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ABSTRACT

The association between injury status of the team and all-rounders on match outcome were investigated in international cricketers. Time and non-time loss injuries were recorded over a 32-month period in 47 senior international cricketers. Team injury status was expressed on a 1-4 scale from "fully available" to "unavailable". Generalised linear model (GLM) was employed to examine whether team injury status and the injury status of all-rounders (AR) and single skill (SS) players was associated with the outcome of the match or series. A significant association between team injury status and match and series outcome was found. Team mean injury status was 12.0% lower ($P < 0.001$; ES = 1.06) during successful series wins and 7.8% lower ($P < 0.001$; ES = 0.66) during successful match outcomes. Skill group injury status was also significantly associated with match ($P=0.001$) and series ($P=0.001$) outcomes with AR exhibiting greater injury status than SS cricketers ($P < 0.001$, ES = 0.44). All injuries, irrespective of time lost, influence the outcome of international cricket series' and matches with injuries to AR having a higher impact on the results. The findings will impact on the injury prevention strategies in elite cricket.

Key Words: Injury and Prevention, Game Analysis, Performance, Non-time loss Injuries

INTRODUCTION

International cricket comprises of a high volume and density of matches. Currently, there is an excess of 400 days of international cricket a year across all Test match playing nations (McNamara, Gabbett, & Naughton, 2017). A fifth of the annual injury prevalence in fast bowling may be attributed to high workload (Orchard, Kountouris, & Sims, 2016). While a plethora of research has been generated in recent years targeting injury prevention/reduction across all positions, (Ahmun, McCaig, Tallent, Williams, & Gabbett, 2018; Orchard et al., 2015a, 2015b; Warren, Williams, McCaig, & Trewartha, 2018), it is surprising that the influence of injury status on match outcome has not yet been explored in cricket.

Within sport it is commonly accepted that injury will have a negative influence on the success of an individual or team. Currently, relatively little research exists to support this notion. In individual sports such as athletics, the loss of training time appears to be a major determinate of success or failure (Raysmith and Drew, 2016). Within team sports, there are slightly more contradictory findings, although the consensus is generally that injury has a negative influence on the success of the team (Arnason et al., 2004; Dauty and Collon, 2011; Eirale, Tol, Farooq, Smiley, & Chalabi, 2013; Hagglund et al., 2013; Podlog, Buhler, Pollack, Hopkins, & Burgess, 2015; Raysmith and Drew, 2016; Williams et al., 2016). Across 11-years, Hagglund, et al. (2013) showed injuries influenced success in football domestic leagues and European competition. To date, only injury incidence, time loss or burden have been assessed in studies investigating the influence and impact of injury on performance. To the best of our knowledge, these studies have failed to consider non-time-loss injuries.

The prevalence of non-time-loss injuries exceeds time-loss injuries in sport (Kerr et al., 2017). Thus, it is suggested that current injury and performance literature does not fully reflect the impact of injury on sport performance. By nature, cricket is a non-contact sport where professionals are subject to high workloads, increasing the susceptibility to overuse injuries (Orchard, Kountouris, et al., 2016). More specifically, the prevalence of non-time loss injuries

has been reported as three time higher than time-loss injuries in international cricket batters and bowlers (Ranson, et al., 2013). It is therefore common for cricketers to train and compete with injuries. Non-time loss injuries have the potential to compromise fielding position, technique and potentially performance in cricket (Dutton, Tam, & Gray, 2019). It is therefore essential that future injury analytical studies should reflect the injury management of cricketers during competition. However, their impact on match outcome is unknown.

Injury and team success literature has also focused on the team as an entirety rather than identifying individual roles within a team. Understanding the impact or the contribution to success that individual roles or players have, may assist in the management of resources in injury reduction programmes. The differences in team roles or positions on team success is yet be considered. Cricket has specialist single skilled players (batters, fast bowlers, spin bowlers and wicketkeepers) as well as all-rounders who are selected specifically for both their batting and bowling ability. Therefore, the injury status of all-rounders could be hypothesised to have a greater influence on the team success when compared to single skilled cricketers.

The purpose of this study was to investigate the impact of injuries on match and series outcome in international cricket over a 32 month period. Injuries were recorded in-line with the recent cricket injury consensus statement (Orchard et al., 2016) and the influence on match and series outcome analysed. The secondary aim of the study was to analyse the impact of single skilled (are selected primarily to bat or bowl) to all-rounders (are selected to bat and bowl) on match and series outcome in international cricket.

