Agora que retomou vida será necessário que a RPCD aproveite este renascer para se renovar, particularmente tendo em atenção a forma como nos novos tempos editoriais as coisas tendem a acontecer. Hoje a RPCD irá competir com outras que durante o seu interregno conquistaram algum do espaço que ela deixou em aberto. No entanto, não antevejo grandes dificuldades na reconquista do lugar e prestígio de que RPCD beneficiava. Ela tem por base uma das melhores e mais bem classificadas faculdades a nível mundial nas ciências do desporto, com um corpo docente e investigadores reconhecidamente excelentes e com grande capacidade de recrutamento de estudantes de nível superior para os seus programas de mestrado e doutoramento. Além disto a Faculdade de Desporto ao longo da sua história criou uma rede de colaboração com instituições de ensino superior a nível mundial e que sempre estiveram ativas e que, agora, estou certo, rapidamente se farão representar no advir das publicações na RPCD.

Passados que são mais de 11 anos de uma presença quase apagada, é bom ver a RPCD a ser novamente editada e a reconquistar o seu espaço editorial. Naquilo que se segue, o sucesso poderá ser quase assumido como um dado adquirido, desde que a disciplina na atividade editorial se mantenha ao nível que foi necessário ter para chegar ao momento presente.

Uma RPCD ativa e cientificamente consolidada faz falta na comunidade científica Lusófona. Por este motivo é com grande satisfação que aqui lhe presto homenagem desejando-lhe as maiores felicidades nos processos difíceis que agora importa ultrapassar.

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Examining the interplay between performance development, game-play participation, and context of practice in two sport education invasion games seasons.

KEYWORDS:
Physical education. Performance development. Participation time. Participation context. Exploratory analysis.

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ABSTRACT

This study aimed to analyse the effects of students' game-play participation (participation time, game involvement, and rate of play) and context of practice (team tasks and competition tasks) on their sport performance development in two invasion games units (handball and football). Over 13-weeks of physical education classes, 24 students were examined while practicing a 3 v 3 game-form in team practice and competition contexts. The performance level of the participants was assessed at the beginning (pre-test) and final (post-test) of each the curricular unit. Paired sample *t*-tests were conducted to test the difference among game-play participation and performance development for each game unit. Pearson correlation coefficients were used to investigate the relationship among performance and participation variables. Results indicated a greater performance development (delta score) in football unit, and a balance between the time allocated to team practice and competition tasks in the two units. However, greater amounts of participation in competition practice were observed over the football unit. The three participation variables showed similar levels of correlation with performance improvement. These findings support the assumption that teachers should strive to promote similar levels of student participation time in activities (minutes on the field), based on game-tasks. Future investigations should study the consecutive participation of students across different categories of games (e.g., net/wall) to ascertain potential differential effects of participation in sport education in students with different characteristics (e.g., skill level).

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Examinando a interação entre o desenvolvimento da performance, a participação no jogo e contexto de prática ao longo de duas épocas no modelo de educação desportiva em jogos de invasão.

RESUMO

Este estudo pretendeu analisar os efeitos da participação em jogo dos alunos (tempo de participação, envolvimento no jogo, taxa de participação) e do contexto de prática (tarefas de equipa e tarefas de competição) no desenvolvimento da performance durante duas unidades de jogos de invasão (andebol e futebol). Ao longo de 13 semanas de aulas de educação física, 24 alunos foram avaliados durante a prática de formas de jogo 3 x 3 em tarefas de equipa e de competição. O nível de desempenho dos participantes foi avaliado no início (pré-teste) e no final (pós-teste) de cada unidade curricular. As diferenças entre a participação em jogo dos alunos e o desenvolvimento do seu desempenho foram aferidas através de um *t*-test de medidas repetidas. Coeficientes de correlação de Pearson foram calculados para a analisar a relação entre as variáveis de desempenho e de participação. Os resultados demonstraram um maior desenvolvimento do desempenho na unidade de futebol, e um equilíbrio do tempo de participação dos alunos em tarefas de equipas e de competição. Variáveis associadas à participação evidenciaram níveis de correlação semelhante com o desenvolvimento do desempenho desportivo. Tais resultados suportam a premissa de que os professores devem possibilitar aos alunos tempos de participação semelhantes (minutos no terreno), dentro de tarefas, com base no jogo. Futuros estudos devem investigar a participação consecutiva dos alunos ao longo de diferentes categorias de jogos (e.g., rede/parede) na tentativa de perceber os possíveis efeitos da participação no modelo de educação desportiva, em alunos com diferentes características (e.g., nível de habilidade).

