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Letter to editor

Differences in the Number of Accelerations between Small-Sided Games and Friendly Matches in Soccer

Dear Editor-in-Chief

Small-sided games (SSG) are widely used in soccer training, both for developing skills and for improving performance, and they have become one of the most popular training methods across all ages and levels (Hill-Haas et al., 2011). Drills of this kind present players with situations that closely resemble what they will encounter in real matches, and they reproduce many of the physical, physiological and technical demands of competitive soccer (Little, 2009).

Comparison of movement patterns between SSG and friendly matches (FMs) reveals that although the former do simulate certain match patterns, it appears that players in SSG engage in less high-intensity activity (Casamichana et al., 2012). Although research on player accelerations has provided useful information (Aughey, 2011) the profile of accelerations in SSG has yet to be compared with what occurs in an actual match. Consequently, the aim of the present study was to compare SSG and FMs with respect to the number of accelerations in different intensity ranges.

Twenty-seven semi-professional male soccer players (Spanish Third Division) took part in the study (mean ± SD age, 22.8 ± 4.5 years; height, 1.77 ± 0.05 m; weight, 74.4 ± 4.8 kg). They were all members of the same team competing at regional level, with a mean playing experience (federation level) of 12.5 years. All players were notified of the research design and its requirements, as well as the potential risks and benefits. They all provided their informed consent before the study commenced. The Ethics Committee of the University of the Basque Country gave its institutional approval for the study.

Match activities were assessed in seven different 11-a-side FMs. At least 72 hours elapsed between each match. The seven FMs yielded a total of 27 recordings, equivalent to 54 hours of analysis. Given that injuries and substitutions occur during matches, a recording was only included in the analysis if it lasted at least 15 minutes.

The SSG demands were examined over a five-week period (from January to February 2010) by monitoring nine training sessions, which were held at least 48 hours apart. Each training session involved three SSG formats (such that the total n = 27: the formats varied were number of players per team: 3 vs. 3, 5 vs. 5, and 7 vs. 7; 3 type of pitch: without goals, with two regulation goals and goalkeepers, and with two small goals but no goalkeepers; and three bouts), producing a total of 217 recordings. This was equivalent to 14.5 hours of analysis. The playing area relative to each player was maintained constant (210 m^2) across all three SSG formats, as was the length:width ratio of the pitch (1.45:1). All the SSG lasted four minutes (3 repetitions of 4 min), with a two-minute passive rest between repetitions.

The number of changes in speed (accelerations) occurring in SSG and FMs were obtained using GPS devices (MinimaxX n.4.0, Catapult Innovations), which enable movement patterns in sports to be monitored in a valid and reliable manner (Varley et al., 2012). Specifically, we used tri-axial sensor accelerometers (Kionix: KXP94) with a sampling rate of 100 Hz (Boyd et al., 2013). In the weeks before the study, the players were familiarized with the use of these devices and with the SSG formats used.

In line with previous studies (Aughey, 2010, 2011) we monitored the *accelerations* completed within different intensity ranges: 1.0-1.5 $m{\cdot}s^{-2}$, 1.5-2.0 $m{\cdot}s^{-2}$, 2.0-2.5 $m{\cdot}s^{-2}$ and greater than 2.5 $m{\cdot}s^{-2}$. Although these categories could not be established according to the maximal acceleration achieved by the players studied, Aughey (2011) found using laser technology that semi-professional athletes in team sports achieve maximal acceleration values between 2.5 and 2.7 $m{\cdot}s^{-2}$. In order to normalize the results and enable comparisons to be made between different durations, the number of accelerations in both SSG and FMs were normalized to one hour of activity.

Figure 1 shows the number of accelerations in both SSG and FMs. There were significant differences between SSG and FMs in all but one of the intensity ranges: 1.0-1.5 $m{\cdot}s^{-2}$ ($T_{(275)}$ = 6.787, p = 0.001), 1-5-2.0 $m{\cdot}s^{-2}$ ($T_{(275)}$ = 2.967, p = 0.003), and 2.0-2.5 $m{\cdot}s^{-2}$ ($T_{(275)}$ = 2.039, p = 0.042), the exception being >2.5 $m{\cdot}s^{-2}$ ($T_{(275)}$ = 1.996, p = 0.053).

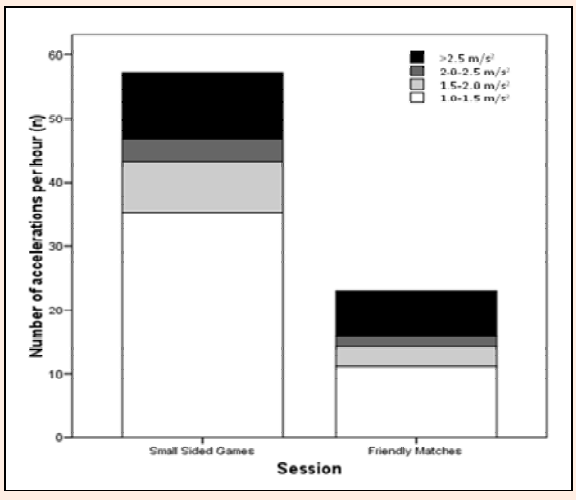

Figure 1. Number of accelerations in different intensity ranges in small-sided games and friendly matches.

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To our knowledge this is the first study in the soccer context to compare the number of accelerations made in SSG and FMs. The results show that the number of accelerations was higher during SSG used as part of training than it was during actual matches. This finding could be related to greater neuromuscular fatigue and increased metabolic cost during matches (Osgnach et al., 2010), although the present study did not monitor the players' heart rate.

When studying player behaviour and performance it is important to consider aspects such as acceleration, because although sprints and associated variables (such as mean sprint distance and duration) are less relevant in small areas such as those used in SSG (Casamichana et al., 2012), accelerations are common. Therefore, the failure to quantify them could lead us to underestimate the amount of high-intensity activity engaged in by players (Varley and Aughey, 2013).

Julen Castellano ✉ and David Casamichana
University of the Basque Country (UPV/EHU), Faculty of Physical Activity and Sport Sciences, Spain

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✉ **Julen Castellano Paulis**
University of the Basque Country (UPV/EHU), Faculty of Physical Activity and Sport Sciences, C/ Lasarte 71, 01007 Vitoria-Gasteiz, Álava, Basque Country, Spain
E-mail: julen.castellano@ehu.es