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Effect of Sport Education on the technical learning and motivational climate of junior high performance swimmers

Efecto de la Educación Deportiva sobre el aprendizaje técnico y el clima motivacional de jóvenes nadadores de alto rendimiento

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Abstract

This study sought to examine the effect of a Sport Education season on the technical learning of four swimming strokes and the perceived motivational climate. Twenty-two young swimmers from a sport club participated in 16 training sessions organized around the key principles of Sport Education. Experts assessed technical learning from video analysis, and the swimmers and their coaches also completed self-assessments. Motivational climate was analysed through the Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2). The results indicated that regardless of performance level (sampling or specializing) and gender, the swimmers significantly improved their technical learning from pre-test to post-test. In addition, all participants reported statistically significant improvements in the task-oriented motivational climate. It was concluded that the intervention program based on Sport Education had a positive impact on improvement of swimming skill, and a more optimal motivational climate.

Key words: instructional model; swimming technique; motivation.

Resumen

Este estudio trata de examinar el efecto de una intervención basada en el modelo de Educación Deportiva sobre el aprendizaje técnico de los cuatro estilos de natación y el clima motivacional percibido. Veintidós jóvenes nadadores federados de un club deportivo participaron en 16 sesiones de entrenamiento basadas en las principales premisas de la Educación Deportiva. Los expertos valoraron el aprendizaje técnico mediante el análisis de grabaciones de vídeo, y los nadadores y sus entrenadores también completaron hojas de observación. El clima motivacional fue analizado con el Cuestionario del Clima Motivacional Percibido en el Deporte-2 (PMCSQ-2). Los resultados indicaron que, independientemente del nivel de rendimiento (iniciación o especializados) y el género, los nadadores mejoraron significativamente su aprendizaje técnico de pre-test a post-test. Además, todos los sujetos lograron mejoras estadísticamente significativas en el clima motivacional orientado a la tarea. Se concluyó que el programa de intervención basado en la Educación Deportiva tuvo un impacto positivo en la mejora técnica de los estilos de natación, y en el clima motivacional.

Palabras clave: modelo de instrucción; técnica de natación; motivación.

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Introduction

In the world of sport sciences, significant attention has been placed on the achievement of optimal technical performance (Gilbert, Gilbert, and Trudel, 2001; Nevill, Atkinson, and Hughes, 2008). In particular, the examination of training variables such as intensity, volume, density and complexity has been seen as critical in promoting the greatest gains in performance (Bompa, 2004; Matveev, 2001; Platonov and Bulatova, 2007; Verkhoshansky, 2002).

Acyclic sports consist of a blend of actions of different intensities, durations, frequencies and kinetic characteristics, all with highly specific movements (Casas, 2008). In contrast, cyclic sports such as swimming and rowing involve continuous movements in which appropriate technical performance is critical to success (Bompa, 2003; Shephard and Astrand, 1996). As a case in point, research on swimming has followed a line of inquiry that seeks to discover the most direct and economical way to execute the various strokes in order to produce the most positive results (Formosa, Sayers, and Burkett, 2014; Mills, Lomax, Ayres, and Scurr, 2014; Vantorre, Chollet, and Seifert, 2015).

Performance in elite swimming requires great technical expertise that takes years to develop (Barden and Kell, 2009), by consequence involves a large number of hours of training to improve sports results (Llop, Arellano, González, Navarro, and García, 2010; Navarro and González, 2012). This form of training is often accompanied by high levels of psychological pressure as athletes are constantly judged by coaches, parents, teammates and friends (Fernández-Río, Cecchini-Estrada, Méndez-Giménez, Fernández-García, and Saavedra, 2013). In the search for sports excellence in the different levels, understanding athletes' motivation in practice to maximise their performance has been a central element in sport psychology (Fernández-Río et al., 2013; Ntoumanis, 2001; Treasure and Roberts, 2001). As a result the motivational climate of a training setting influences athlete goals and behaviours including time spent in an activity, effort exerted, and persistence (Abbott and Collins, 2004; Duda and Hall, 2001; MacNamara, Button, and Collins, 2010; Megan-Babkes and Sinclair, 2013).

One of the main theories that has examined motivation in the sport setting is achievement goal theory (Nicholls, 1989). In this line of inquiry, Newton, Duda and Yin (2000) examined the psychometric properties of the perceived motivational climate in sport, and they identified two dimensions, these being task-oriented motivational climate and ego-oriented motivational climate.