PALAVRAS-CHAVE:
Educação física. Desenvolvimento da performance.
Tempo de participação. Contexto de participação.
Análise exploratória.

INTRODUCTION

Sport education (SE) is one of the most implemented models in worldwide physical education (PE) due to its potential to promote educationally rich sport experiences for all students (Siedentop et al., 2020). This global expansion happens largely because the major educational milestones of SE ("enthusiasm": development of positive disposition to participate in PE and general physical activity; "literacy": development of a healthy sport culture; "competence": development of intelligent and skilful players) strongly align with the range of motor, cognitive and social outcomes required in the PE curriculum (Hastie et al., 2011).

In SE, students greatly appreciate the integration into PE classes of some of the (more educational) features of the wider sports culture (Bessa et al., 2020), which include: (1) longer units named seasons; (2) student affiliation with persistent teams; (3) recording of students' motor and social outcomes; (4) students play sporting roles (e.g., coach, referee, sport manager, etc.); (5) there is formal and regular competition; and, (6) there is a marked festivity and celebration climate. As additional pedagogies, students learn PE in persistent learning teams through participation in modified games during team practice sessions and regularly apply those skills during formal competition events. The role performance feature (e.g., coach, referee) assigns decision-making responsibility to students as a large part of the participation opportunities granted to each teacher member is decided during negotiations among students. Namely, mediated by the teachers, and according to the team strategy, the students set the team strategy through decision-making about who should participate more in team practice or formal competition against other teams (Siedentop et al., 2020).

The last decade has shown substantial evidence of student development of "literacy" and "enthusiasm" in PE lessons taught through SE (Bessa et al., 2021). However, while "competence" and the mission to ensure high levels of participation in activities are foundational goals of SE (and PE), considerably less research has been carried out on these outcomes (Farias et al., 2016). Indeed, especially in invasion games (e.g., football, handball, field hockey), the positive trend of student participation and performance development is still not entirely unequivocal (Hastie et al., 2011). This inconsistency seems to be influenced by several contextual factors such as the duration of student participation in SE units (single versus consecutive SE sport units), the nature of the PE content (hand-, feet-, implement-based), or the context of participation in the activities (team practice tasks or competition tasks) (Farias et al., 2016).

Research in SE has tended to examine in tandem student development of performance (game-play decision-making, execution, or efficacy) and their level of participation in game--play activities (total game involvement or amount of ball contacts per participation minutes). Overall, as found by Farias et al. (2018), student participation in consecutive SE seasons of invasion games seems to facilitate progression both in the level of participation and in their performance. However, the study by Farias et al. (2019) suggested that hand-manipulation games may be "easier to play" by students as there were found improvements in all perfor-

mance components (decision-making and effectiveness) in handball but not in football (improvement only in decision-making). Nonetheless, whereas Pritchard et al. (2014) found performance improvements of seventh-grade students in basketball, Farias et al. (2018) found no participation/performance improvements in that sport, also with seventh-graders.

