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Recovery following the extra-time period of soccer: Practitioner perspectives and applied practices

Article

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Conflict of interest statement

The authors report no conflict of interest.

Abstract

Research has demonstrated that the extra-time (ET) period of soccer negatively impacts recovery. However, it is not known to what extent recovery practices are being adapted by practitioners following ET and where gaps exist between research and practice. Therefore, this study explored soccer practitioner perceptions of recovery practices following ET matches. A total of 72 practitioners from across different levels of soccer and several countries completed a bespoke online survey. Inductive content analysis of the responses identified five higher-order themes: 'conditioning', 'player monitoring', 'recovery practices', 'training', 'and 'future research directions'. Mixed responses were received in relation to whether practitioners condition players in preparation for ET, though 72% allowed players to return to training based on fatigue markers following this additional 30-min period. Sixty-three (88%) practitioners believed that ET delays the time-course of recovery, with 82% highlighting that practices should be adapted following ET compared with a typical 90-min match. Forty-nine practitioners (68%) reduce training loads and intensities for up to 48 hr post ET matches, though training mostly recommences as 'normal' at 72 hr. Sixty-three (88%) practitioners believed that more research should be conducted on recovery following ET, with 'tracking players physiological and physical responses', 'nutritional interventions to accelerate recovery' and 'changes in acute injury-risk' being the three areas of research that practitioners ranked as most important. These data suggest practitioners and coaches adjust recovery practices following ET matches compared to 90 min. Further research on the efficacy of recovery strategies following ET matches is required to inform applied practice.

Keywords

football · applied environment · survey · coaches · qualitative research

Introduction

Soccer matches are typically contested over 90 min, though when scores are tied, in the knockout phase of some major competitions (e.g., FIFA World Cup and UEFA Champions League), matches progress into an additional 30 min period of extra-time (ET). The prevalence of ET has increased in recent years in the knockout phase of major international tournaments. Notably, 41% of knockout phase matches proceeded to ET at the 2014 and 2018 FIFA World Cup competitions [1]. At the 2018 World Cup held in Russia, the finalists Croatia competed in three consecutive knockout phase ET matches (round of 16, quarter-final and semi-final) en route to the final [2]. Simulated and actual match-play observations have shown that ET elicits additional central fatigue [3] and reduces physical performance capacity [4]. Recovery strategies are key to alleviate the debilitating effects of fatigue [5].

Players compete in 50—80 games per season and are exposed to fixture congested schedules [6], with insufficient between-match recovery periods impeding a player's ability to perform optimally in consecutive matches [5, 7]. Extra-time matches are often competed amid congested schedules across a season and during tournaments [1]. The delay in returning players to homeostasis following ET matches may have harmful implications for recovery and performance in consecutive matches [8]. In contemporary elite soccer, practitioners are responsible for implementing evidence-informed strategies designed to accelerate recovery [9]. However, recovery in response to ET is under-researched, and as such, practitioners are faced with challenges concerning whether to remain with common (90-min) modalities or adapt practices to aid recovery following ET matches. Accordingly, collecting practitioner survey data is a useful method to explore perceptions and practices employed in an attempt to 'bridge the gap' between evidence-based research and applied practice in soccer [10].

Over recent years, there has been an increasing number of competitive matches across a season, resulting in a lower availability of time to train between matches [6]. Although, there is no

information available concerning whether players are adequately conditioned to be able to cope with the additional demands of ET [1], practitioners may have limited time to prescribe appropriate training sessions across a season to maintain adequate physical conditioning between matches. This could be problematic as players that are not physically prepared for the additional 30-min period of ET are likely at an increased injury susceptibility, given epidemiological data suggests that injury incidence is increased during ET [11]. Monitoring athlete fatigue to minimise the negative implications associated with non-functional overreaching, injury and illness [12], appears appropriate following ET matches. However, it is unknown whether practitioners monitor fatigue following ET matches to assist with the decision-making processes involved with returning players to training or traditional 90 min approaches are employed. Therefore, such data may assist with identifying fatigued individuals following 120 min of match-play to enable appropriate periodisation of individualised training regimes [5] and inform substitution strategies [13]. Acute spikes in training and competition loads are associated with an increased injury and illness risk [14]. Given matches that proceed to ET are not able to be anticipated, practitioners may have to adapt subsequent training loads and intensities to accommodate the additional weekly loads and stressors associated with ET [1]. Therefore, investigations to determine the extent to which training loads and intensities are tapered following ET matches appear warranted. An operational framework has been proposed for conducting soccer science studies, which implies that gaining an insight into the barriers impacting uptake is key to effective and applicable research [15]. Furthermore, explicit questions asking practitioners to provide future research ideas is likely to assist with increasing the implementation of ecologically valid study designs and facilitate the translation of findings within a ‘real-word’ context [13, 16].

Given the paucity of research exploring practitioners approaches to recovery following ET matches, the purpose of this study was to explore practitioner perceptions and practices with reference to ET and recovery.

Materials and methods

Participants

Upon receiving institutional ethical approval, 208 soccer club/federation representatives were contacted between January 2020 — June 2020 (Table 1). Each recipient received a short description of the research, a web-link to the survey as well as a password required for access. Representatives were encouraged to share the survey with the most appropriate practitioner within their team with responsibility for implementing recovery practices. Upon obtaining access, the procedures involved with completion were outlined, and informed consent and confirmation that respondents were ≥18 years of age was required to progress to the survey questions. Practitioners were asked to provide information relating to their job role, competitive level, as well as the tier and country their team competed, though anonymity was otherwise maintained.

