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Predictive factors of the setting performance and distribution per game complex in junior female volleyball

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ABSTRACT

The present study aimed to analyse the associations between spatiotemporal characteristics of the setting and the origin of the ball in terms of the game complexes for junior female volleyball teams. Multinomial logistic regression and multiple correspondence analysis were applied to analyse 3.675 setting actions (Complex I= 1.593, Complex II= 2.082) in the final phase of the Greek Junior Championship. Results showed that the origin of the ball from the left lane of the court eases the setter for an accurate setting during CI while passing from the right lane incommodes the setter during CII. Regarding setting zone, for accurate setting, odds are increased by 3.2 for zone 4 during CI while decreased by 23.8 for zone 3 during CII. The junior setters' distribution of setting is predictable and creates favourable conditions for the opponent to deal with it. The improvement of junior female setters' ability to follow the team's offensive tactic regardless of the ball's origin, to manipulate passes received from the right lane of the court during CII and the acceleration of setting tempo for the wing hitters could be training goals for coaches.

KEYWORDS: game analysis; junior female; skills; setting; multinomial logistic regression; correspondence analysis.

INTRODUCTION

In modern volleyball, performance analysis is becoming increasingly important. In particular, match analysis lies in the provision of statistical data and insights into players' behaviours in certain game situations. Many studies have investigated the performance of players to identify the factors that result in improved efficiency in training and the game (Drikos, Barzouka, Nikolaidou & Sotiropoulos, 2021; Giatsis, Drikos, & Lola, 2022; Melendez-Nieves, Rodríguez-Torres & Santiago Celeste, 2020; Oliveira, Valladares, Miguel Teixeira Vaz & Vicente João, 2016). Among these, setting is considered to determine the effectiveness of the next action and, to some extent, the final result of the match (Palao, Santos & Ureña, 2004). Indeed, setting is an essential skill in volleyball, both technically and tactically, as it affects the attack while the setter is the player responsible for organising the game (Buscà & Febrer, 2012). Setter is the player who decides to set the ball to the attackers, considering the constraints that arise during the game (Vujmilović & Karalic, 2013). Setters' objective is to create favourable conditions for the attack of their team by utilising the offensive abilities of their teammates to the detriment of the opponent's defence (Afonso, Mesquita, Marcelino, & Silva, 2010). Although both pass and setting are considered "non-scoring skills" (Kitsiou, Sotiropoulos, Drikos, Barzouka & Malousaris, 2020), studies have shown that the effect of the attack is directly dependent on them (Costa, Afonso, Barbosa, Coutinho & Mesquita, 2014; Drikos, Ntzoufras & Apostolidis, 2019). It has been found that due to the hierarchical nature of the game, the performance in the passing affects the setter's strategy and the effectiveness of the attack after reception or after defence (Costa et al., 2016; Costa et al., 2018). The circular and sequential nature of volleyball (Ugrinowitsch et al., 2014) results in two game sequences: the I sequence or side-out (CI) and the defensive sequence (CII) (Bergeles, Barzouka & Nikolaidou, 2009). CI involves the organisation of the attack (Afonso et al., 2010) and consists of the actions of

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reception, setting and attack, as well as coverage of the attack (Silva, Lacerda & João, 2013). The primary goal of CI is to neutralise the opponent's serve to organise the attack smoothly, to gain the point and the right to serve (Zhang, 2000). CII is known as the defensive sequence and includes the skills of the serve, the block, the ground defence, the setting and the counterattack performed sequentially. In the context of CII, the ball does not reach the setter with the best conditions (Costa, Afonso, Brant & Mesquita, 2012), and as a result, the setting tempo is slow (i.e. 2nd and 3rd tempo), and the attack takes place mainly towards the edges of the net (Loureiro et al., 2017). Given that in volleyball, the attack is performed at 3 different tempos, as they are calculated from the flight duration of the ball, it is considered that the shorter the flight of the ball, the more effective the attack will be (Bergeles et al., 2009). However, high-level setters can achieve optimal settings even under difficult conditions (Papadimitriou, Pashali, Sermaki, Mellas & Papas, 2004; Zetou, Moustakidis, Tsigilis & Komninakidou, 2007) by varying the spatio-temporal characteristics of their team attack with the ultimate goal of achieving high efficiency in critical periods that determine the result in sets (Marcelino, Sampaio & Mesquita, 2012).

