Sánchez, M.; García, J.A.; Carcedo, R.; Soto, D. (2022) Does the Effect of Feedback Modulate the Coach's Perception of Competition? Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 22 (88) pp. 893-916 Http://cdeporte.rediris.es/revista/revista88/artmodula1440.htm
DOI: https://doi.org/10.15366/rimcafd2022.88.011

ORIGINAL

DOES THE EFFECT OF FEEDBACK MODULATE THE COACH'S PERCEPTION OF COMPETITION?

¿MODULA EL EFECTO DEL FEEDBACK LA PERCEPCIÓN DE COMPETENCIA DEL ENTRENADOR?

Sánchez, M.[1]; García, J.A.[2]; Carcedo, R.J. [3]; Soto, D.[4]

[1] Degree in Sciences of Physical Activity and Sports and Research Group Planning and Evaluation of Training and Sports Performance, Pontifical University of Salamanca. Salamanca (Spain) msanchezga@upsa.es

[2] Faculty of Education, University of Salamanca. Salamanca (Spain) gherrero@usal.es

[3] Faculty of Psychology, University of Salamanca. Salamanca (Spain) rcarcedo@usal.es

[4] Faculty of Sciences of Physical Activity and Sports of the University of León. León (Spain) dsotg@unileon.es

Spanish-English translators: Andrea Holm, iamandreaholm@gmail.com

Código UNESCO / UNESCO Code: 5899 Otras Especialidades Pedagógicas (Educación Física y Deporte) / Other Educational Specialties (Physical Education and Sport).
Clasificación Consejo de Europa / Classification Council of Europe: 15. Psicología del Deporte / Sport Psychology.

Recibido 14 de septiembre de 2020 **Received** September 14, 2020
Aceptado 29 de diciembre de 2020 **Accepted** Dcember 29, 2020

ABSTRACT

The purpose of this study was to analyze the effect that different types of feedback had on psychological and performance variables as a function of an athlete´s perception of his/her coach´s competence. A case study was conducted with 33 soccer players randomly assigned to three experimental conditions (positive and negative feedback and no feedback). Shot speed and accuracy, competence valuation, perceived competence, autonomous motivation and subjective vitality were measured. An α-level of .05 was employed for all the analyses. Positive feedback group exhibited higher levels of competence valuation, perceived competence of the player, autonomous motivation, and well-being than the negative and neutral feedback groups only in those subjects who had a high perception of the coach's competence. This

effect was not observed in those with a low perception of coach competence. In this respect, the players' perception of coach's competence could be a factor in modulating the differences generated with regard to the type of feedback received.

KEY WORDS: psicología del deporte; entrenador; líder; tipo de feedback.

RESUMEN

El objetivo fue analizar el efecto de diferentes tipos de feedback sobre variables psicológicas y de rendimiento en función de la percepción del deportista de la competencia del entrenador. Se realizó un estudio de caso con 33 futbolistas asignados aleatoriamente a tres condiciones experimentales (feedback positivo, negativo y ausencia de feedback). Se midieron velocidad y precisión de lanzamientos a portería, valoración de competencia, competencia percibida, motivación autónoma y vitalidad subjetiva. Se empleó un nivel α de 0,05 para los análisis. El grupo feedback positivo exhibió niveles más altos de valoración de competencia, competencia percibida, motivación autónoma y bienestar, que los de feedback negativo y ausencia de feedback, en sujetos con alta percepción de competencia del entrenador. Este efecto no se observó en aquellos con baja percepción de competencia del entrenador. La percepción del jugador sobre la competencia del entrenador podría ser un factor en la modulación de las diferencias generadas en cuanto al tipo de feedback.

PALABRAS CLAVE: psicología del deporte; entrenador; líder; tipo de feedback.

1 INTRODUCTION

Juan and David are two tennis players of comparable level, who train with the objective of improving their performance. Juan perceives his coach to be competent, empathetic and approachable. David, on the other hand, has been thinking for months that his coach does not have confidence in him, lacks the skills necessary to help him improve, and is not very competent. Against this background, their coaches give the same feedback to both boys during a training session: "Turn your body when you hit and don't get so far away from the ball. Keep trying". Although the message they receive conveys the same information, the way in which it is interpreted may be considerably different. Do John and David perceive this feedback in the same way? Might the effect of the feedback condition the athlete's perception of his coach's competence?

Numerous works related to motor or sports tasks have studied the effect that feedback has on perceived competence (Amorose and Horn, 2000; Amorose and Smith, 2003; García et al., 2019; Nicaise et al., 2006), motivation (Barzouka et al., 2015; Koka and Hein, 2005; Weidinger et al., 2016) and well-being (Mouratidis et al., 2008). The intent is to establish a relationship between the type of feedback or the orientation of the feedback, and different psychological variables that may affect performance and learning. For decades studies have shown that positive feedback generates higher levels of intrinsic motivation, and

the early works of Deci (1972), were already pointing in this direction. From those early studies to the present day, research has confirmed that a training climate in which positive feedback predominates generates higher levels of autonomous motivation and perceived competence (Allen, and Howe, 1998; Deci et al., 1999; Amorose and Horn, 2000; Koka and Hein, 2005). Positive feedback is considered to be any expression from the coach in which the athletes are praised or encouraged. This feedback may be of a technical nature or aimed at supporting the athlete, but in any case, it is oriented towards encouragement (Carpentier and Mageau, 2013). In the variables of performance or motor and sports learning, no such consistent differences have been observed in terms of positive feedback as compared to other types of feedback (Gernigon and Delloye, 2003; Krenn et al., 2013). The lack of consistency regarding the effect of positive feedback on performance variables may be the result of various factors such as the subjects' past experience or the type of task employed, among others (Mouratidis et al., 2008).

Evidence in previous research is in favour of positive feedback, encouraging its use by teachers and coaches (Horn, 2008). That said, in many of the designs of these studies it has been a researcher and not the coach, who provided the athletes with feedback. This can be observed in designs with more ecological sports tasks such as serving in volleyball (Wulf et al., 2002), putting in golf (Le Foll et al., 2008; Badami et al., 2012), shooting in handball (García et al, 2019) or hitting in badminton (Tzetzis and Votsis, 2006; Tzetzis et al., 2008); as in various motor tasks in the laboratory: precision throwing with a non-dominant hand (Avila et al., 2012; Saemi et al., 2012; Wulf et al., 2014) or balancing tasks (Lewthwaite and Wulf, 2010). In these and other studies (Beedie et al., 2012; Chiviacowsky and Wulf, 2005; Mouratidis et al., 2008), information about the task was provided by the experimenter, or in the absence of such, by a computer (Chiviacowsky and Wulf, 2005; Post et al., 2016). In many of these studies, the effect of feedback being delivered by someone foreign to the athlete is examined. This circumstance, however, is not particularly relevant in real-life situations, namely in which athletes receive feedback concerning their behaviour, and in which the coach plays a significant role.

The trainer-athlete relationship is built continuously and dynamically over months, even years of training. This leads athletes to perceive their coaches as more or less competent and, similarly, to develop affections and feelings of trust or rejection. It is possible that this feedback effect is influenced by the existing relationship between the coach and the athlete, or in other words, that the athlete´s perception of the coach's feedback is a direct result of the relationship that exists between the coach and the athlete. In recent years, different studies have emphasized the value that athletes place on feedback from their coaches based on this existing relationship (Amorose and Nolan-Sellers, 2016), and how the effect of the feedback given may be influenced by the athlete's perception of competence from his or her coach. In the study by Mouratidis et al. (2010), five factors have been identified which condition the effectiveness of positive feedback. Two of these five factors are related to the athlete's perception of his coach: (1) the feedback is perceived as honest and (2) the provider of the feedback is perceived as prestigious, reliable and competent. Accordingly, different models of effective leadership in sport (Horn, 2008; Smoll and Smith,

1989) condition the effect that feedback has on athletes' perceptions of that information. It also depends on the individual characteristics of the athlete, such as gender, age or past experience (Amorose and Horn, 2000; Black and Weiss, 1992).

