Recovery monitoring tool use and perceived usefulness in professional soccer

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Monitoring | Recovery | Usefulness

Headline

The importance of athlete recovery monitoring was highlighted in a recent consensus statement (1), specifically the need for monitoring tools to be part of a robust decision-making process, providing useful and relevant information at an individual level to practitioners, coaches and athletes (1-3). Presently, there is not an agreed holistic approach for soccer player recovery monitoring or information regarding the habitual recovery monitoring practices. Such data would inform future research to benefit practitioners working day-to-day within professional soccer.

Table 1. League and competitive level of practitioners [n = 51, 11 ± 7 (1-32) years of experience, 34 first team/senior team, 5 development/reserves/U21, 12 academy/U18], their role and the make-up of their sports medicine and sports science staff within their squad. Data presented as totals for league and role and mean ± standard deviation with ranges for staff team.

League	n
Qatari Stars League	12
International Football Association	7
English Premier League	6
English Championship (second tier)	2
Norwegian Eliteserien	2
English League Two (fourth tier)	2
Colombian Primera A	1
Australian A-League	1
South African Premier Soccer League	1
Turkish Super Lig	1
Italian Serie B (second tier)	1
Major League Soccer (USA)	1
Belgian First Division A	1
League of Ireland Premier Division	1
Dutch Eerste Divisie (second tier)	1
Chilean Campeonato Nacional (first tier)	1
Indian Super League	1
Role	**n**
Sports Physician	12
Physiotherapist	8
Fitness Coach	7
Physical Performance Coach	7
Sport Scientist	7
Strength and Conditioning Coach	6
Head of Sport Science	5
Sports Medicine Specialist	1
Staff Team	**n**
Total Sports Medicine and Science Staff	8 ± 5 (2-29)
Full-time	5 ± 3 (0-12)
Part-time	3 ± 3 (0-16)
Unpaid	2 ± 1 (0-7)
Contribute directly to recovery monitoring	4 ± 3 (0-17)

Aim

The aim of this study was to assess the current practices of those working in professional soccer with regards to the tools they use to monitor player recovery, their perceived usefulness of different monitoring strategies, and their reasons for using or not using (e.g. barriers) a particular tool.

Design

Cross-sectional, using a bespoke online survey.

Methods

An online survey was designed to assess professional football practitioners use and perceived effectiveness of recovery monitoring tools.

Participants. A convenience sample web-based survey research design was employed, with institutional review board approval (SREP/2017/007) in accordance with the Declaration of Helsinki. Professional soccer practitioners (n = 52) demographics are provided in Table 1.

Design. Through the professional network of the authors, professional soccer clubs and national teams, specifically members of their Sports Medicine or Sports Science departments, were contacted via email with further promotion through Twitter (between May and November 2017; follow-up emails for non-responders were sent in August and October). A single practitioner (with official club/national team email address) from each of the first team, reserves or academy squads was asked to complete the survey (multiple responses for the same squad/club were not seen). The identified practitioner was to have a clearly defined job title (e.g. Head of Recovery and/or Regeneration) and/or defined responsibility for procedures related to recovery monitoring within their squad.

Procedures. The survey was created using an online resource (www.onlinesurveys.ac.uk, Jisc, Bristol, UK) with an approximate completion time of 20 min. After providing their consent, practitioners answered a series of questions to ascertain the information provided in Table 1.