Although the relationship between pass (reception or defence), setting efficiency and attack performance is considered important at every level (González-Silva, Domínguez, Fernández-Echeverría, Rabaz & Arroyo, 2016), it is typically strong in developmental ages (Dias, Lima, Clemente & Silva, 2019). At these ages, the technical skills are under development (González-Silva et al., 2016), and as a consequence, the quality of the setting decreases when the quality of passing is moderate or low (Espa, Vavassori, León Rodríguez, González Ortiz & Ureña Espa, 2011). Given that the physical characteristics and technical skills of junior female volleyball players are not as developed as those of adults (Inkinen, Häyrinen & Linnamo, 2013), it is very likely that the limited knowledge of what constitutes a setting will lead to divergent assessments of performance in both training and competition. Therefore, a thorough investigation of the performance of the setting performed by setters participating in the national junior female championship could contribute to clarifying the parameters of the game that lead to success. The present study aimed to analyse the associations between setting performance, spatiotemporal characteristics of the setting, pass type and performance, as well as the origin of the ball in terms of each one of the game complexes for junior female volleyball teams.

METHODS

Sample

This study is observational research, and an observational design (pluralistic, intrasessional and multidimensional) was used (Anguera, 2013). The sample consisted of the observation of 24 matches from the final phase of the 2016 Greek under 20 (U20) female Championship, totalling 3675 of passing and setting actions (CI= 1593, CII= 2082). Passing in this study was described as the first touch with the ball of a team during CI (serve's reception) or CII (defence). Failure passes (serve's reception or defence) were excluded from the sample since they did not allow the continuation of action and the subsequent accomplishment of the setting. Before any analysis, data were checked for missing values, and characteristics of independent variables that had a frequency < 2% were excluded from the analysis. Within this frame, the category of setting in zone 5 has been removed due to the small proportion (< 2%) of responses for these options.

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Measures

For the identification and selection of independent variables and to represent relevant and important aspects of setting performance, the independent variables in this study were in line with previous research in volleyball (Afonso et al., 2010; Afonso, Esteves, Araújo, Thomas & Mesquita, 2012; González-Silva et al., 2016):

1. Complex of the game. The categories are Complex I (CI), defined as the situation when the team performs the actions of serve's reception, setting and attack in sequential order, and Complex II (CII), defined as the situation when the team performs the actions of the block, pass, setting and counter-attack in sequential order (Zhang, 2000);
2. Rotation of the team in reception (R1, R2, R3, R4, R5, R6) for CI;
3. Position of the setter (front row when the team is in R4, R3, R2 and back row when the team is in R1, R6, R5) for CII;
4. Pass zone was defined as the origin of the ball before setting. To assess the reception and defence area, the court was divided into 9 equal areas, measuring 3x3

m (9 m^2), as suggested by Stankovic, Ruiz-Llamas, Peric and Quiroga-Escudero (2018). The names of the areas were derived from the location of the zones on the horizontal axis of the court [(Front-F), (Central-C), (Back-B) zone] and on the vertical axis [(Left-L), (Middle-M), (Right-R) zone]. For results analysis, the nine areas of reception and defence were merged into three lanes concerning the vertical axis of the court [Left (LL)- Middle (ML)- Right Lane (RL) on a vertical view]. The mapping of the court is presented in Figure 1;