Training is a socially complex activity in which the coach's ability to gain, maintain and develop the confidence and respect of the athletes will narrow the scope of his intervention (Horn, 1985; Nelson et al., 2014). Among other things, one of the factors limiting performance as perceived by the athletes themselves is a weak relationship with their coach (Greenleaf et al., 2001; Poczwardowski et al., 2002; Hampson and Jowett, 2014). In this vein, according to a study by Jowett and Cockerill (2003), feelings of closeness such as trust and respect, and shared goal-oriented thinking such as common objectives, were key to successful relationships between coaches and Olympic medalists. Goal orientations are capable of accurately predicting the causes of being successful or not, both in team sports (Sánchez, Sánchez-Sánchez et al., 2020) and individual (Gómez-López et al., 2020). In youth sport, likewise, the work of Stein et al. (2012) suggests that the type and purpose of feedback is critical to understanding the motivational climate generated in the coach-sport relationship. Studies focused on the teacher-student relationship also showed similar results (Sevil-Serrano et al., 2016). In summary, it seems that empathetic behaviors displayed by the coach are associated with higher levels of athlete satisfaction (Lorimer and Jowett, 2009), and therefore it is possible that the feedback provided by the coach may be conditioned by how he/she is perceived by the athletes. Different studies (Rascle et al., 2019; Tobin and Raymundo, 2009) condition the effectiveness of feedback according to both the experience of the person giving it and whether or not he or she belongs to the group. These same studies find that expert sources are more influential than non-expert sources. In addition to these aspects, others such as the training of coaches, especially in the initiation stages, will be relevant (Pulido et al., 2016).

In light of the above, could the perception of competence that the athlete has of his or her coach modulate the effect that the feedback provided has on the player's perceived competence, autonomous motivation, well-being and task performance?

The purpose of this study was to examine whether the perception of competence that young expert soccer players had of their coaches conditioned the effect of the feedback provided on psychological and performance variables during a given task.

Based on previous studies (Mouratidis et al., 2008; Lorimer and Jowett, 2009; Rascle et al., 2019) we expect that (1) the players receiving positive feedback will present higher levels in the psychological and performance variables after the intervention compared to negative and no feedback groups; (2) the players who have a high perception of coach competence will present higher levels of psychological and performance variables after the intervention compared to players who have low perceived coach’s competence perception; (3) The perceived coach’s competence will moderate the effect of feedback on psychological and performance variables.

2 METHODS

2.1 SAMPLE

A case study was conducted that represents an experimental group, and not the entire population. Thirty-three football players participated in the study (Age: M = 17.33 years, SD = 1.05). The players followed a similar training regime including four weekly 90-minute training sessions, and a competition match every Saturday. Inclusion criteria were: being an outfield player, having played federation football for at least eight years and being free of injury during the four months prior to data collection (Sánchez-Sánchez et al., 2017). None of the participants had any experience in the prescribed task, and none of them were aware of the experiment's aim. The participants were only informed that they were going to take part in a performance task. They were then assigned a number and were randomly assigned to one of three feedback groups: positive (n = 12), negative (n = 12), and no-feedback (n = 9). The coaching staff of the participating club granted permission to conduct the research and, before the study began, the parents or guardians of the players signed the corresponding informed consent forms outlining the procedures, risks and benefits associated with participation in the study. The experimental design was conducted according to the ethical standards of the Declaration of Helsinki.

2.2 INSTRUMENTS AND TASK

To record the speed of the ball in each of the shots, a radar gun (Sports Radar SR3600) with ± 0.44 m/s was used (Hernández-Davo et al., 2014). The radar was placed behind the player, and pointed in the direction of the target located inside the goal (Figure 1).

A digital Panasonic SDR-H80 (Panasonic Corp., Osaka, Japan) camera was placed opposite the goal at a distance of 20.5 m from the goal line and at a height of 2.5 m. The center of the ball as it entered the goal was digitalized by the computer software "Kinovea©", which identified the deviation of the shots with respect to the goal. The point at which the ball entered the goal was indicated digitally, and the coordinates of the actual position (for the deviation in the X and Y axis) were calculated using the dimensions of the goal as a reference. The accuracy was measured by mean radial error (MRE) (Van Den Tillaar and Ettema, 2003). The MRE was obtained by digitizing and transforming the shots at the goal into physical coordinates.

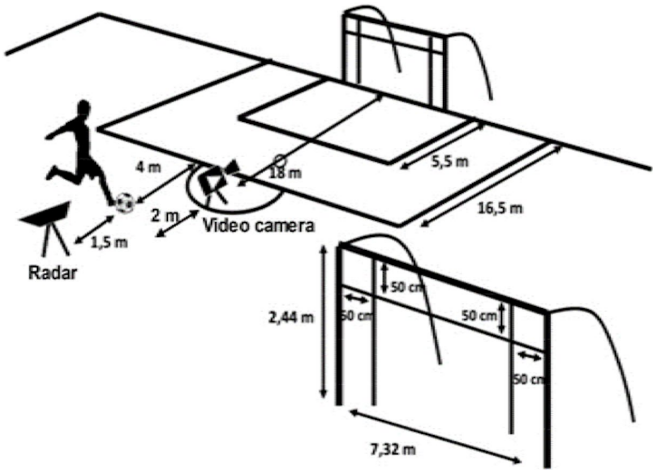

Figure 1. Experimental setup, instrument, and measurements.

2.3 PROCEDURES

On the first day, the players completed the questionnaire of perceived coach's competence. Subsequently, they received information about the task and implemented a standardized warm-up of 12 minutes before the test. To measure the maximum shooting speed, each participant took five maximum shots at the goal without any instruction regarding accuracy, and with a minute of rest between each shot. The shot with the highest speed was selected from the five attempts. On the second day, participants made 21 shots at the goal. The instruction given to the participants was: "shoot the ball with as much strength and precision as possible." The positive and negative feedback groups received feedback every 3 attempts. The group without feedback performed 21 shots without receiving any feedback. Participants in the positive and negative feedback groups received information every three shots (first feedback was received after the third shot), regardless of their actual performance. The type of feedback was positive feedback: "With shots like those you will be one of the best" or "you are deviating very little, you are doing very well" (positive feedback group), and negative feedback: "with shots like those you will be among the worst" or "you are deviating a lot, you're performing pretty badly" (group of negative comments). The coaches of the players were responsible for providing feedback. The researchers gave them instructions on how to provide this feedback. Participants were not allowed to be present when another person was taking the test. At the end of the task, all participants were informed that the feedback they received was pre-established and did not necessarily coincide with their performance. Before and after completing the task, the participants completed a questionnaire in a private room to evaluate the different psychological variables that had been analyzed in the study.

2.4 MEASURES

Type of feedback. Three types of feedback were included in this study: positive, negative and no-feedback.

Perceived coach's competence. This variable was measured using Athletes' Perceptions of Coaching Competency Scale II-High School Teams (APCCS II-HST; Myers et al. (2010). Participants completed this scale only once and before starting the task. This scale is comprised of fifteen items and exhibits high reliability (Cronbach's α = 0.87). A total score was obtained by adding up the individual scores and dividing them by the number of items answered. Possible scores ranged from 1 (= totally incompetent) to 7 (= totally competent). After, participants were split into two groups the 50th percentile: (a) low coach's competence perception group for those participants scoring below the 50th percentile and high coach's competence perception group for those scoring above.

Competence valuation. Competence valuation assesses the extent to which individuals value good performance on an upcoming task. The variable was measured with a three-item scale (Cronbach's α = 0.79 before the shooting task, and Cronbach's α = 0.83 after the shooting task; ICC = 0.80): the two items used by Elliot et al. (2000) were included as well.

Perceived competence. An adaptation of the five-items from the corresponding subscale of the Intrinsic Motivation Inventory (McAuley et al., 1989) was utilized to evaluate participants' perceptions of competence in relation to the task (Cronbach's α = 0.70 before the shooting task and Cronbach's α = 0.81 after the shooting task; ICC = 0.64).

