ORIGINAL ARTICLE

Title: Involving research-invested clinicians in data collection affects injury incidence in youth football

Running head: Injury surveillance in youth football

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ABSTRACT

It is well established that differences in injury definition and recording methodology restrict comparisons between injury surveillance programmes. There is, however, little documentation of the variation that can exist between data recorders. The aim of this study was therefore to explore the effect on reported injuries when team recorders or supervisors are involved in research. Injury data collected prospectively over five seasons for the U16, U17 and U18 age groups in a youth football (soccer) academy were used to compare different recording settings based on the research involvement of the clinicians. A research-invested team physiotherapist reported an 8.8 times greater incidence ($p<0.001$) of non-time-loss injuries and a 2.5 times greater incidence ($p<0.001$) of minimal injuries (1-3 days lost) compared to a setting where neither the team physiotherapists or the supervisor relied on the collected data for research purposes. When team physiotherapists were not invested in research themselves but were supervised by a researcher, the incidence of non-time-loss injuries and minimal injuries was 2.5 times ($p<0.001$) and 2.0 times greater ($p<0.01$) than in the non-invested setting, respectively. However, there were no differences between recording settings for overall incidence of time-loss injuries. The results from this study demonstrate that involving clinicians that are relying on the collected data for research purposes can significantly affect the reported rates of non-time-loss and minimal injuries. Time-loss injuries overall were not affected by research investment, and should therefore be preferred for comparisons between teams and seasons.

KEYWORDS

injury prevention, soccer, adolescent, male, athletes, epidemiology, medical staff, documentation

INTRODUCTION

Robust epidemiological data are essential in the process of preventing injuries and maximising performance,[1-3] and guidelines for injury surveillance have therefore been established.[4] Yet, differences in injury definitions and recording methods continue to restrict comparisons between contexts, teams and seasons.[5-7] The consensus-recommended injury definitions "any physical complaint", "medical attention" and "time loss" operate on a spectre from broad to narrow, and as a consequence, injury rates differ based on the chosen definition.[5,8,9] Similarly, outcomes are affected by the method used for capturing injuries and those responsible for documenting them in sporting populations.[10-18]

When a broad injury definition is applied with multiple recorders there is going to be differences in interpretation.[5,8] An incident could be considered insignificant and simply a normal response to training by one clinician, while another could meticulously note down every single contact with a player. This could be related to the motivation of the recorder,[8] and when clinicians are involved as recorders, their personal interest in the study outcomes, role in a research project or intensity of the supervision could be thought to lead to variations in the collected data.

Previous studies have assessed the strengths and limitations of different injury definitions, and in general, narrow definitions (e.g. "missed match" or "time loss") are considered superior in terms of reliability and cost efficiency, while broad definitions (e.g. "medical attention" or "any physical complaint") are more appropriate for capturing overuse and mild conditions.[5,8,9,19] Comparisons have also been made between different recording methods, such as reporting by technical delegates, parents, coaches, medical staff or players themselves, and collectively their findings indicate that different methods capture different conditions and therefore provide contrasting results.[10-18] There is, however, little documentation of discrepancies within the same injury surveillance programme, where the definition and method is designed to be consistent.

Variation between data recorders has widely been acknowledged as a limitation in previous epidemiological research. The aim of this study was therefore to explore the effect on reported injuries when team recorders or supervisors in the same injury surveillance programme are involved in research relying on the collected data.

METHODS

Study population

This study used injury data collected prospectively over five seasons in an elite youth football (soccer) academy in the Middle East. The participants in the injury surveillance programme were full-time and part-time players registered with the U16, U17 and U18 squads for the 2012/13 through the 2016/17 seasons (Table 1). Ethical approval was obtained from the Anti-Doping Lab Qatar Institutional Review Board (IRB Application #E20140000012), and written informed consent was obtained from all players and their guardians.

Full-time players (student athletes) participated in 8-11 weekly academy sessions (6-8 football sessions and 2-3 strength & conditioning sessions) while part-time players (not registered students with the academy's school) participated in 6-7 academy sessions (5 football sessions and 1-2 strength & conditioning sessions). In addition, both full-time and part-time players participated in local club games on a weekly basis and 1-2 academy matches against international clubs every third week. A player was assumed to have participated with the same squad throughout the season, and although possible, training and playing matches with other age groups was a rare exception. In these cases, injuries were still reported for the age group the player was registered with for the season.