Furthermore, although this has been scantly studied, some research has suggested that the context of student participation in game-play activities (team practice or formal competition events) can be highly impacting on their game-play participation and performance development. Farias et al. (2021) presented quantitative evidence that suggest a generalized equity in the participation time (minutes) granted by teams to their members. However, few discrepancies in equity were found in football (compared to handball) and in the competition context (there was greater equity in the team practice context). Further, also in invasion games, Hastie (1998) found higher game-play success and game involvement in the competition phase of a floor hockey season, whereas in Hastie and Sinelnikov (2006), students tended to show lower game-play success during formal competition (basketball). Further research on contextual effects is warranted.

Both by "listening to student voice" and by fieldwork and systematic observations of game--play events, the evolution of participation and performance in SE has been explained by a set of causal factors (Farias et al., 2018). The participation levels stem largely from the quality of social interactions between students (democratic, empathetic, inclusive). Also, game-play improvements stem from students' extensive participation in small-sided games modified to meet their learning needs, and extensive possibilities to practice games as a team. However, to date, the assessment of students' performance has been conducted mainly by using pre/post-test, but without considering the lesson-by-lesson level and context of participation occurred during the full unit extension. Specifically, no study has empirically examined the relationship between the level and context of participation in activities and the development of student performance.

Therefore, this study examined the effects of students' game-play participation (participation time, game involvement, and rate of play) and context of practice (team and competition) on their sport performance development (delta scores) in two invasion games units (handball and football), while it attempts to answer three research questions: (R1) does performance development differ depending on the sports content (handball, soccer)?; (R2) are there differences in the level of students' participation depending on the practice context (team practice and competition tasks)?; (R3) is there a relationship between the level of students' participation in the activities and their performance development and how does that differ as function of the practice context?

METHOD

PARTICIPANTS AND SETTINGS

The study was conducted during compulsory PE lessons (one 45-mins session and one 90-mins session per week) occurring in the second school term (13 weeks) in an elementary school in Northern Portugal. Students' level of game-play participation and performance development (delta) was examined while practicing a 3v3 game-form in team practice and competition contexts, in two consecutive SE seasons: handball and football (12 lessons of 45 min in each sport).

Purposive and convenience sampling criteria (Sarstedt et al., 2018) were applied to select the PE teacher and his class, who took part in the study. The PE teacher hold 12 years of teaching experience at elementary and secondary levels, and he was selected due to: (a) his high experience with the implementation of SE in schools; (b) be a regular member in continual professional development training on model-based practice at the host university; and (c) his experience on teaching different sport contents (e.g., invasion games, net games) model-based practice. A seventh-grade class of twenty-four of his students also participated (9 girls and 15 boys, mean age: 12.3 ± 1.3). The class had previous school experience in the sports (i.e., handball and football) taught.

The study followed the guidelines stated in the Declaration of Helsinki and was approved by the Institutional Research Ethics Committee of the first author's institution.

STUDY DESIGN

This study is exploratory and it is based on "naturalistic data" (Sparkes & Smith, 2014). That is, the SE model was 'naturalistically' implemented during the regular teaching-learning process conducted by the participant-teacher in his daily professional practice. The participant-teacher led all decisions on the SE programme implementation. To preserve similar pre/post-test conditions (in the 3 v 3), the research team asked the teacher to make these moments happen in a competition context.

PROGRAMME IMPLEMENTATION

An overview of the programme implementation is provided in Table 1.

Content development and competition formats

The two seasons had the following structures in common: (a) students' daily participation in a 3 v 3 game-form representative of handball (season 1) and football (season 2); (b) the students participated in the 3 v 3 games either in team practice tasks and during competition events; (c) the students participated in additional team practice tasks to refine their 3 v 3 game-related skills; (d) the students performed both competition-related roles (scorekeeper, referees) and season roles (captain, sport director, equipment manager coach); and (e) the teams kept a

'team score chart' that allowed them to accumulate points scored for the realisation of tactical goals during the practice tasks, their role performance and the points gathered for fair-play and win/tie in the competition events.

However, the two seasons diverged in the competition championship format and content development structure. The handball season followed a "traditional progressive competition format". The competition events occurred in the four final lessons.

