

## University-level Soccer Players Adopt a Unique 'Pacing Strategy'

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Dear Editors,

We were interested to read the recent article by Mugglestone et al. [9], which examined high-speed running performances of University soccer players during the early stages of each half in competitive match-play. The data is a welcome addition to a small body of work examining the within-match trends in soccer work rate, with particular reference to the half-time interval and its impact upon players' subsequent physical performances. In this letter we direct the authors to several relevant studies that were not considered in their article [1,3,11,12]. We hope that by highlighting these research contributions to the authors and readership, interpretation of within-match analysis trends can be undertaken with necessary due care and caution.

The authors' main observations were no differences in high-speed running parameters between the corresponding periods at the start of each half (5- and 15-min periods). This observation is in direct contrast with previous time-motion analysis studies [1,3,7,11,12]. Mugglestone and colleagues [9] reconciled that the method of time-motion analysis may in-part explain this discrepancy. However, this is unlikely as previous studies reporting between-half differences utilised a wide-range of techniques, including video-analysis [7], semi-automated image tracking [1,11,12], and global positioning systems [3]. Player standard, acute preparation routines, pacing strategies, or methodological concerns of 1Hz GPS systems might contribute to the exclusive nature of the authors' data. Notwithstanding, we urge researchers and practitioners to interpret between-half contrasts of this nature carefully as the validity of using the opening phase of the match as a criterion for comparisons is questionable given its intense and frantic nature [3]. Furthermore, passive half-time intervals cannot be assumed in time-motion analysis studies, given the increasing trend for re-warming activities during this period [10].

On a practical level, the absence of reduced physical performances at the start of the second half led to the authors questioning the value of half-time re-warm-up strategies that have been recommended [4,5,8,13] and translated into practice [10]. We feel that such a strong assertion made from this data set is unwarranted. The objective of a half-time re-warm-up is not simply to enhance the work-rate of a player, rather to optimise their capacity to undertake high-intensity actions, and to be more resistant to injury during the early stages of the second half. With this in mind we would like to take this opportunity to direct the authors to recent evidence in controlled laboratory settings, demonstrating performance improvements and reduced injury risk with re-warming strategies suitable for applied settings [4,13]. Although players and their coaches often lack motivation to perform a re-warm-up at half-time, practitioners have identified a 3-minute window of opportunity [10], and preliminary data suggests that such activities are not detrimental to physical performances at the end of the match [4].

Mugglestone and colleagues [9] conclude that the absence of between-half differences might be indicative of a distinct pacing strategy. Unfortunately the

authors do not elaborate on this resolution. Yet it is an attractive hypothesis and merits further exploration. Based on the time-motion analysis data reported in the paper, we agree that pacing phenomena might explain the discrepancy between University players with professional [1,11,12] and youth players [3]. For example, the amplitude of temporary work-rate fluctuations during match-play are seemingly greater in higher standard professional players when compared to lower ranked and also elite youth players [1,2,7,8]. Overall, the work-rate of an elite, professional soccer match depicts a positive pacing strategy during each half [12], whereby the proportion of HSR performed in the first 15-min of each half is often the greatest [1,7,12]. However, the University players covered only 16% of the total half high-speed running in the opening 15-min periods of each half, implying a negative pacing strategy. To our knowledge this is an unprecedented trend in soccer. Might this explain the unique observation that HSR parameters were not reduced after a passive half-time interval? We would encourage the authors to re-examine their within-match work rate trends in more detail and encourage further dialogue and research on this topic.

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