Injury surveillance

The injury definition was adopted from the football consensus statement,[4] and a recordable incident was defined as any musculoskeletal complaint sustained by a player that resulted in a clinical examination by a member of the academy medical staff, regardless of time loss. Every academy age group had their own physiotherapist and access to medical doctors at all times. All injuries were diagnosed by a medical doctor and entered continuously in a team injury database (Microsoft Excel®) throughout the season by the designated team physiotherapist based on a standardised injury report form. The form contained information on player demographics (age group and status with the academy), as well as the injury characteristics and circumstances (date of injury, discharge date, number of days lost, session type, final diagnosis and injury site).

Data extraction and classification

Entries from the team injury databases for the seasons and squads of interest were matched with the player's squad assignment and status (full time vs. part time) as registered in the central academy database. Duplicates and multiple entries from the same incident were removed, along with illnesses and entries from players who were not full-time or part-time players (trial players and national team players that were not associated with the academy). Injuries were classified as either time loss or non-time loss based on the actual number of days lost from training sessions and matches, as reported by the physiotherapist. In cases where this was not reported, the number of days lost was calculated using the date of injury and date of return to full participation. The same approach was used to categorise severity of time-loss injuries (minimal: 1-3 days, mild: 4-7 days, moderate: 8-28 days, severe: >28 days).[4] If a case was not resolved at the time of data extraction, the treating clinician provided an estimate for the date of return to full participation in order to calculate the number of days lost.[4]

The final diagnosis and injury site were used to categorise every injury based on body region (head/neck, upper limb, trunk, lower limb).[4] The injury context was based on the session in which the injury was reported to occur (academy, club, national team, other). Other injuries, which were related to participation in activities outside of football or were non-sport injuries, were included as they made up a considerable number of complaints seen by the academy staff.

Comparison of injury recording settings

Accurate training exposure data were not available for all five seasons, and injuries were therefore analysed by squad month according to the season (2012/13 to 2016/17), age group (U16, U17 or U18) and month of injury (Figure 1) to account for different season durations.

Three recording settings were identified, based on the level of research investment in the injury surveillance programme. The first setting was when the injury recorder (one of the team physiotherapists) relied on the collected data for a specific research project ("Invested clinical recorder"). The second setting was when injuries were recorded by the other non-research-

invested team physiotherapists under close supervision by the senior physiotherapist who relied on the collected data for research purposes ("Invested supervisor"). The third setting was when injuries were recorded without involvement of a physiotherapist or supervisor relying on the data for specific research projects ("No research-invested supervision").

Age group was included as a co-factor when comparing recording settings to account for potential differences in injury characteristics, which previously have been observed in football academies in Europe and the Middle East.[20-22] National team tournament preparation was added as a co-factor given the unique organisation of this specific football academy and national football association. The academy teams were commonly organised based on upcoming international target tournaments; the AFC (Asian Football Confederation) qualifications and championships, involving the U17 and U19 national teams. In the months leading up to these tournaments football activity revolved around the national team, with a different training environment compared to the rest of the academy year. Typically, both players and medical staff from the academy squads were involved in the national teams. Physiotherapists had more contact time with players during these training camps, and players could potentially have had easier access to and a lower threshold for seeking medical attention. National team preparation month was only added as a co-factor if the academy team physiotherapist was also the national team physiotherapist for the corresponding age group.

Any month with a registered training session for the given season and squad was considered eligible for inclusion, and exclusion was performed stepwise based on three criteria (Figure 1). To start with, months for which we could not confidently assign a single recording setting were excluded. Subsequently, we excluded months where the off-season period represented more than 1/3 of the days, using the first (for the start of the season) or last (for the end of the season) training session of the season as the cut-off dates. Finally, months with unclear co-factors were removed. This concerned only the month type ("national team preparation month" or "academy month"), and a 2/3 definition was applied. For this calculation, the dates of the first national team session and last tournament match were used. The choice of cut-off for these exclusion criteria was agreed upon following discussions with the involved medical staff.