In a task-oriented motivational climate, focus is placed upon individual progress through the performance of a role, learning and success, which is associated with the most positive impact on the cognitive, behavioural and affective domain. Alternately, in an ego-oriented motivational climate, focus is placed upon the specific indicators of competition and athletic performance. Numerous studies have been completed using this construct (Duda, Chi, Newton, Walling, and Catley, 1995; Duda and Nicholls, 1992; Jiménez, 2004; Newton and Duda, 1993; Ntoumanis, Healy, Sedikides, Smith, and Duda, 2014) with the general conclusions indicating a stronger association between boys and an ego-oriented motivational climate, and girls showing a greater tendency toward a motivational climate task-oriented.

Despite the widespread examination of achievement goal theory in sports in general, there have been few attempts to apply the theory within swimming. Apart from Petherich and Weigand (2002), who assessed the relative influence of dispositional goal orientations and motivational climates on indices of motivation in male and female swimmers, the only evidence lies in the work of Fernández-Río et al. (2013). In this study, achievement goal dominance, self-determined situational motivation, and competence in high-level swimmers were assessed before and after training sessions set at different working intensities. The results indicated that the participants showed an overwhelming mastery-approach achievement goal dominance that remained stable at the conclusion of the different training sessions under all intensity levels.

Traditionally the teaching of swimming is based on management models (Light and Wallian, 2008) in which the coach transmits information, and swimmer reproduces without evaluating the psychological variables embedded in the teaching, learning and assessment. However there are now other teaching methodologies, primarily in the context of school physical education, that focus on more 'non-linear' transmissions of information which is typical of teacher (or coach) directed learning, as the proposed by Chow, Davids, Hristovski, Araújo, and Passos (2011). These models are based on the notion that giving responsibilities to students (or athletes), and involving them more directly in their own learning may not only be more effective (Rink, 2006), but increases the level of involvement and creating a motivational climate that encourages such learning (Morgan, Sproule, Weigand, and Carpenter, 2005). Actually, one of the most prominent student-centred approaches to teaching physical education model is known as Sport Education (Siedentop, 1994).

In contrast to a teacher-directed approach, Sport Education follows the assumption that learning results from an interactive and cooperative construction of shared meanings between students devised by means of authentic learning environments and meaningful activities (Siedentop, 2002). As such, Sport Education sessions within physical education are framed within a six features structure referenced to community-based sports. That is, students are grouped into persisting teams, there is formal and regular competition, records are kept that provide systematic feedback that define standards and learning goals, culminating events which enhance the social relevance of learning are held, and practice and competition are surrounded by a festive climate which aims to provide meaning to activities (Siedentop, Hastie, and van der Mars, 2011). Furthermore, seasons of Sport Education are usually longer (ranging between 15- to 20-lessons) than typical units in physical education so students are enable to learn a variety of roles other than player (e.g., coaches, referees, trainers, scorekeepers, statisticians). These same students also take on curriculum ownership and instructional autonomy by means of student-led tasks (Siedentop, 1998).

Sport Education research has focused almost exclusively on team sports in physical education, with examples including football (Curtner-Smith and Sofo, 2004), volleyball (Pritchard, Hawkins, Wiegand, and Metzler, 2008) and basketball (Sinelnikov and Hastie, 2008), and by consequence, there is a limited understanding of the application of the model in cyclic sports in which there is a focus on technique. Indeed, the only study to examine the model in this sport category is that of Hastie, Calderón, Rolim, and Guarino (2013), who showed improvement in both students' technique and outcome performance during a season of track and field athletics.

To date, Sport Education research has been conducted exclusively within school physical education (Hastie, Martínez de Ojeda, and Calderón, 2011). In contrast, there have been no studies that have analysed the effects of different pedagogical models applied in youth sports settings. Given this situation, the purpose of the present work was to examine the extent to which Sport Education might serve as an appropriate intervention in a high performance junior sport to know the development of the technical learning of the main swimming strokes as well as the motivational climate perceived by the participants.