Autonomous motivation. To measure this construct, an adaptation of the Autonomous Motivation subscale from the Spanish version of the Echelle de Motivation dans les Sports (EMS; Núñez et al., 2007 –Spanish version–) was utilized. This subscale was selected from the study of Mouratidis et al. (2008). The autonomous motivation score (Cronbach's α = 0.91 before the shooting task and Cronbach's α = 0.95 after the shooting task; ICC = 0.82) was determined by averaging intrinsic and identified motivation scores.

Subjective vitality. This variable was used in order to measure an individual's well-being. An adaptation of the six-item version the Subjective Vitality Scale (Bostic et al., 2000) was used (Cronbach's α = 0.91 before the shooting task, and α = 0.94 after the shooting task; ICC = 0.84). This variable was selected as an index of well-being. Vitality assessed the extent to which participants felt energetic and active in relation to the task of shooting.

For all scales and subscales, participants were asked to report their level of agreement or disagreement with each of the three items on a 7-point Likert scale ranging from 1 (= strongly disagree) to 7 (= strongly agree). A total score was obtained by adding up the individual scores and dividing them by the number of items answered. Possible scores ranged from 1 (= low competence valuation, perceived competence, autonomous motivation, and/or subjective well-being) to 7 (= high).

Subjective well-being. This variable was measured across two dimensions: positive and negative affectivity. Both dimensions were assessed using the

Spanish version of the Positive and Negative Affectivity Scale (PANAS; Sandín et al., 1999 -original version: Watson et al., 1988-). This scale consisted of 20 items that describe feelings and emotions, of which 10 describe positive affectivity (e.g., enthusiasm) and another 10 items measure negative affectivity (e.g., irritable). A total score was obtained by adding up the individual scores and dividing them by the number of items answered. Possible scores ranged from 1 (= none) to 5 (= a lot). Good levels of reliability were obtained both in positive affect (Cronbach's α = 0.90 before the shooting task, and α = 0.93 after the shooting task; ICC = 0.80) and negative affect (Cronbach's α = 0.89 before the shooting task, and α = 0.86 after the shooting task; ICC = 0.81).

Shooting speed. This variable was recorded in km/h for all 21 shots. To calculate this percentage, the absolute value of the velocity t in km/h of each participant's shot was divided by their maximum shooting speed and then multiplying the result by 100.

To measure individual maximum shooting speed, each participant performed five standing maximal shots at the goal without any instructions as to accuracy, and with one minute of rest between each shot. The shot with the highest speed was chosen out of the five attempts.

Finally, performance percentage in relation to maximum shooting speed was used to measure this variable. The 21 shots were divided in three sets: 1-3 (no feedback for any group), 4-12 (positive and negative feedback groups started receiving feedback), and 13-21 (positive and negative feedback groups kept receiving feedback). A total score for each set was obtained by adding up the individual performance percentages in relation to maximum shooting speed of each shot and dividing them by the number of shots.

Shooting accuracy. The MRE was used to measure shooting accuracy. The MRE was determined by measuring the average absolute distance from the center of the target of the 21 shots. Again, the 21 shots were divided in three sets (1-3, 4-12, and 13-21) and a total score for each set was obtained by adding up the individual shooting accuracy scores of each shot and dividing them by the number of shots.

2.5 STATISTIC ANALYSIS

An α-level of .05 was employed for all the analyses. Parametric repeated measures MANOVA and ANOVA assumptions were tested. Based on Royston's H test, the hypothesis that the data come from a multivariate normal distribution can be rejected at the 5% significance level for psychological ($H = 27.28$, $p = 0.003$), and performance variables ($H. = 14.79$, $p = 0.013$). Shapiro-Wilks tests rejected at the 5% significance level that the data came from a univariate normal for good a number of the psychological and performance variables: competence ($W = 0.90$, $p = 0.004$) and negative affect ($W = 0.87$, $p < 0.001$) before receiving feedback, autonomous motivation ($W = 0.93$, $p = 0.042$) and negative affect ($W = 0.92$, $p = 0.026$) after the intervention, and shooting accuracy at shots 1-4 ($W = 0.93$, $p = 0.048$) and 13-21 ($W = 0.90$, $p = 0.004$).

Mauchly's tests found sphericity violations in performance variables such as shooting speed and shooting accuracy together (W = 0.71, p = 0.011), and also separately for shooting speed (W = 0.73, p = 0.018) and shooting accuracy (W = 0.70, p = 0.009). This test was not possible performed for psychological variables (only two time points of measurement). In addition, Levene's test of equality of error variances resulted significant for different psychological (vitality after receiving feedback –F(5, 27) = 2.70, p = 0.042– and positive affect before receiving feedback –F(5, 27) = 2.63, p = 0.046–) and performance variables (shooting accuracy at 4-12 shoots –F(5, 27) = 3.54, p = 0.014–).

Violations of multivariate normality sphericity, and homogeneity of error variances assumptions, the small sample size, and the use of ordinal Likert-type scales data required a semi-parametric and/or a non-parametric approach (Friedrich et al., 2018; Gibbons, 1993; Konietschke et al., 2015; Noguchi et al., 2012).

Currently, there is a lack of adequate alternatives to parametric tests in the context of factorial designs when multivariate normality or equal covariance matrices across groups may not be assumed, or these tests do not allow to analyze interaction effects across within-subjects and between-subjects variables. (Bathke et al., 2018). The parametric tests are not reliable or even false if these assumptions are not met or impossible to verify (Noguchi et al., 2012). However, in the context of repeated measures analyses, a semi-parametric alternative for MANOVA (Friedrich et al., 2018) and ANOVA analyses (Noguchi et al., 2012) have been developed recently. Subsequent simulation studies have found a better performance of these tests than MANOVA and ANOVA analyses when their assumptions are not met. For example, the traditional MANOVA has been found to fail in meeting the Type I error rate in small samples. Whereas Wilks' Lambda yielded simulated levels above 20% in several situations, these new procedures achieved simulated levels of below 7% at nominal 5%-level. In addition, these analyses have also found a good performance regarding Type II error rate (Bathke et al., 2018).

The 'MANOVA.RM' package (Friedrich, Konietschke and Pauly, 2019) is included in 'R 4.0.1' program. The RM function calculates the Wald-type statistic (WTS) and ANOVA-type statistic (ATS) in a repeated measures design with an arbitrary number of crossed whole-plot (between subjects) and sub-plot (within subjects) factors. A resampling method based on wild bootstrap using Rademacher weights were used in this study in order to improve the small sample behavior of the test statistics. Thus, two semi-parametric repeated measures MANOVA were performed to test the effect of feedback and perceived coach's competence on all the psychological and performance variables at a multivariate level.

Follow-up nonparametric repeated measures ANOVA were performed to study the effect of feedback and perceived coach's competence separately for each psychological and performance variable using an f1-ld-f1 function in the software package 'nparLD' (Noguchi et al., 2012) included in 'R 4.0.1' program. In the case of significant interaction effect, post hoc Tukey contrast effects of psychological variables and performance between the three types of feedback

for each time of measure were calculated using the function nparcomp of the R package 'nparcomp' (Konietschke et al., 2019). Post hoc pairwise comparisons between the different times of measure for each type of feedback group was tested using a nonparametric studentized permutation analysis with 10000 repetitions (function npar.t.test.paired of the R package 'nparcomp') and a Bonferroni correction for multiple comparisons (the observed p-values for each comparison were multiplied by the number of comparisons). At last, Cliff's Delta was used to measure the nonparametric effect size of pairwise comparisons using the R package 'effsize' (Torchiano, 2019).

3 RESULTS

Descriptive information regarding the variables of this study can be seen in Table 1.

Table 1. Median, quartiles 1 and 3, rank means, and sample size of psychological and performance variables for coach's competence, type of feedback, and time of measure.

