**Section III – Sports Training**

# The Impact of a Good Season Start on Team Performance in Elite Handball

*by*
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The aim of the current study was (i) to identify how important was a good season start in relation to elite handball teams' performance, and (ii) to examine if this impact was related to the clubs' financial budget. The match performances and annual budgets of all teams were collected from the Spanish Professional Handball League during ten seasons. The dependent variable was the difference between the ranking of each team in accordance to the annual budget and the ranking of each team at the end of the season. A k-means cluster analysis classified the clubs according to their budget as High Range Budget Clubs (HRBC), Upper-Mid Range Budget Clubs (UMRBC), Lower-Mid Range Budget Clubs (LMRBC) and Low Range Budget Clubs (LRBC). Data were examined through linear regression models. Overall, the results suggested that the better the team performance at the beginning of the season, the better the ranking at the end of the season. Each position in the ranking above expected in accordance to the budget of the teams in Rounds 3, 4 or 5 improved by 0.47, 0.50 or 0.49, respectively, in the ranking at the end of the season (p<0.05). However, the impact of the effect depended on the clubs' annual budget. For UMRBC, LMRBC and LRBC a good start to the season had a positive effect on the final outcome (p<0.05). Nevertheless, for HRBC, a good or a bad start of the season did not explain their final position. These variables can be used to develop accurate models to estimate final rankings. UMRBC, LMRBC and LRBC can benefit from fine-tuning preseason planning in order to accelerate the acquisition of optimal performances.

*Key words*: handball, financial capacity, team performance, initial results.

## Introduction

One of the aims of performance analysis is to provide an opportunity to predict sport performance in order to be well prepared for the future competitive scenarios (Volossovitch, 2013). In fact, a fundamental question in this topic is whether research can be reliable enough to predict the future performance, rather than merely recounting the past (Sampaio and Leite, 2013).

Unsurprisingly, the matches are widely discussed amongst fans, sports journalists, academic experts and elite coaches, sometimes using player and team evaluation criteria based on match observation and statistics. These information sources are rather subjective and represent poorly the teams' performance as they tend to focus too much on players' offensive technical performances (e.g., the number of shots, the number of successful passes), disregarding how teams can overcome the sum of their individual counterparts. The team performance is characterized by the fact that the total outcome is more than the sum of its parts. Therefore, team playing is not only the simple aggregation of

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players' task-relevant abilities, but also the intra-team interactions which are likely to influence performance. With regard to soccer, all tasks are complementary to reach a successful outcome; therefore, the optimal strategy is to combine players who master different skills into a team.

Research covering the relationships between player salaries and performance indicates that the number of goals, the number of assists and minutes of play are key determinants of player salaries. However, an important point undermining the accuracy of these predictions is the limitation of using only past information to predict future player performance.

In handball, the preparation phase for a long competitive season (several months) is usually rather short (a few weeks) and often includes a higher frequency of training sessions (2 daily units). A common strategy used during this period is to promote friendly preparation matches against opponents of different levels, in addition to the training sessions.

During the preseason, the coaching staff is required to make important decisions on planning the achievement of players' optimal fitness and tactical team coordination (Folgado et al., 2014; Tessitore et al., 2007). These preseason decisions concern the number of training sessions, the workload dynamics' in each session or the number and type of opponents when playing friendly matches. For some coaches, the preseason should be based on higher intensity workloads that improve the players' fitness levels faster consequently leading to the first official game in the best possible condition. Another rationale to anticipate the players' optimal fitness levels and increase the probability of reaching positive results sooner is related to psychological and social behavior (Carron et al., 2002; Feltz and Lirgg, 1998; Kozub and McDonnell, 2000; Ronglan, 2007). In fact, a positive beginning will likely increase player and team self-confidence and serve as an important catalyst to the forthcoming games and, ultimately, to the season outcome. However, the opposite view is also proposed. Some coaches and scientists suggest that the preseason should be based on lower intensity workloads in order to avoid a decrease in the players' fitness levels towards the end of the season (Ekstrand et al., 2011; Ekstrand et al., 2004).

