Manuscript Title: Predictors of time to return to play and re-injury following hamstring injury with and without intramuscular tendon involvement in adult professional footballers: A retrospective cohort study.

Short title: Time to return to play and re-injury rate following hamstring injury.

Submission Type: Original research

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Abstract Word Count: 248

Manuscript Word Count: 3234

Number of References: 35

Tables: 2

Figures: 1

Abstract

Objectives: In one English Premier League football club over four seasons, 1) describe the number of hamstring strain injuries (HSI) sustained using the British Athletics Muscle Injury Classification (BAMIC); 2) determine if intramuscular tendon HSI influenced the time to return to play (TTRTP) and reinjury rate; 3) determine the predictors of TTRTP and reinjury.

Design: Retrospective cohort design.

Methods: All first team players who sustained a HSI between 2014 and 2018 were included. Players underwent an MRI scan that was graded by a Radiologist using the BAMIC (0a-4) criteria. TTRTP, reinjury rate and information on suspected predictors were recorded.

Results: Thirty-five HSI experienced by 24 players (age = 26 ± 4 years) were recorded over the 4 seasons. There was a difference in TTRTP between grades 1a and 2c (P = 0.007), but not between 2b and 2c (P = 0.845). Grade of HSI (P = < 0.001) and removal of the player (P < 0.001) were predictors of TTRTP, with each increase in grade resulting in an additional 3 days of TTRTP, and being removed, an additional 11 days. Grade and all other predictors did not influence reinjury rate, albeit higher odds were evident for previous HSI, experiencing the HSI during sprinting, passing a ball or stretching, and reported increase days of pain during walking.

Conclusion: HSIs extending into the intramuscular tendon (2b *cf.* 2c) do not influence TTRTP or re-injury, albeit TTRTP was affected by the BAMIC grade and if the player was removed from activity.

Keywords: Hamstring injury, tendon, professional football, rehabilitation, BAMIC.

Introduction

Hamstring strain injuries (HSI) account for ~12% of all injuries in professional football[1] and are consistently the most prevalent time-loss injury reported during a competitive season.[2] Such is the prevalence (~12%) and incidence rates (0.4-1.9/1000 exposure hours)[3] of HSI, it's reported that a 25-player squad typically experience 5-6 HSI per season, resulting in more than 80 days lost due to injury.[1] It has also been reported that the average cost per injured player competing in the UEFA Champions League is approximately €500,000 per month.[4] For example, during the 2016/2017 English Premier League (EPL) season, £177 million was spent in wages to injured players,[5] increasing to £217m in 2017/2018 and £221m in 2018/2019, with HSI accounting for a large proportion of these injuries.[5]

Given the high prevalence and incidence rates of HSI in football players and the implications this has for the player, club and medical team, return to play (RTP) research has become a focus for many researchers and clinicians involved in football.[6] Indeed, two Delphi surveys, an expert led consensus statement, and a survey of 131 professional football teams have made recommendations for reducing HSI and improving RTP in professional football.[6-8] A worldwide Delphi survey concluded that RTP following HSI should be defined as "the moment a player has received criteria-based medical clearance and is mentally ready for full availability for match/team training with RTP decisions based on shared decision-making, providing clarity of when RTP is appropriate to reduce the risk of injury recurrence".[9] The RTP consensus statement by Arden et al.[6] recommended that: 1) RTP should be viewed as a continuum rather than a single event at the conclusion of rehabilitation, and follow through to 'return-to-performance'; 2) objective markers should guide RTP and; 3) practitioners should follow a shared decision-making process including key stakeholders.[6, 7] In part, these guidelines aim to improve time to return to play (TTRTP) and moderate the risk of HSI re-injury.