Psychological Variables	Perceived C´s C	Feedback	Time of measure	Median	Q1-Q3	Rank Mean
Competence Valuarion	Low	F0	Before	4.25	4.25-4.50	27.50
			After	5.00	4.50-6.00	38.30
		F-	Before	4.50	3.87-5.25	28.14
			After	4.25	3.62-5.12	26.00
		F+	Before	4.62	4.50-5.50	35.50
			After	4.87	4.56-5.56	35.67
	High	F0	Before	4.50	4.25-4.87	30.12
			After	3.87	3.31-4.12	13.50
		F-	Before	4.50	4.50-5-00	32.70
			After	4.25	4.00-4.75	24.00
		F+	Before	5.75	5.06-6.25	45.92
			After	6.25	6.06-6.62	57.08
Perceived Competence	Low	F0	Before	3.80	3.40-4.40	28.20
			After	3.40	3.20-4.40	25.50
		F-	Before	4.60	4.20-4.60	41.86
			After	4.00	3.20-4.50	27.79
		F+	Before	4.30	3.90-4.55	32.50
			After	4.20	3.65-4.75	34.83
	High	F0	Before	4.40	4.05-4.65	38.12
			After	3.40	3.15-3.75	17.62
		F-	Before	3.60	3.60-3.60	21.40
			After	3.40	2.40-3.40	13.40
		F+	Before	5.20	4.10-6.15	48.75
			After	5.90	5.20-6.15	60.50
Autonomous Motivation	Low	F0	Before	4.50	3.92-4.83	27.30
			After	4.92	4.25-5.00	29.90
		F-	Before	4.42	4.29-4.62	27.36
			After	4.33	3.62-4.67	21.00
		F+	Before	4.87	4.48-5.15	33.33
			After	4.96	4.85-5-19	37.00
	High	F0	Before	4.46	4.27-4.54	22.25
			After	3.59	3.02-4.08	12.75
		F-	Before	4.92	3.92-5.17	32.70
			After	4.67	4.58-4.75	32.90
		F+	Before	5.83	5.33-6.08	55.42

			After	6.08	6.02-6.09	60.67
Subjective Vitality	Low	F0	Before	3.80	3.67-3.83	22.30
			After	4.67	3.83-4.83	32.00
		F-	Before	4.17	3.92-5.25	33.43
			After	4.17	2.83-5.25	28.93
		F+	Before	4.42	4.21-4.75	32.33
			After	4.42	3.87-5.08	31.58
	High	F0	Before	3.87	3.23-4.62	25.62
			After	3.33	2.50-4.25	17.50
		F-	Before	4.33	4.17-4.50	32.80
			After	3.67	2.83-4.00	17.60
		F+	Before	6.17	5.71-6.75	57.33
			After	6.08	5.87-6.42	58.50

Psychological Variables	Perceived C´s C	Feedback	Time of measure	Median	Q1-Q3	Rank Mean
Positive Affect	Low	F0	Before	3.40	3.20-4.30	40.30
			After	3.70	3.70-3.90	39.60
		F-	Before	2.90	2.84-3.80	27.86
			After	3.20	2.55-3.85	27.36
		F+	Before	3.70	3.02-3.70	31.83
			After	3.25	3.20-3.60	31.92
	High	F0	Before	2.75	2.47-3.02	15.62
			After	2.70	2.40-2.82	11.37
		F-	Before	3.60	3.20-3.80	37.40
			After	3.00	2.40-3.10	18.00
		F+	Before	4.05	3.92-4.32	51.83
			After	4.45	4.17-4.57	57.75
Negative Affect	Low	F0	Before	1.20	1.10-2.10	26.80
			After	1.10	1.10-2.00	22.90
		F-	Before	1.80	1.75-3.80	39.86
			After	2.00	1.70-2.25	42.07
		F+	Before	1.55	1.32-2.00	34.67
			After	1.45	1.40-1.72	33.33
	High	F0	Before	1.10	1.07-1.12	11.12
			After	1.20	1.15-1.27	18.25
		F-	Before	2.80	2.20-3.00	57.40
			After	2.50	2.40-2.60	57.20
		F+	Before	1.25	1.12-1.37	24.08
			After	1.40	1.15-1.65	24.33

Performance Variables	Perceived C´s C	Feedback	Set of shots	Median	Q1-Q3	Rank Mean
Throwing Speed	Low	F0	1-3	77.14	76.92-77.78	37.60
			4-12	75.56	73.86-78.85	38.20
			13-21	74.60	72.80-80.66	38.80
		F-	1-3	79.75	76.39-80.86	53.64
			4-12	81.72	78.63-84.54	66.21
			13-21	81.62	77.62-81.80	58.00
		F+	1-3	77.35	72.89-83.15	47.67
			4-12	76.90	75.59-81.80	48.83
			13-21	79.42	76.42-82.65	52.83
	High	F0	1-3	74.04	72.25-76.93	32.75
			4-12	76.02	72.56-78.83	33.75
			13-21	72.82	70.80-76.49	30.25
		F-	1-3	76.57	75.00-76.97	36.60
			4-12	75.76	74.59-81.73	42.00
			13-21	78.22	75.66-80.98	44.50

		F+	1-3	80.52	78.90-82.39	62.00
			4-12	81.20	79.96-82.83	68.42
			13-21	78.72	75.66-80.98	75.17
Throwing Accuracy	Low	F0	1-3	194.10	182.30-206.80	59.40
			4-12	155.70	152.30-186.90	46.80
			13-21	221.90	181.20-214.40	67.20
		F-	1-3	146.60	128.60-212.60	43.14
			4-12	156.00	141.00-163.20	38.43
			13-21	160.40	142.30-175.20	44.43
		F+	1-3	186.48	122.93-238.41	51.67
			4-12	186.70	165.50-194.60	58.50
			13-21	187.30	148.00-204.80	50.17
	High	F0	1-3	207.20	170.00-237.10	62.25
			4-12	178.10	147.40-210.90	53.00
			13-21	155.60	153.10-171.70	49.50
		F-	1-3	186.92	123.00-247.67	51.60
			4-12	159.20	124.10-248.40	50.00
			13-21	167.30	151.10-216.60	54.40
		F+	1-3	143.10	118.40-250.80	44.33
			4-12	177.60	140.90-192.50	46.50
			13-21	167.30	151.10-216.60	42.50

Note: C's C = Coach's Competence; F0 = No Feedback; F- = Negative Feedback; F+ = Positive Feedback; Q = Quartile; n = Sample Size.

Two semi-parametric repeated measures MANOVA, one for psychological variables and one for performance variables, were conducted. Regarding psychological scores two sub-plot factors (psychological variables and before-after the shooting task), and two whole-plot factors (feedback and perceived coach's competence) were entered in the analysis. Repeated measures MANOVA yielded a multivariate effect in both tests (WTS and ATS) for feedback (WTS: $p = 0.028$; ATS; $p = 0.023$) and psychological variables (WTS: $p < 0.001$; ATS; $p < 0.001$), and the feedback*coach's competence interaction (WTS: $p = 0.032$; ATS; $p = 0.029$).

Considering performance scores, again, two sub-plot factors (performance variables and set of shots), and two whole-plot factors (feedback and perceived coach's competence) were entered in the analysis. No significant effects were found in the case of performance variables.

Six follow-up nonparametric repeated measures ANOVA with one sub-plot factor containing three levels for performance variables (1-3 shots –baseline–, 4-12 shots, and 13-21 shots) and two levels for psychological variables (before and after the shooting task), and two whole-plot factors with three levels for feedback (positive, negative, and lack of feedback) and two levels for perception of coach's competence (low and high) were performed as a means to study the impact of these factors on competence valuation, perceived competence, autonomous motivation, subjective vitality, positive and negative effect (psychological variables), shooting speed, and shooting accuracy (performance variables).

First, the effects of feedback, coach's competence, and their impact on psychological variables were analyzed. Feedback main effects were determined

for all the psychological variables (see Table 2). The positive feedback group showed higher levels than the other feedback groups in all psychological variables, with the exception of the negative effect, which presented lower levels than the negative feedback group alone. Also, the negative feedback group showed higher levels of negative affect than the no-feedback group. No significant time of measure or perception of the coach's competence main effects was observed.

Table 2. Non-parametric repeated measures ANOVA-type models of psychological and performance variables for each type of feedback, coach's competence, time of measure and their interaction.

