

## Chronological Versus Skeletal Age and its Relationship with Motivational Profiles and Psychological Skills Among Male Youth Football Players from South Africa

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### Abstract:

**Background:** Self-determined motivation (SDM) and psychological coping skills are important for the development of youth soccer players. This study examined the relationships between chronological age (CA), skeletal age (SA), and psychological variables among South African youth football players.

**Aim:** This research aims to compare the influence of CA and SA on SDM and psychological coping skills in South African male adolescent soccer players, enhancing understanding of how these age factors impact psychological development in youth football.

**Methods:** CA was calculated as the difference between each participant's birthdate and the assessment date. SA was estimated using the BAUSport™ system, a quantitative ultrasound device, based on the Tanner-Whitehouse 2 method by measuring bone density at three sites of the left hand. Data were collected from 109 male adolescent football players from three academies (mean CA: 14.8 ± 2.4 years, mean SA: 14.2 ± 2.1 years). Participants completed the Sport Motivation Scale-II (SMS-II) and the Athletic Coping Skills Inventory (ACSI-28).

**Results:** Significant differences in amotivation, external, and introjected regulations were observed across CA groups in the SMS-II, negatively affecting the Relative Autonomy Index (RAI). No significant differences were found in identified, integrated, or intrinsic regulations. SDM, as reflected by the RAI, declined with CA, reaching its lowest point at 15–17 years. Grouping by SA revealed significant differences only for amotivation and external regulation, with no significant differences in the other subscales or the RAI. For the ACSI-28, coachability was the only subscale that showed significant differences across both CA and SA groups. Correlations revealed that amotivation and coachability scores were positively associated with both CA and SA. Concentration showed a weak positive correlation with CA, and a weak negative correlation with SA, when the other age variable was controlled for.

**Conclusion:** Grouping players by their CA better captures differences in SDM across age groups than SA. The decline in SDM during mid-adolescence likely reflects the developmental challenges associated with maturation. Psychological characteristics in youth soccer players may be influenced by complex interactions that extend beyond age. Future research should use longitudinal designs with larger, more diverse samples to better understand how psychological skills evolve in youth athletes and contribute to their athletic development. While the measures used in this study have been validated, further work is needed to validate their cross-cultural and ecological validity for the South African context.

**Keywords:**

Air pollution, PM 2.5, control chart, anomaly detection.