Development of the interval endurance capacity of talented youth field hockey players

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Introduction
Field hockey is a high intensity non-continuous game in which players at the elite level need a well-developed interval endurance capacity to carry out explosive actions, such as sprinting, in combination with the ability to recover well during low-intensity activities, such as walking (e.g., Aziz et al., 2000). So far, the level of the interval endurance capacity of youth field hockey players who want to make it to the top is unknown, as well as its relation with level of performance. Therefore, the purpose of this study was to gain more insight into the mechanisms that underlie the development of the interval endurance capacity in talented youth field hockey players in the 12-19 age-band.

Methods
The Interval Shuttle Run Test (ISRT; Lemmink et al., 2004) was used to measure the interval endurance capacity of 217 talented youth field hockey players (107 girls; 110 boys) for three consecutive years resulting in 377 complete measurements. All participants were playing at the highest competition level for their age. Additionally, players were classified in elite and sub-elite players. Elite players were part of a selection team of the Dutch Field Hockey Association (KNHB) in contrast to sub-elite players who were part of a selection team of their club only. Anthropometrics (height, lean body mass, percentage of body fat), training characteristics, and motivation were assessed. Longitudinal changes in interval endurance capacity were investigated using the multilevel modelling program MlwiN (Goldstein et al., 1998).

Results
A consecutive 7-year development pattern of the interval endurance capacity was estimated for elite and sub-elite boys and girls (see Figure). It was found that a polynomial model of order 2 adequately represents the variance structure of the data (deviance 3394.0, difference with a fully saturated model of 43.9 on 36 degrees of freedom, \(p = 0.17\)). The fixed part of the model contains a different intercept and linear age term for boys and girls, and a common quadratic term; the random part of the model as a common level 2 (between-individual) variance and gender-specific level 1 (measurement) variances. The model was significantly improved by including differential effects of performance level for age and gender (deviance 3367.8, difference with previous model 26.2 on 3 degrees of freedom, \(p < 0.01\)). No effect was found for height and lean body mass, but a significant negative effect was found for percentage body fat (\(t = 4.423, p < 0.01\)). A positive significant effect was found for additional training (\(t = 3.374, p < 0.01\)), whereas no effect was found for field hockey training as such. Finally, a positive significant effect of motivation was found (\(t = 2.726, p = 0.003\)). The coefficients of the variables percentage body fat, additional training hours, and motivation are unstandardized. Their effects, however, can be interpreted such that an additional training hour could compensate for 1.23 % body fat (1.093/0.889), or likewise, is equivalent to 0.225 points on the motivation scale (1.093/4.86).

Discussion/Conclusion
Percentage body fat, additional training hours, and motivation appear to have a significant effect on ISRT scores of talented youth field hockey players. Nevertheless, the between-persons variation is considerable. During adolescence, both male and female elite youth field hockey players have a more promising development pattern of their interval endurance capacity than sub-elite youth field hockey players. Evidently, a field hockey performance can be broken down into many multidimensional performance characteristics, from which the interval endurance capacity is only one (Elferink-Gemser et al., 2004). In their young adolescent years, players still seem to be able to compensate for less developed performance characteristics such as their interval endurance capacity. Towards expertise, however, performance demands increase and all players need to meet high values for all performance characteristics, including the interval endurance capacity.

References