5. Pass type was defined as the technique used by the passer during a pass. The categories of pass type were basic forearm pass, side forearm pass and emergency pass;
6. Pass performance was defined as the effect obtained during the pass (reception of serve or defence). For the evaluation of the quality grade of the pass, a 5-level tactical rating scale was used (Eom & Schutz, 1992). The levels of the entire evaluation scale were error (E), moderate (M), good (G), very good (VG) and excellent (EX);
7. Setting performance was defined as the effect obtained during setting. For the evaluation of the grade of the quality of the setting, a 5-level tactical rating scale was used (Eom & Schutz, 1992). The levels of the entire evaluation scale were error (E), moderate (M), good (G), very good (VG) and excellent (EX). For results analysis, the five levels of setting performance were merged into three levels, such as inaccurate (error and moderate), good and accurate (very good and excellent) setting.

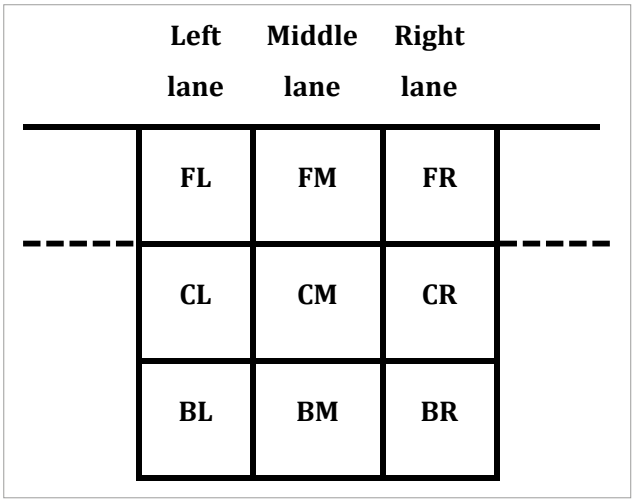

Figure 1. Nine-area subdivision of the volleyball court used to define the area of the serve direction.

8. Setting zone was defined as the area of the court where the attack strike was made. The categories were: positions Z1, Z6, Z5, Z4, Z3, and Z2. If the attacker's feet were in two adjacent zones, the airspace where the attack took place was considered the attack zone;
9. Setting tempo was defined as the interaction between the moment the setter contacted the ball and the start of the attacker player approach (Afonso et al., 2010). The categories were: 1st tempo (the attacker jumps simultaneously or immediately after the setter touches the ball), 2nd tempo (the attacker performs two or three steps after the setting) and 3rd tempo (the attacker starts the approach when the ball reaches the higher point of trajectory after leaving the setter's hands).

Instruments and procedures

All games were recorded from a top viewpoint, as a camera was positioned 3 meters above the ground, about 6-8 meters behind the back-court line. A Sony camera with 1080p HD definition of 60 Hz was used. A three-member group of experienced coaches with professional coaching experience of over 15 years who hold a PhD and served as junior and senior national team coaches assessed passing and setting characteristics. Data were registered in worksheets created with Microsoft Excel and later analysed using IBM SPSS Statistics version 23.0. The reliability of the observations was assured by the inter-observer and intra-observer agreement within four weeks intervals to avoid any possible adverse learning effects established. Ten per cent (10%) of the total observations were analysed according to the minimum value given in the literature (Tabachnick & Fidell, 2007). Inter-rater and intra-rater reliability coefficients were estimated using Cohen's kappa coefficient. The intra-rater reliability coefficient Adjusted K Cohen was > 0.901 for each one of the three observers showing very good values (Tabachnick & Fidell, 2007). The inter-rater reliability was evaluated in three randomly selected matches, which were analysed by the observers. The inter-rater reliability coefficient Adjusted K Cohen was 0.864, showing a very good value (Tabachnick & Fidell, 2007).

Statistical analysis

Initially, the descriptive analysis of the variables was performed to discover the frequencies of each variable per game complex under study. Multinomial logistic regression was applied to construct models, one for each complex, that could determine which of the independent variables is more relevant to the setting performance. Finally, a multiple correspondence analysis (MCA) to represent graphically

the information contained in a multiway contingency table (Greenacre & Blasius, 2006) was carried out on skills data for both complexes. The interpretation of MCA is based upon proximities between points in a dimensional map. Statistical significance was set at $p < 0.05$.