In a recent paper, Lago-Peñas and Sampaio (2015) found that in soccer the better the team performance at the beginning of the season, the better the ranking at the end of the season. However, the impact of the effect depended on the clubs' annual budget, with lower budgets being associated to greater importance of having a good season start. According to the authors, these clubs can benefit from fine-tuning preseason planning in order to accelerate the acquisition of optimal performances. However, to our knowledge no studies have analyzed the relationship between the preseason, a good or a bad season start and the final outcome in handball. In fact, it should be recognized that the quantity of statistical and scientific work in handball performance analysis lags far behind that done for basketball, baseball, ice hockey or soccer (Volossovitch, 2013).

The clubs' budget is likely to have a major influence on the teams' short, mid and long-term season success. There is considerable evidence of a high correlation between aggregate player spending and the league performance of teams (Szymanski, 2000; Kuper and Szymanski, 2009). Thus, the higher-range budget clubs can count on higher-level players, capable of adapting differently to the new season determinants of team performance (either from a physiological or a tactical perspective). For soccer clubs this is an important issue, as the recruitment of new players for a team is accomplished by using information from past performances obtained when playing for previous clubs. Each new season actually represents a new beginning in the process of building synergies towards a collective performance which enables achieving of success.

Therefore, the aim of the current study was (i) to identify how important was a good season start in relation to elite handball teams' performance, (ii) to examine if this impact was related to the clubs' financial budget, and (iii) to develop a model to estimate final rankings according to these previous variables.

## Material and Methods

### *Participants*

Performances of all teams from the Spanish Professional Handball League (ASOBAL) during ten seasons (from 2003-2004 to 2013-2014 seasons) were analysed. The number of teams

involved in the study was 25. The number of seasons recorded for each observed team ranged from 1 (4 teams) to 10 (5 teams). All teams played a balanced home and away schedule (16 teams, 30 home and 30 away games). The team performance variables were obtained from the ASOBAL League official website (http://www.asobal.es) and included: (i) the ranking of each team in Round 3, 4 and 5 of the season; (ii) the final ranking of each team in the season. Additionally, the annual budget of the teams was recorded (€1.81m ± 1.98, min: €270.000, max: €9m).

### Procedures

Data were obtained from the ASOBAL League official website (http://www.asobal.es), and collected by professional analysts. Previous studies had also used data from the same source (i.e., Gomes et al., 2014; Gómez et al., 2011; Lago-Peñas et al., 2013; Oliveira et al., 2012). The reliability of the analysts coding these matches had been previously determined for an array of variables and the Kappa (K) values ranged from 0.95-0.98. The study was approved by the University of Vigo`s ethics committee.

### Measures

The independent variable was the performance reached by the teams in the 3, 4 and 5 first Rounds of the competition. The variable used was the difference between the classification of each team in accordance with the annual budget (from 1 to 16, 1 being the highest annual budget and 16 the lowest) and the ranking of each team in Round 3, 4 and 5 of the season. Thus:

*Performance Round 3, 4 or 5 = Ranking of the team in accordance to the annual budget – Ranking in Round 3, 4 or 5.*

The dependent variable was the final ranking of the teams at the end of the season. The variable was the difference between the ranking of each team in accordance to the annual budget (from 1 to 16, 1 being the highest annual budget and 20 the lowest) and the ranking of each team at the end of the season. Thus:

*Performance = Ranking of the team in accordance to the annual budget – Ranking at the end of the season.*

A value of 0 means that the team has finished the season in the same position that would be expected in accordance to its financial budget; a negative value means that the team has finished in a worse ranking than would be expected in accordance to its financial budget and,

finally, a positive value indicates that the team observed has finished in a better ranking than would be expected in accordance to its financial budget. For example, if a team were in the tenth position in the budget ranking and finished the championship in the twelfth position, the value of the dependent variable would be -2; if its final ranking were eighth, the dependent variable would be +2; finally, if its final ranking were tenth, the dependent variable would be 0.

### Analysis

For each season, a *k*-means cluster analysis was performed to identify a cut-off value to classify clubs into four different groups depending on their budget as: High Range Budget Clubs (HRBC), Upper-Mid Range Budget Clubs (UMRBC), Lower-Mid Range Budget Clubs (LMRBC) and Low Range Budget Clubs (LRBC), as it had been suggested by Lago-Peñas and Sampaio (2015).

