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Gender Differences in Morphometric Predictors of Jumping Ability Among Ghanaian High School Athletes

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Purpose: This study examines gender-specific morphometric predictors of jumping ability in Ghanaian Senior High School athletes by: (1) creating gender-specific training models that boost performance while safeguarding musculoskeletal health, and (2) establishing safe anthropometric benchmarks for adolescent development. By analysing morphological factors (leg length, calf circumference, upper body dynamics), provides coaches with tools for talent identification for athletic performance and long-term physical wellbeing, for performance optimisation and health-aware training within Ghana's school sports programmes.
Methods: A correlational design was employed with 420 athletes (210 males, 210 females; aged 16–22). Twenty-two morphometric variables (BMI, 5 body length, 7 body circumference, 1 body diameter, and 7 skinfolds) were measured using standardised tools (non-elastic tape, stadiometer, electronic weighing scale, sliding calipers, and skinfold calipers), while jumping ability was assessed via jump tests. Stepwise multiple regression analyses were used to analyse key predictors for each gender, with strict adherence to ethical protocols (UCCIRB/CES/2022/70).
Results: The results revealed that leg length, calf circumference, and pectoral skinfold thickness were predictors of jumping ability in female athletes, explaining 35% of the variance ($R^2 = 0.35$, $p < 0.05$), while for male athletes, upper arm extension/flexion and leg length emerged as significant predictors, accounting for 32% of the variance ($R^2 = 0.32$, $p < 0.05$). Gender-specific predictive equations were developed for females, jumping ability = 1.414 + (0.012 × leg length) – (0.006 × pectoral skinfold) – (0.007 × calf circumference); and for males, jumping ability = 1.781 – (0.050 × upper arm extended) + (0.009 × leg length) + (0.033 × upper arm flexed).
Conclusion: This study identifies gender-specific predictors of jumping performance (leg length, calf circumference, upper body dynamics) and provides coaches with tools to enhance athletic ability while safeguarding musculoskeletal health in adolescents. For females, lower-body morphology and body composition (pectoral skinfold) guide power development while monitoring growth-related stress. For males, upper-limb and leg length parameters support balanced development and injury prevention during peak growth. These findings enable: (1) performance optimisation through tailored training, (2) injury risk reduction via biomechanically sound programming and safe progression benchmarks for resource-limited settings. Future research should explore pubertal stage interactions to refine health-focused training protocols.