Football followed an adapted "event model format". Team practice lessons were interspersed with lessons allocated to competition gameplay (Siedentop et al., 2020). This organization followed a more pronounced logic of problem-based learning with training-application cycles where the skills worked during team practice sessions were regularly applied in competitions events (Farias et al., 2019). In addition, over the football season, students assumed greater responsibility for identifying their game-problems, designing their team practice tasks and game strategy, as well as teaching content to their peers.

Teacher mediation of participation in the activities

The teacher put in place a set of external and internal regulators (Farias et al., 2017) to ensure that students had a baseline of equitable participation in 3 v 3 activities. First, an articulation strategy allowed that the number of students per team (eight students divided by two sub-teams of four players) was aligned with the structure of the 3 v 3 game-form. Six students could practice at a time with continuous rotation of the remaining two students (at every 2-minutes of practice). The teacher also established 8-minutes as the fixed time for each game-play session (team practice or competition tasks). Importantly, the teacher placed the external structure and encouraged students to exhibit inclusive behaviours and democratic participation in each lesson. However, each team was responsible for negotiating and managing their team's structure according to the level of participation of each team member. Second, match role-playing and performance scoring strategy. All students scored points (from 1 to 5) for their role-playing throughout the season. In the team score charts and culminating events, recognition of merit for sporting performance (e.g., most valuable player) was equated with role performance (e.g., best referee), and self-referenced competence development (e.g., player who has evolved the most). Third, equity and inclusion scoring strategy, in which the teacher established equity/inclusion as the main themes of the lesson. The most equitable/inclusive teams would score higher.

Sport education fidelity

The fidelity of models-based practice implementation followed the procedures recommended by Hastie and Casey (2014). Two independent researchers, not associated to this investigation, validated the application of the SE model through observations and coding of the 'immutable' features of SE (Farias et al., 2019).

Table 1. Overview of the SE seasons (lesson time and content, context, and practice time of the 3 v 3 game-form).

Handball					**Football**				
Lesson content					Lesson content				
Lesson	Time	Practice tasks	Game form	Participation context	Lesson	Time	Practice tasks	Game form	Participation context
1/2	90-min	-	3 v 2 + GK	Competition	1	45-min	-	3 v 2 + GK	Competition
3	45-min	2 v 1	3 v 2 + GK	Team Practice	2/3	90-min	3 v 1	3 v 2 + GK	Team practice
4/5	90-min	3 v 1	3 v 2 + GK	Team Practice	4/5	90-min	2 v 1	3 v 2 + GK	Competition
6	45-min	3 v 3 3 v 1	3 v 2 + GK	Team Practice	6	45-min	3 v 0	3 v 2 + GK	Team practice
7/8	90-min	3 v 1 + 1	3 v 2 + GK	Competition	7/8	90-min	3 v 2	3 v 2 + GK	Competition
9	45-min	-	3 v 2 + GK	Competition	9	45-min	3 v 1 + 1	3 v 2 + GK	Team practice
10/11	90-min	-	3 v 2 + GK	Competition	10/11	90-min	2 v 1 3 v 0	3 v 2 + GK	Competition
12	45-min	-	3 v 2 + GK	Competition	12	45-min	-	3 v 2 + GK	Competition

DATA COLLECTION

All lessons (24 in total of 45-min each) were videotaped using two crossed-angled cameras strategically placed in the gym to capture all the events related to students' 3 v 3 game-form. For assessing students' performance, in each one of the two seasons, the first and final lessons were used for capturing pre- and post-test measures, respectively. All these assessment moments occurred in the competition context to assure a similar evaluation context. Students' participation in 3 v 3 game-form was recorded on a student-by-student, and lesson-by-lesson basis (TABLE 1).

