

Pace versus prediction: Is the age of the runner associated with success in a big city marathon?



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ABSTRACT

INTRODUCTION: During closed-loop exercise, such as marathon running, the athlete adopts a pacing strategy to optimise performance. Exercise intensity (speed) is modulated in response to afferent signals from biological and psychological systems, which relay the responses of the exercise to the brain where efferent, homeostatic-orientated responses are issued. Thus a conscious perception of effort is continuously compared to a sub-conscious template which is derived from previous exposure to the sensations of pain and fatigue and expected exercise duration. The purpose of this study was to explore the association between pacing strategy/race outcome and biological age of the athlete. **METHODS:** Following local institutional ethical approval n = 777 runners who were competing in the 2015 London Marathon volunteered and agreed to participate. Age, gender and experience of the participants were ascertained using an online survey and opportunistic questionnaire surveying at the pre-marathon registration event. Age was stratified according to the following classifications: 18-39 yrs, 40-49 yrs, 50-59 yrs and >60 yrs. Additionally, participants were asked to predict their marathon finish time (PT) serving as a proxy for end-point and compared to actual finish time (FT). All participating runners 5km splits and FT were downloaded from the race website, converted to speed and then normalised (%) to the final split time/speed ($\text{m}\cdot\text{s}^{-1}$). **RESULTS:** Significant differences were observed for all age groups ($p < 0.001$) between FT and PT except >60 yrs ($p = 0.153$). Non-significant differences observed between age groups across all 5km splits ($p > 0.05$), but within group differences observed between 10-15km for all age groups ($p < 0.05$). Medium to large effect sizes (ES) were observed at 30-35km for 18-39 yrs (ES = 0.37), 40-49 yrs (ES = 0.34), 50-59 yrs at 25-30km (ES = 0.37) and 30-35km (ES = 0.42) and >60 yrs at 30-35km (ES = 0.53). **CONCLUSIONS:** These data suggest that the biological age of the athlete is associated with the implementation of a successful pacing strategy and may be a function of the accrued training volume and/or emotional-event development. Athletes are encouraged to pace themselves with older (>60 yrs) athletes with similar PT's.

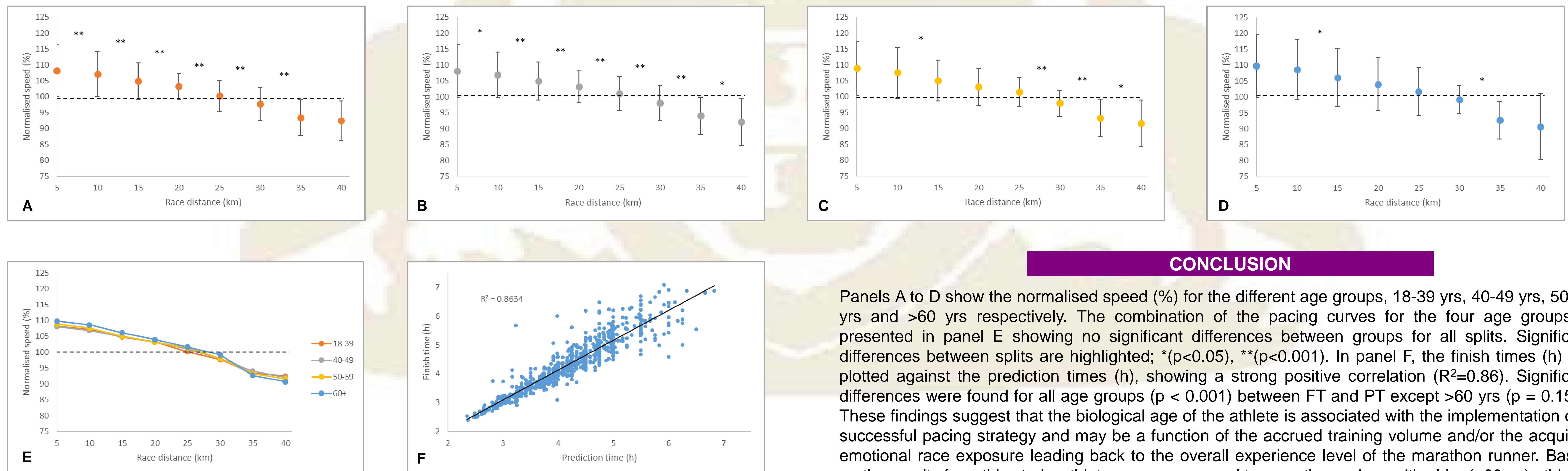
INTRODUCTION

Exercise performance can be optimised by adopting a pacing strategy; in long duration events, such as marathon running, a more even based strategy has been suggested to produce the best results (*Abbiss et al 2008. Sports Med 38(3): 239-252*). In a teleoanticipatory manner, the athlete uses the known end-point of the marathon to regulate the pace depending on intrinsic (i.e. physiological, biomechanical, and cognitive) as well as extrinsic (i.e. environmental, and course topography) signals to prevent a homeostatic imbalance (*Hampson et al 2001. Sports Med 31(13): 935-952*). Thus, a conscious perception of effort is continuously compared to a sub-conscious template which is derived from previous exposure to the sensation of pain and fatigue and the expected race duration (*Foster et al 2009. Br J Sports Med 43: 765-769*). Therefore, the aim of this study was to explore the association between the biological age of the athlete, the adopted pacing strategy and the attained race outcome in a big city marathon.

METHOD

Following local institutional ethical approval n = 777 runners who were competing in the 2015 London Marathon volunteered and agreed to participate. Age, gender and experience of the participants were ascertained using an online survey and opportunistic questionnaire surveying at the pre-marathon registration event. Age was stratified according to the following classifications: 18-39 yrs (n = 404), 40-49 yrs (n = 273), 50-59 yrs (n = 82) and >60 yrs (n = 18). Additionally, participants were asked to predict their marathon finish time (PT) serving as a proxy for end-point and compared to actual finish time (FT). All participating runners 5km split times and FT were downloaded from the race website, converted to speed and then normalised (%) to the mean overall race speed ($\text{m}\cdot\text{s}^{-1}$) to explore differences in pacing strategy between the age classifications.

RESULTS



CONCLUSION

Panels A to D show the normalised speed (%) for the different age groups, 18-39 yrs, 40-49 yrs, 50-59 yrs and >60 yrs respectively. The combination of the pacing curves for the four age groups is presented in panel E showing no significant differences between groups for all splits. Significant differences between splits are highlighted; *($p < 0.05$), **($p < 0.001$). In panel F, the finish times (h) are plotted against the prediction times (h), showing a strong positive correlation ($R^2 = 0.86$). Significant differences were found for all age groups ($p < 0.001$) between FT and PT except >60 yrs ($p = 0.153$). These findings suggest that the biological age of the athlete is associated with the implementation of a successful pacing strategy and may be a function of the accrued training volume and/or the acquired emotional race exposure leading back to the overall experience level of the marathon runner. Based on the results from this study, athletes are encouraged to pace themselves with older (>60 yrs) athletes with similar PT.