Effects of Team Performance (TF) at the start of the season on the Final Outcome (FO) were examined using a linear regression model. When estimating the regression models, we found no evidence of heteroscedasticity in residuals or multicollinearity among regressors. Moreover, the RESET test (Ramsey, 1969) did not reveal specification problems (RESET stands for a regression specification error test). The detection of heteroscedasticity was done according to the White's test which is used to establish whether the residual variance of a variable in a regression model is constant. To test for constant variance, one regresses the squared residuals from a regression model onto the regressors, the cross-products of the regressors and the squared regressors. One then inspects the $R^2$-value. Multicollinearity was checked using the Klein's rule, which states that serious multicollinearity is present if the $R^2$-value of the regression of a predictor variable on other predictor variables is higher than the $R^2$-value of the original regression. Since teams are present between 4 and 10 times in the sample, single players are entered several times in the calculations. As a consequence, all standard errors are clustered by players to account for non-independence in the data structure. Positive or negative coefficients indicate a better or worse chance for a good ranking at the end of the season, respectively. $\beta_1$ is the intercept and $\beta_2$ is the impact of the team performance.

Finally, ε₁ is the disturbance term. The model is as follows:

$$FO = \beta_1 + \beta_2 \cdot TF + \varepsilon_1$$

Analyses were conducted using STATA (version 12.0, Texas, USA). For all analyses statistical significance was set at *p<0.05*

## Results

Table 1 presents the influence of the team performance in Round 3, 4 and 5 on the ranking at the end of the season (Insert Table 1 near here, please). When all the teams are taking jointly into account, a good start of the season had a positive effect on the final outcome of the teams (p<0.01). Each position in the ranking above expected in accordance to the budget of the teams in Rounds 3, 4 or 5 improved by 0.47, 0.50 or 0.49 the ranking at the end of the season. Figure 1 shows a strong correlation between the team performance in Round 3 and the ranking at the end of the season

For UMRBC, LMRBC and LRBC a good start of the season had a positive effect on the final outcome. The impact of the dependent variable was higher for UMRBC than for LRBC or LMRBC. For UMRBC, each position in the ranking above expected in accordance to the budget of the teams in Rounds 3, 4 or 5 improved by 0.89 (p<0.01), 0.83 (p<0.05) and 0.82 (p<0.05) the ranking at the end of the season. For LMRBC, each position in the ranking above expected in accordance to the budget of the teams in Rounds 3, 4 or 5 improved by 0.35, 0.34 and 0.44 (p<0.05) the ranking at the end of the season. For LRBC, each position in the ranking above expected in accordance to the budget of the teams in Rounds 3, 4 or 5 improved by 0.44, 0.52 and 0.45 (p<0.01) the ranking at the end of the season. However, for HRBC a good or a bad start of the season does not explain their final position. Table 2 displays the simulated final outcome of the team in accordance with the results shown in Table 1. The better the team performance in Round 3, the better the ranking at the end of the season. The findings of the simulation suggest that a good or a bad start of the season could determine the final outcome for UMRBC, LMRBC and LMRBC.
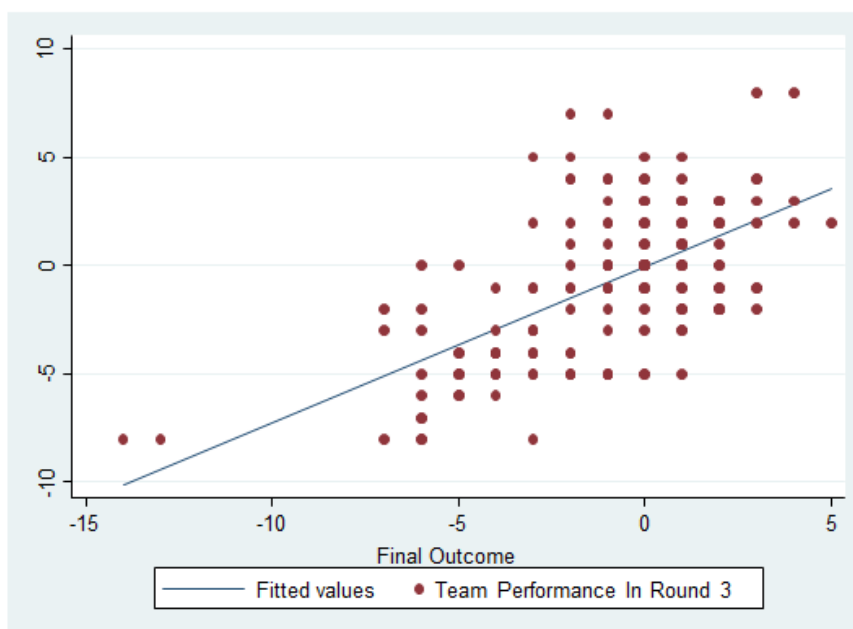