Performance variables

The students' game performance was measured using the assessment instrument used by Hastie et al. (2017) in invasion games. All offensive (passing, receiving, dribbling, shooting, defending) and defensive (interception, goalie) game actions with and without success were coded as well as the occasions when the students were available to receive the ball, but the ball was intercepted (targeted) or was not passed to them. Performance was established from the following data: the number of opposition throws which were intercepted, as well as catches from one's own team (RC); the total of successful passes, dribbling actions, scoring shots and availability to receive events (JP); and the sum of all throws that went out of bounds or were intercepted (LP), using the formula (RC + JP)/(10 + LP). Validity data for this efficiency index are available in the research of Gréhaigne et al. (1997).

Participation variables

The participation variables were assessed on a lesson-by-lesson basis and included each student's game-play (participation time, game involvement, rate of play) participation and context of practice (team tasks and competition tasks) throughout the 24 lessons (handball: 12; football: 12). The participation time counted the total number of minutes/seconds each student was on the field and scheduled to play. The game involvement includes all the student's successful or unsuccessful game actions. The rate of play is calculated by dividing the game involvement by the participation time.

RELIABILITY

One member of the research team recoded twice 20% of the data with a time-delay of thirty days, related to the participation time and game actions over the two seasons. A second researcher, not associated with this study but previously familiar with the coding dataset and variables under recording, coded randomly 20% of the dataset (i.e., three lessons of each season). The intra-observer reliability coefficients (Cronbach's) were higher than .89, and the inter-observer reliability coefficients were higher than .96, suggesting a strong agreement (Van der Mars, 1989).

DATA ANALYSIS

A delta value was calculated for the performance variable (difference between post-test and pre-test). Then, and exploratory analysis (mean and standard deviation values) was conducted on all the performance and participation variables. After the data yielding normal distribution, paired sample *t*-tests were conducted for performance (delta scores of handball vs. delta scores of football; pre-test/post-test differences) and context of participation (team practice scores vs. competition tasks scores). The relationship between performance and participation variables were tested using Pearson correlation coefficients. The values were interpreted using the following thresholds: very weak (0-.19), weak (.20 - .39), moderate (.40 - .59), strong (.60 - .79), and very strong (.80 - 1) (BMJ, 2021). Statistical significance level was set at p = .05. All the statistical procedures were conducted using SPSS 25.0 software (IBM, Inc., Chicago, IL).

RESULTS

Descriptive statistics, mean (*M*) and standard deviations (*SD*) of the performance variable in handball and football are presented in Table 2. The mean values of the performance variable indicate that learners showed higher performance scores in handball both in pre-test and post-test. The delta scores of learners' performance in handball were lower than in football, showing more pronounced pre-/post-test improvement in football. The analysis of performance between pre- and post-test showed no significant differences in handball ($t_{(23)} = -1.244$, $p = .226$), and significant differences in football ($t_{(23)} = -4.233$, $p < .001$). Also, there was not found a significant main effect between the delta scores of handball and football.

Table 2. Descriptive statistics for performance variables.

	Context	
	Handball	Football
Performance Variables	*M* (*SD*)	*M* (*SD*)
Pre-test	48.38 (26.38)	9.42 (6.86)
Post-test	56.13 (22.27)	21.92 (14.4)
Delta scores (diff.)	7.75 (5.56)	12.50 (9.47)

Table 3 presents de descriptive statistics of the participation variables for the different contexts (team practice and competition tasks), in each sport. In participation time, significant differences were found only in handball ($t_{(23)} = -5.926$, $p < .001$). In the game involvement variable, significant main effects were found in football ($t_{(23)} = -6.813$, $p < .001$), while regarding the rate of play no significant differences were found.

Table 3. Descriptive statistics for participation variables.