Statistical analysis

Injury counts for each outcome category were used to compare injury recording settings. To calculate incidence, the nominator consisted of injury counts for the given category and/or recording setting, while the denominator (exposure) consisted of the number of player months for the corresponding squads. Player months were standardised so that the incidence represents the number of injuries per player for a 31-day month. Incidence is presented with 95% confidence intervals (CI). A Poisson regression model was used to examine the effect of different recording settings, adjusting for potential co-factors (age group and month type). Odds ratios for the co-factors age group and month type were generated in the regression model, and are presented for overall injuries in order to inform on the impact they had on the statistical comparisons. Pairwise comparisons between recording settings were made between the estimated marginal means applying a Bonferroni post-hoc correction, where p-values <0.05 were considered significant.

RESULTS

Squad months, players and exposure

Figure 1 gives an overview of squad months. A total of 168 months were identified for potential inclusion for the seasons and age groups of interest. Of these, 31 were excluded (11 with unclear injury recording setting, 18 with >1/3 of days outside of season, 2 with <2/3 of days as either national team preparation or academy), resulting in 137 squad months included in the final analyses.

A total of 374 player seasons (267 full time, 107 part time) were identified in the database. After reviewing the original squad lists with the associated medical staff, 32 missing player seasons (9 full time, 23 part time) were included. This resulted in a total of 406 player seasons (211 unique players; mean 1.8 ± 0.9 seasons per player) in the final analyses (Table 1).

The exposure for the five seasons was 3615.2 player months overall (one player month equals one player participating for one normalised 31-day month), where full-time and part-time players contributed with 2473.1 and 1142.0 player months, respectively. The overall exposure was 1462.4 player months for the Research-invested clinical recorder setting (n=51 squad months),

1702.8 for Research-invested supervisor (n=68 squad months) and 450.0 for No research-invested supervision (n=18 squad months).

Injuries

The initial extraction from team injury databases resulted in a total of 1357 incidents recorded by the academy physiotherapists. Of these, 53 entries were excluded (3 duplicates, 6 multiple entries for the same incident, 1 illness, 38 entries for players who were not full-time or part-time students, 4 entries with date of injury outside the study period, 1 blank entry), leaving 1304 entries in the final data set. In 40 cases, actual day loss was not reported by the clinician, and the dates of injury and return to full participation were used to calculate the number of days lost. There was one case where the player had not returned to play at the time of data extraction, and context was missing for one injury.

The final sample consisted of 1167 injury entries for the included months (Table 1). Frequency, distribution and incidence for each injury category is described in Table 2 for all players combined, full-time players and part-time players.

Age group and month type as co-factors

Both co-factors (age group and month type) contributed significantly to the statistical model for overall injuries ($p < 0.001$). The overall incidence for the U16, U17 and U18 age groups was 0.38 (0.34 to 0.41), 0.33 (0.30 to 0.36) and 0.27 (0.24 to 0.30) injuries per player month, respectively. Using the U18 age group as the reference, the odds ratio was 1.7 (1.4 to 2.0) for U17 players and 1.9 (1.6 to 2.2) for U16 players. The overall incidence for academy months was 0.28 (0.27 to 0.30) injuries per player month, while the incidence for national team preparation months was 0.70 (0.61 to 0.79). When standard academy month was set as the reference, the odds ratio was 2.1 (1.8 to 2.5) for a national team preparation month.

Injury recording setting

Overall, the adjusted incidence for the Research-invested clinical recorder setting was 0.60 (0.55 to 0.65; n=623 injuries) injuries per player month, which was significantly greater ($p<0.001$) than both the Research-invested supervisor and No research-invested supervision settings, where the incidence was 0.32 (0.29 to 0.36; n=458) and 0.27 (0.22 to 0.34; n=86), respectively.

The incidence of time-loss injuries was not significantly different between any recording settings (Invested recorder 0.24, 0.21 to 0.28; Invested supervisor 0.21, 0.18 to 0.24; Non-invested 0.20, 0.15 to 0.25) (Figure 2). For non-time-loss injuries, the incidence for the Research-invested clinical recorder setting (0.35, 0.31 to 0.39) was 3.5 times greater than the Research-invested supervisor setting (0.10, 0.08 to 0.12; $p<0.001$) and 8.8 times greater than the No research-invested supervision setting (0.04, 0.02 to 0.07; $p<0.001$). Non-time-loss incidence was 2.5 times greater for the Research-invested supervisor setting compared to the No research-invested supervision setting ($p<0.001$).