INSERT TABLE 1

Survey design

The survey was constructed using Qualtrics.^{XM} online software (Utah, USA; https://www.qualtrics.com/uk/). Two professional practitioners and a researcher with previous experience of constructing surveys of this nature, piloted and reviewed the questions to check usability and face validity [17]. Several alterations were then carried out: three questions were rephrased, or a description added to provide clarity, three questions were amended to ensure practitioner relatability, and the wording of one question was adjusted as it was potentially 'leading'. The final version of the survey comprised relevant background information, followed

by an informed consent section and a page whereby practitioners were required to enter a unique I.D which could later be used to withdraw responses. The survey contained 14 main questions and five sub-items, each taking either a scaled, rank, multiple-choice or open-ended format allowing practitioners to expand on four individual questions. Respondents were asked to consider their practices, and future research recommendations specific to ET matches compared with the approaches ordinarily taken in relation to a 90-min match.

Survey analyses

Upon cessation of survey data uptake, raw data were exported to Microsoft Excel (Microsoft Corp., Redmond, WA, USA). Native speakers, proficient in translation checked open responses to ensure content accuracy. We adhered to the checklist for reporting results of internet e-surveys (CHERRIES) for both survey design and analyses [18].

For Likert-scale questions, 5- and 7-point scale questions were used, asking practitioners to indicate their perceived level of importance or extent of agreement. All points were labelled with qualitative anchors for importance (i.e., 'not at all important' [1], 'slightly important' [2], 'moderately important' [3], 'important' [4], and 'very important' [5]) and agreement (i.e., 'very strongly agree': 3, 'strongly agree': 2, 'agree': 1 'neither agree nor disagree': 0, 'disagree': -1, 'strongly disagree': -2, 'very strongly disagree': -3) [19]. Frequency analysis was used to determine the percentage of practitioners that endorsed each response [13]. Other items involved participants ranking (from '1' to '5') their order of perceived importance from a list of available responses, with the accumulation of scores for each option used to determine the mean order of importance (i.e., the choice rated first was scored 5 points, second—4 points, third—3 points, fourth—2 points, and fifth—1 point) [16].

In order to facilitate elaborative answers, open-ended questions were used to offer participants the opportunity to 'explain' the reasons underpinning certain responses. These qualitative

responses were systematically arranged and read diligently by the lead researcher (AF) on several occasions to develop a deep sense of the content and context of the data [16]. An inductive content analysis approach was used [20], with raw data open coded and grouped into larger and more general dimensions in a higher order concept [21]. This process was repeated until theoretical saturation was achieved [22]. The list of themes were discussed at each stage and validated independently by two researchers (AF and LDC) until a consensus was reached regarding data interpretation and theme credibility [21].

Results

A total of 72 completed all questions and were included in analyses. A total of 87 practitioners initially returned the survey, though as all questions were not completed, a further 15 practitioners were omitted. These numbers represent a 42% survey return rate and a completion rate of 83%. Table 2 shows the role and level of employment for each practitioner. Five general dimensions emerged from the survey data including 'conditioning', 'player monitoring', 'recovery practices, 'training' and 'future research directions'.

INSERT TABLE 2

Conditioning

When practitioners were asked if they '*condition players outside of peak periods to be able to cope with the demands of extra-time',* the most prevalent responses were 'no' (*n* = 35; 49%), 'yes' (*n* = 26; 36%) and 'sometimes' (*n* = 11; 15%), respectively. 'Infrequency' (e.g., 'extra-time is a rarely experienced event'), 'time' (e.g., "time restrictions make player access difficult"), 'expectation that normal practice is sufficient' (e.g., "training loads are usually geared at the normal game exposure which should indirectly condition them to face extra-time periods") and 'other appropriate methods' (e.g., "verbal encouragement and substitution

strategies") were identified as second-order themes. Conditioning work involved 'exceeding duration' (e.g., "we conduct training matches comprising of 4 x 25 min halves"), 'within week preparation' (e.g., "training load is increased approx. 4-5 days prior to extra time games"), and 'strength and conditioning practices' (e.g., "structured injury prevention sessions are used to prepare for extra-time").

Player monitoring

The frequency with which practitioners '*track player fatigue markers following ET matches and return to training based on such feedback'* is reported in Figure 1. Players were returned to training based on 'physical performance metrics' (49%; e.g., "countermovement jump", "peak power output (watt bike)", "isometric hamstring test", "GPS data"), 'subjective assessments' (31%; e.g., "fatigue scales", "wellness questionnaires", "conversations with the players"), and their 'physiological status' (20%; e.g., "creatine kinase analysis", "heart rate variability", "hydration and saliva samples"). 'Logistical constraints' (e.g., "financial reasons, time restrictions lack of staff and equipment etc.") were identified for lack of adaption to monitoring practices.

INSERT FIGURE 1

Recovery practices

Practitioners were asked if they agreed with the following statement: *'extra-time further delays the time-course of recovery when compared to a 90 min match'* with no respondents 'very strongly disagreeing' (Figure 2).

