Defensive Balance in Elite Football: Exploring the Development of Goal Scoring Opportunities

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Headline
In association football (soccer), both teams start with ten outfield players and a goalkeeper, which suggests that balance exists between them. In order to create space for goal scoring opportunities (GSOs; shooting attempts), it was found that this balance has to be disturbed (1, 2). Assessing balance qualitatively may provide insights into playing effectiveness in a time-efficient and accessible fashion. Furthermore, practitioners do not have to rely on fixed events, such as shots or possessions, potentially improving the flexibility of analyses (3).

Aims of the paper
In order to determine the applicability of such an approach, the present study aimed to explore defensive balance in a qualitative manner. By having experts observe and rate the between-team balance during match events leading up to GSOs, it was aimed to determine whether the concept can be validly described and applied by qualified individuals. By collecting the reasons for the occurrence of the GSOs, thus for a loss of balance, typical styles of play affecting balance may become apparent.

Methods
Design. Expert participants completed two experimental trials (case series), in which videos containing attacking sequences were rated for defensive balance in a second-by-second fashion. General questions about each event were answered afterwards to describe the progression of play.

Participants. Eight observers (age: 36±11 yrs; experience with match analysis: 9±6 yrs) participated in the present study. The observers were match analysts or coaches, holding at least a B-level licence from the European Football Association (UEFA). Furthermore, participants had 20±8 yrs of playing experience, ensuring sufficient understanding of tactics in football. The participants provided informed consent before the first trial. The study was ethically approved by the local Human Research Ethics Committee (Ärztethiker Saarland) and performed according to the Declaration of Helsinki.

Fig. 1. Graphical representation of the wide-view tactical perspective.

Methodology. In total, 14 sequences ending in a GSO were incorporated. The events were derived from multiple matches played by the German national team and consisted of various build-ups to the GSOs. Five sequences were included in a familiarisation trial and nine were included in the experimental trials. Those nine events were counterbalanced for outcome (goal, save, wide) and build-up (elaborate, direct, counter) (2). A wide-view tactical perspective, wherein all outfield players were constantly in sight, was used as footage (see Figure 1). The events were cut at the moment the ball was last struck and started with the recovery of possession or after maximally 20 seconds of possession. Hereby, the outcome was not identifiable to the observers, preventing possible bias.

The familiarisation trial was performed to ensure full understanding of the concept and procedures. The experimental phase consisted of two trials, during which nine match events were shown in a randomised order. The events were shown in 1-second bouts with a self-controlled pause in between. For every second, a rating had to be given on a 5-point Likert scale (from "very poor" to "very good"; see Figure 2). Afterwards, the observers had to answer three questions: 1) which second in the sequence was crucial (SEC); 2) the offensive play creating the GSO; and 3) the defensive error allowing for the GSO.

To analyse the rating pattern, the slope over every four consecutive ratings of defensive balance was calculated. The ratings were natural log-transformed, making the change from "bad" [2] and "very bad" [1] more detrimental to the balance than that from "very good" [5] and "good" [4]. The largest negative slope was selected as the moment where balance was lost (SLP; see Figure 2). Since the duration of the match events differed, SEC and SLP were computed as continuous time variables counting backwards from the moment of the actual attempt. Thus, both measures described the time (in seconds) before the attempt where defensive balance was deemed to be lost.

Statistical analysis. Outcomes are displayed, where appropriately, as mean and 90% confidence limits (CL). The validity of the two measures of defensive balance (SEC and SLP) was determined through effect sizes (ES; Cohen’s d) (4). Cohen’s Kappas (K) were calculated to determine the magnitude of the reliability of all variables (5). A quadratic weighting was chosen for SEC and SLP to emphasize the importance of ratings closer together. For OFF and DEF, a non-weighted approach was used, since the answering options had no relationship to each other.

Results
Balance was found to be lost on average 5.6 [5.0; 6.3] s before the attempt according to SEC and 5.9 [5.4; 6.4] s before the attempt according to SLP (ES=0.3).