Methods

Participants

The participants in this study were 22 swimmers (eleven boys and eleven girls) from a sports club in the south eastern region of Spain. These swimmers represented two training groups of different performance level: "sampling" (n = 12) and "specializing" (n = 10) (Coté, Baker, and Abernethy, 2007). The sampling swimmers had high amounts of deliberate play, low amounts of deliberate practice, together with involvement in several sports. The specializing swimmers had involvement in fewer sports, and had a more even balance between deliberate play and practice. The first group consisted of swimmers aged nine to eleven (M = 10.13; SD = 2.71), while the second group had ages spanning 13 to 16 years (M = 15.33; SD = 2.92).

The coaches in this study had between 15 and 30 years of experience in swimming, both at the high performance and sampling levels. They had also received formal instruction in Sport Education following an adapted version of the Calderón and Martínez de Ojeda (2014) protocol to coaches. This consisted of weekly seminars and aligned practical applications for a month prior to the Sport Education season. The study had the approval of the board of the sports club, and the parents or legal guardians of each student signed the informed consent letter to allow their child to participate in the study that had the approval of the Ethics Committee of the researchers' university.

Design

This study followed a mixed-methods approach. Quantitative data were collected using a quasi-experimental intragroup design using three measurement points. Pre-tests on swimming technical learning took place before the instruction began, and again at the completion of instruction. The swimmers' perceptions of the motivational climate were assessed at both pre-test and post-test. From a qualitative perspective, the swimmers were also interviewed on completion of the study in order to record their perceptions of the season and for methodological triangulation (Olsen, 2004).

The Sport Education Season

The swimmers participated in a season that took place four times per week over a period of four weeks for a total of 16 training sessions (Table 1). Each session was scheduled for 150 minutes. In the first session of each week the coach introduced the key technical details of the four strokes. The remaining three sessions of the week consisted of two parts. The first was coach-directed, in which training was focused on the development of selected physiological parameters. In the second part, the swimmers took part in their own autonomous training using a task card provided by the coach. In this part the swimmers completed four strokes technique observation sheets, a process that remained consistent over the season. A critical part of Sport Education is the taking of roles by the participants in the conduct of the season. In this experience, those roles were assigned by the coach and included (a) coach, (b) timekeeper, (c) record keeper, (d) observer, (e) equipment manager, and (f) journalist. The swimmers took responsibility for their roles respectively (a) by following a task card, to explain and demonstrate the training exercises set by the coach-directed, (b) to keep time of swimmers' laps and the time allocated to each training exercise, (c) to record the accumulated points according to assessments of the other swimmers by the observation sheets (d) to analyse peers' training performance through the use of coach-directed provided observation sheets (e) to set out and organize all the materials needed for each training session, and (f) to take photographs and videos of swimmers both in the water and conducting their roles throughout the training session.

Table 1. Content of Sport Education season.

Session	Phase	Content
1	Introduction	Information of Sport Education, and the assignment of roles. Training: technical strokes, Re-1 and Ve-1. Pre-test: PMCSQ-2 to the swimmers and observations sheets of the four swimming strokes to the coaches.
2	Part 1 Part 2	Training: technical front crawl, technical turns and Re-2.
3	Part 1 Part 2	Training: technical strokes and Re-2.
4	Part 1 Part 2	Training: technical front crawl, Re-2 and Re-3. Self-evaluations "front crawl".
5	Part 1	Rotating roles. Training: technical strokes, Re-1 and Ve-1.
6	Part 2 Part 1	Training: technical backstroke and Re-3.
7	Part 2 Part 1	Training: technical strokes, Re-1 and Re-2.
8	Part 2 Part 1	Training: technical backstroke and Re-1. Self-evaluations "Backstroke".
9	Part 2	Rotating roles. Training: technical strokes, technical turns, Ve-2, Re-1
10	Part 1	Training: technical breaststroke, Ve-1 and Ve-2.
11	Part 2	Training: technical strokes, Ve-1 and Re-3.
12	Part 1	Training: technical breaststroke and Re-2. Self-evaluations "Breaststroke".
13	Part 2	Rotating roles. Training: technical strokes, technical turns, Re-1 and Ve-2.
14	Part 1 Part 2	Training: technical butterfly, Ve-1 and Ve-2.
15	Part 1 Part 2	Training: technical strokes, Ve-2 and Re-2.

16	Part 1	Training: technical competition (front crawl, backstroke, breaststroke, butterfly) and Re-1.Self-evaluations "Butterfly".
	Part 2	Post-test: PMCSQ-2 to the swimmers and observations sheets of the four swimming strokes to the coaches. Interviews performed.
Final Event	Formal Competition	Competition.