INSERT FIGURE 2

Most practitioners either 'very strongly agreed' (n = 10; 14%), 'strongly agreed' (n = 28; 39%) or 'agreed' (n = 21; 29%) that '*recovery practices should be adapted following an extra-time match vs. a typical 90-minute match'*, while the remaining practitioners 'neither agreed nor

disagreed' (n = 6; 8%) or 'disagreed' (n = 7; 10%). Practitioners were asked to expand on why they held this viewpoint; with the second-order themes established for those in support of adapting recovery practices in response to ET presented in Table 3.

INSERT TABLE 3

Figure 3 shows the percentage of practitioners that adapt practices (i.e., '*cool down'*, '*nutritional intake'*, '*additional specific recovery modalities'*, '*no change to practice'*) following matches that proceed to ET versus traditional 90-min approaches.

INSERT FIGURE 3

Cool down

Among practitioners that adapted their post-match cool downs, bespoke practice in the sense of 'duration' (e.g., "prolonged cool down", "more work around mobility") was employed.

Rest period

It was highlighted that 'additional rest' (e.g., "we promote 1 day + 1/2 day off instead of the normal 1 day off", "start the matchday +1 session later. Normally +1 to 2 hours") was given to players post ET matches which was largely based upon 'individual game-time' (e.g., "depending on duration each individual player plays another day of recovery may be planned") and 'manager discretion' (e.g., "possibly yes if the manager is happy with the result he will give extra days off to recover").

Nutritional intake

Adapting nutritional intake immediately post-match mainly resides around modifying 'macronutrient intake' (80%; e.g., "increase quantities of carb intake to replenish depleted glycogen stores, as well as increased protein intake to account for the additional tissue damage sustained"), 'hydration' (12%; e.g., "electrolyte sachets for rehydration purposes"),

‘supplementation’ (5%; “creatine”, “omega 3”) and ‘polyphenols’ (3%; e.g., “beetroot/ tart cherry juice to help with inflammation”). Similar second-order themes were identified for the 24 and 24—48 hr post-match period with the addition of ‘individualised nutritional provision’ (e.g., “depends on each player’s physiological profile”), ‘inter-disciplinary communication’ (e.g., “where possible we talk with the club chef”), and ‘player education’ (e.g., “players aren’t usually at the club but are advised to increase calorie intake”). A reduction in adaption to nutritional practice was observed 48—72 hr post ET, with the 15 practitioners (21%) that persisted with modifying nutritional intake being largely ‘schedule dependent’ (e.g., “periodisation to previous match and subsequent training/match schedule”).

Additional specific recovery modalities

Non-nutritional recovery modalities identified as being adapted immediately post ET matches were mainly “cryotherapy”, “massage”, “compression garments”, and “active recovery” with an increased emphasis on ‘duration’ (e.g., “longer time spent in an ice bath”) and ‘intensity’ (“more intensive manual massage”). Adjusting ‘hydrotherapy’ (e.g., “cryotherapy”, “swimming”, “contrasting bathing”) practices were prevalent among practitioners at 24—72 hr post-match in response to ‘individual preferences’ (e.g., “each individual player decides the modality”).

No change to practice

Second-order themes identified as to why practice was not adjusted immediately post-match were ‘time’ (e.g., “the delay to the end of the match puts us behind”), ‘finance’ (“we are financially stretched with our usual practices”), and ‘away matches’ (“often difficult to implement on away games”). For 24—72 hr following ET matches, ‘recovery protocols deemed sufficient’ (e.g., “we feel we use the best protocols in this period irrespective of 90 or 120 min games”), ‘player access’ (e.g., “do not have access to the players”), and ‘squad

rotation' (e.g., "most competitions with extra-time we would rotate the squad in order to compensate for the next game") were highlighted as key reasons for no change to practice.

Training

Practitioners were asked how important they believed it was to '*adapt training loads and intensities following an ET match'*. No practitioners considered adapting training loads as 'not important', although six (8%) believed that doing so was 'slightly important'. 'Moderately important', 'important' and 'very important' received seven (10%), six (8%) and 53 (74%) responses, respectively. Adapting training intensities was of 'no importance' to one practitioner (1%), 'slight importance' to four (6%), while a further 14 (19%) respondents attributed 'moderate importance' to this adaption. Nine (13%) believed it was 'important' to adapt intensities and the remaining 44 (61%) indicated this was 'very important'.

A total of 33 (46%), 49 (68%) and 28 (39%) out of the 72 practitioners adapted training loads and/or intensities at 24, 24—48 and 48—72 hr, respectively.

Training load/intensity adaption at 24 hr

Training loads and/or intensities were 'reduced' (e.g., "volumes and intensities are decreased") by all 33 respondents at 24 hr with the primary motive behind tapering training loads and intensities being associated with 'player health and well-being' (e.g., "players health status takes priority", "managed according to well-being").

Training load/intensity adaption at 24—48 hr

Responses indicated that adapting training loads and/or intensities at 24—48 hr was dependent on player 'physiological status' (e.g., "dependent on recovery markers") and 'match completion' (e.g., "reduce loads on players who completed the full game") as well as the 'preceding schedule' (e.g., "dependent on accumulative output from the week") and 'upcoming schedule' (e.g., "what competitions we have coming up"). 'Training variables' (e.g.,

285 "manipulation of pitch sizes and drill times to restrict high-speed running, accelerations and
286 decelerations") and 'training type' (e.g., "players will have an extended off-feet recovery day
287 (bike & pool)", "tactical sessions used for starters") represented the most prevalent adaption to
288 training.