	Context			
	Handball		Football	
	M (*SD*)		*M* (*SD*)	
Participation Variables (total unit)	TP	Comp	TP	Comp
Participation time	18.65 (3.78)	26.46 * (4.45)	21.56 (8.42)	24.56 (8.16)
Game involvement	179.0 (50.1)	204.5 (51.5)	63.50 (18.36)	124.33 * (47.10)
Rate of play	7.97 (2.16)	7.77 (2.32)	4.53 (1.36)	3.91 (1.58)

Note: TP (Team practice); Comp (Competition) * p < .001 (team practice vs. competition)

Table 4 displays the Pearson correlation values (*r*) between the participation and the performance (delta) variables for handball and football. Overall, there were found five significant correlations (two in handball, one positive and one negative; three in football, two positive and one negative).

Table 4. Pearson correlation coefficients between participation and performance delta variables for handball and football.

	Performance Delta scores (diff.)			
	Handball		Football	
Participation (total unit)	TP	Comp	TP	Comp
Participation time	-.458*	-.107	.633**	-.483*
Game involvement	-.251	.268	.451*	.278
Rate of play	-.293	.433*	.055	.383

Note: TP (Team practice); Comp (Competition) * $p < .05$; ** $p < .001$

In handball, a significant negative correlation of moderate magnitude was found between participation time and performance delta score in team practice ($r = -.458$, $p = .024$). A moderate significant positive correlation was found between rate of play and performance delta score in competition ($r = .433$, $p = .030$).

In football, regarding the team practice context, significant positive correlations of strong and moderate magnitude were found between participation time and performance delta score ($r = .633$, $p = .001$) and between game involvement and performance delta score ($r = .451$, $p = .027$). Further, in competition, a significant negative correlation of moderate magnitude was found between participation time and performance delta score ($r = -.483$, $p = .017$).

DISCUSSION

This study sought to examine the effects of students' game-play participation (participation time, game involvement, and rate of play) and context of practice (team and competition) on their sport performance development (delta scores) in two invasion games units (handball and football). The achievement of these objectives has been attempted by answering the three major research questions.

Research question 1 (R1) sought to clarify whether performance development differed depending on the sports content (handball, football). The results confirmed the trend found in prior research in SE where students tended to show high performance in handball-based games (e.g., Hastie et al., 2017). On the other hand, the pre/post-test improvement found in football (second season) contradicts the studies that suggest a lower potential for students to evolve in this sport (e.g., Farias et al., 2019) and confirm, nonetheless, the pedagogical benefits of involving students in consecutive units of games in the same category (Mitchell et al., 2020). In addition, as suggested in previous research (Araújo et al., 2019), given the high scores found at students' entrance to the unit (pre-test), the lack of improvements found in handball may be justified by a ceiling effect. As pedagogical implications, the results of this study suggest that handball can be used as a propaedeutic subject for the ensuing approach to sports whose nature of skills may pose additional challenges to students (e.g., football, volleyball).

Research question 2 (R2) scrutinized the potential differences in the level of students' participation as a function of the practice context (team practice and competition tasks). Overall, especially in the interaction between game involvement and participation time (i.e., rate of play), the results suggest there was a balance between the time allocated to team practice and competition tasks in the two seasons. The exceptions were in the participation time of handball and in the game involvement of football (higher competition practice in both). Linking to R1, the high-performance scores found at the beginning and end of the handball unit, and the progression in time found in football seem to suggest benefits in the intensification of student participation in competition events. Unlike other studies where students disliked participating in overly competitive activities, ill-managed by teachers (Parker & Curtner-Smith, 2012), the present SE context provided a healthy competition environment to students. This reinforces the need for teachers to manage the meanings attributed by students to competition evens through the recognition of fair-play behaviors and rewards for the cognitive and social dimensions of learning.

