

## ESTIMATING SAMPLE SIZE FOR INTERVENTION STUDIES INVOLVING MATCH ACTIVITY DATA AS INDICATORS OF SOCCER PERFORMANCE

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### **Introduction**

Match-to-match variability in performance characteristics of elite soccer players is high (1). This variability influences sample size requirements in intervention studies in which match activity variables are primary outcomes. Averaging match activity variables over multiple matches before and after an intervention will decrease the sample size (number of players) required to detect a given effect. The aim of the present study therefore was to quantify the influence of increasing the number of matches pre- and post-intervention on sample size estimation in typical intervention designs.

### **Methods**

A total of 120 individual match performance observations (high speed running distance, as an example outcome) were undertaken on 30 outfield players (4 successive games per player) competing in the English Premier League in 2005/2006 (Prozone®, Leeds, England). These data were used to generate the requisite parameters to inform the sample size estimations: between-subject SD and within-player variability (reliability). We estimated the sample size required to detect a standardised mean difference of 0.2 between-subject standard deviations (Power = 90%, 2P = 0.05) based on mean high-speed running distance over equal numbers of matches before and after the intervention (up to 10 repeat matches).

### **Results**

In the one group design a sample size of 122, 61, 41, 31, 25 and 13 players was estimated when the number of pre and post matches used to determine performance equated to 1, 2, 3, 4, 5 and 10, respectively. When the number of pre-matches was maintained at 10, using only 5 matches following the intervention increased the sample to 19. In the two-group design, using 1, 2, 3, 4, 5 or 10 matches in pre and post intervention required a sample size of 214, 113, 77, 59, 47 and 24 players in each group. The use of 10 and 5 matches pre and post intervention, respectively, increased the sample to 36.

### **Conclusions**

The present findings demonstrate that with an equal number of pre and post matches used to define match performance, doubling the number of matches effectively halves the sample size required to achieve the desired power and precision of estimation of the effect. These observations provide a framework for estimating the sample size needed to determine the impact of any intervention (e.g. training) that utilises the activity profile within a game as an indicator of performance.

### **References**

1. Gregson W, Drust B, Atkinson G, Di Salvo V. (2010). *Int J Sports Med*, 31, 237-42.