289 *Training load/intensity adaption 48—72 hr*

290 The 28 practitioners that continued to adapt training at 48—72 hr post ET matches outlined
291 that though training loads and/or intensities were "lesser than a normal training session; they
292 were "gradually built back up". An 'individual approach' (e.g., "adaptation according to the
293 recovery status of each athlete") was reflective of the key second-order theme for 48—72 hr.

294 ***Future research directions***

295 Sixty-three (88%) practitioners believed that '*further research should be conducted on the*
296 *recovery response following the extra-time period'*, whilst the remaining nine (12%) did not
297 believe that conducting research of this nature was required. The 63 practitioners were provided
298 with a list of options (Figure 2) and were asked to rank which they '*believed warranted further*
299 *investigation following an extra-time match'*. When given the opportunity to indicate any
300 'other' areas aside from those provided, 'sleep' (e.g., "sleep study"), 'cognitive aspect' (e.g.,
301 "mental aspect of recovery and fatigue"), 'away match logistics' (e.g., "effects of mode of
302 travel and overnight stay vs travel on day") and 'subsequent performance' (e.g., "performance
303 in the following match"), were identified amongst the small number of practitioners (n = 6).

304 ***INSERT FIGURE 4***

305 **Discussion**

306 The present study develops knowledge in relation to applied practice and recovery strategies
307 associated with the additional 30-min ET period. These survey data offer novel practitioner
308 insights, enhance understanding of applied practice, and highlight future research

considerations for recovery following ET soccer matches. Collectively, these findings suggest that practitioners adapt recovery practices following ET matches, though support further research in this area.

While half of the practitioners surveyed condition players outside of peak periods in preparation for matches that proceed to ET, the other half indicated that changes to conditioning practices were not implemented. Practitioners revealed existing difficulties with maintaining training volumes across an entire season, especially during periods of fixture congestion [7]. This challenge may impede maintenance of within-season training loads that are sufficient to prepare players for ET, whilst also ensuring adequate regeneration periods. It appears that some practitioners implement acute 'within-week preparation'; however, it is unlikely that such strategies elicit the desired adaptations in such a short timeframe [16]. Therefore, since fatigue-induced injuries are likely to occur during the latter stages of 90-min matches [23, 24], players that are inadequately conditioned for the prolonged ET period may be susceptible to injury. Since practitioners in the current survey highlighted 'changes in acute injury-risk' as an important area for future investigation, epidemiological research is warranted to determine whether players are at an increased risk of injury during ET and consecutive matches.

Most practitioners 'agreed' to 'very strongly agreed' with the proposition that ET prolongs recovery and that practices should be adjusted appropriately. It was highlighted that practitioners extend the cool-down duration post ET matches, despite evidence that prolonged cool down durations have no effect on muscle soreness or glycogen resynthesis [25]. Those who do not change practice immediately post-match reportedly lack 'time' (e.g., "you have to get on the bus as sometimes the driver may go over his hours with the delay to the end of the game"). This issue may be problematic following away matches from a logistical viewpoint, particularly for lower-league and semi-professional practitioners who have fewer resources available and are unable to intervene with acute strategies that are targeted at enhancing

recovery immediately post matches that proceed to ET. This could be detrimental to player recovery considering ET has shown to evoke additional central fatigue, increase perceived muscle soreness and reduce blood glucose concentrations [3, 8, 26]. This highlights the importance of appropriate feeding strategies that can be implemented whilst travelling. 'Away match logistics' following ET matches was a topic of interest to a small number of practitioners and requires investigation.

A variety of practices were observed in relation to practitioners modifying nutritional intake immediately post and up to 24 hr following an ET match. The majority largely modulated carbohydrate and protein intake, rehydration practices, and used supplementation and polyphenols strategically in line with current evidence-based recommendations when limited time separates matches [27]. Though it has yet to be measured directly, ET matches could require greater liver and muscle glycogen utilisation than 90 min and could have implications for adjusting carbohydrate guidelines following 120-min matches [26]. While evidence suggests that consuming carbohydrate in the 5 min break prior to ET attenuates the reduction in dribbling performance [28]; there remains a dearth of clear evidence-informed guidelines for adapting consumption to aid recovery following this additional period of match-play. The survey respondents ranked this area of research as the second most important following ET matches and thus should be explored.

Increasing the massage duration and intensity post-match was a notable adjustment made to post ET practice by approximately 15% of practitioners, despite its efficacy for recovery being largely ambiguous (for a review see Poppendieck, Wegmann [29]). Similarly, an increased duration with which cold water immersion and cryotherapy practices are employed were highlighted among ~20% of practitioners. Although, little evidence is available to support a dose-response relationship, recovery benefits after exercise are better established following cryotherapy [30]. Nevertheless, practitioners individualised player recovery protocols, which

is advised given that high inter-individual variations exist with recovery [5]. This is an encouraging finding considering most of what is currently known about and adopted in relation to post ET match recovery modalities is derived from anecdotal observations or practices that have demonstrated efficacy following 90-min matches [31]. Therefore, non-nutritional modalities and their recovery properties remain largely unexplored in response to ET and presents an avenue for future research.

