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Evaluación del rendimiento físico y
asimetrías funcionales en
jugadoras de fútbol adolescentes
Evaluation of physical
performance and functional
asymmetries in adolescent female
soccer players

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Fisiatría y Enfermería

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FE DE ERRATAS TESIS

Se hace constar que en la Tesis Doctoral de la alumna Elena Pardos Mainer dirigida por José Antonio Casajús Mallén y Oliver Gonzalo Skok, titulada “Evaluación del rendimiento físico y asimetrías funcionales en jugadoras de fútbol adolescentes”, perteneciente a la Universidad de Zaragoza, Facultad de Ciencias de la Salud y del Deporte, Departamento de Fisiatría y Enfermería, se han advertido los siguientes errores:

1. En la página 7, debe aparecer “Dr.” en todos los miembros del tribunal.
2. En la página 81, donde dice “plataforma de fuerza”, debe decir “plataforma de infrarrojos”. Lo mismo sucede en la página 82 y 84.
3. En la página 86, línea 14, hay que añadir “El pie de salida se colocaba 0,5 m antes de la primera célula fotoeléctrica (Witty, Microgate, Bolzano, Italia)”.
4. En la página 86, donde dice “Byomedic, fotoelectric cells, Barcelona”, debe decir “Witty, Microgate, Bolzano, Italia”.
5. En la página 138 y 139, en las tablas 10 y 11 existen análisis estadístico que no deberían figurar. Se adjuntan las tablas correctas.
6. En la página 141 y 142, en las tablas 12 y 13 existen análisis estadístico que no deberían figurar. Se adjuntan las tablas correctas.
7. En la página 146, donde dice “Reliability, usefulness and responsiveness of jumping tests” debe decir “Reliability and sensitivity of jumping tests”.
8. En la página 205, donde dice “tabla 4” debe decir “tabla 25”. Se adjunta la tabla.

Table 10. Measures of reliability in jumping, linear sprinting and CODA tests in U-16 female soccer players (n = 37)

Test	Trial 1	Trial 2	TEM (90% CL)	CV (90% CL)	ICC (90% CL)	Difference (90% CL)	ES (90% CL) (rating)
CMJ	21.7 ± 3cm	21.7 ± 3cm	1.03cm (0.86 to 1.31)	4.8% (3.9 to 6.1)	0.89 (0.81 to 0.94)	-0.03cm (-0.47 to 0.41)	0 (Trivial)
UCMJ	10.8 ± 2.5cm	11 ± 2.6cm	0.56cm (0.41 to 0.71)	4.8% (4 to 6.2)	0.95 (0.92 to 0.97)	0.11cm (-0.13 to 0.35)	0.08 (Trivial)
SLH	119.8 ± 14.1cm	120 ± 14.3cm	4.02cm (3.35 to 5.08)	3.8% (3.2 to 4.9)	0.92 (0.87 to 0.96)	0.11cm (-1.57 to 1.78)	0.01 (Trivial)
10m	2.05 ± 0.09s	2.09 ± 0.1s	0.05s (0.04 to 0.06)	1.8% (1.4 to 2.4)	0.75 (0.56 to 0.87)	0.04s (0.02 to 0.06)	0.42 (Small)
20m	3.56 ± 0.14s	3.62 ± 0.16s	0.06s (0.05 to 0.08)	1.3% (1.0 to 1.7)	0.85 (0.72 to 0.92)	0.06s (0.03 to 0.09)	0.4 (Small)
30m	5.08 ± 0.25s	5.16 ± 0.31s	0.07s (0.06 to 0.09)	1.3% (1.0 to 1.7)	0.94 (0.88 to 0.97)	0.07s (0.04 to 0.11)	0.29 (Small)
40m	6.53 ± 0.33s	6.63 ± 0.37s	0.08s (0.06 to 0.11)	1% (0.8 to 1.4)	0.96 (0.91 to 0.98)	0.10s (0.06 to 0.14)	0.29 (Small)
180°COD	3.01 ± 0.10s	3.01 ± 0.11s	0.05s (0.04 to 0.06)	1.7% (1.4 to 2.3)	0.82 (0.68 to 0.90)	-0.01s (-0.03 to 0.02)	0 (Trivial)
V-cut	7.71 ± 0.37s	7.82 ± 0.47s	0.16s (0.12 to 0.23)	2.1% (1.6 to 3.0)	0.76 (0.50 to 0.89)	0.11s (0.01 to 0.21)	0.26 (Small)