Note: Types of training are indicated using the Maglischo (2009) nomenclature.

Instruments

Technical Learning: Digital video records were made of the swimmers' technical learning of four swimming strokes at either two measurements time points. Both front and side perspectives were captured. These video records were then analysed by three national level coaches using observation sheets developed for the study based upon the criteria listed by Maglischo (2003, 2009) and Hannula and Thornton (2012). In addition to the swimmers' evaluations and evaluation from the coaches, the swimmers completed self-evaluations following the points indicated in Table 2. Observations sheets were constructed for each of the four swimming strokes, with each consisting of four categories: body position, movement of arms, kick, and breathing. Within each category, the key technical description (complete with diagram) was accompanied by description of the "correct" and "incorrect" execution. Correct scores counted for one point, while incorrect were scored as zero points. The final score was the tally of points. Five national level coaches and two university professors who were experts in swimming evaluated the content validity of the evaluation sheets. Following two rounds of review (with the second focusing on the production of the images) the final version was approved. Table 2 provides a listing of categories and samples of subcategories for each stroke.

Table 2. Content of the evaluation sheets.

Stroke	Technical category	Sample subcategory
Front crawl	Body position (2)	Horizontal alignment of the body
	Movement of the arms (8)	Water at the entrance to the shoulder at ear level
	Kick (2)	Leg down hard and the other amounts relaxed
	Breathing (4)	Low average mouth breathing out of water
Backstroke*	Body position (5)	Head relaxed and still, and fixed on the water
	Movement of the arms (5)	Shoulder really close to the ear on exit of the water
	Kick (2)	Continuous legs movement (hip, knee and ankle flexion-extension)
Breaststroke	Body position (4)	Maximum flexion position: elbows, hips and knees in full flexion
	Movement of the arms (4)	In the water: semi circular trajectory
	Kick (4)	Recovery phase: knees open more than the hips
	Breathing (1)	Head-shoulder and trunk go up in diagonal trajectory (up and in front)
Butterfly	Body position (1)	Ondulatory continuous movement of the body
	Movement of the arms (10)	Arms start the cycle simultaneously
	Kick (4)	Ondulatory and continuous movement of the legs (flex extension hip, knee, ankle)
	Breathing (1)	Head come in and come out of the water before the arms

*Breathing was not evaluated in this stroke as the mouth is constantly out of the water.

Motivational climate: The swimmers' perceptions of the motivational climate during the season were measured using the Spanish version (Cecchini, González, López-Prado, and Brustad, 2005) of the Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2) (Newton et al., 2000). The instrument is composed of 33 items, 17 of which measured perceived task climate and the other 16 perceived ego climate. The task climate is assessed through three subscales. These are "cooperative learning", "effort/improvement" and "role". The ego climate was assessed by subscales labelled "punishment for mistakes", "unequal recognition" and "rivalry group members". The questionnaire items contain the stem sentence "During training sessions in swimming..." and respondents use a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Interviews: At the completion of the season, all swimmers participated in an interview with a member of the research team. Each interview lasted ten minutes and consisted of five questions adapted from similar research on Sport Education (Kinchin, MacPhail, and NiChroinin, 2009). The questions included: (1) What are the differences between the way you trained before this season and during this season? (2) What did you enjoy the most (and least) about this form of training? (3) Were you more or less motivation by having a role? What did you like/dislike about the roles? (4) Do you think having a role and doing self-evaluations helped you improve your swimming performance? (5) Would you enjoy continuing training using this format in the future?

Data analysis

Technical learning: To determine whether there were differences in the swimmers' technical learning across the season, a series of 2 (sex) x 2 (performance level) x 2 (time) repeated measures Analysis of Variances (ANOVAs) were conducted using the IBM Statistical Package for the Social Sciences Version 21. To examine differences between the swimmers' self-assessments and the evaluations made by the coaches, independent sample t-tests were performed. Separate analyses were conducted for each swimming stroke. Rather than using the Bonferroni method for controlling Type I error inflation, the Holm's sequential Bonferroni method was applied, as it is less conservative and has greater power (Maxwell and Delaney, 2000). When any one of the ANOVAs yielded a significant difference, subsequent analyses were performed at the subscale level to provide insight into the precise location of differences and the effect sizes.