Finally, research question 3 (R3) examined the relationship between the level of students' participation in the activities (i.e., their scores gathered along all lessons of the two units) and their performance development (delta scores). There were found higher events of correlations between participation/performance variables in football (two positive correlations, one negative correlation) than in handball (one negative and one positive correlation). More specifically, in handball, there was found a positive correlation between the rate of play in the competition context and the performance delta score. In football, the team practice context seems to have

a higher expression as there were two positive correlations found between participation variables (participation time/game involvement) and the performance delta score. The explanation may relate to different content development structural aspects contained in the two units. Namely, the football season followed and adapted 'event model' format whereby the team practice tasks were interspersed with events allocated to competition game-play (Siedentop et al., 2020). Previous research has shown that this type of structure enhances student engagement in a problem-solving logic (cycles of practicing skills in team practice/applying them in competition) (Farias et al., 2019). This may have generated a greater commitment from students to team practice activities, with, inherently, a greater contribution to the development of their performance (see also Farias et al., 2020).

In sum, our exploratory analysis indicates that SE seasons promoted a balanced participation in team practice and competition events. Also, the three participation variables showed similar levels of correlation with performance improvement (delta scores), suggesting that teachers should strive to promote similar levels of student participation time in activities (minutes on the field), with game tasks that allow high involvement with and without the ball. To robust the knowledge on the participation subject, we strongly recommend that future investigation study the consecutive participation of students in, or across, different categories of games (e.g., net/wall) to ascertain potential differential effects of participation in SE according to students' characteristics (e.g., skill level, social status, sex).

REFERENCES

Araújo, R., Hastie, P., Lohse, K., Bessa, C., & Mesquita, I. (2019). The long-term development of volleyball game play performance using sport education and the step-game-approach model. *European Physical Education Review, 25*(2), 311-326. https://doi.org/10.1177/1356336X17730307

Bessa, C., Hastie, P., Rosado, A., & Mesquita, I. (2020). Differences between sport education and traditional teaching in developing students' engagement and responsibility. *Journal of Physical Education and Sport, 20*(6), 3536-3545. https://doi.org/10.7752/jpes.2020.06477

Bessa, C., Ramos, A., Hastie, P., & Mesquita, I. (2021). What actually differs between traditional teaching and sport education in learning outcomes? A critical systematic review. *Journal of Sports Science and Medicine, 20*, 110-125. https://doi.org/10.52082/jssm.2021.110

BMJ, T. (2021). *Correlation and regression.* https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression.

Farias, C., Harvey, S., Hastie, P., & Mesquita, I. (2019). Effects of situational constraints on students' game-play development over three consecutive sport education seasons of invasion games. *Physical Education and Sport Pedagogy, 24*(3), 267-286. https://doi.org/10.1080/17408989.2019.1571184

Farias, C., Hastie, P., & Mesquita, I. (2017). Towards a more equitable and inclusive learning environment in *Sport Education*: results of an action research-based intervention. *Sport, Education and Society, 22*(4), 460-476. https://doi.org/10.1080/13573322.2015.1040752

Farias, C., Mesquita, I., & Hastie, P. (2016). The sport education model: Research update and future avenues for practice and investigation. *Portuguese Journal of Sports Sciences, 16*(1), 73-96.

Farias, C., Segovia, Y., Valério, C., & Mesquita, I. (2021). Does sport education promote equitable game-play participation? Effects of learning context and students' sex and skill-level. *European Physical Education Review, 28*(1), 20-39. https://doi.org/10.1177/1356336X211013832

Farias, C., Valério, C., & Mesquita, I. (2018). Sport education as a curriculum approach to student learning of invasion games: Effects on game performance and game involvement. *Journal of Sports Science and Medicine, 17*(1), 56-65.

