all
5. I am proud of the work I do:  
 All the time  Most of the time  Sometimes  Not at all
6. I feel full of energy during my training and matches:  
 All the time  Most of the time  Sometimes  Not at all
7. When I get up in the morning, I look forward to going to train:  
 All the time  Most of the time  Sometimes  Not at all
8. I am strong and vigorous in my sport activity:  
 All the time  Most of the time  Sometimes  Not at all
9. My sport activity is full of meaning and resolve:  
 All the time  Most of the time  Sometimes  Not at all
10. I am carried away by my sport activity:  
All the time  Most of the time  Sometimes  Not at all
11. I am happy when I am engrossed in my sport activity:  
 All the time  Most of the time  Sometimes  Not at all
12. I feel inspired whilst carrying out my sport activity:

All the time  Most of the time  Sometimes  Not at all

13. I am oblivious to everything going on around me when I train:

All the time  Most of the time  Sometimes  Not at all

14. I am absorbed in my sport activity:

All the time  Most of the time  Sometimes  Not at all

15. Time flies when I am training or competing:

All the time  Most of the time  Sometimes  Not at all