Inter-Rater Reliability. The ratings of defensive balance, described by SLP, showed a moderate between-observer agree-
ment (K=0.47). A similar moderate agreement between observers was found for SEC (K=0.50). Finally, when analysing the reasons for the occurrence of the GSO, slight between-observer agreements were found for OFF and DEF (K=0.17 and K=0.11, respectively).

Intra-Rater Reliability. Substantial within-observer agreements were found for SLP and SEC (K=0.72 and K=0.79, respectively). For the reasoning, why the GSOs occurred, the observers showed moderate intra-agreement (K=0.53 for offensive and K=0.40 for defensive reasons). The experience of the observers (years active as coach or analyst) did not substantially affect any of the agreements.

Situational Variables. Observers showed lower agreements in SEC during counter attacks and elaborate build up in comparison with direct passing build up (ES=2.4 and ES=2.8, respectively). Also, a higher between-observer agreement was found for those events that led to a goal (which the observers were unaware of), in comparison with those attempts that were saved or off target (ES=1.2 and ES=1.6, respectively).

Discussion

The present study aimed to determine whether defensive balance in elite football can be reliably distinguished and rated by expert observers. Through the rating of attacking sequences on a second-by-second base, the development of (dis)balance within the defensive organisation was measured. The most detrimental change within the ratings was compared with the selection of the most decisive second by the observers. A small effect was found for both methods, which, in combination with substantial within-observer agreements for both measures, indicates that practitioners are capable of reliably selecting the moment they hold crucial during an attacking sequence.

However, moderate between-observer agreements were found for the development or loss of balance. This indicates that individuals have a different interpretation of the constructs involved in defensive balance, most likely due to the multidimensional nature of the concept (1). Along with limited agreements between the reasons for the occurrence of the GSO, the qualitative approach of the current study does not seem to be suitable to determine what (typical) constellations of player and ball positioning are most effective in disturbing an opponent’s organisation and thus creating GSOs.

The slight between-observer agreements found, question whether the proposed parameters are two dimensional (e.g. good or bad). It has been suggested, that tight defensive pressure is an indication of a balanced defence (1). Furthermore, ball interceptions, which require high pressure, were also found to be linked with team success (6). In line with these results, the current study found mistakes in defensive pressure to be crucial (43% of the time). As such, applying pressure by defensive players seems to influence the defensive performance. However, ball interceptions require a move towards the upcoming attacker, thereby mirroring its run towards goal. By failing to succeed in intercepting possession, space opens up for the attack. This, in turn, agrees with the results from Moura and colleagues, which highlight movements in opposite directions (anti-phase coordination) by the defensive and attacking teams before GSOs (7). Thus, high pressure alone does not seem to be sufficient for a balanced defence, when the attacker is able to evade the first defender.

The importance of balance is supported by the fact that higher agreements were found in the current study when the GSO ended in a goal, although the observers were unaware of the outcome. This implies that the severity of the disturbance in balance is greater and thereby less disputable. Thus, it can again be argued that defensive balance indeed affects attacking effectiveness (1). Where the current qualitative approach failed to identify typical styles of play affecting balance, techniques involving machine learning may enable the objective identification of successful patterns of play (8). Such research would be in line with studies relating specific types of play to attacking success (9). However, when relying on changes in balance instead of GSOs, many more sequences will become available, leading to a more detailed description of playing style.

Practical Applications

- A uniform type of play affecting defensive balance was not found, however the present study did show that experts are able to reliably select what they deem to be the decisive second within an attacking sequence.
- This method is the least time consuming of the currently included techniques and the available quantitative approaches describing defensive balance. An individual application of the current approach seems promising from a practical point of view.
- By studying which teams or players are capable of disturbing the balance within an opponent’s defence, training and preparation may be improved.

Limitations

- The current study only involved few (nine) sequences observed and rated by a relatively low number of (eight) experts. Future studies could aim to increase this sample size, or, as mentioned before, extrapolate the results of the current and previous studies into an approach involving machine learning.
References


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