Competition performances are related to technique test measures in elite rifle shooters

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BACKGROUND

• Air rifle shooting is an Olympic sport
  – 10m shooting distance
  – 10 ring diameter 0.5 mm
  – 60 (men) or 40 (women) shots in the qualification round
  • 8 best shooters proceed to final stage
BACKGROUND

- Determinants of elite-level air rifle shooting performance identified in training situation
  - Stability of hold, especially horizontal direction
  - Aiming accuracy
  - Cleanness of triggering
  - Timing of triggering

- Regression equation explains 81% of the variation in shooting score

Ihalainen et al. 2016 SJMSS
BACKGROUND

• There are no studies reporting how shooting technical components change over time
  – how changes relate to performance enhancement

• Shooting technical components have been related to the shot scores achieved in the testing situation
  – competition anxiety affects performance outcomes in shooting competitions
    • Sade, S. at al. 1990 Percept Mot Skills

• The purpose of this study was to
  – describe the changes caused by long-term professional shooting training
  – investigate the relationship between the changes in shooting technique and performance changes
  – examine the relationship between shooting technique test results and actual competition performances
METHODS

- 8 male and 9 female Finnish national team air-rifle shooters
- Subjects measured over 3 consecutive seasons between the years 2009 and 2014
- All subjects participated regularly in international and national air-rifle competitions
METHODS

• Testing conditions according to the official rules and regulations in ISSF competitions
• Shooting score and aiming point trajectory variables recorded with Noptel
• Postural balance measured with Metitur force platform
• Competition results collected from all competitions
RESULTS

• A significant main effect of time (One-way repeated-measures ANOVA) in
  – mean test scores ($P = .019$)
  – stability of hold (DevX, $P = .002$)
  – aiming accuracy (COGhit, $P = .014$),
  – cleanness of triggering (ATV, $P = .002$)
  – postural balance variables

• These aspects of shooting technique developed during the 3-year period

• No significant effects of time on
  – competition mean score ($P = .364$)
  – competition maximum score ($P = .318$)
  – timing of triggering (TIRE, $P = .418$).
RESULTS

• Stability of hold measured in testing situation related to the athletes’ competition results
  – changes in stability of hold toward a more stable hold improved competition results

• Stability of hold and cleanness of triggering were also related to postural balance

Ihalainen, S. et al. 2016 IJSPP
DISCUSSION AND CONCLUSIONS

• Improvement in the test shooting scores without simultaneous improvement in the competition shooting scores
  – Psychological factors in the competition situation
• Stability of hold and cleanness of triggering values correlated with the season competition performances
  – Improvements in these variables resulted in enhanced performances in competitions
• Elite rifle shooters should focus on developing stability of hold and cleanness of triggering
FUTURE PERSPECTIVES

- Air rifle competition measurements conducted and manuscript in preparation
  - Are the same shooting technical components valid in competition situation as in the training situation
  - How do these components change from training to competition, how do these changes relate to changes in performance

- Biathlon measurements conducted and manuscript in preparation
  - Determinants of biathlon shooting performance in rest and after intense exercise
  - Changes in these determinants from rest to exercise, and relation of these changes to changes in shooting performance
Thank you for your attention!

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