METHODS

Participants and Sample

Forty-seven players (age 26 ± 3 years, stature 1.84 ± 0.65 m, body mass 84.5 ± 7.9 kg) were involved in the 32 month (29/09/15 – 29/05/18) observational study. Participants included all players competing for the national team and consisted of 18 batters, 13 fast bowlers, 8

spinners, 5 all-rounders and 3 wicketkeepers. Number of matches, series and frequencies of wins, losses, draws, ties and no results across Tests, One-Day Internationals (ODIs) and Twenty20 (T20) contests are presented in Table 1. Project approval was gained through the local ethics committee, in line with the declaration of Helsinki. Participants consented to the use of this data as part of standard practices.

****Insert Table 1 here****

Injury Data

For international matches, injury status was recorded for each match day by the team's physiotherapist. To account for medical attention conditions, injury data was recorded in-line with the recent international cricket consensus statement on injury surveillance (Orchard, Ranson, et al., 2016). Each player's injury status was recorded on a 1-4 scale:

1. Fully available for training and matches, with no injury or illness
2. Fully available for training and matches, but with an injury or illness
3. Available for selection in a major match, but with modified activity due to injury or illness
4. Unavailable for selection in a major match due to injury or illness

Time loss injuries were category 4, whilst category 2 and 3 were medical conditions that were being actively treated and monitored but did not impact the physical availability of the player in question. These categories included any pre-existing medical conditions.

Match outcome

Match and series outcome was recorded for all international matches over the 32 month period (29/09/15 – 29/05/18). Only International Cricket Council sanctioned matches were included in the analysis. Series were defined as more than a single match. World Cup and triangular series were included in the analysis and winning series were defined as more matches won than lost. Test match, One-Day and Twenty20 series were analysed independently.

Statistics

Statistical analyses were conducted using SPSS statistical analysis software (SPSS, version 24, Chicago, IL), with alpha levels of 0.05 set prior to data analysis. Analyses of the influence of team injury status and outcomes was split into matches and series with injury status across each day of the match in series being analysed. Analyses were also split to determine if the injury status of "All-Rounders" (AR) or "Single Skill" (SS) players influenced the outcome of matches or series. AR and SS classifications were defined based on whether the player was selected to ideally contribute as a batter (SS), bowler (SS) or both (AR). Wicketkeepers were defined as SS cricketers.

Generalised linear models were employed to examine whether team injury status and the injury status of AR and SS players was associated with the outcome of series or matches. Team injury status was modelled as the dependant variable and initially series or match outcome (win or loss) were set as factors, with skill group (AR or SS) being added as a covariate once the influence of team injury status alone had been determined and model fit established. In all cases, model fit was established via visual inspection.

In addition, probabilistic magnitude-based inferences about the true value of outcomes were employed (Batterham and Hopkins, 2006). Dependent variables were analysed to determine the effect of the designated condition as the difference in change following each condition. To calculate the possibility of difference, the smallest worthwhile effect for each dependent variable was the smallest standardized change in the mean. ie: 0.2 times the between-subject SD for baseline values of all participants. This method allows practical inferences to be drawn using the approach identified by Batterham and Hopkins (2006). Furthermore, standardized effect size (Cohen's d) analyses were used to interpret the magnitude of any differences (Cohen, 1992). As inferential statistics were employed here, confidence intervals were set at 90% as this is consistent with an unclear effect having >5% chance of being positive and >5% chance of being negative.

RESULTS

****Insert Table 2 here****

The generalised linear mixed model indicated that the outcome of series' and matches were associated with team injury status (Table 2). Furthermore, the model also indicated that the injury status of specific skill groups (AR and SS) were associated with the outcome of a match or series, as presented in Table 2. The details of team injury status' in winning and losing series and matches are presented in Table 3. Across all matches and series, the injury status of AR (1.50±0.43) was greater than that of SS (1.35±0.15) players ($P < .001$, ES = 0.44, 9.6%, difference possible). Details of the injury status of AR and SS players during winning and losing matches and series are presented in Table 4.

****Insert Table 3 here****

****Insert Table 4 here****

DISCUSSION

The main findings of the study show that team injury status influenced the match and series outcome of international cricket. Furthermore, the AR injury status had an association on the match outcome when compared to the SS cricketers across all forms of cricket.