RESULTS

The frequencies of reported data of independent variables are presented in Table 1.

The model fitting information of multinomial logistic regression for both complexes was as above. The predictors of the model that contained only the intercept, the fit between the final model and the data improved significantly, for the CI χ^2 (32, N= 1.593)= 713.033, $p < 0.001$, NagelkerkeR^2= 0.436 and for the CII χ^2 (24, N= 2.082)= 973.260, $p < 0.001$, NagelkerkeR^2= 0.460. There was a fairly good model fit (discrimination among levels of setting performance) for both complexes based on the relevant performance indicators. Thus, the next step was to examine which parameter estimates could affect the final model.

Table 1. Descriptive data concerning variables under analysis.

Variable	Category	CI	CII
Setting performance	Inaccurate setting	342	371
	Good setting	1,039	1,429
	Accurate setting	212	282
Pass zone	Right lane	314	633
	Left lane	411	527
	Middle lane	868	922
Pass type	Basic forearm pass	927	1,077
	Side forearm pass	466	364
	Emergency pass	200	641
Setting zone	Z1	82	89
	Z2	334	522
	Z3	275	242
	Z4	789	1033
	Z6	113	196
Setting tempo	1st tempo	231	187
	2nd tempo	157	219
	3rd tempo	1,205	1,676
Rotation	R1	337	
	R2	221	
	R3	214	
	R4	229	
	R5	309	
	R6	283	
Setter position	Front row		854
	Back row		1,228
Total		1,593	2,082

As shown in Table 2, significant unique contributions were made for the CI concerning pass performance, pass zone, setting zone and setting tempo. On the other hand, for the CII, the statistically significant independent variables were pass performance, pass zone, pass type, setting zone and setting tempo. So, from an initial point of view, for both complexes, the predictors of setting performance are common with the marginal addition of pass type for CII. However, team rotation in CI and setter position in CII have no contribution.

Parameters estimates and odds ratios with their 95% confidence limits for both complexes are presented in Table 3. Pass performance as an ordinal variable was treated as a covariate in the analysis, while nominal variables (pass zone, pass type, setting zone and tempo) were treated as factors. The standard interpretation of the multinomial logit is that for a unit change in the predictor variable, the logistic of comparison outcome relative to the base outcome is expected to change by its odds ratio, given that the other characteristics in the model remain unchanged. Regarding CI, if pass performance were to increase by one unit, the multinomial log-odds of having a good than an inaccurate setting would be expected to increase by 4.746 (95%CI, 3.749–6.008) *ceteris paribus* all the other variables. As for the setting zone, the multinomial log-odds of having a good rather than an inaccurate setting would be expected to increase for setting zones 4, 2, and 1 instead of zone 6 by 3.956 (95%CI, 2.443–6.407), 2.568 (95%CI, 1.503–4.388) and 3.098 (95%CI, 1.546–6.207), while for setting zone 3 instead of zone 6 would be expected to decrease by 5.387 (given by the reciprocal of .186) and for 1st instead of 3rd tempo the log-odds expected to increase by 4.076 (95%CI, 1.261–13.182). In addition, for CI and concerning the multinomial log-odds of having an accurate than an inaccurate setting, if pass performance were to increase by one unit, they were expected to increase by 10.860 (95%CI, 7.936–14.862). As for the passing zone, the log odds of having an accurate instead of an inaccurate setting would be expected to increase by 2.566 (95%CI, 1.556–4.232) if the origin of the pass is left instead of from the middle lane of the court. For setting to zone 4 instead of zone 6, the log odds of an accurate setting are expected to increase by 3.118 (95%CI, 0.952–10.215), while for setting to zone 3 instead of 6, the log odds of an accurate setting are expected to decrease by 6.404 (given by the reciprocal of .156). As for the setting tempo, setting 1st and 2nd instead of 3rd tempo increases the log odds by 13.272 (95%CI, 3.080–57.187) and 3.094 (95%CI, 1.404–6.818).