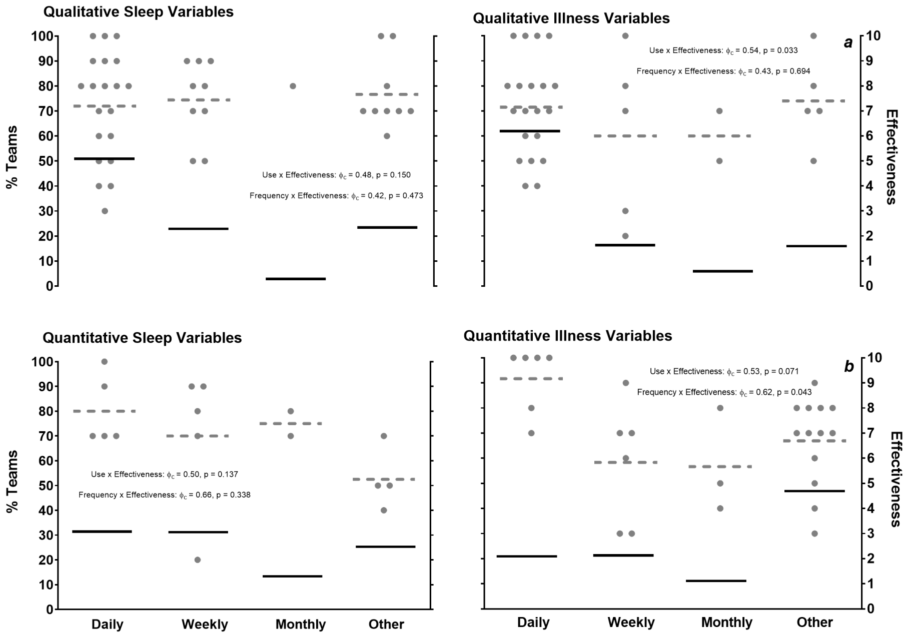


Figure 1. Quantitative and qualitative sleep variables use, frequency of use, and perceived effectiveness, within professional soccer.

% of teams which use tool (left Y axis) x frequeny of use (X axis)

Mean practitioner perceived effectiveness (right Y axis) x frequency of use (X axis)

Individual ratings of perceived effectiveness

b Significant relationship between frequency of tool use and perceived effectiveness ($p < 0.05$)

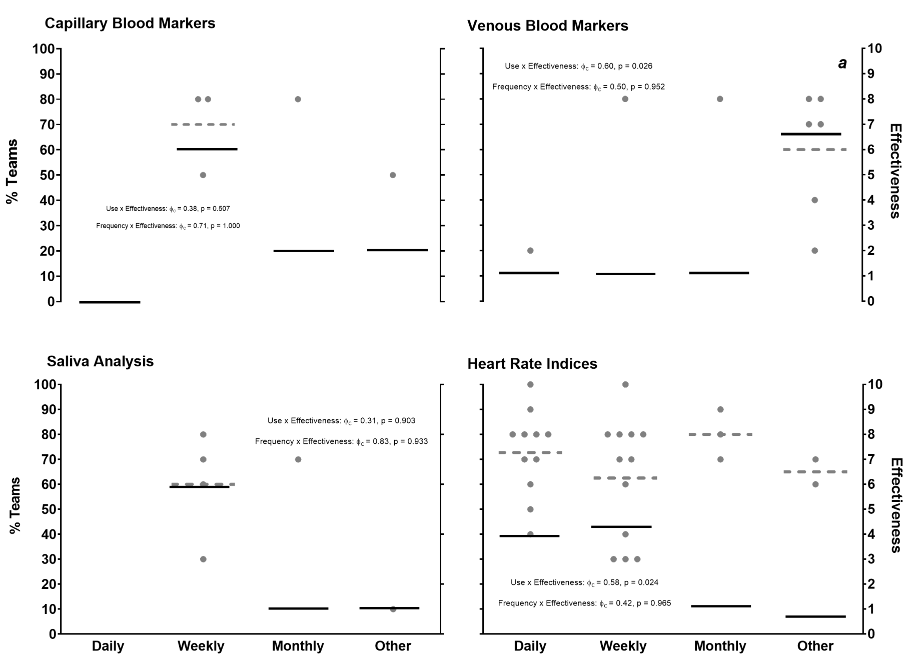


Figure 2. Capillary and venous blood markers, saliva analysis and heart rate indices use, frequency of use, and perceived effectiveness, within professional soccer.