Motivational climate: A 2 (sex) x 2 (performance level) x 2 (time) x 2 (climate component) repeated measures ANOVA was used to assess differences in the perceived motivation climate prior to and at the end of the season.

The effect sizes were reported with Cohen´s d because the data of the technical learning and the motivational climate, confirmed by a Kolmogorov-Smirnov test, were parametric. A large effect size was defined as $d > 0.8$, moderate as between 0.8 and 0.5, and a small effect size defined as < 0.5 (Cohen, 1988; Field, 2009; Hopkins, 2000).

Interviews: All interviews were recorded and later transcribed. Data analysis was performed in Spanish language and the resulting themes were later translated into English for the purposes of reporting. The analysis before translation approach was used to reduce the possibility of inconsistencies that may arise from translation. Using the QSR NVivo program 10, data were analysed using the procedure recommended by Bardin (2002). That is, a coding system was generated after the first reading (exploratory) to then categories and indicators were created through inductive reasoning. Similar to the constant comparative method

(Glaser and Strauss, 1967; Lincoln and Guba, 1985), the data were reviewed repeatedly and continually coded to identify similarities and differences, groupings, and patterns.

Results

Technical learning

Repeated measures ANOVA revealed the same outcomes for each of the swimming strokes, the technical learning was analysed through the percentages of success (% = (Total*-ITrial*)/100) according to the items established in the observation sheets. The results show that the junior high performance swimmers had a high technical learning from pre-test to post-test in the four swimming strokes: front crawl (pre: 60.70%, post: 79.87%), backstroke (pre: 60.22%, post: 77.65%), breaststroke (pre: 58.76%, post: 83.11%), and butterfly (pre: 57.40%, post: 82.70%) (Figure 1).

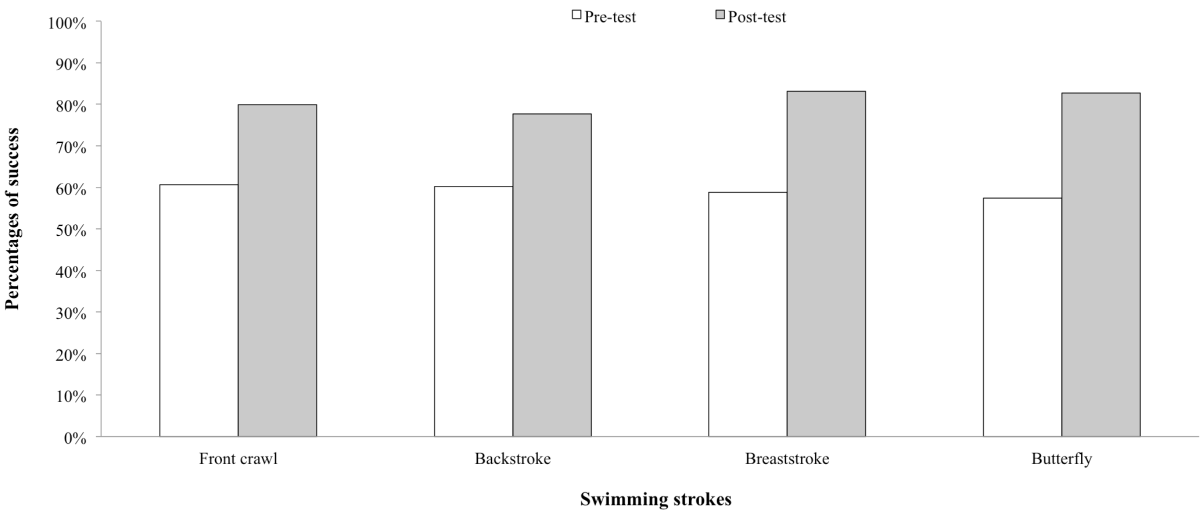

Figure 1. Changes in technical learning across the season (pre-test and post-test).

To analyse significant increases for technical learning by sex, the results show that the male swimmers have a higher learning than the female swimmers in all swimming strokes: front crawl (F = 3.01, p = <.001*, η^2 = 4.83), backstroke (F = 4.22, p = <.001*, η^2 = 2.49), breaststroke (F = 3.88, p = <.001*, η^2 = 2.51), and butterfly (F = 3.77, p = <.001*, η^2 = 3.41). To analyse significant increases for technical learning by performance level, the results show that the specializing swimmers have a higher performance than the sampling swimmers in all swimming strokes: front crawl (F = 3.74, p = <.001*, η^2 = 2.25), backstroke (F = 3.89, p = .011*, η^2 = 2.95), breaststroke (F = 4.19, p = .011*, η^2 = 3.36), and butterfly (F = 3.21, p = .002*, η^2 = 2.33). However in all cases, significant increases are found for the entire sample of swimmers with values of p < .001. Figure 2 shows the changes of the technical learning in all swimming strokes across the season by sex and performance level.

