

Abstract

Title: Selected physical abilities and golf skills in relation to the performance in elite junior golf players

Objectives: The aim of the study was to objectify the level of golf skills and physical abilities and to identify the inter-relationships between the individual determinants of performance during the long-term development of elite junior golf players. The sub-objectives of the thesis were to: develop a valid and reliable golf skills test battery; objectify the level of physical abilities in relation to energy generation during the golf swing; objectify the level of individual golf skills in relation to game performance; and identify key determinants of performance over the long-term development of elite junior golf players.

Methods: The thesis consists of one standardization study and two longitudinal-survey studies involving a total of 30 elite junior golfers (13-18 years old). Perennial year testing was conducted in laboratory and field conditions. Participants were measured in the level of individual golf skills using a developed golf skills test battery and also underwent measurements of anthropometric parameters, body composition parameters and physical abilities, more specifically muscle strength of the extensors and flexors of the knee and explosive muscle strength during vertical jumps.

Results: The developed golf skills test battery showed moderate to good reliability (ICC: 0,506 – 0,894) and good to excellent factorial validity for the individual golf tests. The junior golfers improved in physical abilities and body composition, but in terms of golf skills, they significantly improved only in drives distance and long approach shot accuracy ($p < 0,05$). A significant relationship was found between acceleration of club head speed and increase in body height ($r = 0,56$), increase in peak power of countermovement jump ($r = 0,55$) and squat jump ($r = 0,52$). A relationship approaching significance was found between acceleration of club head speed and increase in fat-free mass ($r = 0,42$; $p = 0,06$) and increase in peak torque of knee extensors at an angular velocity of $60^{\circ}.s^{-1}$ ($r = 0,44$; $p = 0,07$). In terms of golf skills, a significant relationship was found between an increase in game performance and an increase in long approach shot accuracy ($r = 0,48 - 0,88$), an increase in short approach shot accuracy ($r = 0,57 - 0,71$), an increase in drives accuracy ($r = 0,51 - 0,63$) and an increase in drives distance ($r = 0,56$).

Conclusion: The study developed a holistic valid and reliable golf skills test battery, allowing the isolation and assessment of individual golf skill levels. This enabled us to identify key skills

in golf and the relevance of each skill to the game performance. Based on the results, we can conclude that accuracy of long approach shots (105 - 165 m) is the most important skill in junior golfers in relation to performance, followed by accuracy of short approach shots (55 - 95 m), drive distance and accuracy, and short game from the bunker. There was no significant relationship with performance for short game from the fairway (< 30 m) and for putting. The present study suggests that the most important abilities for achieving maximum club head speed are body height in terms of anthropometric parameters, fat free mass in terms of body composition, and explosive lower limb strength in the vertical jump and maximal strength of knee extensors in terms of physical abilities. This study highlights the importance of long-term observation and analysis of performance determinants in golf using game statistics, selected physical tests, and the golf skills test battery developed as part of this thesis.

Keywords: performance analysis, golf skills, club head speed, lower limb strength, body composition