Table 2. Predictor's unique contribution in the multinomial logistic regression for both complexes*.

Variables	C1				CII			
	-2 Log Likelihood of Reduced Model	χ^2	df	Sig.	-2 Log Likelihood of Reduced Model	χ^2	df	Sig.
Pass performance	1,690.839	346.482	2	0.000	1,487.113	430.155	2	0.000
Pass zone	1,359.445	15.087	4	0.005	1,068.016	11.058	4	0.026
Pass type	1,348.427	4.070	4	0.397	1,066.442	9.484	4	0.050
Setting zone	1,418.187	73.830	8	0.000	1,133.207	76.249	8	0.000
Setting tempo	1,378.341	33.984	4	0.000	1,121.442	64.484	4	0.000
Rotation	1,350.215	5.858	10	0.827				
Setter position					1,061.735	4.778	2	0.092

*The χ^2 statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Table 3. Parameters estimate contrasting setting performance versus each other level and variable for both complexes.

Setting[a]	Variable	C1				CII			
		Sig.	Exp (B)	95% Confidence Interval for Exp(B)		Sig.	Exp (B)	95% Confidence Interval for Exp(B)	
				Lower Bound	Upper Bound			Lower Bound	Upper Bound
Good setting	Pass	**0.000**	4.746	3.749	6.008	**0.000**	5.949	4.611	7.674
	Right lane	0.459	1.154	0.790	1.684	0.276	0.833	0.600	1.157
	Left lane	0.108	1.339	0.938	1.912	0.135	0.772	0.549	1.084
	Middle lane[b]								
	Basic	0.183	1.326	0.875	2.009	**0.008**	1.532	1.117	2.102
	Side	0.517	1.155	0.746	1.788	0.552	1.116	0.777	1.602
	Emergency								
	Z1	**0.001**	3.098	1.546	6.207	0.098	0.591	0.317	1.103
	Z2	**0.001**	2.568	1.503	4.388	0.117	1.444	0.912	2.285
	Z3	**0.003**	0.186	0.062	0.559	**0.000**	0.092	0.032	0.265
	Z4	**0.000**	3.956	2.443	6.407	**0.018**	1.634	1.087	2.456
	Z6[b]								
	1st tempo	**0.019**	4.076	1.261	13.182	0.263	2.192	0.555	8.659
	2nd tempo	0.717	0.880	0.441	1.755	0.143	1.721	0.832	3.558
	3rd tempo[b]								
Accurate setting	Pass	**0.000**	10.860	7.936	14.862	**0.000**	16.515	12.011	22.706
	Right lane	0.082	1.645	0.939	2.881	**0.004**	0.491	0.303	0.794
	Left lane	**0.000**	2.566	1.556	4.232	0.132	0.691	0.427	1.118
	Middle lane[b]								
	Basic	0.692	1.153	0.570	2.331	0.055	1.622	0.990	2.658
	Side	0.436	1.344	0.639	2.825	0.130	1.597	0.871	2.929
	Emergency								
	Z1	0.174	2.935	0.621	13.862	0.827	1.161	0.303	4.451
	Z2	0.102	2.802	0.816	9.613	**0.011**	3.308	1.317	8.308
	Z3	**0.039**	0.156	0.027	0.908	**0.000**	0.042	0.009	0.199
	Z4	**0.060**	3.118	0.952	10.215	0.053	2.398	0.989	5.817
	Z6[b]								
	1st tempo	**0.001**	13.272	3.080	57.187	**0.000**	25.656	5.046	130.461
	2nd tempo	**0.005**	3.094	1.404	6.818	**0.000**	6.983	3.144	15.513
	3rd tempo[b]								