Predicting TTRTP and minimising injury recurrence is challenging as reflected in that HSI recurrence rates are 15-20% (range 14% to 63%).[10, 11] Further, there is weak evidence to suggest that scanning with Magnetic Resonance Imaging (MRI) can aid prediction of TTRTP and prognosis for RTP following HSI.[12] Time to RTP has been shown to vary greatly between

and within MRI classification systems following HSI,[13] so, when used, the specific MRI classification should be reported to avoid miscommunication.[13]

Severity and site of tear is an important factor when considering RTP, as evidence suggests intramuscular tendon injuries require longer rehabilitation and TTRTP, with a higher risk of injury recurrence compared to HSI with no tendon involvement.[10, 14, 15] Pollock et al.[10] proposed the British Athletics Muscle Injury Classification (BAMIC), using a 0-4 scale, with grades 1-4 including a grade of a-c to specify injury site within the muscle; a = myofascial, b = musculotendinous junction, or c = intratendinous.[10] This method has been shown to demonstrate 'substantial' intra-rater and 'almost perfect' inter-rater reliability when concerning the overall BAMIC classification.[15] The first study to use the BAMIC in a sporting context looked at TTRTP and injury recurrence over a 4-year period in track and field athletics.[10] The results showed injuries extending into the tendon [grade c] are more prone to reinjury and resulted in a greater number of days taken to RTP.[10] Since then, the relevance of intramuscular tendon tears has been disputed and remains controversial, with evidence indicating complete resolution of these injuries on MRI is not necessary for successful RTP.[16-19] As such, further research investigating if intramuscular tendon tears influence the duration of time-loss and reinjury rate is warranted in a range of populations including football players.

The aims of this study were, 1) To use the BAMIC to describe the number of HSI over four competitive football seasons; 2) Determine if HSI including an intratendinous tear results in extended TTRTP and higher reinjury; and 3). Explore possible predictors of TTRTP and reinjury in professional footballers.

Methods

This was a retrospective observational study of HSI over four consecutive English Premier League seasons 2014-2018, including domestic and European cup matches. Ethical approval was obtained from the Faculty of Health, Psychology and Social Care Research Ethics

Committee at Manchester Metropolitan University (Ref: 1055) with consent obtained from the athletes and club.

Participants included professional footballers contracted to a single football club in the English Premier League. All first team players registered at the club at the beginning of each season who sustained an HSI were included. Players who transferred to another club or whose contract had finished before the end of the season were included providing they played for the club in that season, provided prior consent and had return to play to allow TTRTP to be determined. Over four seasons, 52 players were eligible, receiving full-time medical care with all injury episodes recorded on an electronic medical record system by the physiotherapists at the club. Injury and rehabilitation data were subsequently collected and analysed by the lead researcher who was not directly involved in the key decisions related to the care of the players. Injury definitions and data collection procedures followed the consensus statement and data collection of football injuries, [20, 21] thus standardising the reporting across all physiotherapists at the club and when completing the electronic medical record system. Included were HSI reported between June 2014 and May 2018 that occurred during training, matches or rehabilitation. These were defined as "*an acute injury to the posterior thigh muscle resulting in further assessment and referred for MRI investigation within 7 days of the injury*".[8] Excluded were HSI including contusions, haematomas, chronic tendinopathies, and players who experienced an exacerbation of the current injury during rehabilitation.[10, 20]

Injury data were reviewed by one independent physiotherapist (musculoskeletal specialist with >10 years clinical experience) to determine all episodes of HSI that occurred between the 2014 and 2018 seasons. Over the study period, treatment was provided by different physiotherapists, all with >10 years clinical experience each. HSI-related RTP criteria included hamstring length; strength (isometric and isokinetic, <10% limb symmetry) and function (pitch-based running, acceleration, and high speed). Criteria were not prescriptively implemented, as clinicians acted autonomously providing individualised rehabilitation approaches according to clinical and pitch-based objective markers to determine RTP.

TTRTP was defined as *'the number of days until the player had resumed full team training and available for match selection'.*[21] To establish TTRTP, the electronic medical record system was reviewed to calculate the number of days each player was unavailable based on the player's status changing from 'unavailable for play or training' to 'available'.

Injury recurrence was defined as *'an injury of the same type, at the same site as an index injury on return to full participation'* that was recorded during the subsequent 12-month period.[21] To determine when players were most at risk of re-injury after RTP, follow-ups were documented routinely at 2, 6 and 12 months.