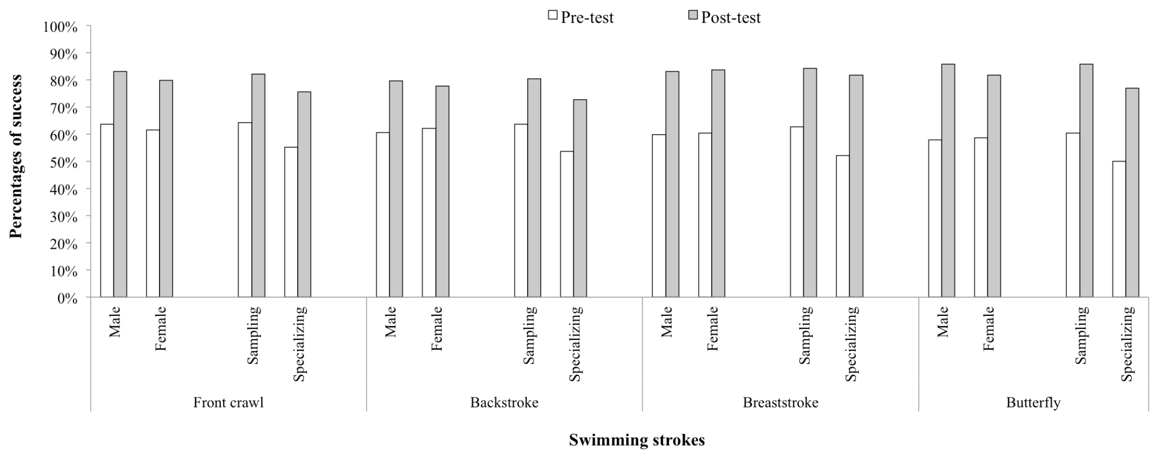

Figure 2. The technical learning across the season by sex and performance level (pre-test and post-test).

With respect to the comparisons between the swimmers' self-perceptions and those of the coaches, the data presented in Table 3 show the only difference concerned the butterfly stroke, where the swimmers significantly underscored their coaches (p = .004*). These findings suggest swimmers at this age and level are capable of making accurate evaluations of their own performances. With respect to the differences in butterfly, it is believed that the complexity of the technique of this stroke may account to the variations in scores.

Table 3. Differences between the perceptions of the coach and swimmers concerning technique.

Technique	Coach	Swimmer			
	*M**(SD)*	*M**(SD)*	*t*	*p*	*d*
Total	81.66(6.49)	77.05(11.83)	1.45	.176	0.004
Front crawl	81.25(1.06)	76.19(14.07)	1.70	= .101	0.005
Backstroke	78.47(8.48)	74.65(9.66)	1.96	= .061	0.004
Breaststroke	83.33(5.43)	84.52(10.46)	-0.62	= .539	0.001
Butterfly	83.59(11.02)	72.86(13.15)	2.78	= .004*	0.009

**Significant difference between the pre-test and post-test (p* < 0.05*).*

**%= (Total*-ITrial*)/100.

Motivational Climate

Table 4 shows the changes in both the mastery and ego climate variables across the season. Significant increases were found for mastery variables across the entire sample and for all subgroups with values of p = .001*, according to sex (F = 44.39, p = <.001*, η^2 = 2.93) and performance level (F = 44.47, p = <.001*, η^2 = 3.12). However no differences were detected for ego climate variables across the season (p = .491), according to sex (F = 0.238, p = .359, η^2 = 0.28) or performance level (F = 0.323, p = .429, η^2 = 0.47).

Table 4. Changes in mastery and ego climate variables across the season.