[a]*Inaccurate setting is the reference category for the dependent variable (setting performance)*
[b]*Reference category for the independent variable*

Regarding CII, if pass performance were to increase by one unit, the multinomial log odds of having a good rather than an inaccurate setting would be expected to increase by 5.949 (95%CI, 4.611–7.674) *ceteris paribus* all the other variables. As for the pass type, the log odds of having a good than an inaccurate setting would be expected to increase by 1.532 (95%CI, 1.117–2.102) if the basic forearm pass is used. For setting to zone 4 instead of zone 6, the log odds of a good setting are expected to increase by 1.634 (95%CI, 1.087–2.456), while for setting to zone 3 instead of 6, the log odds of a good setting are expected to decrease by 10.870 (given by the reciprocal of 0.092).

In addition, for CI and concerning the multinomial log-odds of having an accurate instead of an inaccurate setting, if pass performance were to increase by one unit, they were expected to increase by 16.515 (95%CI, 12.011–22.706). As for the passing zone, the log odds of having an accurate rather than an inaccurate setting would be expected to decrease by 2.036 (given by the reciprocal of 0.491) if the origin of the pass is from the right instead of the middle lane of the court. For setting to zone 2 instead of zone 6, the log odds of an accurate setting are expected to increase by 3.308 (95%CI, 1.317–8.308), while for setting to zone 3 instead of 6, the log odds of an accurate setting are expected to decrease by 23.808 (given by the reciprocal of 0.042). As for the setting tempo, setting 1st and 2nd instead of 3rd tempo increases the log odds by 25.676 (95%CI, 5.046–130.461) and 6.983 (95%CI, 3.144–15.513).

Figure 2 displays two-dimensional maps, one for each complex, as a result of the multiple correspondence analyses applied to the contingency tables of setting performance data for each complex. In the left dimensional map setting performance data from CI were presented. The first two dimensions, namely those represented in the map, accounted for 84.2% of the total variance. The first (horizontal) dimension, explaining 50.5% of the total variance, may be considered to reflect the trend of setting tempo and selection concerning the reception performance. Precise (excellent and very good) receptions evolve transformative into 1st tempo accurate setting in zone 3, whereas moderate or good receptions connect with 3rd tempo setting in zones 1, 2, 4 and 6 where opposite outside hitters and setters attacked. The second dimension (vertical, 33.7% of the explained variance) may instead reflect the positive/negative outcome of the setting in respect of the reception performance and the setting zone. Inaccurate settings lie in the upper part of the plot connected with moderate reception and setting in the back row (zones 1 & 6).

In the right dimensional map setting performance data from CII were presented. The first two dimensions, namely those represented in the map, accounted for 72.9% of the total variance. The first (horizontal) dimension, explaining 42.9% of the total variance, reflects the trend of setting tempo and selection concerning the pass type and performance. Precise passes executed with the technique of basic forearm pass evolve into 1st tempo accurate setting in zone 3, whereas moderate or good receptions executed with the