Other information and potential predictors included previous HSI, age, mechanism of injury, muscle injured and location, days taken to walk pain-free, and if the player was removed from play (match, training, or rehabilitation).[10, 22-24] A decision to remove a player from play was based on clinical reasoning following on-pitch assessment including: muscle palpation, length and (isometric) strength testing, combined with the player's subjective feedback (ability to continue), often determined by the mechanism of injury (sudden traumatic onset of pain vs. gradual onset of pain).

Players were imaged on either 1.5T or 3T Siemens MRI platforms using dedicated surface coils. The imaging protocol consisted of coronal T1 and inversion recovery sequences with 4mm slice thickness, axial T1 and fat-saturated proton density and sagittal fat-saturated proton density sequences with 3mm slice thickness. All sequences used high-resolution matrix parameters. To minimise bias, all scans were read by a fellowship-trained musculoskeletal radiologist with 14 years' experience in sports imaging and were conducted 48 hours after the injury. The radiologist was not provided with any players' medical history - only a note on the suspect HSI - and provided a report on the athlete immediately after the scan to support the club's medical staff during rehabilitation. The radiologist provided a grade for severity and location of HSI that was in accordance with the BAMIC along with their clinical interpretation and recommendations.[10]

All statistics were analysed using the IBM SPSS package Version 25 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp). Descriptive statistics were used to describe player and HSI characteristics (Aim 1). The Shapiro-Wilk Test was used to determine if the data conformed to the assumptions of normality. BAMIC grades were compared according to TTRTP using Kruskal Wallis tests with Bonferroni corrected Mann Whitney post-hoc test (Aim 2). Differences in reinjury across BAMIC grades was assessed using Fisher's Exact test. Mean, SD and 95% confidence limits (CL) were calculated for descriptive purposes.

Linear and binary logistic regression using an 'Enter' method were used to determine the independent effects of grade of injury, age, previous history of HSI, mechanism of injury, muscle injured and location, injured during match/training/rehabilitation (TTRPT only), removed from play (player unable to continue due to HSI, and number of days to walk pain free on TTRTP and injury recurrence (Aim 3), respectively. Odds ratios were derived for predictors in the binary logistic regression. The compatibility of the data with the hypothesis was interpreted using the exact probability statistic (*P* value).

Results

Player and injury characteristics

Forty HSI were reported by twenty-six players over four English Premier League seasons (Table 1). Five injuries were excluded due to surgical intervention to address other chronic musculoskeletal injuries not related to each hamstring injury. Three HSI were excluded from the analysis for TTRTP as they experience a re-injury during rehabilitation and a return date was not available. However, these were included in the analysis for injury recurrence. Thus, the final analysis was based on 32 and 35 HSI's for TTRTP and recurrence, respectively, from 24 players.

******Table 1. Player and injury characteristics******

Grade 0, 1, 2 and 3 accounted for a total of 2, 12, 19 and 2 HSI's respectively. Of the 35 injuries, 9 injury recurrences were recorded after the players had returned to full team training. Six of these occurred <2 months of RTP and three recurrences occurring <12 months of RTP.

Intramuscular tendon injury and RTP and injury recurrence

There were differences in TTRTP according to BAMIC injury types 0b-3b (H = 17.3, df = 6, *P* = 0.008). TTRTP differences were observed between small myofascial (1a) and moderate musculotendinous junction tears (2b) (mean difference = 14 days, 95%CI = 4-24 days; *P* = 0.016) and small myofascial (1a) and moderate intratendinous tears (2c) (mean difference = 14 days; 95% CI = 5-23 days; *P* = 0.007). There were no differences (at *P* = 0.05) in TTRTP between injuries with and without tendon involvement (1a & 1b, or 2b & 2c; all *P* > 0.05) (Figure 1). There were no differences between injury recurrence according to the BAMIC grading, 0b-3b (Fishers Exact value = 3.897, *P* = 0.844), two reinjuries observed for grades 1b and 2c, and one observed for grade 0b,1a, 2a, 2b and 3b.