Psychological Variables	Competence Value	Competence	Autonomous motivation	Vitality	Positive Affect	Negative Affect	Shooting Speed	Shooting Accuracy
	F (df^a)	F (df^a)	F (df^a)	F (df^a)	F (df^a)	F (df^a)	F (df^a)	F (df^a)
Feedback	3.89*	8.04***	9.27***	7.43***	5.96**	13.18***	2.33	0.43
	(1.92)	(1.93)	(1.98)	(1.93)	(1.98)	(1.98)	(2.00)	(1.88)
Coach's Competence	0.14	0.15	2.11	1.07	0.06	0.11	0.04	0.01
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)
Time	0.13	2.28	0.08	1.16	1.63	0.03	1.25	0.17
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.66)	(1.60)
Feedback*Coach's Competence	2.08	7.41***	4.43*	5.21**	10.43***	3.38*	1.42	0.42
	(1.92)	(1.93)	(1.98)	(1.93)	(1.98)	(1.86)	(2.00)	(1.88)
Feedback*Time	1.91	3.25*	1.13	1.58	2.33	0.11	0.58	0.41
	(1.93)	(1.97)	(1.68)	(1.78)	(1.93)	(1.88)	(3.23)	(2.99)
Coach's Competence*Time	2.48	0.02	0.07	2.61	1.27	0.96	0.12	0.23
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.66)	(1.60)
Feedback*Coach's Competence*Time	5.22**	1.55	1.33	1.11	2.15	0.76	0.30	0.33
	(1.93)	(1.97)	(1.68)	(1.78)	(1.93)	(1.88)	(3.23)	(2.99)

Note: [a] The denominator of all df values is ∞; e.g. 1.96, ∞ α-level is set at 0.05; *p < 0.05, **p > 0.01, ***p > 0.001

Only one second-order interaction was significant regarding psychological variables: feedback*perception of coach's competence*time of measure for competence valuation (see Table 2). Post-hoc tests revealed that the positive feedback group with a high perception of the coach's competence showed higher levels of competence appraisal than the negative group and likewise with the group with no feedback where the level of perception of the coach's competence was also high after having received feedback. No feedback differences were found in competence valuation for those who perceived their coach's competence as low. Before receiving feedback, no differences in competence valuation were observed regarding feedback and/or coach's competence (see Figure 2).

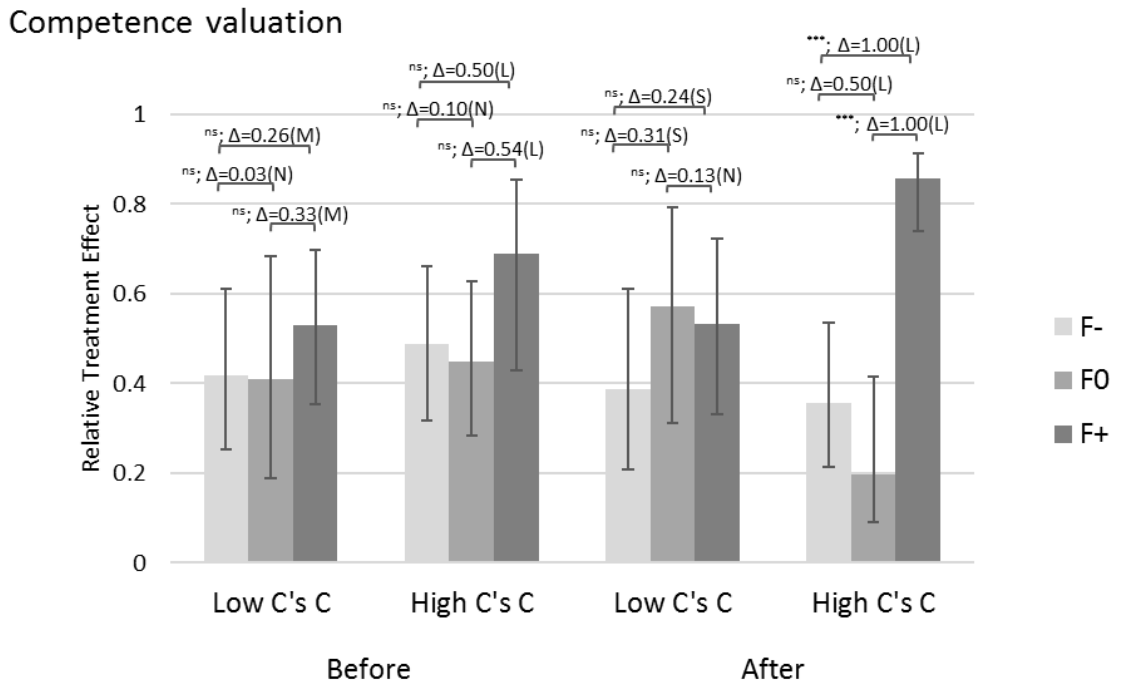

Figura 2. Significant feedback*perception of coach's competence*time of measure interaction: relative treatment effects with 95% confidence intervals, post-hoc comparisons significance and Cliff's Delta effect size.

Note: C's C = Coach's Competence; F- = Negative Feedback; F0 = No Feedback; F+ = Positive Feedback; Δ = Cliff's Delta effect size; N = Negligible; S = Small; M = Medium; L = Large; ns = not significant; *, **, *** denotes significant differences between groups ($p < 0.05$, $p < 0.01$, and $p < 0.001$ respectively)

The most consistent result of this study was the significant interaction of feedback*coach's competence for players' perception of competence, autonomous motivation, subjective vitality, and positive and negative affect (see Table 2). Post hoc tests indicated differences among the three feedback groups for those with a high perception of the coach's competence. In this regard, the positive feedback group showed higher levels of perceived competence, autonomous motivation, subjective vitality, and positive affect than those who were assigned to the negative feedback group. The positive feedback group also showed lower levels of negative affect than the negative group, while no differences were found with respect to the no-feedback group. Likewise, the negative feedback group showed lower levels of autonomous motivation and higher levels of negative affect than the no-feedback group. No differences between these two groups were observed regarding perceived competence, subjective vitality, and positive affect. By contrast, no differences among the three feedback groups for those with a low perception of the coach's competence were observed in any variable.

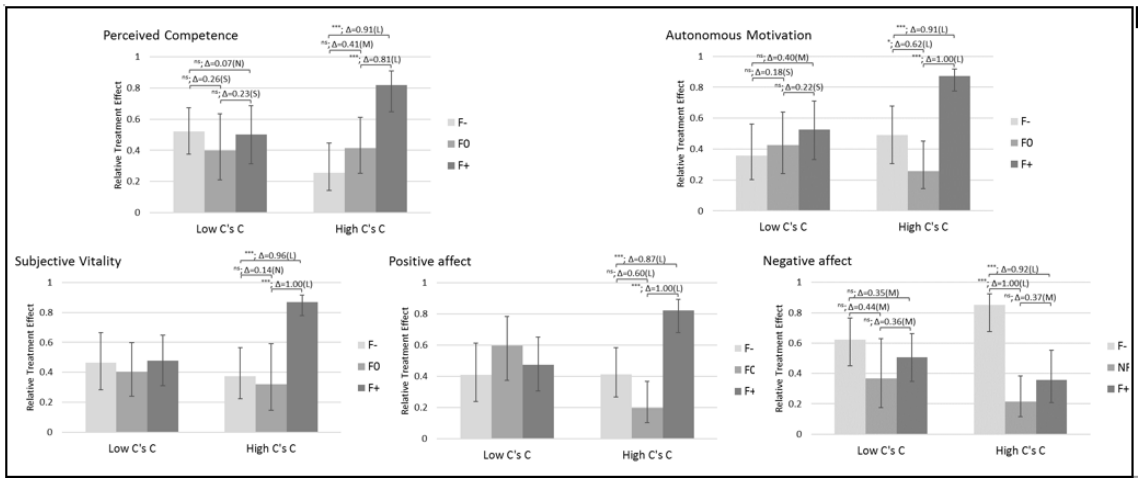

Figura 3. Significant feedback*perception of coach's competence interactions: relative treatment effects with 95% confidence intervals, post-hoc comparisons significance and Cliff's Delta effect size.