% of teams which use tool (left Y axis) x frequeny of use (X axis)

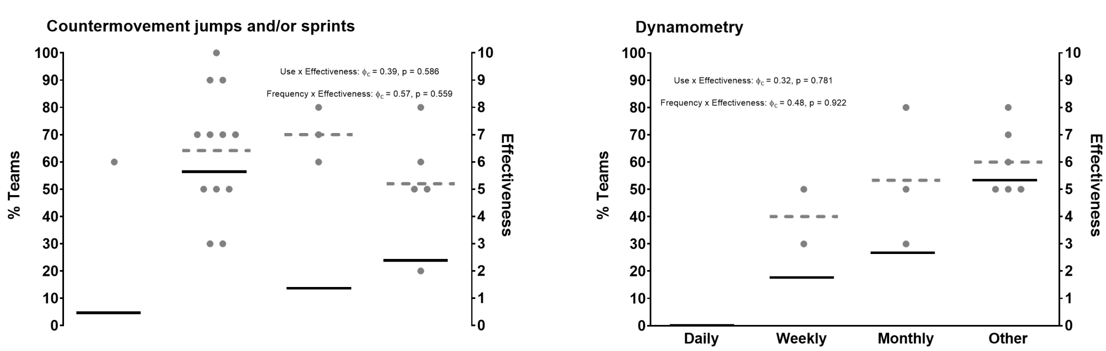
Mean practitioner perceived effectiveness (right Y axis) x frequency of use (X axis)

Individual ratings of perceived effectiveness

a Significant relationship between tool use and perceived effectiveness ($p < 0.05$)

Table 2 Practitioners' perceived effectiveness ratings for tools they do not use and main reasons for not using a particular tool. The main reasons given by practitioners for why they use a particular tool are also provided.

Tool	Effectiveness rating for those who do not use	Main reasons for using	Main reasons for not using
Qualitative sleep variables *(e.g. self-reported sleep quality)*	6.9 ± 2.1	Empirical evidence (62%), time efficiency (59%), low cost (33%)	Player preference (62%), time (54%)
Accelerometry/GPS	6.6 ± 3.1	Empirical evidence (68%), available facilities (44%), anecdotal evidence (41%)	Available facilities/equipment/expertise (72%), cost (33%)
Qualitative illness variables *(e.g. self-reported illness)*	5.8 ± 2.3	Time efficiency (63%), empirical evidence (47%), cost (44%)	Lack of time (45%), player preference (35%)
Visual Analogue Scales	5.7 ± 2.1	Empirical evidence (59%), good time efficiency (51%), low cost (41%), *player conversation* (e.g., "Prefer to discuss with each player predominantly… the use of the scale is done to engage in conversation.")	Player preference (55%), lack of empirical evidence (36%), anecdotal evidence (36%), *lack of staff* (e.g., "we don't have enough staff members to do this") and *player engagement* (e.g., "the players run away after training")
Jump/sprint metrics	5.5 ± 2.2	Time efficiency (52%), empirical evidence (43%)	Available facilities/equipment/expertise (55%), time (45%), *risk* ("…a lot of joint issues…would be putting them at risk according the physio's"),
Quantitative sleep variables *(e.g. actigraphy)*	5.5 ± 2.2	Empirical evidence (44%), available facilities/equipment/expertise (38%)	Available facilities (65%), time (43%), cost (38%)
Movement screening	5.0 ± 2.0	Time (65%), empirical evidence (58%), anecdotal evidence (39%)	Time (43%), lack of available facilities/equipment/expertise (33%)
Heart rate (HR) indices *(e.g. HR variability)*	5.0 ± 2.7	Empirical evidence (55%), available facilities/equipment/expertise (48%)	Facilities/equipment/expertise, *accuracy* provided as an additional reason ("accuracy/consistency of measures").
Saliva analysis *(e.g. testosterone/cortisol)*	5.0 ± 2.6	Empirical evidence (67%), available facilities/equipment/expertise (50%)	Available facilities/equipment/expertise (70%), cost (59%)
Capillary blood markers *(e.g. creatine kinase)*	5.0 ± 2.5	Empirical evidence, time, cost (all 40%)	Available facilities/equipment/expertise (68%), cost (55%)
Quantitative illness variables *(e.g. physician exam)*	4.6 ± 2.1	Facilities/equipment/expertise (46%), time efficiency (39%), cost (36%)	Lack of facilities/equipment/expertise, time (50% for both)
Dynamometry	4.5 ± 2.3	Available facilities/equipment/expertise (73%), empirical evidence, time and cost (all 45%)	Available facilities/equipment/expertise (66%), time (39%)
Venous blood markers *(e.g. complete blood counts)*	4.3 ± 2.6	Available facilities/equipment/expertise (67%), empirical evidence, cost, player preference (all 33%)	Available facilities/equipment/expertise (67%), cost (60%)