******Figure 1******

Predictors of TTRTP and injury recurrence

Results from the linear regression indicated that all predictors combined explained 84.7% of the variance of the TTRTP (*P* < 0.001) (Table 2). Grade and whether the athlete was removed from the activity were significant predictors (Table 2). The unstandardised beta for grade indicated that for every 1 increase of grade of HSI, TTRTP increased by ~3 days (95% CI = 2 to 4). Being removed from the field of play was associated with an additional ~11 days (95% CI = 7 to 15) to RTP. All other predictors had confidence limits that overlapped the null effect, implying that association between the predictor (e.g., previous injury) and TTRTP is minimal (Table 2).

****Table 2. Predictors of TTRTP and injury recurrence****

Results from the binary logistical regression indicated that the predictors explained 49.7% of the variance in injury recurrence (Nagelkerke R^2 = 0.497). However, none of the predictors significantly altered the odds of experiencing a reinjury at P = 0.05. The odds ratio, whilst not significant (95%CI cross 1), did suggest that there are 'slightly' higher odds of a reinjury when players have had a previous HSI, experience the HSI during sprinting, passing a ball or stretching and experience increased days of pain during walking (Table 2).

Discussion

The aims of this study were to use the BAMIC to describe HSI over four English Premier League seasons; to determine if HSI including an intratendinous tear results in extended RTP and higher injury recurrence; and to determine the influence of some predictors of RTP and injury recurrence.

Injury characteristics

The current findings of 35 HSIs in 24 professional footballers over four seasons was higher than previous UEFA audits where 5-6 HSIs were reported per season.[1] Whilst this was undoubtedly a unique period for HSI in this club, comparisons to other clubs are beyond the scope of this study. Furthermore, it is difficult to account for differences in medical expertise, player characteristics, training loads and management strategies amongst many other factors between clubs. However, the number of HSI across multiple seasons allows further exploration beyond studies that are based over a single season or experience a limited number of HSI.

Findings in the current study highlight that most HSI occurred during match-play, which is noteworthy given this is 3.5 times more than training. Such findings might be explained by higher

overall intensity, greater physical loads and a greater degree of risk taking when compared to training. Bengtsson et al.[25] suggested that injury rates in the first match after RTP increase by 87% compared with a 'typical match', with the odds of injury dropping by 7% with each additional training session before the first match. However, training-related HSI rates have increased since 2001 (~4%), whilst match-related HSI rates have remained relatively stable.[1] In this study, the final data analysis of RTP and injury recurrence consisted of 35 HSI in 24 players with the moderate, (2a-c), injuries most common (54%) and with intratendinous tears (2c) producing the longest RTP of all grades.

The long head of biceps femoris was the most injured muscle, with the highest injury recurrence rate, which is in accordance with previous research.[10, 23, 26] The long head of biceps femoris undergoes the greatest lengthening during high-speed running[27] and has a separate nerve supply to the short head, potentially with asynchronous contraction.[28] This might, in part, explain the greater recurrence rate, though we urge caution given the limited number of re-injuries. To confirm such findings, a multi-club, multi-league and/or multi-nation approach is required.

Intratendinous injuries

It has been suggested that injuries extending into the tendon require prolonged rehabilitation with longer RTP and higher risk of injury recurrence.[10, 14, 16.] Whilst the current study found differences in TTRTP between myofascial and intratendinous tears, they were also different sizes (small 1a vs. medium 2b, 2c) which needs consideration. No difference in TTRTP was found between tears with and without intratendinous involvement of the same size (2b vs. 2c). These findings suggest that HSI extending into the tendon do not always mean a greater time-loss for professional footballers, though further research with a larger sample from multiple clubs is needed to substantiate or refute this finding.