CMJ: countermovement jump; UCMJ: unilateral countermovement jump; SLH: single leg hop test; 180°COD: average of both left and right leg in 5+5 m sprint test with a 180° change of direction; V-cut: 25-m sprint test with 4 x 45° changes of direction; cm: centimetres; s: seconds; m: meters; n= final number of participants; TEM: typical error of measurement; .CL: confidence limits; CV: coefficient of variation expressed as percentage of TEM; ICC: Intraclass correlation coefficient; Difference: difference in mean between the 2 trials; ES: effect size and ES rating (see Methods); SWC: smallest worthwhile change (0.2 x standard deviation = SWC_{0.2}; 0.6 x standard deviation = SWC_{0.6}; 1.2 x standard deviation = SWC_{1.2} and rating of usefulness.

Table 11. Measures of reliability in jumping, linear sprinting and change of direction ability tests in U-18 female soccer players (n = 23)

Test	Trial 1	Trial 2	TEM (90% CL)	CV (90% CL)	ICC (90% CL)	Difference (90% CL)	ES (90% CL) (rating)
CMJ	22.3 ± 4cm	22.2 ± 3.5cm	0.75cm (0.55 to 1.19)	3.6% (2.7 to 5.8)	0.97 (0.91 to 0.99)	-0.11cm (-0.69 to 0.47)	-0.03 (Trivial)
UCMJ	12.7 ± 3.2cm	12.2 ± 3cm	0.44cm (0.32 to 0.72)	3.6% (2.4 to 7.6)	0.99 (0.95 to 1)	0cm (-0.36 to 0.36)	-0.16 (Trivial)
SLH	125.6 ± 12cm	124.1 ± 13.4cm	2.21cm (1.65 to 3.43)	1.6% (1.1 to 3)	0.98 (0.93 to 0.99)	-1.50cm (-3.12 to 0.12)	-0.12 (Trivial)
10m	2.05 ± 0.09s	2.06 ± 0.09s	0.04s (0.03 to 0.07)	2.2% (1.7 to 3.3)	0.79 (0.54 to 0.91)	0.01s (-0.02 to 0.04)	0.11 (Trivial)
20m	3.59 ± 0.15s	3.60 ± 0.16s	0.07s (0.05 to 0.10)	1.8% (1.4 to 2.7)	0.85 (0.65 to 0.94)	0.02s (-0.02 to 0.06)	0.06 (Trivial)
30m	5.07 ± 0.23s	5.08 ± 0.23s	0.08s (0.06 to 0.11)	1.5% (1.1 to 2.2)	0.91 (0.78 to 0.96)	0.01s (-0.04 to 0.06)	0.04 (Trivial)
40m	6.57 ± 0.33s	6.57 ± 0.32s	0.11s (0.08 to 0.17)	1.7% (1.3 to 2.5)	0.90 (0.76 to 0.9)	0s (-0.08 to 0.07)	0 (Trivial)
180°COD	2.98 ± 0.14s	2.97 ± 0.12s	0.06s (0.05 to 0.10)	1% (0.7 to 2.2)	0.80 (0.55 to 0.92)	-0.02s (-0.06 to 0.03)	-0.08 (Trivial)
V-cut	7.74 ± 0.26s	7.79 ± 0.43s	0.19s (0.14 to 0.31)	2.2% (1.5 to 4.3)	0.75 (0.39 to 0.91)	0.08s (-0.07 to 0.23)	0.12 (Trivial)

CMJ: countermovement jump; UCMJ: unilateral countermovement jump; SLH: single leg hop test; 180°COD: average of both left and right leg in 5+5 m sprint test with a 180° change of direction; V-cut: 25-m sprint test with 4 x 45° changes of direction; cm: centimetres; s: seconds; m: meters; n= final number of participants; TEM: typical error of measurement; .CL: confidence limits; CV: coefficient of variation expressed as percentage of TEM; ICC: Intraclass correlation coefficient; Difference: difference in mean between the 2 trials; ES: effect size and ES rating (see Methods); SWC: smallest worthwhile change (0.2 x standard deviation = SWC_{0.2}; 0.6 x standard deviation = SWC_{0.6}; 1.2 x standard deviation = SWC_{1.2} and rating of usefulness).