For severity categories of time-loss injuries, only minimal injuries showed differences between recording settings (Figure 3). Compared to the No research-invested supervision setting (0.04, 0.02 to 0.07), the Research-invested supervision setting (0.08, 0.06 to 0.10) resulted in 2.0 times greater adjusted incidence ($p<0.01$) while the Research-invested clinical recorder setting (0.10, 0.09 to 0.13) resulted in 2.5 times more minimal injuries per player month ($p<0.001$). Comparisons of incidence between the recording settings for body region and injury context are presented in Table 3.

DISCUSSION

This is the first study to examine the variations in injury incidence between medical staff recorders with different levels of research-investment within the same surveillance programme. Based on 1167 injuries from 406 academy player seasons, the results demonstrated that the incidence of non-time-loss injuries and injuries with short day loss (1-3 days) was significantly greater when research-invested clinicians were involved in the data collection. The incidence of time-loss injuries overall was, in contrast, similar between clinicians, irrespective of research investment.

Injury incidence depends on the level of research investment

Orchard & Hoskins[8] suggested that methodological limitations are responsible for discrepancies in injury incidence between studies applying medical attention definitions. They argue that data recorders will respond to less serious incidents differently, either due to adherence with the injury definition or a pragmatic approach to what is considered a real injury. As a consequence, the reliability of the surveillance system will suffer. This argument is supported by the findings in the current study, where the incidence of less severe injuries (non-time loss and minimal) was significantly greater with increasing involvement of research-invested clinicians, while the incidence of time-loss injuries was the same, independent of the recording setting.

Non-time-loss incidence was especially sensitive to different recording settings, and a research-invested clinical recorder reported almost nine times greater incidence compared to the setting where research-invested clinicians were not involved as data recorders or as a supervisor. In practical terms, the adjusted injury rates from the most invested setting imply that an academy squad with 25 players could expect around 135 injuries overall during a 9-month season, where approximately 54 injuries would result in time loss from training sessions and/or matches and 79 would not. In comparison, the adjusted injury rates from the more common setting, where team physiotherapists are not invested in the research project or supervised by a researcher, suggest that the squad could expect around 61 overall injuries, where approximately 45 would lead to time loss and only 9 would not. The large variations in overall and non-time-loss injuries essentially render comparisons between teams and seasons meaningless, as it is nearly impossible to tell whether the variation was a result of real differences in injury rate, for example as a result of a new training regime and/or prevention programme, or was simply due to the rigor of recording by the assigned team physiotherapist.

Upper limb injuries may be more often neglected

As discussed above, the variations in the number of recorded injuries could be caused by clinicians considering certain injuries more or less relevant to record. In support of this, a greater incidence of upper limb injuries was revealed for the most research-invested setting (invested clinical recorder) compared to the setting where physiotherapists were supervised by a clinical

researcher but were not invested in research themselves. Injuries to the upper limb may not be considered crucial to football participation, and it could therefore be suggested that these are more likely to be neglected when reporting injuries. This sports-specific aspect has been emphasized previously as a limitation for time-loss definitions,[23] as some injuries would allow a player to fully train and compete while still undergoing treatment or rehabilitation. At the same time, there were no differences for head/neck and trunk injuries, and a consistent trend for unequal reporting was only observed for injuries to the lower limb.

The differences between recording settings in terms of injury context were especially apparent for national teams, with 17 times greater overall incidence in the most invested compared to the least invested setting. Although important for understanding the current dataset, it should be interpreted with caution given the very specific and complex interplay between academy teams and national teams in this setting. As mentioned previously, medical staff and players frequently crossed over between the two, and even though national team tournament preparation months were controlled for, it was not possible to accurately control for national team activity for the remainder of the season. It is also possible that invested physiotherapists were more likely to be recruited for national team duty.

Should only time-loss incidence be used for comparisons?