Recurrence

Player unavailability due to injury increases pressure on medical teams to return players to training as quickly as possible, whilst ensuring injury recurrence is no greater than a pre-injured

level.[11] There is no consensus on a single clinical or functional test or imaging investigation that provides a safe indication of RTP, but a multi-disciplinary approach is likely to be important with the use of subjective and objectives measures.[8, 23]

Previous research indicates HSI injury recurrence is not related to tendon involvement.[18] In the current study, the HSI reoccurrence rate of 26% was slightly higher than other, such as the 19% and 14% reported by Van der Made et al[18] and Malliaropoulos et al.[29], respectively. Further comparisons cannot be made to other studies due to a lack of sufficient power to determine differences in the current study. However, 89% of reinjuries occurred in grade 0, 1 and 2 injuries, similar to Malliaropoulos et al.[29] who found low grade 1 & 2 HSI were more likely to recur than high grade 3 & 4, thus potential reflecting a short rehabilitation period and less monitoring.

The first month following RTP has the highest risk for HSI recurrence.[16, 30] Of the 29 HSI in the current study, four re-injuries occurred within two months following RTP, with the highest recurrence rate seen in grade 1 HSI as opposed to higher grades of HSI. These findings suggest professional footballers are at greatest risk of injury recurrence within the first 2 months on RTP following a grade 1 HSI, with a key risk factor potentially due to incomplete healing times and ongoing muscle regeneration in lower grades of injury.[31]

Predictors

The finding that injury grade, determined using BAMIC, and whether a player was removed from play are significant predictors of TTRTP provide a useful insight with estimated number of days that medical personnel can use in future practice when giving estimates to coaching staff and the athlete. Our results indicated that for every increase in BAMIC grading, the number of days before the athletes return increased by 3, with an upper confidence limit of 4 days. A result that the severity of HSI increases the TTRTP is not surprising, but the qualification of an upper value is clinically and practically meaningful in the context of a professional football club where accurate estimates can be used. The results also indicated that an inability to continue with the activity (match, training, rehabilitation) was associated with an increased TTRTP of between 7 and 15 days. A sudden onset of symptoms in the posterior thigh (the player who “pulls up”) is a

good indicator that a significant muscle injury has taken place, and this can usually be confirmed with length, strength (isometric) and palpation testing on pitch.[32] This contrasts with the lower grade injury where a player won't experience a significant sudden onset of pain and will often report the issue at the end of a game as the resultant on pitch symptoms haven't limited their ability to perform or they have continued with play regardless.[32]

We also note how a range of other factors appeared to have limited predictive ability for TTRTP and reinjury following HSI. Indeed, our results, and those of others, indicate that an increased age, passive loss of range of movement and previous HSI, maximum pain at time of injury, delay in physiotherapy, time taken to walk pain free, change in pain during strength testing, duration of palpation pain, eccentric hamstring strength, hamstring fascicle length, maximal velocity running exposure and hamstring fatigue resistance require further investigation before being ruled in/out as clinical predictors.[22, 33] Our results do, however, suggest a greater emphasis and responsibility should be placed on the club's medical department to monitoring player training and match loads closely in the first 2 months on RTP and for low-grade HSI due to the elevated risk of injury recurrence and natural healing likely to be incomplete.[31] Furthermore, medical and sport science personnel should ensure injury prevention programmes are performed routinely and targeting high-risk players (e.g. those with previous HSIs).[34] Recommendations for HSI prevention suggest a holistic approach that translates existing knowledge of risk and applying this to a football context.[33]

Strengths of study

This study was based over four English Premier League seasons with final data collection analysis consisting of 29 HSI in 24 professional footballers. To limit bias, injury definitions, two main outcome measures and data collection followed the consensus statement and data collection of football injuries, ensuring a clear and accurate methodological process.[1, 20, 21] Rehabilitation adopted the same principals and recommendations advised by the 2016 RTP consensus statement with clear objective progressive markers used to guide RTP combined

with a shared decision-making process involving key stakeholders from the club's medical department.[6]

Limitations and future directions

The relatively small sample included in this study is a limitation and impacts on the statistical power, especially during the predictive analysis on re-injury. However, there needed to be a balance between the number of seasons to capture enough HSIs and the variances in coaches, managers, and medical personnel. As such, future work might consider a multi-club, multi-league and/or a multi-nation approach to ensure enough HSI are observed to provide additional statistical power, explore other predictors, and tailor programmes to moderate injury risk.