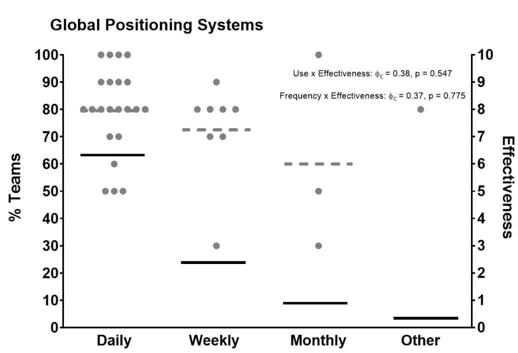


Figure 3. Countermovement jumps and/or sprints, dynamometry and global positioning systems use, frequency of use, and perceived effectiveness, within professional soccer.

% of teams which use tool (left Y axis) x frequeny of use (X axis)

Mean practitioner perceived effectiveness (right Y axis) x frequency of use (X axis)

Individual ratings of perceived effectiveness

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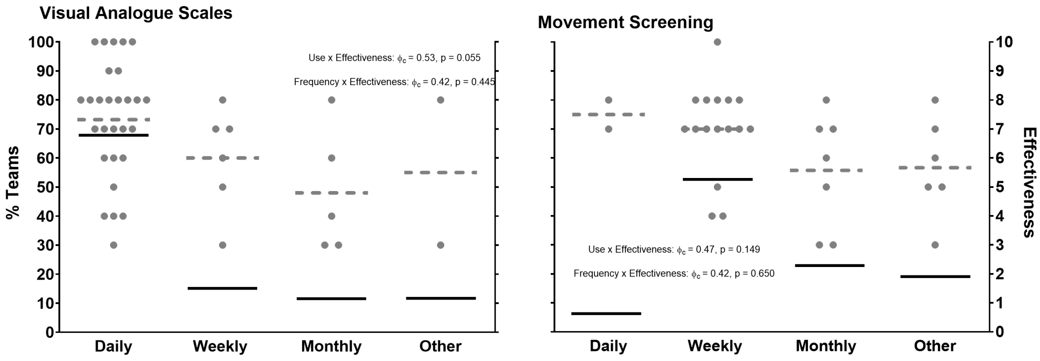

Figure 4. Visual analogue scale and functional movement screening use, frequency of use, and perceived effectiveness, within professional soccer.

% of teams which use tool (left Y axis) x frequeny of use (X axis)

Mean practitioner perceived effectiveness (right Y axis) x frequency of use (X axis)

Individual ratings of perceived effectiveness

The survey then asked questions related to thirteen recovery monitoring tools (see Table 2 first column), including: the frequency they used the tool to assess/monitor the recovery status of their players [options: never, every day, once a week, once per month, other (asked to specify)]; their own perceived usefulness of the tool for monitoring/assessing recovery status of their players [1-10 scale; 1 = not effective at all, 5 = moderately, 10 = highly effective (even if they did not use the tool they were asked to state its perceived usefulness)]; the reasons for using or not using a specific tool [options: empirical evidence (e.g., scientific/clinical literature, robust or lack of), time efficiency (good or bad), cost (economical or not), player preference (they like or dislike it), anecdotal/experience of using the tool, available facilities, equipment or expertise (club has these or not), other (asked to specify)]. The practitioners could choose more than one option. All questions were mandatory and required a response in order to progress to the next question. Practitioners were also presented with an empty text box at the end of the survey where they could state any recovery monitoring tools they used but were not listed, their perceived usefulness of that tool, and the reasons for using that approach.

Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics 24 (IBM, Armonk, NY). A Pearson's Chi-square test was used, to assess the relationship between; i) the percentage of teams who use a tool and their perceived effectiveness of the tool; and ii) a team's frequency of using a tool and their perceived effectiveness of the tool. When more than 20% of expected counts were less than 5, a Fisher's Exact test with Cramer's V (ϕ_c) was used. Effect sizes (ES) were calculated using Cramer's V, as all degrees of freedom were > 1. Criteria for ES were set as small (0.10), medium (0.30) and large (0.50). Alpha was set at $p \leq 0.05$.