Note: C's C = Coach's Competence; F- = Negative Feedback; F0 = No Feedback; F+ = Positive Feedback; Δ = Cliff's Delta effect size; N = Negligible; S = Small; M = Medium; L = Large; ns = not significant; *, **, *** denotes significant differences between groups ($p < 0.05$, $p < 0.01$, and $p < 0.001$ respectively).

A significant interaction of time* feedback was found for perceived competence. Higher levels of perceived competence were observed among those who received positive feedback in comparison with those who received negative feedback ($p < 0.01$; Δ = 0.68 –large effect–) or did not receive any ($p < 0.01$; Δ = 0.69 –large effect–).

Lastly, although no significant results were found in the MANOVA considering performance variables and there is no need to use follow-up analyses, we also conducted two follow-up nonparametric repeated measures ANOVA in order to test if this result was consistent when shooting speed and accuracy were analyzed separately. These two ANOVA included one sub-plot factor containing three levels for performance variables (1-3 shots –baseline–, 4-12 shots, and 13-21 shots), and two whole-plot factors with three levels for feedback (positive, negative, and lack of feedback) and two levels for perception of coach's competence (low and high). Again, no significant main or interaction effects were found for any of the performance variables.

4 DISCUSSION

The purpose of this study was to analyze the effect of different types of feedback on psychological and performance variables as a function of the athletes' perception of their coaches' competence. With respect to the psychological variables, the most consistent result indicates that, when both times of measure were taken together, when the athletes perceived their coaches as competent, the positive feedback group showed higher values of autonomous motivation, perception of competence and well-being (greater vitality and positive affect and reduced negative affect), than the negative and neutral feedback groups. These results coincide with other studies in which positive feedback presented higher levels in psychological variables similar to

those studied here (Ávila et al., 2012; García et al., 2019; Nicaise et al., 2006; Weidinger et al., 2016).

Differences were similarly detected between the neutral and negative feedback groups which had a high perception of their coach's competence regarding autonomous motivation and negative affect. In this sense, the neutral feedback group showed higher levels of autonomous motivation and lower levels of negative affect. In this respect, these results reinforce the idea exposed by other studies (Le Foll et al., 2008; Mouratidis et al., 2008), where the orientation of feedback can generate differences between athletes at both emotional and motivational levels. As in other research (Brewer et al., 1991), adverse results in the negative feedback group can also be observed here.

In these studies, however, the person responsible for providing feedback to the students or athletes was not their coach or teacher, but rather a researcher outside the teaching or training process and unknown to the participants. In our design we decided to incorporate the coach as the person responsible for providing feedback, understanding that he or she is a relevant figure in the learning process (Amorose and Nolan-Sellers, 2016).

When players perceived their coaches as lacking in competence, none of the three types of feedback, (positive, negative or no feedback), had any effect on the psychological variables studied (perception of competence, autonomous motivation and well-being). In this sense, as already suggested by Mouratidis et al. (2010), it is possible that the perception of competence that athletes have about their coaches modulates the effect of feedback. As with other studies that analyze the effect of feedback according to the source of the feedback (Rascle et al., 2019), it seems that its effect may be increased or mitigated by other variables, in our case, the players' perception of their coaches' competence. Our results are consistent with those presented by Amorose and Nolan-Sellers (2016), in which the importance that adult softball players attributed to their coaches conditioned the athletes' perception of competition. Thus, when coaches were perceived as being of little importance, the comments they provided had less effect on the athletes' perception of competence. Here, the results found do not show a favorable effect of positive feedback when the coach was perceived as lacking in competence (a question that does arise when the coach is perceived as competent). It is possible that this variable (coach's or educator's perception of competence) explains some results obtained in other studies, where positive feedback had little effect on the students' perception of competence (Drost and Todorovich, 2017).

It should be acknowledged, however, that the differences found between these groups after analysing the trainer's feedback*competence interaction do not show any variation between before and after the intervention, though this effect does appear with respect to the competence valuation. In this case, only the positive feedback group with a high perception of the trainer's competence showed higher levels of competence valuation than the other post-intervention feedback groups when no differences existed before the intervention. This effect was not found among those participants who had a low perception of the trainer's competence.

To finish with the psychological variables, it is important to point out that the player's perception of competence was indeed affected by the impact of the feedback received without the coach's perception of competence playing a role. In this sense, the positive feedback group presented higher levels of the player's perceived competence than the other two feedback groups after the intervention, while no differences existed before the intervention. This result is consistent with multiple previous studies that have found a favourable effect of positive feedback on the player's own perception of competence (e.g., García et al., 2019).

For the performance variables (speed and accuracy), no significant differences were found in any of the conditions studied. Our results are consistent with other studies in which the type of feedback provided to learners did not generate changes in the learning or performance variables (Gernigon and Delloye, 2003; Mouratidis et al., 2008; Krenn et al., 2013). For Mouratidis et al. (2008), the change in psychological variables would not necessarily imply an immediate increase in performance, hence this improvement could be observed in the longer term.

5 CONCLUSIONS

Based on the hypotheses set, it can state that (1) the first hypothesis is confirmed for player’s perceived competence; (2) the second hypothesis is not confirmed; (3) the third hypothesis is confirmed for competence valuation, although a significant interaction between feedback and competition is also observed independently of the measurement point (before and after receiving feedback). In this sense, those participants with a high perception of coach’s competence presented differences in the psychological variables due to the type of feedback received. Within this group, those who received positive feedback showed higher scores in perceived competence, autonomous motivation, vitality, and positive affect, whereas those who received negative feedback presented higher scores in negative affect. By contrary, participants with a low perception of coach’s competence did not present any significant difference in any variable due to the type of feedback received.

The positive feedback group presents higher levels of competence valuation, perceived players' competence, autonomous motivation, and well-being than the negative and neutral feedback groups only in those who have a high perception of the coach's competence. This effect was not observed in those with a low perception of the coach's competence. In this sense, the perception of competence of the coach could modulate the differences generated by the type of feedback received.

Based on these findings, we advise coaches to provide positive feedback to their athletes. We also encourage educators and coaches to consider the variables that affect their competence as relevant, given that the way in which they are perceived by their athletes will have a direct effect on the reception of feedback provided.

As with all studies, this one also presents limitations. Firstly, the sample size is limited. A larger number of participants would have facilitated greater statistical power and more diverse analyses. Secondly, the division between having a high or low perception of the coach´s competence was established at the 50th percentile, which implies that subjects close to the median can be categorized into different groups without a large difference in the score between them. This aspect is related to the sample size previously indicated.

With regard to future lines of research, we propose a design that modifies or manipulates the subjects' perception of the competence of the person in charge of applying the three types of feedback (positive, negative and no-feedback). Similarly, it would be advisable to create designs in which the effect of the feedback provided by the coach could be conditioned by the degree of previous experience on the part of the subjects. Finally, we believe it is necessary to continue exploring the effect that feedback has on the design, in which the coach of the athletes is responsible for providing the feedback.

6 REFERENCES

Allen, J.B. y Howe, B.L. (1998). Player ability, coach feedback, and female adolescent athletes' perceived competence and satisfaction. *Journal of Sport and Exercise Psychology 20*(3): 280-299. https://doi.org/10.1123/jsep.20.3.280

Amorose A.J. y Nolan-Sellers W. (2016). Testing the moderating effect of the perceived importance of the coach on the relationship between perceived coaching feedback and athletes' perceptions of competence. *International Journal of Sports Science & Coaching 11*(6): 789-798. https://doi.org/10.1177/1747954116676105.

Amorose, A.J. y Horn, T.S. (2000). Intrinsic motivation: Relationships with collegiate athletes' gender, scholarship status, and perceptions of their coaches' behavior. *Journal of Sport and Exercise Psychology 22*(1): 63-84. https://doi.org/10.1123/jsep.22.1.63

Amorose, A. y Smith, P. (2003). Feedback as a source of physical competence information: Effects of age, experience and type of feedback. *Journal of Sport & Exercise Psychology 25*(3): 341-359. https://doi.org/10.1123/jsep.25.3.341.