Mastery									
		Pre-test		Post-test					
		*M***	*SD*	*M***	*SD*	*Δ*	*t*	*p*	*d*
Total		80.48	7.77	94.00	3.26	13.52	2.31	< .001*	0.041
Sex	Male	81.87	4.16	93.64	4.33	11.77	3.58	= .001*	0.027
	Female	79.39	6.68	94.36	1.78	14.97	2.11	< .001*	0.084
Level	Sampling	82.57	7.12	93.44	3.50	10.87	2.98	< .001*	0.031
	Specializing	76.83	7.77	94.97	2.69	18.14	3.47	< .001*	0.067
Ego									
		Pre-test		Post-test					
		*M***	*SD*	*M***	*SD*	*Δ*	*t*	*p*	*d*
Total		48.01	9.64	49.09	9.19	1.08	1.30	.491	0.117
Sex	Male	50.34	13.90	51.33	9.65	0.99	1.58	.573	0.102
	Female	45.67	6.15	46.44	8.49	0.77	1.16	.719	0.090
Level	Sampling	47.03	10.48	47.76	10.91	0.73	1.83	.733	0.066
	Specializing	49.72	8.01	51.43	5.17	1.71	1.49	.492	0.330

**Significant difference between the pre-test and post-test (p* < 0.05*).*

**% = (Total*-ITrial*)/100

Interview data

The results of the content analysis of the interviews are presented according to time. Before the season commenced, the swimmers presented two themes that best represented their perceptions of the motivational climate in which they were participating (Figure 3).

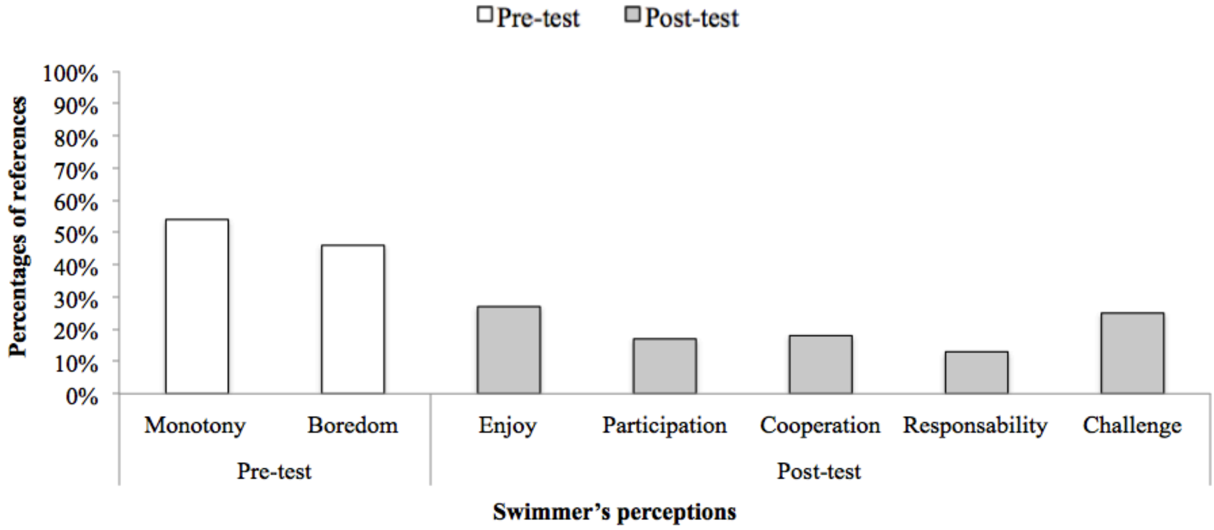

Figure 3. Percentages of references by swimmers about the season (pre-test and post-test).

These have been termed "*monotony*" (54% references) and "*boredom*" (46%). With respect to monotony, a number of swimmers mentioned the idea of sameness, and associated it with low motivation due to the established routine training. More than half of the swimmers made references to boredom, with this factor being the most representative of the emotional aspects of the swimmers prior to this intervention, for example *"before we did not have that intrigue because we always we were doing the same exercises and nothing else"*.

Following the season, the swimmer's perceptions were not only changed, but were more expansive. Within the interviews, there were references to "*enjoy*" (27%), "*participation*" (17%), "*cooperation*" (18%),"*responsibility*" (13%) and "*challenge*" (25%). With respect to "*enjoy*", the swimmers were near unanimous in reporting this aspect of the season as the strongest emotion. In terms of "*participation*", more than half of the swimmers reflected they valued the opportunity to be part of the teaching/learning process. This in turn provided a sense of importance and responsibility during workouts. A representative statement included: *"Now we all do everything, because we learn to be coaches, explain the exercises to others, to take pictures, to observe, and so on"*. The swimmers saw the "*cooperation*" as vital variable to the training program because the swimmers had the opportunity to interact with others. As one swimmer stated, *"It is best that we now help each other through the roles, so that everyone can get to be the best to try to do better every day"*.