Another interesting finding in the present study was that future research should investigate the impact of ET on sleep variables. Contemporary issues exist in elite tournament soccer that disrupt natural circadian rhythms and recovery, such as, interstate travel across time zones, jet lag and sleeping in unfamiliar environments [5, 32]. Since the ET period has shown to elicit higher levels of adrenaline [26, 33], and 120 min matches delay the finish of soccer matches by approximately 40 mins [1], it seems plausible to hypothesise that a delay in sleep onset latency may occur following ET matches. The interference with sleep onset may also be exacerbated if night matches proceed to ET, given that intense exercise performed close to bedtime can impair sleep [34]. Therefore, as recommended by a proportion of the current sample, the influence that competing in ET matches has on sleep parameters should be explored. However, although the positive effects of optimal sleep quality are evident [35], it is difficult for practitioners to regulate individual sleep schedules given the intrusive nature of intervening with personal sleeping habits. Therefore, as proposed in a theoretical model for conducting soccer science research [15], the major challenges for managing bedtime behaviours to promote sleep enhancement should be identified for researchers to accommodate practitioner barriers to carefully develop apposite study designs.

Reductions in training loads and intensities were most pronounced at 24—48 hr after ET matches. This may also be linked with teams typically having a rest day following a match regardless of duration [36]. The importance of "maintaining training intensities whilst reducing

loads" (i.e., overall volume) was commonly highlighted among practitioners with 'training drills' (e.g., "pitch sizes and drill times") manipulated to reduce physical output (e.g., "high-speed running, accelerations, and decelerations"). Indeed, tapering training loads was highly dependent on the proximity of previous and upcoming matches, as opposed to whether the team had competed in an ET period. This could have detrimental implications for recovery potentially given that biomechanical loads are increased during simulated ET matches [37]. Given their unforeseeable nature, adapting training loads in response to ET matches requires versatility and carefully orchestrated periodisation to overcome the complexities associated with maintaining aerobic fitness whilst minimising the risk of load-related injuries [38]. This remains a key challenge in the applied soccer environment, though with a contemporary practitioner endorsed rule change permitting the introduction of a fourth substitution during ET [13], players exposed to excessive weekly loads may be identified and replaced. For those that are unable to be substituted, research that involves 'tracking the physical and physiological response' would help determine the extent to which recovery is impacted post ET. The survey data highlights that practitioners support research of this nature.

Though the current study received a high number of survey responses compared with other published works [16, 39], response rate alone may not reflect greater external validity [40]. A convenience sample was used whereby personal networks were contacted, potentially introducing selection bias [41], although this approach was used to ensure the dataset was limited to one response per team [16]. Practitioners were made aware of the survey topic prior to completion and thus, it is possible that the pool of participants had biased propensities towards this area of research.

Conclusion

This study presents novel practitioner insights and examines how recovery practices are managed following ET matches. Although ET conditioning approaches vary considerably

between practitioners, many respondents return players to training based on fatigue markers following this period of match-play. Recovery practices are adapted in response to 120-min matches as practitioners believe that the additional 30-min period has negative implications for recovery. Training loads and intensities are tapered up until 48 hr post ET matches, though are mostly returned to normal by 72 hr. Future research considerations were overwhelmingly in support of tracking players physiological and physical responses, nutritional interventions to accelerate recovery and changes in acute injury-risk following ET. It is recommended that practitioners work closely with appropriate stakeholders to address barriers and ensure practices are player-focused post ET match-play to optimise recovery.

Figure captions

Figure 1 The proportion of practitioners that track player fatigue markers following ET matches.

Figure 2 Practitioner extent of agreement to the statement regarding whether extra-time delays the time-course of recovery.

Figure 3 Percentage of practitioners that adapt specific recovery practices following matches that require extra-time compared with traditional 90-min matches.

Figure 4 Practitioners perceived importance of areas for future research.

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Table I. Details of the competitive league and response rate of the invited clubs