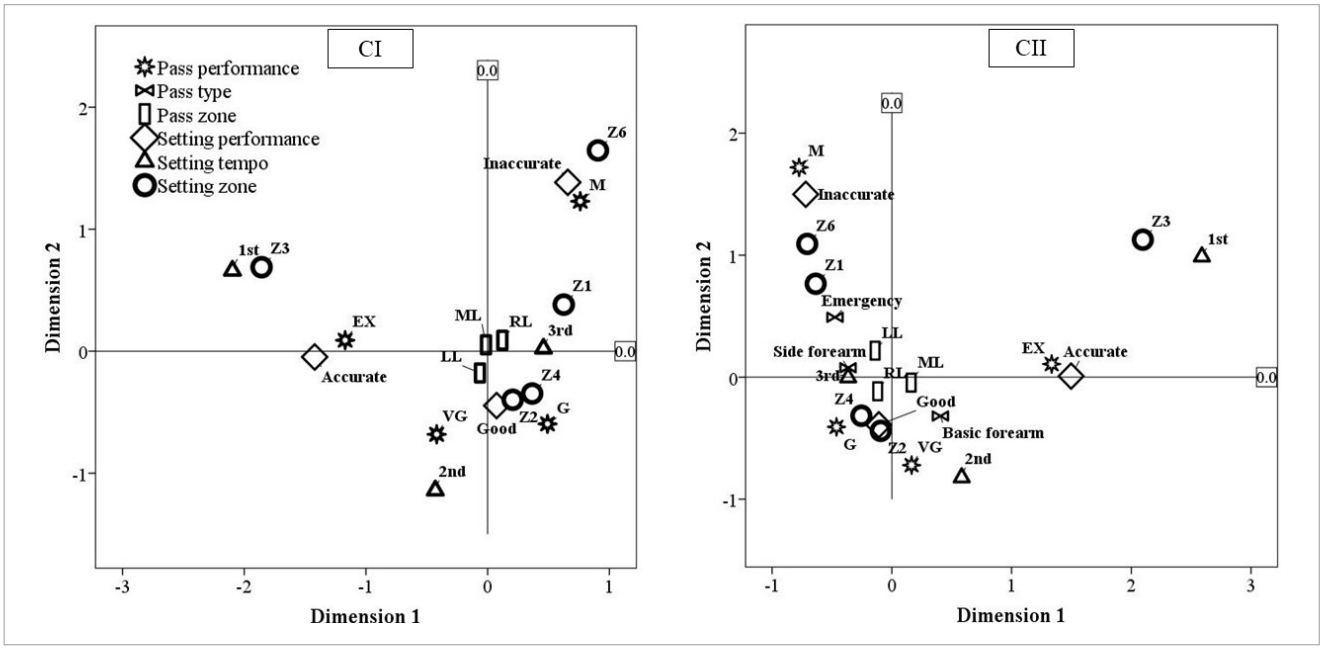

Figure 2. Maps (CI on the left, CII on the right) obtained by the multiple correspondence analysis. The maps display the coordinates of categories of all variables in the two dimensions that capture the highest fraction of the total variable.

technique of side or emergency pass connect with 3rd tempo setting in zones 1, 2, 4 and 6 where opposite outside hitters and setters attacked. The second dimension (vertical, 30% of the explained variance) reflects mainly the distribution of setting when the sequence of preceding skills was not ideal. So, moderate passes executed with side forearm or emergency passes evolve into an inaccurate setting in the back row (zones 1 & 6).

DISCUSSION

The study aimed to analyse the associations between setting performance, spatiotemporal characteristics of the setting, pass type and performance, as well as the origin of the ball in terms of each one of the game complexes for junior female volleyball teams. For both complexes, the predictors of setting performance are common (origin of the ball, pass performance, setting zone and tempo) with the marginal addition of the pass type for CII, while the team's rotation and setter's position did not affect the setting performance.