The overall incidence for players in this specific football academy can be translated to approximately 2.9 injuries per player over a typical 9-month academy season from September through May. As mentioned in the introduction, one of the main issues with injury surveillance studies is the inability to confidently compare results to similar programmes and assess whether or not these numbers are normal for academy players. Given the stability across recording settings that was demonstrated in the current study, using time-loss injuries alone for comparisons would be considered the most appropriate. In this football academy the incidence of time-loss injuries equated to approximately 1.7 per player/season, which can be considered normal based on the injury incidence of 1.35 (U16) and 2.14 (U18) reported in English youth academies.[22]

The incidence of non-time-loss injuries (approximately 1.2 per player/season) suggests that these were less frequent than time-loss injuries and accounted for around 40% of the injuries seen by the academy staff. As was highlighted in the present study, this could vary significantly depending on the setting of the injury recording and should therefore not be assumed to accurately represent the real situation. The proportion of non-time-loss injuries in this academy was also higher than what was reported for an English football academy, where only 12% of the injuries did not result in days lost.[24] Following the points made previously, these comparisons provide little value, as we do not know how invested the data recorders were, even though the injury definition and recording methodology were the same.

If non-time-loss injuries are neglected in epidemiological studies due to questionable reliability, it is important to understand the consequences of narrowing the definition. Even though a time-loss definition is arguably the most reliable, it is vulnerable to differences in training and match schedules and season phase, and does not capture situations where players participate with pain or use painkillers in order to play.[5,8] It is also less suited for individual sports, where athletes compete less frequently and can modify their training on a more individual basis.[5,8] The time-loss definition captures what many consider the most relevant injuries affecting sporting participation, but will not capture the full extent of mild and overuse issues that athletes face.[19] Applying a medical attention definition is suggested to provide a better indication of the true burden of injuries,[5,9] and in the current injury surveillance programme a broad medical attention definition was considered the most appropriate, given the high proportion of overuse injuries in academy athletes in the Middle East.[20,25] This definition also provides a better representation of the staff workload than a time-loss definition alone would,[5] which could be valuable in the process of allocating staff and justifying jobs.

Methodological considerations

This study included a large dataset from several teams, with very few missing data points. A consistent methodology was applied over all five seasons, and the broad coverage ensured equal treatment opportunities with experienced physiotherapists as data collectors. Even so, there are some important methodological limitations to take into account when interpreting the results.

First, the specific context and cultural considerations can limit the applicability of the findings to other football academies and surveillance programmes. The reader is therefore encouraged to compare this setting with their own practice and evaluate the similarities and differences. Second, retrospective examination of injury databases and squad lists has limitations even though the data were recorded prospectively by the physiotherapists and academy staff. It is not certain that the squad lists for a season were accurate for each month and accurate training exposure data could not be obtained. Even though the best effort was made to separate injury recording settings, injury cases could be handled by multiple clinicians, and physiotherapists exceptionally covered training sessions and matches for other teams than their own. Third, the analyses were based on assumptions that there were no systematic differences in the training regime or injury prevention programmes that would affect one recording setting more than another. There was only one season with non-invested supervision; however, the similarity in time-loss incidence suggests that the injury pattern was not very different between seasons. Finally, there was no examination of underlying factors for the level of research-investment (e.g. intrinsic and extrinsic motivation, academic qualifications), and this classification is solely based on whether or not the clinician was involved in research projects using the collected data.

PERSPECTIVES

This study demonstrates that the incidence of overall and non-time-loss injuries can increase substantially if recorders or supervisors are invested in research relying on the collected data. Time-loss injuries were not affected by research involvement, and should therefore be preferred for comparisons between teams and seasons.

Although no injury surveillance system will capture all injuries, estimating the direction and extent of bias by underreporting is important.[26] The findings from this study are therefore relevant for all practitioners and researchers involved in injury surveillance programmes using multiple data recorders, and should be taken into account when interpreting results from epidemiological studies. Over several seasons with inevitable staff turnover in clinical settings, variation between data recorders has the potential to compromise the outcomes of any otherwise well-designed surveillance programme. If medical staff are recording injuries, using a broad

injury definition, it is important to ensure that recorders receive sufficient training, and that there is a clear consensus about what constitutes a recordable injury.

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TABLES

Table 1 Summary of months, players and injuries included in the final analyses (FT: Full-time players, PT: Part-time players).