Ávila, L., Chiviacowsky, S., Wulf, G., et al. (2012). Positive social-comparative feedback enhances motor learning in children. *Psychology of Sport and Exercise 13*(6): 849-853. https://doi.org/10.1016/j.psychsport.2012.07.001

Badami, R., VaezMousavi, M., Namazizadeh, M., et al. (2012). Feedback after good versus poor trials: Differential effects on selfconfidence and activation. *Research Quarterly for Exercise and Sport 83*(2): 196-203. https://doi.org/10.1080/02701367.2012.10599850

Bathke, A.C., Friedrich, S., Pauly, M. et al. (2018). Testing mean differences among groups: multivariate and repeated measures analysis with minimal assumptions. *Multivariate Behavioral Research 53*(3): 348–359. https://doi.org/10.1080/00273171.2018.1446320

Barzouka, K., Sotiropoulos, K., y Kioumourtzoglou, E. (2015). The effect of feedback through an expert model observation on performance and learning the pass skill in volleyball and motivation. *Journal of Physical Education and Sport 15*(3): 407-416. DOI: 10.7752 / jpes.2015.03061.

Beedie, C.J., Lane, A.M. y Wilson, M.G. (2012). A Possible Role for Emotion and Emotion Regulation in Physiological Responses to False Performance Feedback in 10 Mile Laboratory Cycling. *Applied Psychophysiology and Biofeedback 37*(4): 269-277. https://doi.org/10.1007/s10484-012-9200-7

Black S.J. y Weiss M.R. (1992). The relationship among perceived coaching behaviors, perceptions of ability, and motivation in competitive age-group swimmers. *Journal of Sport and Exercise Psychology 14*(3): 309–325. https://doi.org/10.1123/jsep.14.3.309

Bostic, T.J., Rubio, D.M. y Hood, M. (2000). A validation of the subjective vitality scale using structural equation modeling. *Social Indicators Research 52*(3): 313-324. https://doi.org/10.1023/A:1007136110218

Brewer, B.W., Van Raalte, J.L., Linder, D.E. et al. (1991). Peak performance and the perils of retrospective introspection. *Journal of Sport & Exercise Psychology 13*(3): 227–238. https://doi.org/10.1123/jsep.13.3.227.

Carpentier, J. y Mageau, G.A. (2013). When Change-Oriented Feedback Enhances Motivation, Well-Being and Performance: A Look at Autonomy-Supportive Feedback in Sport. *Psychology of Sport and Exercise 14*(3): 423-435. https://doi.org/10.1016/j.psychsport.2013.01.003

Chiviacowsky, S (2014). Self-controlled practice: Autonomy protects perceptions of competence and enhances motor learning. *Psychology of Sport and Exercise 15*, 505–510. https://doi.org/10.1016/j.psychsport.2014.05.003

Chiviacowsky, S. y Wulf, G. (2005). Self-controlled feedback is effective if it is based on the learner's performance. *Research Quarterly for Exercise and Sport 76*(1): 42–48. https://doi.org/10.1080/02701367.2005.10599260

Deci, E.L. (1972). Intrinsic motivation, extrinsic reinforcement, and inequity. *Journal of Personality and Social Psychology 22*(1): 113–120. https://doi.org/10.1037/h0032355

Deci, E.L., Koestner, R. y Ryan, R.M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin 125*(6):627–668. https://doi.org/10.1037/0033-2909.125.6.627

Drost, D.K. y Todorovich, J.R. (2017). Perceived competence and skill development in physical education: the effect of teacher feedback. *Journal of Sports Sciences 5,* 291–304. https://doi.org/10.17265/2332-7839/2017.06.001

Elliot, A.J., Faler, J., McGregor, H.A., et al. (2000). Competence valuation as a strategic intrinsic motivation process. *Personality and Social Psychology Bulletin 26*(7): 780-794. https://doi.org/10.1177/0146167200269004

Friedrich, S., Konietschke, F. y Pauly, M. (2019). Package MANORA.RM. Resampling-Based Analysis of Multivariate Data and Repeated. Retrieved from https://cran.r-project.org/web/packages/MANOVA.RM/MANOVA.RM.pdf.

García, J.A. Carcedo, R.J. y Castaño, J.L. (2019). The influence of feedback on competence, motivation, vitality, and performance in a throwing task. *Research Quarterly for Exercise and Sport 90*(2): 172-179. https://doi.org/10.1080/02701367.2019.1571677

García, J.A., Sánchez-Sánchez, J., Luis-Pereira, J.M. et al. (2016). The effects of induced variability in the performance on shot in soccer. International *Journal of Sports Science & Coaching 11*(5): 648-654. https://doi.org/10.1177/1747954116667101

Gómez-López, M.; Manzano-Sánchez, D.; Merino-Barrero, J.A. y Valero-Valenzuela, A. (2020) Causes of Success in Handball through the Beliefs about Ability. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte*, *20* (77): 103-118 https://doi.org/10.15366/rimcafd2020.77.007

Greenleaf, C., Gould, D. y Dieffenbach, K. (2001). Factors influencing Olympic performance: interviews with Atlanta and Nagano US Olympians. *Journal of Applied Sport Psychology 13*(2): 154-184. https://doi.org/10.1080/104132001753149874

Gernigon, C. y Delloye, J.B. (2003). Self-efficacy, causal attribution, and track athletic performance following unexpected success or failure among elite sprinters. *The Sport Psychologist 17*: 55–76. https://doi.org/10.1123/tsp.17.1.55

Hampson, R. y Jowett, S. (2014). Effects of coach leadership and coach–athlete relationship on collective efficacy. *Scandinavian Journal of Medicine & Science in Sports 24*: 454-460. https://doi.org/10.1111/j.1600-0838.2012.01527.x

Hernández-Davo, H., Urbán, T., Sarabia, J.M. et al. (2014). Variable training: effects on velocity and accuracy in the tennis serve. *Journal of Sports Sciences 32*(14): 1383-1388. https://doi.org/10.1080/02640414.2014.891290.

Horn, T.S. (1985). Coaches' feedback and changes in children's perceptions of their physical competence. *Journal of Educational Psychology 77*(2): 174-186. https://doi.org/10.1037/0022-0663.77.2.174

Horn T.S. (2008). Coaching effectiveness in the sport domain. In: Horn TS (ed.) Advances in sport psychology. Champaign, IL: Human Kinetics, 240–267.

Jowett, S. and Cockerill, I.M. (2003). Olympic medallists' perspective of the athlete-coach relationship. *Psychology of Sport and Exercise 4*(4): 313-331. https://doi.org/10.1016/S1469-0292(02)00011-0

Koka, A. y Hein, V. (2005). The effect of perceived teacher feedback on intrinsic motivation in physical education. *International Journal of Sport Psychology 36*(2): 91-106. ISSN: 0047-0767(Print).

Konietschke, F., Bathke, A.C., Harrar, S.W. et al. (2015). Parametric and nonparametric bootstrap methods for general manova. *Journal of Multivariate Analysis 140*: 291–291. https://doi.org/10.1016/j.jmva.2015.05.001

Konietschke, F., Noguchi, K. y Rubarth, K. (2019). Package 'nparcomp': Multiple Comparisons and Simultaneous Confidence Intervals. R package version 3.0 Retrieved from https://cran.r-roject.org/web/packages/nparcomp/nparcomp.pdf.