Table 12. Sensitivity of the jumping, linear sprinting and CODA tests in U-16 female soccer players at different stages of the soccer season (n = 30).

	Variable	SWC 0.2 (rating of sensitivity)	SWC 0.6 (rating of sensitivity)	SWC 1.2 (rating of sensitivity)
CMJ (cm)	1-2	0.6cm (Marginal)	1.8cm (Marginal)	3.6cm (Marginal)
	1-3	0.6cm (Marginal)	1.8cm (Good)	3.6cm (Good)
	2-3	0.6cm (Marginal)	1.8cm (Marginal)	3.6cm (Good)
UCMJ (cm)	1-2	0.51cm (Marginal)	1.53cm (Marginal)	3.06cm (Marginal)
	1-3	0.51cm (Marginal)	1.53cm (Marginal)	3.06cm (Good)
	2-3	0.51cm (Marginal)	1.53cm (Marginal)	3.06cm (Good)
SLH (cm)	1-2	2.84cm (Marginal)	8.52cm (Marginal)	17.04cm (Marginal)
	1-3	2.84cm (Marginal)	8.52cm (Marginal)	17.04cm (Good)
	2-3	2.84cm (Marginal)	8.52cm (Marginal)	17.04cm (Good)
10m (s)	1-2	0.03s (Good)	0.09s (Good)	0.18s (Good)
	1-3	0.03s (Good)	0.09s (Good)	0.18s (Good)
	2-3	0.03s (Marginal)	0.09s (Good)	0.18s (Good)
20m (s)	1-2	0.06s (Marginal)	0.17s (Good)	0.33s (Good)
	1-3	0.06s (Marginal)	0.17s (Marginal)	0.33s (Good)
	2-3	0.06s (Good)	0.17s (Good)	0.33s (Good)
30m (s)	1-2	0.07s (Marginal)	0.21s (Marginal)	0.42s (Good)
	1-3	0.07s (Marginal)	0.21s (OK)	0.42s (Good)
	2-3	0.07s (OK)	0.21s (Good)	0.42s (Good)
40m (s)	1-2	0.02s (Good)	0.06s (Good)	0.13s (Good)
	1-3	0.02s (Good)	0.06s (Good)	0.13s (Good)
	2-3	0.02s	0.06s	0.13s

180°COD (s)	1-2	(Marginal) 0.02s	(Good) 0.06s	(Good) 0.13s	
	1-3	(Marginal) 0.02s	(OK) 0.06s	(Good) 0.13s	
	2-3	(Marginal) 0.02s	(Marginal) 0.06s	(Good) 0.13s	
	1-2	(OK) 0.08s	(Good) 0.25s	(Good) 0.5s	
	V-cut (s)	1-2	(Marginal) 0.08s	(Marginal) 0.25s	(Marginal) 0.5s
		1-3	(Marginal) 0.08s	(Marginal) 0.25s	(Marginal) 0.5s
2-3		(Marginal) 0.08s	(Good) 0.25s	(Good) 0.5s	

CMJ: countermovement jump; UCMJ: unilateral countermovement jump; SLH: single leg hop test; 180°COD: average of both left and right leg in 5+5 m sprint test with a 180° change of direction; V-cut: 25-m sprint test with 4 x 45° changes of direction; cm: centimetres; s: seconds; m: meters; n= final number of participants;. Each stage represented 8 weeks. 1: September; 2: November; 3: February; SWC: smallest worthwhile change.