The results (Table 2) of this study agree with findings from previous research which suggests that injuries have a negative impact on the successful outcome of team performance (Eirale, et al., 2013; Hagglund, et al., 2013; Williams, et al., 2016). Several possibilities exist for the reduction in injury incidence or prevalence and improved team performance. The most likely explanation is the ability of coaches to select an optimal team for each match, increasing the chance of success (Hagglund, Walden, & Ekstrand, 2009). Further factors such as the psychological impact of injury can also not be excluded (Ivarsson, Johnson, & Podlog, 2013), as injuries to teammates can have negative effects on the mental state of the whole team (Hurley, 2016). Although these results indicate a clear association between injury and successful outcome, it also needs to be recognised that players spend more time in the field during Test matches which are lost. This potentially increases the risk of overuse injuries,

particularly to bowlers (Orchard, Kountouris, et al., 2016). Conversely, winning sides often bowl less and fast bowlers are exposed to less workload. Based on the findings of this study, winning and losing may therefore directly influence the injury status of the squad.

This study provides a thorough overview of the impact of injury within international cricket on performance (table 2). The nature of international cricket is that if a significant long-term time loss injury occurs, the player will be released from the international squad and return to their domestic county medical team to be rehabilitated in conjunction with the international medical staff. As a result, the injury data of this study largely reflects the management and severity of long-term non-time loss injuries within the current squad. It can therefore be suggested that less modifications in match roles for players (such as not bowling if the player is an AR, or fielding in a certain position) as a result of injuries and illnesses will enhance the success of a professional cricket team.

The team injury and match results association (Table 2) and lower injury status during winning matches (Table 3) in this study are similar to those reported in other team sports such as rugby and football (Hagglund, et al., 2009; Hagglund, et al., 2013; Williams, et al., 2016). While these sports are largely reliant on synergy between teammates to win, the success of a cricket team is more likely to occur as a result of several individual performances. Therefore, it seems appropriate that the injury status of the AR, have a greater influence on the outcome of the match or series as they are required to contribute to the batting and bowling performance of the team. Bowling has the highest injury incidence compared to batting and fielding (Goggins et al., 2020), with bowlers showing the highest injury prevalence (Orchard et al., 2016). Combining fast bowlers, batters and wicketkeepers in a single group may be over simplistic. Therefore, the importance of skill specific roles (spin bowling, fast bowling, batting) should be determined in future research. Finally, the importance of the player to the team needs to be acknowledge in future studies. For example, an AR who is one of the better players in the team may have a greater influence on the results compared to an AR who is selected to provide balance in batting and bowling options within the team.

Professionals working within team sports invest a significant amount of time and resources into developing an athlete's capacity for load, thus increasing their overall injury resilience (Thorpe, Atkinson, Drust, & Gregson, 2017). The results of this study suggest that an improvement in team injury status, particularly around AR, will have a positive effect on the success of a cricket team. Consequently, practitioners should focus a significant amount of their time, in the management of workloads and injury prevention protocols for AR. This notion is further supported given that injury status was on average higher during the 32-month period of observation in the AR when compared to the SS cricketers (Table 4). Thus, there is a greater capacity to improve the injury status of the AR. However, whether this may have a negative effect of the injury status of the SS cricketers is unclear.

CONCLUSION

Injuries to AR and SS cricketers influence the outcome of international cricket matches and series. Furthermore, injury to AR significantly affects the outcome of matches more than SS cricketers. Adequate preparation periods that focus on injury and illness preventions strategies should be planned prior to international tours and domestic competitions. It may be pertinent to focus available resources and provision of care on AR.

Reference List

Atkinson, G. (2007). What's behind the numbers? Important decisions in judging practical significance. *Sportscience*, *11*, 12-16.

Ahmun, R., McCaig, S., Tallent, J., Williams, S., & Gabbett, T. (2018). Association of Daily Workload, Wellness, Injury and Illness during Tours in International Cricketers. *International journal of sports physiology and performance,* 14(3), 369-377.

Arnason, A., Sigurdsson, S. B., Gudmundsson, A., Holme, I., Engebretsen, L., & Bahr, R. (2004). Physical fitness, injuries, and team performance in soccer. *Medicine and Science in Sports and Exercise, 36*(2), pp. 278-285.

Batterham, A. M., & Hopkins, W. G. (2006). Making meaningful inferences about magnitudes. *International Journal Sports Physiolgy and Performance, 1*(1), pp. 50-57.