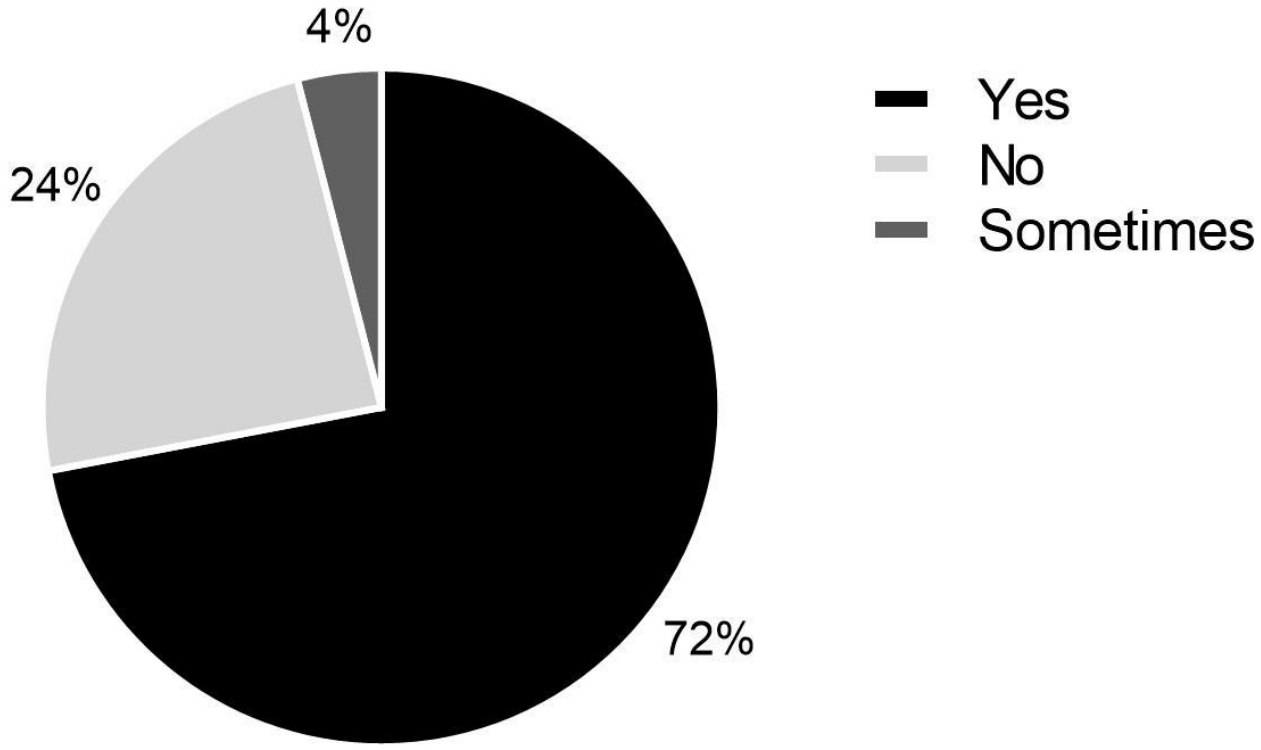
League (National tier)	**Responses** (Invited/Responded/Included)
English Premier League (1st tier)	17/9/8
English Championship (2nd tier)	21/10/7
English League One (3rd tier)	21/11/9
English League Two (4th tier)	18/13/10
English National League (5th tier)	17/3/1
English National League North/South (6th tier)	17/10/6
Scottish Premiership (1st tier)	5/2/2
League of Ireland Premier Division (1st tier)	2/1/1
Portuguese Premeira Liga (1st tier)	6/4/4
Portuguese LigaPro (2nd tier)	4/1/1
Portuguese Terceira Liga (3rd tier)	1/1/1
Campeonato de Portugal Serie A (4th tier)	1/1/1
Italian Serie A (1st tier)	4/2/2
French Ligue 1 (1st tier)	3/1/1
Super League Greece (1st tier)	1/1/1
Hungary OTP Bank Liga	1/1/1
Spain Segunda División B	1/1/1
Qatari Stars League (1st tier)	4/2/2
Taiwan Football Premier League (1st tier)	1/1/1
Australian A League (1st tier)	4/2/2
Other leagues	45/2/0
International associations	
Union of European Football Associations	7/4/4