	Months	No. of players (FT/PT)	No. of injuries (FT/PT)
U16			
2012-2013	9	28 (15/13)	49 (31/18)
2013-2014	10	28 (26/2)	165 (160/5)
2014-2015	8	26 (24/2)	65 (60/5)
2015-2016	11	24 (15/9)	113 (89/24)
2016-2017	8	22 (11/11)	42 (19/23)
U17			
2012-2013	10	27 (17/10)	53 (41/12)
2013-2014	11	26 (12/14)	48 (30/18)
2014-2015	10	30 (28/2)	190 (188/2)
2015-2016	9	25 (23/2)	84 (80/4)
2016-2017	5	25 (16/9)	16 (14/2)
U18			
2012-2013	10	33 (19/14)	68 (48/20)
2013-2014	10	23 (18/5)	46 (37/9)
2014-2015	10	28 (13/15)	50 (34/16)
2015-2016	11	28 (21/7)	150 (139/11)
2016-2017	5	33 (18/15)	28 (20/8)
Total	137	406 (276/130)	1167 (990/177)

Table 2 Frequency, distribution and incidence (injuries per player month) by category for all players combined, full-time players (FT) and part-time players (PT) (Minimal: 1-3 days, Mild: 4-7 days, Moderate: 8-28 days, Severe: >28 days).

	No. of injuries			Distribution (%)			Injuries per player month (95% CI)		
	All	FT	PT	All	FT	PT	All	FT	PT
Overall									
All injuries	1167	990	177				0.32 (0.30-0.34)	0.40 (0.38-0.43)	0.15 (0.13-0.18)
Time loss									
Time loss	698	570	128	59.8	57.6	72.3	0.19 (0.18-0.21)	0.23 (0.21-0.25)	0.11 (0.09-0.13)
Non-time loss	469	420	49	40.2	42.4	27.7	0.13 (0.12-0.14)	0.17 (0.15-0.19)	0.04 (0.03-0.06)
Severity of time loss									
Minimal	244	205	39	20.9	20.7	22.0	0.07 (0.06-0.08)	0.08 (0.07-0.10)	0.03 (0.02-0.05)
Mild	126	101	25	10.8	10.2	14.1	0.03 (0.03-0.04)	0.04 (0.03-0.05)	0.02 (0.01-0.03)
Moderate	186	150	36	15.9	15.2	20.3	0.05 (0.04-0.06)	0.06 (0.05-0.07)	0.03 (0.02-0.04)
Severe	142	114	28	12.2	11.5	15.8	0.04 (0.03-0.05)	0.05 (0.04-0.06)	0.02 (0.02-0.04)
Body region									
Head/neck	28	25	3	2.4	2.5	1.7	0.01 (0.01-0.01)	0.01 (0.01-0.01)	0.00 (0.00-0.01)
Upper limb	85	74	11	7.3	7.5	6.2	0.02 (0.02-0.03)	0.03 (0.02-0.04)	0.01 (0.00-0.02)
Trunk	73	63	10	6.3	6.4	5.6	0.02 (0.02-0.03)	0.03 (0.02-0.03)	0.01 (0.00-0.02)
Lower limb	981	828	153	84.1	83.6	86.4	0.27 (0.25-0.29)	0.33 (0.31-0.36)	0.13 (0.11-0.16)
Context									
Academy	539	451	88	46.2	45.6	49.7	0.15 (0.14-0.16)	0.18 (0.17-0.20)	0.08 (0.06-0.09)
Club	326	269	57	27.9	27.2	32.2	0.09 (0.08-0.10)	0.11 (0.10-0.12)	0.05 (0.04-0.06)
National team	259	239	20	22.2	24.1	11.3	0.07 (0.06-0.08)	0.10 (0.08-0.11)	0.02 (0.01-0.03)
Other	42	30	12	3.6	3.0	6.8	0.01 (0.01-0.02)	0.01 (0.01-0.02)	0.01 (0.01-0.02)

Table 3 Adjusted incidence (injuries per player month) for body region and context with pairwise comparisons of the three different injury recording settings (1: Research-invested clinical recorder, 2: Research-invested supervisor, 3: No research-invested supervision).