Nearly half the swimmers mentioned the idea of "*responsibility*". Having formal tasks made them feel important and provided a sense of obligation to achieve these well each day. The final theme was that of "*challenge*", particularly as it involved becoming a better swimmer. Many of the participants recounted in interviews the monotony of the previous format of training was changed by having the challenges of new tasks. Moreover to self-improvement, challenge also referred to the role of coach. As a specializing swimmer commented, *"I like that feeling, so I want to be forever known as a trainer and see how I behave to bring out the best in others"*.

Discussion

The goal of this study was to examine the effect of Sport Education on technical learning swimming strokes (butterfly, backstroke, breaststroke and front crawl) and the motivational climate perceived by study participants during the intervention program. As can be seen from the results, the swimmers improved in the technical aspects of all four strokes. These outcomes mirror those of Hastie et al. (2013), who showed significant technical learning after experiencing Sport Education in athletics, albeit it in a school setting.

Furthermore, this study found the improvements to be global across both sex and performance level, without favouring either boys or girls, or the sampling or specializing swimmers. These findings corroborate Sport Education as a format of achieving significant improvements in learning and performance in a sports setting as they have shown in physical education (Calderón, Martínez de Ojeda, and Hastie, 2013; Hastie and Sinelnikov, 2006; Pritchard et al., 2008; Sinelnikov et al., 2008). Moreover the results found by Stran and Curtner-Smith (2010), and Wallhead, Hagger, and Smith (2010) are corroborated; because they applied Sport Education in different age groups and all improved the learning. According to the development of higher levels of technical competence, the results of this study show that Sport Education season promoted a more mastery climate focus in the swimmers. Although swimming is an individual sport, athletes still represent their clubs when competing, and hence it is important to recognize the importance of team cohesion and its affect on sports performance (Harwood and Beauchamp, 2007). The finding of high values of a perceived mastery motivational climate are consistent with those found in numerous studies showing that such a climate provides task-oriented high levels of effort, persistence, intrinsic motivation and satisfaction in the study participants (Guan, Xiang, McBride, and Bruene, 2006; Trenz and Zusho, 2011). Experiencing roles and making decisions during the process of training significantly increased the degree of engagement of the swimmers. By consequence, teamwork and responsibility (González-Cutre, Sicilia, Moreno, and Fernández-Balboa, 2009) were encouraged.

One key feature of Sport Education is the provision of materials that promote formative and shared asseseements, which have shown particularly valuable in physical education settings (see López-Pastor, Kirk, Lorente-Catalán, MacPhail, and Macdonald, 2012). The results of this study showed the potential value of such a pedagogy in this club sport context.

In terms of gender, the results of this study differed from those obtained by Newton et al. (1993) who in term of the achievement goal theory found that females are more task oriented and males more ego oriented. Our findings were more consistent with those found by Duda and Hom (1993); Ginn, Vincent, Semper, and Jorgensen (2000), and Petherich et al. (2002), who showed no differences between the preferred motivational climate by gender. In addition, when we consider the results for young athletes, the findings support the direct relationship between early age swimmers and a motivational climate task orientation first identified by Chaumeton and Duda (1988) and Nicholls (1989). Within the swimming specific literature, only the study of Fernández-Río et al. (2013) has been identified as incorporating achievement goal theory. Their findings that suggest a positive motivational profile is best enhanced through a task-oriented motivational climate were similar to those found in the present study.

Conclusions

The findings of this study suggest that Sport Education may serve as a viable alternative to other training formats within the area of youth sport. After examining the data, we can conclude that there were no deleterious effects on technical performance as a result of providing swimmers with more autonomy, but indeed significant improvements in the learning. Second, from an analysis of the results it could be concluded that the features of the model (in particular the assigning of roles, team responsibilities, peer coaching and data recording) serve to promote a motivational climate that encourages a commitment to learning and training intensity. Nevertheless, future investigations of longer duration and with larger sample sizes are necessary to corroborate the initial positive findings of this first intervention.

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