Asian Football Confederation	5/4/4
Confederation of African Football	1/1/1
Confederation of North, Central American and Caribbean Association Football	1/1/1
Total	**Invited: 208, Responded: 87 Included: 72**

Table II. Practitioner roles and level of employment upon survey completion

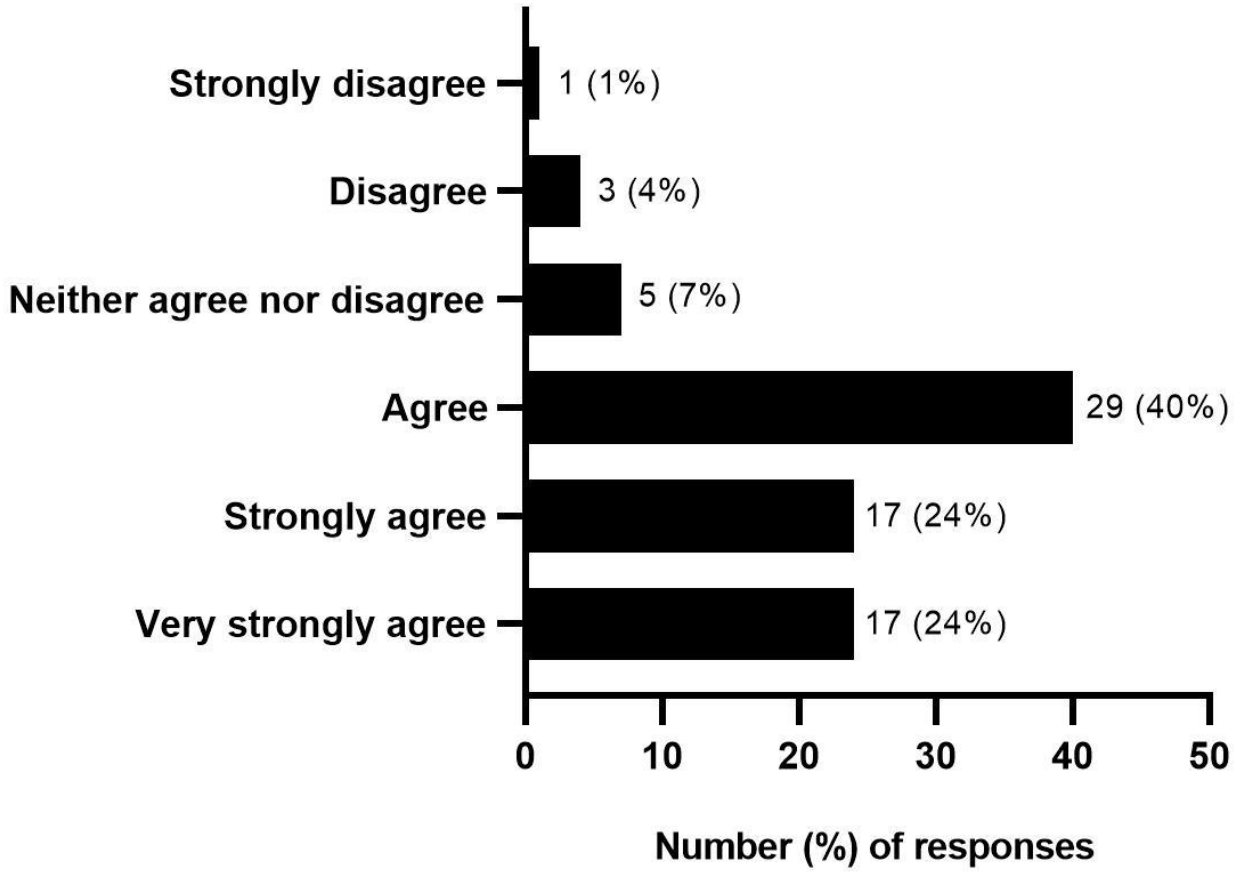
	Level of current employment				
Practitioner and coach roles	Professional	International	Semi-pro	Academy	**Total**
Science Staff	**27**	**5**	**4**	**4**	**41**
Sports scientist	10	1	3	2	17
Head of sports science	1	0	0	0	1
Head of science & medicine	8	2	0	0	10
Strength & conditioning coach	4	1	1	1	8
Head of fitness & conditioning	1	0	0	0	1
Nutritionist	4	0	0	0	4
Exercise physiologist	0	1	0	1	2
Medical Staff	**5**	**1**	**3**	**2**	**11**
Sport therapist/physiotherapist	4	0	3	2	9
Club Doctor	1	1	0	0	2
Coaching staff	**11**	**4**	**3**	**2**	**20**
Fitness coach	8	3	1	0	12
Head/assistant coach	3	0	2	2	7
Head of talent ID	0	1	0	0	1
Total	**44**	**10**	**10**	**8**	**72**