Cohen, J. (1992). A power primer. *Psychol Bull, 112*(1), pp. 155-159.

Dauty, M., & Collon, S. (2011). Incidence of injuries in French professional soccer players. *Int J Sports Med, 32*(12), pp. 965-969.

Dutton, M., Tam, N., & Gray, J. (2019). Dutton, M., Tam, N., & Gray, J. (2019). Incidence and impact of time loss and non-time-loss shoulder injury in elite South African cricketers: A one-season, prospective cohort study. *Journal of Science and Medicine in Sport*, 22(11), 1200-1205.

Eirale, C., Tol, J. L., Farooq, A., Smiley, F., & Chalabi, H. (2013). Low injury rate strongly correlates with team success in Qatari professional football. *British Journal of Sports Medicine, 47*(12), pp. 807-808.

Goggins, L., Peirce, N., Ranson, C., McCaig, S., Newman, D., Langley, B., ... & Williams, S. (2020). Injuries in England and Wales elite men's domestic cricket: A nine season review from 2010 to 2018. *Journal of Science and Medicine in Sport*.

Hagglund, M., Walden, M., & Ekstrand, J. (2009). UEFA injury study--an injury audit of European Championships 2006 to 2008. *British Journal of Sports Medicine, 43*(7), pp. 483-489.

Hagglund, M., Walden, M., Magnusson, H., Kristenson, K., Bengtsson, H., & Ekstrand, J. (2013). Injuries affect team performance negatively in professional football: an 11-year follow-up of the UEFA Champions League injury study. *British Journal of Sports Medicine, 47*(12), pp. 738-742.

Hurley, O. A. (2016). Impact of Player Injuries on Teams' Mental States, and Subsequent Performances, at the Rugby World Cup 2015. *Frontiers in Psychology,* 7, 807.

Ivarsson, A., Johnson, U., & Podlog, L. (2013). Psychological predictors of injury occurrence: a prospective investigation of professional Swedish soccer players. *Journal of Sport Rehabilitation, 22(1), 19-26.*

Kerr, Z. Y., Lynall, R. C., Roos, K. G., Dalton, S. L., Djoko, A., & Dompier, T. P. (2017). Descriptive Epidemiology of Non-Time-Loss Injuries in Collegiate and High School Student-Athletes. *Journal of athletic training,* 52(5), 446-456.

McNamara, D. J., Gabbett, T. J., & Naughton, G. (2017). Assessment of Workload and its Effects on Performance and Injury in Elite Cricket Fast Bowlers. *Sports medicine, 47*(3), pp. 503-515.

Orchard, J. W., Blanch, P., Paoloni, J., Kountouris, A., Sims, K., Orchard, J. J., & Brukner, P. (2015a). Cricket fast bowling workload patterns as risk factors for tendon, muscle, bone and joint injuries. *British Journal of Sports Medicine, 49*(16), pp. 1064-1068.

Orchard, J. W., Blanch, P., Paoloni, J., Kountouris, A., Sims, K., Orchard, J. J., & Brukner, P. (2015b). Fast bowling match workloads over 5-26 days and risk of injury in the following month. *Journal of Science and Medicine in Sport, 18*(1), pp. 26-30.

Orchard, J. W., Kountouris, A., & Sims, K. (2016). Incidence and prevalence of elite male cricket injuries using updated consensus definitions. *Open Access Journal of Sports Medicine, 7*, pp. 187-194.

Orchard, J. W., Ranson, C., Olivier, B., Dhillon, M., Gray, J., Langley, B., . . . Finch, C. F. (2016). International consensus statement on injury surveillance in cricket: a 2016 update. *British Journal of Sports Medicine, 50*(20), pp. 1245-1251.

Podlog, L., Buhler, C. F., Pollack, H., Hopkins, P. N., & Burgess, P. R. (2015). Time trends for injuries and illness, and their relation to performance in the National Basketball Association. *Journal of Science and Medicine in Sport, 18*(3), pp. 278-282.

Raysmith, B. P., & Drew, M. K. (2016). Performance success or failure is influenced by weeks lost to injury and illness in elite Australian track and field athletes: A 5-year prospective study. *Journal of Science and Medicine in Sport, 19*(10), pp. 778-783.