Figure 1

*The impact of the team performance in Round 3 on the ranking of the clubs at the end of the season*

**Table 1**

*The impact of the team performance in Rounds 3, 4 and 5 on the ranking of the clubs at the end of the season depending on the budget of the clubs*

| | Models | | | | |
|---|---|---|---|---|---|
| Dependent Variable | All teams | HRBC | UMRBC | LMRBC | LRBC |
| Team Performance in Round 5 | 0.49 (0.09)** | -0.08 (0.15) | 0.82 (0.24)* | 0.44 (0.15)* | 0.45 (0.09)** |
| Constant | -0.52 (0.24)* | -0.19 (0.26) | 0.54 (1.02) | −0.32 (0.41) | -0.87 (0.36)* |
| Adjusted R² | 0.37 | 0.05 | 0.53 | 0.27 | 0.38 |
| Number of observations | 160 | 21 | 24 | 45 | 70 |
| Team Performance in Round 4 | 0.50 (0.08)** | -0.10 (0.15) | 0.83 (0.30)* | 0.34 (0.16)* | 0.52 (0.08)** |
| Constant | -0.50 (0.24)* | −0.21 (0.27) | 0.81 (1.25) | −0.29 (0.44) | -0.87 (0.32)* |
| Adjusted R² | 0.36 | 0.07 | 0.41 | 0.15 | 0.48 |
| Number of observations | 160 | 21 | 24 | 45 | 70 |
| Team Performance in Round 3 | 0.47 (0.09)** | -0.31 (0.21) | 0.89 (0.23)** | 0.35 (0.14)* | 0.44 (0.10)** |
| Constant | -0.59 (0.25)* | −0.28 (0.24) | 1.05 (1.03) | −0.26 (0.43) | -1.04 (0.37)* |
| Adjusted R² | 0.31 | 0.27 | 0.58 | 0.22 | 0.30 |
| Number of observations | 160 | 21 | 24 | 45 | 70 |

HRBC = High Range Budget Clubs, UMRBC = Upper-Mid Range Budget Clubs, LMRBC = Lower-Mid Range Budget Clubs and LRBC = Low Range Budget Clubs.

*$p<0.05$; **$p<0.01$

**Table 2**

*Simulated final outcome depending on Team Performance in Round 3 of the season for UMRBC, LMRBC and LRBC*

| UMRBC | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Team performance | −12 | −8 | −4 | -2 | 0 | +2 | +4 | +6 | +8 |
| Final Outcome | −10 | −6 | −3 | -1 | +1 | +3 | +5 | +6 | +8 |
| ULRBC | | | | | | | | | |
| Team performance | −8 | −4 | −2 | 0 | +2 | +4 | +8 | +12 | +15 |
| Final Outcome | −3 | −1 | −1 | 0 | +1 | +1 | +3 | +4 | +5 |
| LRBC | | | | | | | | | |
| Team performance | −4 | −2 | 0 | +2 | +4 | +8 | +12 | +16 | +19 |
| Final Outcome | −3 | −2 | 0 | +1 | +2 | +3 | +4 | +5 | +6 |

*UMRBC = Upper-Mid Range Budget Clubs, LMRBC = Lower-Mid Range Budget Clubs and LRBC = Low Range Budget Clubs*

## Discussion

The aim of the current study was to identify how important was the team performance in Rounds 3, 4 and 5 in relation to the ranking of the clubs at the end of the season in elite handball. Previous studies had considered this topic in other team sports (Lago and Sampaio, 2015), however, to the best of our knowledge, no studies have examined this association in handball.