Table III. Reasons provided for adapting recovery practices following matches that proceed to extra-time compared with typical 90 min matches

Second order theme	Supporting quotations
Physical stress	"increased muscle damage", "greater prospect of injury-risk", "excessive physical stress and loads are being placed on player", "extra stress on the skeletal system", "more micro trauma", "I believe players experience greater DOMS".
Physiological and metabolic demands	"added physiological demand", "a greater degree of oxidative stress", "further glycogen depletion", "more energy expended", "increased metabolic demand", "changes in substrate utilisation", "usually we find that individual internal markers are more adverse with extra-time".
Mental pressure	"players are not mentally able to cope", "we should also consider the emotional pressure associated with the extra time period", "there is likely an increased psychological demand due to increased pressure", "an extra-time match may impact psychometrics", "mental fatigue plays a critical part".
External workload	"additional demands placed on the players (e.g., total distance, high-speed running and sprint distances)", "greater incidence of changes of direction and high-speed running", "increased external load than the typical experienced during normal 90 min games".
Exercise duration/volume	"Players are not conditioned for 120 minutes", "simply competing for an extended period of time", "taking into account the higher volume", "Depending on the duration of the match each individual player plays".


4%
24%
72%
Yes
No
Sometimes

584



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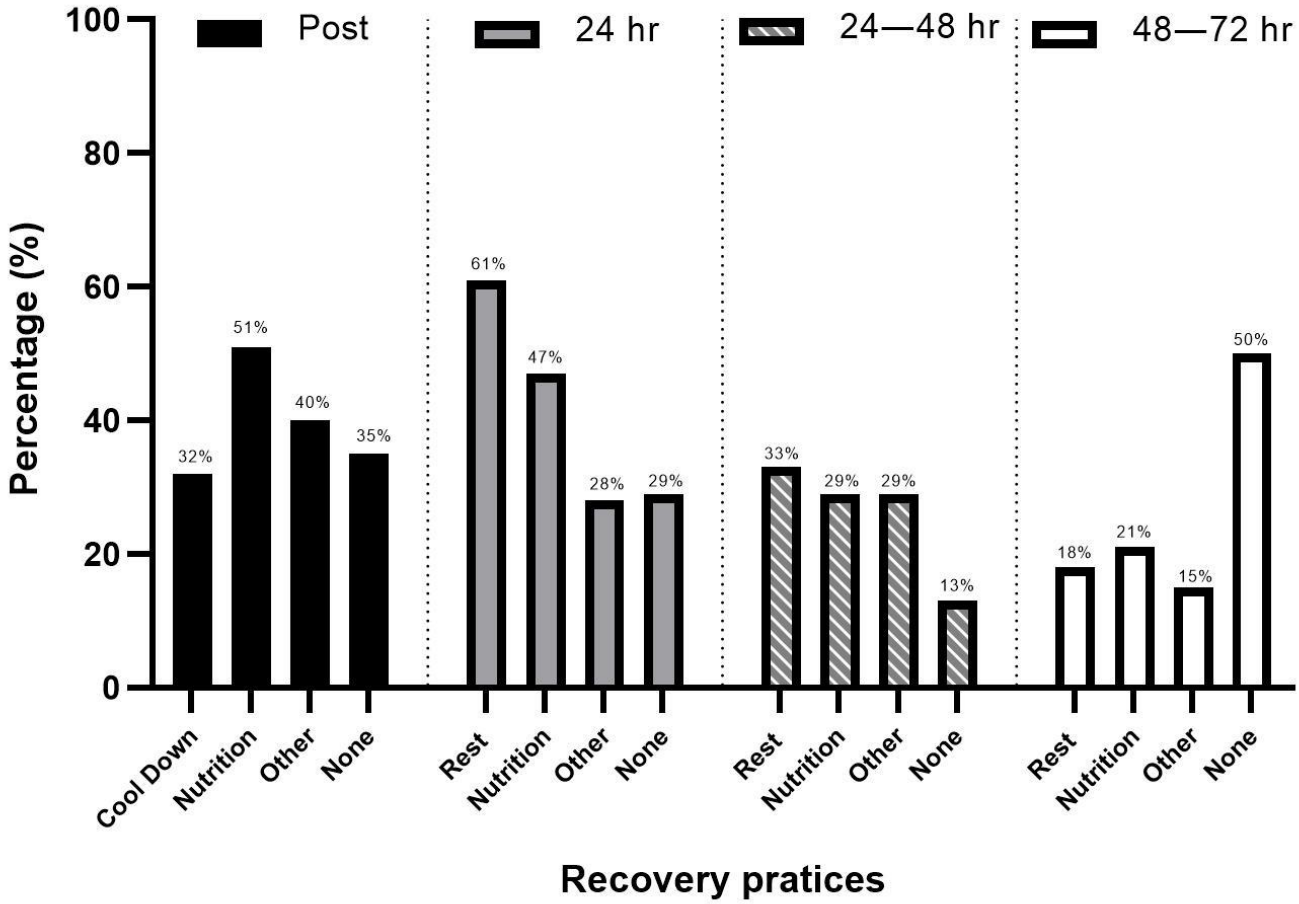
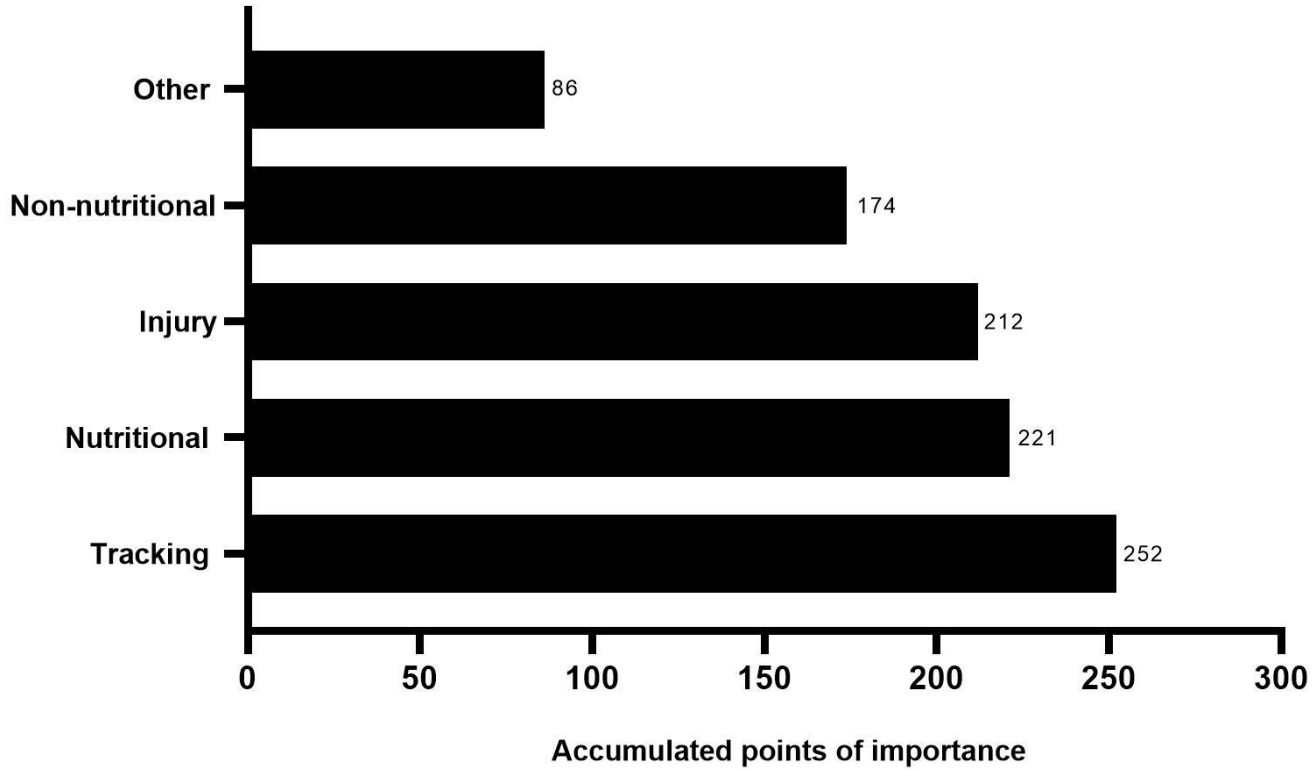

Post
24 hr
24—48 hr
48—72 hr
Percentage (%)
100
80
60
40
20
0
32%
51%
40%
35%
61%
47%
28%
29%
33%
29%
29%
13%
18%
21%
15%
50%
Cool Down
Nutrition
Other
None
Rest
Nutrition
Other
None
Rest
Nutrition
Other
None
Rest
Nutrition
Other
None
Recovery pratices

604


Other
86
Non-nutritional
174
Injury
212
Nutritional
221
Tracking
252
0
50
100
150
200
250
300
Accumulated points of importance

605