Table 13. Sensitivity of the jumping, linear sprinting and CODA tests in U-18 female soccer players at different stages of the soccer season (n = 22).

	Variable	SWC ^{0.2} (rating of sensitivity)	SWC ^{0.6} (rating of sensitivity)	SWC ^{1.2} (rating of sensitivity)
CMJ (cm)	1-2	0.75cm (Marginal)	2.25cm (Marginal)	4.5cm (Marginal)
	1-3	0.75cm (Marginal)	2.25cm (Good)	4.5cm (Good)
	2-3	0.75cm (Marginal)	2.25cm (Marginal)	4.5cm (Good)
UCMJ (cm)	1-2	0.62cm (Marginal)	1.86cm (Marginal)	3.72cm (Marginal)
	1-3	0.62cm (Marginal)	1.86cm (Marginal)	3.72cm (Good)
	2-3	0.62cm (Marginal)	1.86cm (Marginal)	3.72cm (Good)
SLH (cm)	1-2	2.54cm (Marginal)	7.62cm (Marginal)	15.2cm (Marginal)
	1-3	2.54cm (Marginal)	7.62cm (Good)	15.2cm (Good)
	2-3	2.54cm (Marginal)	7.62cm (Good)	15.2cm (Good)
10m (s)	1-2	0.03s (OK)	0.09s (Good)	0.11s (Good)
	1-3	0.03s (Marginal)	0.09s (Good)	0.11s (Good)
	2-3	0.03s (Marginal)	0.09s (Good)	0.11s (Good)
20m (s)	1-2	0.03s (Marginal)	0.09s (Good)	0.11s (Good)
	1-3	0.03s (Marginal)	0.09s (Marginal)	0.11s (Good)
	2-3	0.03s (Marginal)	0.09s (Good)	0.11s (Good)
30m (s)	1-2	0.05s (Marginal)	0.14s (Good)	0.28s (Good)
	1-3	0.05s (Marginal)	0.14s (Marginal)	0.28s (Good)
	2-3	0.05s (Marginal)	0.14s (Good)	0.28s (Good)
40m (s)	1-2	0.07s (Marginal)	0.19s (Good)	0.39s (Good)
	1-3	0.07s	0.19s	0.39s

180°COD (s)	2-3	(Marginal) 0.07s	(Marginal) 0.19s	(Good) 0.39s
	1-2	(Marginal) 0.03s	(Good) 0.08s	(Good) 0.16s
		(Marginal) 0.03s	(Good) 0.08s	(Good) 0.16s
	1-3	(Marginal) 0.03s	(Marginal) 0.08s	(Good) 0.16s
	2-3	(Marginal) 0.03s	(Marginal) 0.08s	(Good) 0.16s
	V-cut (s)	1-2	(Marginal) 0.07s	(Marginal) 0.21s
1-3		(Marginal) 0.07s	(Marginal) 0.21s	(Marginal) 0.41s
2-3		(Marginal) 0.07s	(Marginal) 0.21s	(Marginal) 0.41s
		(Marginal)	(Good)	(Good)

10. CMJ: countermovement jump; UCMJ: unilateral countermovement jump; SLH: single leg hop test; 180°COD: average of both left and right leg in 5+5 m sprint test with a 180° change of direction; V-cut: 25-m sprint test with 4 x 45° changes of direction; cm: centimetres; s: seconds; m: meters; n= final number of participants;. Each stage represented 8 weeks. 1: September; 2: November; 3: February; SWC: smallest worthwhile change.

Table 25. Sprinting performance and maximal sprinting speed as a function of age group.

Age Group	Files (n)	10-m time (s)	MSS (km*h ⁻¹)
U14	40	2.13 ± 0.09 _{b,c}	23.5 ± 1.23 _{b,c}
U16	74	2.06 ± 0.10 _a	25 ± 1.6 _a
U18	46	2.03 ± 0.10 _a	25.1 ± 1.45 _a
Age Effect		<0.001	<0.001

MSS: maximal sprint speed; a: different from U14 with $p < 0.05$; b: different from U16 with $p < 0.05$; c: different from U18 with $p < 0.05$

