Introduction

In photocell timing, the athlete must start a certain distance back from the initial timing gate to avoid premature triggering caused by a typical starting posture with a forward lean of the upper body. Thus, the athlete is already travelling at a certain speed as he/she passes the starting line, termed as flying start. A review of published studies monitoring speed performance reveals considerable variation in foot placement distance behind the initial timing gate. Therefore, the aim of the present study was to generate correction factors across a range of flying start distances used in sprint testing with photocells. Such information should facilitate more meaningful comparisons of published sprint performance results.

Methods

Forty-four well-trained junior soccer players (14 females and 30 males, age 18 ± 1 yr, height 175 ± 8 cm, body mass 68 ± 9 kg) volunteered to participate in the present study. They performed sprint testing on an indoor 40-m sprint track at the Norwegian Olympic Training Center. 5, 10 and 20-m sprint times with 0.5, 1, 1.5, 2, 5, 10, 15 and 20 flying start were recorded twice for each athlete. Furthermore, 25 and 30 m flying starts were conducted for the 5 and 10 m sprints. The rationale for the design was to facilitate reliability analyses and minimize possible fatigue effects across sprints. The 5, 10 and 20-m sprint times with varying flying start distances formed the basis for correction factor generation.

Results and discussion

We observed that varying flying start distances can generate sprint time differences of up to 0.66 s with dual-beamed photocell timing. The following equation can calculate 20-m sprint time differences (y) across flying start distance (x), where 0.5 m flying start is used as reference: 

\[ y = 0.718 \cdot 0.220^x - 0.653 \]

Corresponding equation for 10-m sprints was 

\[ y = 0.659 \cdot 0.225^x - 0.602 \]

and for 5-m sprint 

\[ y = 0.718 \cdot 0.220^x - 0.653 \]

At the extreme, a 20-m sprint time of 3.0 s measured with 0.5 m flying start is equivocal to 2.35 s when using a 20-m flying start. Thus, the flying start distance used can result in greater time differences than what is possible to achieve by specific conditioning. Increasing the flying start distance from 0.5 to 1.5 m leads to a performance enhancement of 0.15 s, which represents the difference between the 50th and 95th percentile in male soccer players. For internal comparisons of performance in a training monitoring setting, changing the flying start distance is unacceptable.

![Figure 1: The calculated relationship between flying start distance and time saving, where 0.5 m flying start is used as reference](image-url)