	Invested recorder	**Invested supervisor**	**Non-invested**	**Pairwise comparisons**		
	Adjusted incidence (95% CI)	Adjusted incidence (95% CI)	Adjusted incidence (95% CI)	p (1-2)	p (1-3)	p (2-3)
Body region						
Head/neck	0.02 (0.01-0.03)	0.01 (0.00-0.02)	0.00 (0.00-0.03)	0.31	0.08	1.00
Upper limb	0.04 (0.03-0.06)	0.02 (0.01-0.03)	0.03 (0.02-0.06)	<.001	0.74	0.52
Trunk	0.03 (0.02-0.04)	0.02 (0.01-0.03)	0.02 (0.01-0.04)	0.51	0.72	1.00
Lower limb	0.51 (0.46-0.56)	0.27 (0.24-0.31)	0.21 (0.17-0.27)	<.001	<.001	0.14
Context						
Academy	0.23 (0.20-0.26)	0.09 (0.07-0.11)	0.10 (0.07-0.14)	<.001	<.001	1.00
Club	0.07 (0.05-0.09)	0.06 (0.04-0.08)	0.04 (0.02-0.06)	0.49	<.01	0.07
National team	0.17 (0.14-0.20)	0.08 (0.07-0.10)	0.01 (0.00-0.05)	<.001	<.001	<.001
Other	0.01 (0.00-0.02)	0.02 (0.01-0.03)	0.02 (0.01-0.04)	0.71	1.00	1.00

FIGURE LEGENDS

Figure 1 Overview of all squad months that were evaluated for inclusion in the final analyses, by season and age group. Grey fill represents excluded months and reason for exclusion is provided (REC = Unclear recording setting, INC = Incomplete month, with more than 1/3 of the days outside of season, MON = Unclear month type, where less than 2/3 of the days were either national team preparation or standard academy). Numbers indicate the allocated injury recording setting for the included months (1: Research-invested clinical recorder, 2: Research-invested supervisor, 3: No research-invested supervision). "N" indicates that the squad was preparing for an upcoming Asian Football Confederation (AFC) qualification or championship with the national team, which was added as a co-factor in the statistical model.

Figure 2 Comparison of adjusted incidence (95% CI) for time-loss and non-time-loss injuries between the three injury recording settings. 1: Significantly lower than Research-invested clinical recorder, 2: Significantly lower than Research-invested supervisor.

Figure 3 Comparison of adjusted incidence (95% CI) for time-loss severity categories between the three injury recording settings. Severity categories are based on the number of days lost (Minimal: 1-3 days, Mild: 4-7 days, Moderate: 8-28 days, Severe: >28 days). 1: Significantly lower than Research-invested clinical recorder, 2: Significantly lower than Research-invested supervisor.

		JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
2012-2013	U16			REC	2	2	2	2	2	2	2	2	2	INC
	U17		INC	2	2	2	2	2	2	2	2	2	2	INC
	U18		INC	1	1	1	1	1	1	1	1	1	1	INC
2013-2014	U16		INC	1-N	1-N	1	1	1	1	1	1	1	1	
	U17		2	2	2	2	2	2	2	2	2	2	2	INC
	U18		2-N	2-N	2-N	MON	2	2	2	2	2	2	2	INC
2014-2015	U16	REC	REC	REC	REC	2	2	2	2	2	2	2	2	INC
	U17	INC	1-N	1-N	MON	1	1	1	1	1	1	1	1	INC
	U18			1	1	1	1	1	1	1	1	1	1	INC
2015-2016	U16		2-N	2-N	2-N	2	2	2	2	2	2	2	2	INC
	U17			INC	2	2	2	2	2	2	2	2	2	INC
	U18		1-N	1-N	1-N	1	1	1	1	1	1	1	1	
2016-2017	U16				INC	3	3	3	3	3	3	3	3	
	U17				INC	3	3	3	3	3	REC	REC	REC	
	U18				INC	3	3	3	3	3	REC	REC	REC	