Results

Descriptives Results. Descriptive results: Frequency of tool use and their associated perceived effectiveness are provided in Figures 1, 2, 3 and 4. Table 2 outlines practitioner reasoning for and against using a tool, and perceived effectiveness for tools that were not used. The only 'other' recovery tools (i.e. not listed in Table 2) practitioners used were smartphone apps (time efficiency as the main reason), online wellness program algorithm, and thermography (time efficiency and available facilities/equipment/expertise two main reasons).

Relationships. Results from Chi-Square and Fisher's Exact Tests are provided in Figures 1, 2, 3 and 4. Significant relationships between those who did and did not use venous blood counts and qualitative illness measures and their perceived effectiveness were found (see Figures 1 and 2). There was also a significant relationship for frequency of use and perceived effectiveness of quantitative illness measures (see Figure 1).

Discussion

A variety of practitioners have responsibility for overseeing recovery monitoring tool use (Table 1). Competing player/staff needs likely limit the time available for recovery monitoring tools to be employed. Indeed, regarding tool use or non-use, 'time' ranked fourth for both, whilst facilities (including expertise and equipment) were first and third, respectively. This demonstrates that practitioners need practically employable and cost effective (time and finance) monitoring tools, which provide meaningful data to guide player preparedness decisions. Figure 3 illustrates that the most frequently used tools likely came from one piece of hardware (GPS vest unit likely with integrated HR) complemented by qualitative reporting of muscle soreness, perceived recovery, sleep and illness. These approaches are relatively easy to administer to squads of players, and excluding the initial cost of GPS/HR units and the set-up of any electronic/on-line qualitative data acquisition methods, are low in ongoing time and financial commitments/costs.

Practitioner's perceived effectiveness for some tools (e.g. venous blood counts, qualitative illness reporting) was associated with adoption or not of the tool within their practice. Further, increased frequency of qualitative illness reporting was seen with increased perceived effectiveness. Several interesting constructs are raised by such relationships. Firstly, this demonstrates how the value of qualitative and quantitative approaches even for the same purpose (e.g. quantitative vs qualitative illness monitoring) must undergo robust evidence-informed consideration, each subject to their own pros and cons, prior to adoption within athlete recovery monitoring (1,4,5). Secondly, the need for robust evidence to be communicated efficiently (e.g. infographics, micro-podcasts, etc.) to busy practitioners, who may not have the time to read several peer-reviewed articles in order for their practice to be evidenced-informed (i.e. their perceived effectiveness is evidence informed). Thirdly, if a practitioner does not have robust, palatable and easily accessible evidence to hand, their perceived effectiveness of a particular tool may not be evidenced-informed and thus adoption of a tool within their practice may be based on anecdotal evidence (as was reported within the present data, see Table 2). Finally, it is important that the player receives a palatable evidence-informed rationale as to why particular monitoring tools are being employed.

The predominant reasons provided for tool use were empirical evidence, time efficiency, available facilities (including expertise and equipment) and time (speed of use). Rationales for tool non-use focused upon facilities, time, player preference and cost. Practitioners could therefore benefit from specific data, particularly reliability, validity and sensitivity from different professional soccer demographics regarding the tools they commonly employ within their practice (1). Such data would allow measurement tool error, individual error of measurement and smallest worthwhile change in monitoring tool, to be considered appropriately before making a player preparedness decision. A recent consensus statement suggests using a longitudinal Bayesian approach incorporating gradual individualization of reference ranges (1). Ultimately, a recovery monitoring strategy and the data produced should evolve reductively, to promote The Law of Parsimony (4).

Practical Applications

- The data generated by these frequently used tools should guide player preparedness decisions and facilitate prescription of individualized, meaningful and reliable recovery promotion activities 1.
- The predominant reasons for not using a particular tool were a lack of time, available facilities and expertise, and cost. Therefore, there is scope to assess the cost-benefit of tools that are not used for these reasons.
- Researchers and practitioners could harmoniously work together to determine the reliability, validity and sensitivity of such data; historical data may be a convenient starting point.
- This data would feed forward into future ecologically valid research projects that would benefit the day-to-day activities of staff in professional soccer, therefore supporting practitioners as they seek to optimize player health, recovery and performance.

Acknowledgments

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