For higher-level clubs (HRBC), the results at the beginning of the season had no influence on the ranking at the end of the championship. At the end of the season, these clubs finished the competition according to the expectations based on their financial budget. However, for the rest of the clubs (LHRBC, LMRBC and LRBC) good or bad results at the start of the season were associated with the ranking at the end of the season. A high correlation between wages spending and league finish in team sports is one of the most important findings in performance analysis studies (Garcia del Barrio and Szymanski, 2009; Szymanski, 2000; Szymanski and Kuipers, 1999; Szymanski and Smith, 1997). Kuper and Szymanski (2009) show that in soccer a club's total expense on wages explained 89% of the variation in its average place in the final league table.

The higher range budget clubs can count on higher-level players, capable of adapting differently to the new season determinants of team performance. Other factors, such as the effort the manager puts into training, devising tactics or the role of fortune could explain the remaining percentage of success (Anderson and Sally, 2013). In this context, the findings of the current study suggest that for lower level clubs (LHRBC, LMRBC and LRBC) a good or a bad season start could be one of these additional factors determining success at the end of the season.

As it was suggested by Lago-Peñas and Sampaio (2015), it is possible that in higher-level clubs the presence of the best players allows them to achieve success in spite of poor initial results. Self-efficacy of these players depends more on their self-perception rather than on the teams' previous results. From a collective point of view, it is likely that they believe they can overcome the bad results at any time. However, in LHRBC, LMRBC and LRBC the perception of self-efficacy is more affected by previous results due to their limited talent. For these teams, good results at the start of the season could be a positive boost that helps build player and team self-confidence.

A positive relationship between collective efficacy perceptions at the beginning of the season and success in the competition was presented earlier (Feltz and Lirgg, 1998; Hodges and Carron, 1992;; Myers et al., 2004; Spink, 1990). Results from different studies (Spink, 1990; Lirgg et al., 1994; Ramzaninezhad et al., 2010) showed that athletes from successful teams rated higher in collective efficacy than less successful teams and athletes from less successful teams rated higher in collective efficacy than unsuccessful teams. With this regard Spink (1990) and Lirgg et al. (1994) found that collective efficacy was positively correlated with group performance. They reported that high efficacy teams performed significantly better in competition than did teams with low levels of collective efficacy. However, the dependence on the financial capacity of the clubs had not been considered until now.

Concerning the limitations of the current study some aspects should be highlighted. Firstly, future research should also analyse the budget allocated to players' salaries. This variable might reflect the relative effort made by the clubs in hiring players (Szymanski and Kuypers, 1999). Possibly, the financial capacity of the clubs does not have a positive relation with the budget allocated to the players. In addition, collecting data about collective self-efficacy in teams with a good and a bad start of the season should also help understand this relation. Finally, the findings are limited to a certain extent by the sample given that only one domestic league season was analyzed. Future investigations should verify the findings across different countries and competitions.

Some methodological guidelines for the preseason could be suggested for LRBC and LMRBC. The players should start the season with the best possible chances of winning the initial matches. In addition, coaches should anticipate measures to stem the potential decline in performance occurring in the following months of the season. This can be accomplished by rotation of players in the starting line-up, reducing

training loads or introducing additional recovery methods. Also, it is likely that selecting theoretically weaker opponents to play preseason friendly matches should strengthen the perception of collective efficacy. Thus, the importance of winning should be considered by coaches. Finally, strategies that facilitate the improvement of collective efficacy should be proposed.

In conclusion, the findings of this study suggest that the better the team performance at the beginning of the season, the better the ranking at the end of the season. However, the impact of the effect depends on the clubs' annual budget, with lower budgets being associated to greater importance of having a good season start. These results can be used to develop accurate models to estimate final rankings.

## Acknowledgements

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