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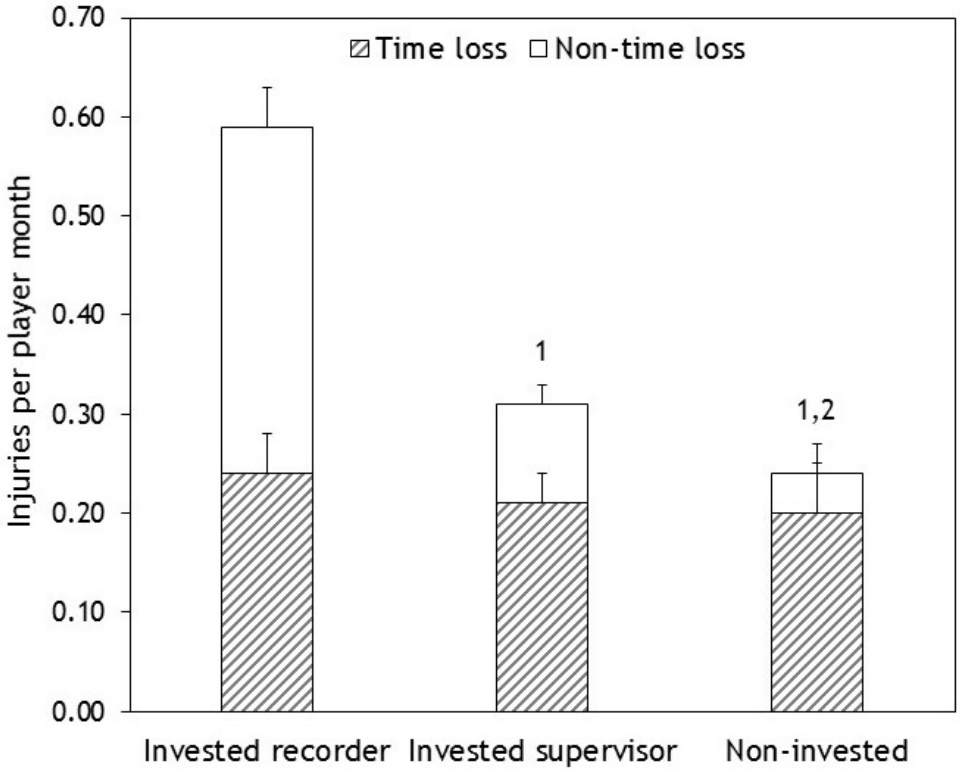

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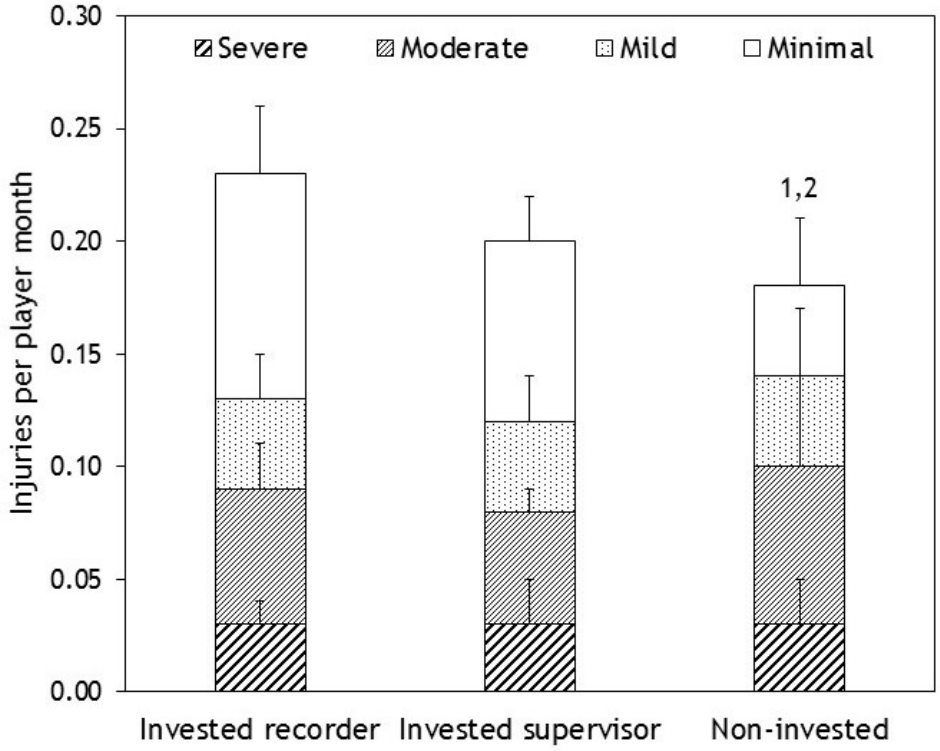

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