The dominant setting zone for both complexes was zone 4, as good and accurate settings were more likely to be directed in zone 4 than the other setting zones, while zone 3 was a difficult choice for junior female setters as the possibility of an inaccurate setting increased. This finding is in complete agreement with the results of previous studies, which found that at the level of junior female setters, settings to the wing spikers predominate those in the centre (Inkinen et al., 2013). A reasonable explanation may lie in the ability of the outside hitters to attack effectively even when the setting tempo is slow (Afonso et al., 2010; Drikos, Sotiropoulos, Gkreka, Tsakiri & Barzouka, 2023) and the opponent block is well organised (Araújo, Castro, Marcelino & Mesquita, 2011; Millán-Sánchez, Rábago & Ureña-Espá, 2017). In addition, the presence of the opponent setter in the offensive line in three out of six rotations seems to create several times favourable conditions for the outside hitter given her lower body height compared to the opposite player and possibly her less effective block (Sotiropoulos, Barzouka, Tsavdaroglou & Malousaris, 2019). In the developmental ages, regardless of the passing zone of the ball and the game complex, the setters send the ball with the criterion of confidence and almost automatically to zone 4 (González-Silva et al., 2016). These options prove that the distribution of the ball was not affected by its receiving part but was probably due to the preference of specific attackers (González-Silva et al., 2016; Oikonomopoulou, Barzouka, Sotiropoulos, Drikos & Noutsos, 2022). This may be because during difficult conditions of offensive organisation, as in CII, female junior setters choose the safe selection of zone 4, very often even at the expense of the equilibrium between the attacking zones (González-Silva et al., 2016). This is considered to be expected at the developmental ages because both technical and physical abilities are far from those of adults (Inkinen et al., 2013). The less dominant setting zone for both complexes was zones 1 and 6 in the defensive line. This is probably due to the tendency of players to use attacks from the defensive line not as part of a tactical plan but as a solution of necessity (Sotiropoulos et al., 2019).

Regarding the performance of the previous action (reception or defence), the improvement of one unit in the reception or defence performance increases the possibility of a good or accurate setting by 4.7 or 10.9 during CI and by 5.9 or 16.5, respectively. According to this, a balanced relationship between setting performance and the preceding action was confirmed. The quality of the pass (reception or defence) affects the setting's performance. Along the lines of this study's results, previous studies have shown the importance of pass quality and the influence of the setter's offensive strategy (Costa et al., 2014, 2016, 2018) for adults. The novel finding of this study is the quantification of the influence according to the odds of the multinomial regression model adopted.

Moreover, the origin of the ball was an important variable for the subsequent setting considered at this level of the game. When the ball came from the left lane of the court, it assisted the setter in executing an accurate setting. Nevertheless, the vast majority of serves performed by women are directed to the left lane of the court in the area of responsibility of the outside hitter (Kitsiou et al., 2020). Contrary to this, when the ball came from the right lane was a disadvantage for the setter's performance during CII. The right lane was the defending area for the setter and maybe provoked additional difficulties for the setter to set the ball after a block jump or after a defence position.

Regarding MCA results interpretation, findings suggest that for CI, quick (1st tempo) setting in zone 3 is deeply dependent on the quality of serve reception (Costa et al., 2014), while poor receptions end up to slow tempo inaccurate settings (Millán-Sánchez, Parra-Royón, Benítez & Espa, 2020). Additionally, regarding CII, a connection between the type of pass used by the defenders and the spatiotemporal characteristics was revealed. Basic forearm pass connects with a quick (1st tempo) setting in zone, while side forearm pass or emergency passes evaluated as moderate and transform to inaccurate setting in the back row (Sotiropoulos et al., 2019). This is considered to be expected at the developmental ages because both technical and physical abilities are far from those of adults (Inkinen et al., 2013).

However, the analysis of game procedures occurred only for the Greek U20 female players, the spatiotemporal characteristics of the opponent's serve and attack were not analysed, and the influence of the game location (home or away from home) was not considered, being study limitations and suggesting caution in the generalisation of the findings.

CONCLUSIONS

Results showed that for both complexes, the predictors of setting performance are common (origin of the ball, pass performance, setting zone and tempo) with the marginal addition of the pass type for CII, while the team's rotation and setter's position did not affect the setting performance. The origin of the ball from the left lane of the court eases the setter for an accurate setting during CI, while passing from the right lane incommodes the setter during CII. Regarding setting zone, for accurate setting, odds are increased for zone 4 while decreased for zone 3. The above results lead to the conclusion that junior setters' distribution of setting is predictable and creates favourable conditions for the opponent to deal with it. The improvement of junior female setters' ability to follow the team's offensive tactic regardless of the ball's origin, to manipulate passes received from the right lane of the court during CII and the acceleration of setting tempo for the outside hitters and the opposite player could be training goals for coaches of the specific age category.

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