Thorpe, R. T., Atkinson, G., Drust, B., & Gregson, W. (2017). Monitoring Fatigue Status in Elite Team-Sport Athletes: Implications for Practice. *International Journal of Sports Physiology and Performance, 12*(Suppl 2), pp. S227-S234.

Warren, A., Williams, S., McCaig, S., & Trewartha, G. (2018). High acute:chronic workloads are associated with injury in England & Wales Cricket Board Development Programme fast bowlers. *Journal of Science and Medicine in Sport, 21*(1), pp. 40-45.

Williams, S., Trewartha, G., Kemp, S. P., Brooks, J. H., Fuller, C. W., Taylor, A. E., . . . Stokes, K. A. (2016). Time loss injuries compromise team success in Elite Rugby Union: a 7-year prospective study. *British Journal of Sports Medicine, 50*(11), pp. 651-656.

Table 1. Total Test, One-Day International (ODI), Twenty20 (T20) series and matches played and frequencies of wins, losses, draws, ties and no results (and % of total) over the 32-month observational period.

	Total	Win	Loss	Draw	Tie	No result
			Series			
Test	8	4 (50.0%)	3 (37.5%)	1 (12.5%)	n/a	n/a
ODI	11	9 (81.8%)	2 (18.2%)	0 (0.0%)	n/a	n/a
T20	4	2 (50.0%)	2 (50.0%)	0 (0.0%)	n/a	n/a
			Matches			
Test	28	12 (42.9%)	12 (42.9%)	4 (14.2%)	0 (0.0%)	0 (0.0%)
ODI	42	29 (69.0%)	10 (23.8%)	n/a	1 (2.4%)	2 (4.8%)
T20	21	10 (47.6%)	10 (47.6%)	n/a	1 (4.8%)	0 (0.0%)

Table 2. Mean ± SD team and skill group injury statuses in series and matches over the 32-month observational period, 90% confidence intervals (CI) and generalised linear model (GLM) associations with match outcomes are also presented.

	Team injury status		GLM
	Win (90% CI)	**Loss (90% CI)**	***P* – value (X^2)**
	Series		
Team	1.41 ± 0.16 (1.38 - 1.43)	1.60 ± 0.20 (1.57 - 1.63)	<0.001 (52)
Skill group			
Single Skill	1.38 ± 0.17 (1.35 - 1.41)	1.58 ± 0.19 (1.55 - 1.62)	0.001 (48)
All rounder	1.45 ± 0.43 (1.39 - 1.52)	1.67 ± 0.50 (1.59 - 1.76)	
	Match		
Team	1.42 ± 0.16 (1.39 - 1.44)	1.54 ± 0.21 (1.50 - 1.57)	0.017 (11)
Skill group			
Single Skill	1.38 ± 0.18 (1.35 - 1.41)	1.51 ± 0.20 (1.48 - 1.55)	0.001 (8.83)
All rounder	1.50 ± 0.41 (1.43 - 1.57)	1.62 ± 0.52 (1.53 - 1.70)	

328 **Table 3.** Mean ± SD team injury statuses and differences between winning and losing series
329 and matches over the 32-month observational period. Percentage differences (Δ%), Cohen's
330 D effect sizes, magnitude based inference (MBI) are also presented.

Team injury status		Δ%	*P* - Value	Effect size	MBI
Win	**Loss**				**qualitative inference**
			Series		
1.41 ± 0.16	1.60 ± 0.20	12.0	<.001	1.06	Effect very likely
			Match		
1.42 ± 0.16	1.54 ± 0.21	7.8	<.001	0.66	Effect likely

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Table 4. Mean ± SD skill group injury statuses and differences in injury status between Single Skill players and All-Rounders in winning and losing series and matches over the 32-month observational period. Percentage differences (Δ%), Cohen's D effect sizes, magnitude based inference (MBI) are also presented.

Injury status		Δ%	*P* - Value	Effect size	MBI
Single Skill	**All-Rounder**				**qualitative inference**
			Series – win		
1.38 ± 0.17	1.45 ± 0.43	5.5	0.042	0.43	Effect possible
			Series – loss		
1.58 ± 0.19	1.67 ± 0.50	5.6	0.057	0.44	Effect possible
			Match – win		
1.38 ± 0.18	1.50 ± 0.41	8.3	<0.001	0.49	Effect possible
			Match – loss		
1.51 ± 0.20	1.62 ± 0.52	6.8	<0.001	0.46	Effect possible