Farias, C., Wallhead, T., & Mesquita, I. (2020). "The project changed my life": Sport education's transformative potential on student physical literacy. *Research Quarterly for Exercise and Sport, 91*(2), 263-278. https://doi.org/10.1080/02701367.2019.1661948

Gréhaigne, J.-F., Godbout, P., & Bouthier, D. (1997). Performance assessment in team sports. *Journal of Teaching in Physical Education, 16*(4), 500-516. https://doi.org/10.1123/jtpe.16.4.500

Hastie, P. (1998). Applied benefits of the sport education model. *Journal of Physical Education, Recreation and Dance, 69*(4), 24-27. https://doi.org/10.1080/07303084.1998.10605530

Hastie, P., & Casey, A. (2014). Fidelity in models-based practice research in sport pedagogy: A guide for future investigations. *Journal of Teaching in Physical Education, 33*(3), 422-431. https://doi.org/10.1123/jtpe.2013-0141

Hastie, P., Ojeda, D. M. d., & Luquin, A. C. (2011). A review of research on Sport education: 2004 to the present. *Physical Education and Sport Pedagogy, 16*(2), 103-132. https://doi.org/10.1080/17408989.2010.535202

Hastie, P., & Sinelnikov, O. (2006). Russian students' participation in and perceptions of a season of Sport Education. *European Physical Education Review, 12*(2), 131-150. https://doi.org/10.1177/1356336X06065166.

Hastie, P., Ward, J. K., & Brock, S. J. (2017). Effect of graded competition on student opportunities for participation and success rates during a season of sport education. *Physical Education and Sport Pedagogy, 22*(3), 316-327. https://doi.org/10.1080/17408989.2016.1203888

Mitchell, S., Oslin, J., & Griffin, L. (2020). *Teaching sport concepts and skills: A tactical games approach* (4th ed.). Human Kinetics.

Parker, M. B., & Curtner-Smith, M. D. (2012). Sport education: A panacea for hegemonic masculinity in physical education or more of the same? *Sport, Education and Society, 17*(4), 479-496. https://doi.org/10.1080/13573322.2011.608945

Pritchard, T., McCollum, S., Sundal, J., & Colquit, G. (2014). Effect of the sport education tactical model on coeducational and single gender game performance. *Physical Educator, 71*(1), 132-154.
Sarstedt, M., Bengart, P., Shaltoni, A. M., & Lehmann, S. (2018). The use of sampling methods in advertising research: A gap between theory and practice. *International Journal of Advertising, 37*(4), 650-663. https://doi.org/10.1080/02650487.2017.1348329.
Siedentop, D., Hastie, P., & van der Mars, H. (2020). *Complete guide to sport education* (3rd ed.). Human Kinetics.
Sparkes, A. C., & Smith, B. (2014). *Qualitative research methods in sport, exercise and health: From process to product*. Routledge.
Van der Mars, H. (1989). *Observer reliability: Issues and procedures*. In P. Darst, D. Zakrajsek, & V. Mancini (Eds.), Analysing physical education and sport education (2nd ed.) Human Kinetics.

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Somato-physiological profile of under-17 female futsal players.

KEYWORDS:
Futsal. Somatotype. Physiology. Youth Team. Performance. Female.

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ABSTRACT

The somato-physiological characterization in sport is an essential tool to assist the elaboration of the training planning. Therefore, the present study aimed to (a) characterize the somatotype and physiological profile in young female futsal players, (b) provide a comparison between playing positions, and (c) test associations between dependent measures. Eighteen Brazil state-level players from the under-17 category participated in the study. Anthropometric measurements (body mass, height and somatotype determination), aerobic fitness (multistage 20 m shuttle run test) and the ability to perform repetitive sprints (Running Anaerobic Sprint Test) were assessed. These procedures were divided into two 24 h apart sessions. A Bayesian statistical approach was adopted. The results indicated the predominance of the endo-ectomorph somatotype for players and a negative and moderate correlation between body fat and maximum rate of oxygen (VO_{2MAX}) (r = -.54; BF_{10} = 3.34). Despite the association between a high percentage of body fat and poor performance, the physiological profile presented by the athletes seems to be enough for futsal demands (VO_{2MAX}: 34.73 $ml.kg_{-1}.min^{-1}$; maximum power: 371.16 W; and maximum speed: 21.1 $km.h^{-1}$). Interestingly, participants presented a homogeneous somatotype and physiological profile across playing positions.

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