Conclusion

Following acute HSI in professional footballers, the BAMIC is a detailed and useful method of categorisation. Differences in TTRTP were observed between small myofascial (1a) and moderate musculotendinous tears (2b) and small myofascial (1a) and moderate intratendinous tears (2c). However, the effect of injuries with and without intramuscular tendon injury on TTRTP and injury recurrence remains inconclusive.

Practical Implications

- Medical personnel working in professional football can use the BAMIC classification for categorising hamstring strain injuries in a standardised manner, support future interpretation and comparison across other teams, age categories and/or sports.
- Indications are that hamstring strain injury's extending into the intramuscular tendon (2b *cf.* 2c) tend not to influence RTP or reinjury in professional footballers.
- Low grade (0b, 1a & 1b) hamstring strain injury reflected 89% of the reinjury rate, most occurring <2 months on return to play. Indications are that professional footballers are

at greatest risk of injury recurrence within the first 2 months of RTP following a low grade HSI.

- BAMIC grade of hamstring strain injury and removed from play were significant predictors of RTP and may prove a useful guide for medical personnel in professional football to support estimates for RTP.

Acknowledgements

We would like to acknowledge Liverpool Football Club for supporting this research and the players involved in the study.

Funding The authors declare no specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests: None declared.

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474

475 **Table 1. Player and injury characteristics**

Variable	*N*	% of total
Players available	52	-
All HSI		
Players with HSI between 2014-2018	26	-
HSI	40	-
2014-2015 season	8	-
2015-2016 season	22	-
2016-2017 season	4	-
2017-2018 season	6	-
Player age (years)	26 ± 4	-
Players with >2 separate HSI from analysed 24 players	8	-
HSI excluded due to additional rehabilitation/intervention	5	-
Analysed HSI		
Players with HSI analysed	24	
HSI - TTRTP	35	
HSI – Recurrence	32	
Injury occurrence		
Match injury	25	71%
Training injury	7	20%
Rehabilitation	3	9%
Mechanism of Injury		
Sprint	13	37%
Stretch	8	23%
Insidious (gradual onset)	12	34%
During a pass	2	6%
Location of injury		
Proximal	22	63%
Central (Mid 1/3)	1	3%
Distal	11	31%
Combined proximal & distal	1	3%
Muscle injured		
Biceps Femoris (Long Head)	17	48%
Biceps Femoris (Short Head)	1	3%
Semitendinosus	5	14.2%
Semimembranosus	3	8.6%
Multiple muscles (inc. tendon injury)	9	25.7%
Multiple Muscles		
Biceps Femoris	3	33.3%
Biceps Femoris & semitendinosus	2	22.2%
Semitendinosus	1	11.1%
Semimembranosus	2	22.2%
Sacrotuberous Ligament	1	11.1%
Intramuscular Tendon Injury (Multiple)		
No tendon disruption	26	74%
Free tendon disruption	3	9%
Intramuscular tendon disruption	6	17%
Tendon disruption (Tendon Injury Orientation)		
Longitudinal	8	89%
Transverse	1	11%
Recurrences / Exacerbations		
No	26	74%
Yes, after RTP	6	17%
Yes, before RTP (Injured during rehabilitation)	3	9%

HSI reinjury - muscle		
Biceps Femoris (Long head)	6	67%
Biceps Femoris (Short head)	0	0
Semitendinosus	1	11%
Semimembranosus	1	11%
Multiple muscles (inc. tendon injury)	1	11%
HSI reinjury - location		
Proximal	7	78%
Central	0	0
Distal	2	22%