Krenn, B., Würth, S. y Hergovich, A. (2013). The Impact of Feedback on Goal Setting and Task Performance. Testing the Feedback Intervention Theory. *Swiss Journal of Psychology 72*(2): 79–89. https://doi.org/10.1024/1421-0185/a000101

Le Foll, D., Rascle, O. y Higgins, N.C. (2008). Attributional feedback-induced changes in functional and dysfunctional attributions, expectations of success, hopefulness, and short-term persistence in a novel sport. *Psychology of Sport and Exercise 9*(2): 77-101. https://doi.org/10.1016/j.psychsport.2007.01.004

Lewthwaite, R. y Wulf, G. (2010). Social-comparative feedback affects motor skill learning. *Quarterly Journal of Experimental Psychology 63*(4): 738–749. https://doi.org/10.1080/17470210903111839

Lorimer, R. y Jowett, S. (2009). Empathic accuracy, meta-perspective, and satisfaction in the coach-athlete relationship. *Journal of Applied Sport Psychology 21*(2): 201–212. https://doi.org/10.1080/10413200902777289

McAuley, E., Duncan, T. y Tammen, V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: a confirmatory factor analysis. *Research Quarterly for Exercise & Sport 60*(1): 48-58. https://doi.org/10.1080/02701367.1989.10607413

Mouratidis, A., Lens, W. y Vansteenkiste, M. (2010). How you provide corrective feedback makes a difference: The motivating role of communicating in an

autonomy-supporting way. *Journal of Sport and Exercise Psychology 32*(5): 619-637. https://doi.org/10.1123/jsep.32.5.619

Mouratidis, A., Vansteenkiste, M., Lens, W. et al. (2008). The motivating role of positive feedback in sport and physical education: evidence for a motivational model. *Journal of Sport and Exercise Psychology 30*(3): 240-268. https://doi.org/10.1123/jsep.30.2.240

Myers, N.D., Chase, M.A., Beauchamp, M.R. et al (2010). Athletes' Perceptions of Coaching Competency Scale II-High School Teams. *Educational and Psychological Measurement 70*(3): 477-494. https://doi.org/10.1177/0013164409344520

Nelson, L., Potrac,P. y Groom, R. (2014). Receiving video-based feedback in elite ice-hockey: a player's perspective. *Sport, Education and Society 19*(1): 19-40. https://doi.org/10.1080/13573322.2011.613925

Nicaise, V., Cogerino, G., Bois, J. et al. (2006). Students' perceptions of teacher feedback and physical competence in physical education classes: Gender effects. *Journal of Teaching in Physical Education 25*(1): 36-57. https://doi.org/10.1123/jtpe.25.1.36

Noguchi, K., Gel, Y.R., Brunner, E. et al. (2012). Nparld: An R software package for the nonparametric analysis of longitudinal data in factorial experiments. Journal of Statistical Software 50(12). https://doi.org/10.18637/jss.v050.i12

Noguchi, K., Latif, M., Thangavelu, K. et al. (2012). Package 'nparLD': Nonparametric analysis of longitudinal data in factorial experiments. R package version 2.1. Retrieved from https://cran.r-project.org/web/packages/nparLD. https://doi.org/10.18637/jss.v050.i12

Núñez, J.L., Martín-Albo, J. y Navarro, J. (2007). Propiedades psicométricas de la versión española de la escala de motivación deportiva. *Revista de Psicología del Deporte 16*(2): 211-223. ISSN: 1132-239X.

Poczwardowski, A., Henschen, K. y Barott, J. (2002). The athlete and coach: their relationship and its meaning. Results of an interpretive study. *International Journal of Sport Psychology 33*(1): 116 -140. ISSN: 0047-0767.

Post, P., Aiken, C., Laughlin, D. y Fairbrother, J. (2016). Self-control over combined video feedback and modeling facilitates motor learning. *Human Movement Science 47*: 49-59. https://doi.org/10.1016/j.humov.2016.01.014

Pulido, J.J., Sánchez-Oliva, D., Sánchez-Miguel, P.A., Leo, F.M. y García-Calvo, T. (2016). Influence of Coaches Training on Athletes Motivation. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte*, *16* (64): 685-702. https://doi.org/10.15366/rimcafd2016.64.005

Rascle, O., Charrier, M., Higgins, N. et al (2019). Being one of us: Translating expertise into performance benefits following perceived failure. *Psychology of Sport and Exercise 43*: 105-113. https://doi.org/10.1016/j.psychsport.2019.01.010

Saemi, E., Porter, J., Ghotbi-Varzaneh, A. et al. (2012). Knowledge of results after relatively good trials enhances self-efficacy and motor Learning. *Psychology of Sport and Exercise 13*(4): 378-382. https://doi.org/10.1016/j.psychsport.2011.12.008

Sánchez, M.; Sánchez-Sánchez, J.; Carcedo, R.J.; García, J.A. (2020) Climate, Orientation and Fun in Under-12 Soccer Players. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, 20* (79) : 507-520. https://doi.org/10.15366/rimcafd2020.79.008

Sánchez-Sánchez, J., Sánchez, M., Hernández, D., et al. (2017). Fatigue in U12 soccer-7 players during repeated one day tournament games – A pilot study. *Journal of Strength and Conditioning Research 33*(11): 3092-3097. https://doi.org/10.1519/JSC.0000000000002141

Sandín, B., Chorot, P., Tostao, L. et al. (1999). Escalas PANAS de afecto cognitivo y negativo: validación factorial y convergencia transcultural, *Psicothema 11*(1): 37-51. ISSN: 0214-9915.

Sevil-Serrano, J., Aibar-Solana, A., Abós-Catalán, A., y García-González, L. (2016). Motivational climate of teaching physical education: Could it affect student grades?. *Retos,* (31), 98-102. https://doi.org/10.47197/retos.v0i31.46514

Smoll F.L. and Smith R.E. (1989). Leadership behavior in sport: a theoretical model and research paradigm. *Journal of Applied Social Psychology 19*: 1522–1551. https://doi.org/10.1111/j.1559-1816.1989.tb01462.x

Stein, J., Bloom, G.A. y Sabiston, C.M. (2012). Influence of perceived and preferred coach feedback on youth athletes' perceptions of team motivational climate. *Psychology of Sport and Exercise 13*(4): 484-490. https://doi.org/10.1016/j.psychsport.2012.02.004

Tobin, S. y Raymundo, M. (2009). Persuasion by causal arguments: The motivating role of perceived causal expertise. *Social Cognition 27*(1): 105–127. https://doi.org/10.1521/soco.2009.27.1.105

Torchiano, M. (2019). Package 'effsize': Efficient effect size computation. R package version 0.7.6. Retrieved from https://cran.r-project.org/web/packages/effsize/effsize.pdf.

Tzetzis G. y Votsis E. (2006). Three feedback methods in acquisition and retention of badminton skills. *Perceptual and Motor Skills 102*: 275-284. https://doi.org/10.2466/pms.102.1.275-284

Tzetzis G., Votsis E. y Kourtessis T. (2008). The effect of different corrective feedback methods on the outcome and self confidence of young athletes. *Journal of Sports Science and Medicine 7*(3): 371-378. PMID: 24149905

Van Den Tillaar, R. y Ettema, G. (2003). Instructions emphasizing velocity, accuracy, or both in performance and kinematics of overarm throwing by experienced team handball players. *Perceptual and Motor Skills 97*: 731-742. https://doi.org/10.2466/pms.2003.97.3.731

Watson, D., Clark, L.A. y Tellegen, A. (1988a). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology 54*(6): 1063-1070. https://doi.org/10.1037/0022-3514.54.6.1063

Weidinger, A.F., Spinath, B. y Steinmayr, R. (2016). Why does intrinsic motivation decline following negative feedback? The mediating role of ability self-concept and its moderation by goal orientations. *Learning and Individual Differences 47*: 117–128. https://doi.org/10.1016/j.lindif.2016.01.003

Wulf, G., Chiviacowsky, S. y Cardozo, P. (2014). Additive benefits of autonomy support and enhanced expectancies for motor learning. *Human Movement Science 37*: 12–20. ttps://doi.org/10.1016/j.humov.2014.06.004

Wulf, G., Mc Connel, N., Gärtner, M. et al. (2002). Enhancing the Learning of Sport Skills Through External-Focus Feedback. *Journal of Motor Behavior 34*(2): 171–182. https://doi.org/10.1080/00222890209601939.

Número de citas totales / Total references: 66 (100%).
Número de citas propias de la revista / Journal's own references: 3 (4,54%).

Rev.int.med.cienc.act.fís.deporte - vol. 22 - número 88 - ISSN: 1577-0354