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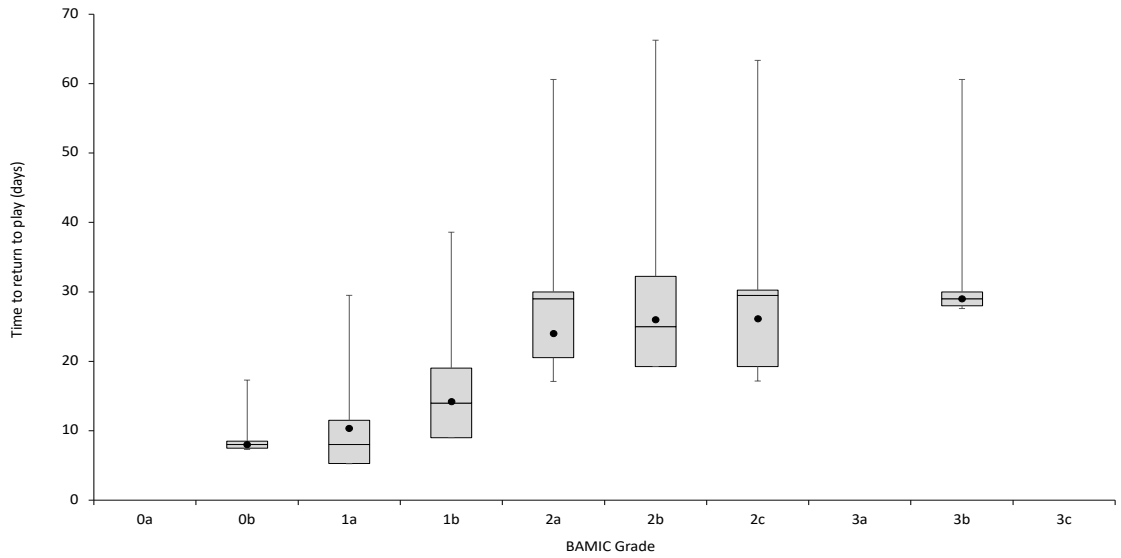

Figure 1. Time taken to return to play (RTP) according to British Athletics Muscle Injury Classification (BAMIC) grade of injury.

Note: The whiskers box plots represent the 25th to 75th percentile of results inside the box, the median is indicated by the horizontal line across the box, and the mean by a solid black circle. The whiskers on each box represent the 5th to 95th percentile of results.

484 **Table 2**. Predictors of RTP and injury recurrence

Predictors of TTRTP	Unstandardized beta (95%CI)	Std. Error	t	*P*
Constant (days)	31.4 (7.6; 55.1)	11.5	2.737	0.012
Grade	3.3 (2.1; 4.4)	0.5	5.998	**<0.001**
Activity	1.3 (-1.9; 4.5)	1.5	0.868	0.395
Previous injury	-2.1 (-6.9; 2.7)	2.3	-0.918	0.368
Age	-0.4 (-0.9; 0.2)	0.3	-1.296	0.209
Mechanism	-2.6 (-6.9; 1.8)	2.1	-1.234	0.230
Removed from activity	-11.0 (-15.3; -6.7)	2.1	-5.298	**<0.001**
Muscle injured	-0.4 (-1.6; 0.8)	0.6	-0.677	0.505
Location of injury	0.6 (-1.7; 2.9)	1.0	0.561	0.580
No. days walking with pain	-0.6 (-1.9; 0.6)	0.6	-1.078	0.293

Predictors of a reinjury occurring	Unstandardized beta (95%CI)	Std. Error	Wald	*P*	Adjusted OR
Constant	-2.652	3.853	0.474	0.491	0.07
Grade	-0.493	0.529	0.871	0.351	0.61
Previous injury					
No (reference)	-	-	-	-	-
Yes	-0.260	1.462	0.032	0.859	0.77
Age	0.150	0.158	0.896	0.344	1.16
Mechanism					
Insidious (reference)	-	-	-	-	-
Pass	1.683	1.690	0.992	0.319	5.38
Stretching	0.672	1.900	0.125	0.723	1.96
Sprinting	3.435	2.271	2.290	0.130	31.1
Removed from activity					
No (reference)	-	-	-	-	-
Yes	0.713	1.569	0.207	0.649	2.04
Muscle injured	-0.229	0.504	0.207	0.649	0.80
Location	-1.473	0.816	3.257	0.071	0.23
No. days walking with pain	0.779	0.407	3.672	0.055	2.18

485 *Note: TTRTP = time to return to play, OR = odds ratio, std = standard, 95%CI = 95%*

486 *confidence intervals.*