



MÉTODOS

- .GENERALIDADES
- .OBJETIVO DE RENDIMIENTO
- .MEDIOS INESPECIFICOS
- .ANALISIS DE LOS MEDIOS
- .MEDIOS ESPECIFICOS
 - .ARRASTRE DE TRINEOS
 - .OTRAS SUPERFICIES
 - .COLINA
 - .CHALECO LASTRADO



GENERALIDADES



¿CÓMO MEJORAR LA
ACELERACIÓN?

AUMENTAR FRECUENCIA DE PASO
SIN DISMINUIR LONGITUD

AUMENTAR LONGITUD DE PASO
SIN DISMINUIR FRECUENCIA

AUMENTAR LA TÉCNICA

OBJETIVOS



TIEMPOS IDEALES

< 2,0
SEGUNDOS

< 3,3
SEGUNDOS

< 1,2
SEGUNDOS





MEDIOS INESPECIFICOS



¿CON QUÉ MEDIOS
CUENTO?

ESPECIFICOS

EMPUJE DE TRINEOS

ARRASTRE DE TRINEOS

CUESTA ARRIBA

ARENA

PARACAÍDAS

CHALECO LASTRADO

INESPECIFICOS

PLIOMETRIA

FUERZA

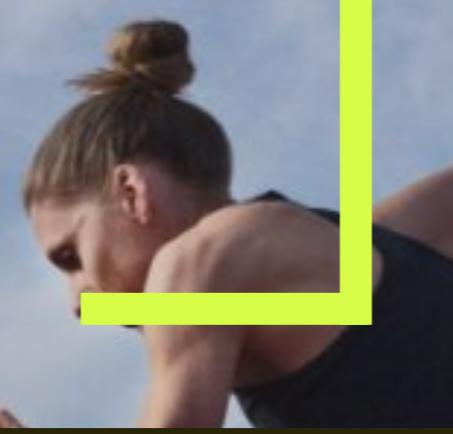
POTENCIA

PLIOMETRIA PESAS VELOCIDAD



FST and RST				PT			WT		
Wk	Interval	Sets × reps	Distance	Exercise	Sets × reps	Contacts	Exercise	Sets × reps	%1RM
1	0-5	2 × 3	30	Box jump	3 × 10	30	Squats	3 × 10-12	75
	0-10	2 × 3	60	Bounding	4 × 5	20	Step-ups	3 × 10-12	75
	0-15	1 × 3	45	Forward hop	2 × 10	20	Hip flexion	3 × 10-12	75
	0-20	1 × 3	60 (195 m)	Hurdle jump	2 × 10	20	Calf raise	3 × 10-12	75
2	0-5	2 × 4	40	Drop jump	2 × 5	20 (100)	Squats	3 × 8-10	75-80
	0-10	2 × 4	80	Box jump	3 × 10	30	Step-ups	3 × 8-10	75-80
	0-15	1 × 3	45	Bounding	4 × 6	24	Hip flexion	3 × 8-10	75-80
	0-20	1 × 3	60 (225 m)	Forward hop	3 × 8	24	Calf raise	3 × 8-10	75-80
3	0-5	3 × 3	45	Drop jump	2 × 8	16 (118)	Squats	3 × 6	80-85
	0-10	2 × 4	80	Box jump	3 × 10	30	Step-ups	3 × 6	80-85
	0-15	1 × 4	60	Bounding	5 × 6	30	Hip flexion	3 × 6	80-85
	0-20	1 × 3	60 (245 m)	Forward hop	3 × 10	30	Calf raise	3 × 6	80-85
4	0-5	3 × 3	45	Hurdle jump	3 × 8	24	Squats	3 × 5	80-85
	0-10	3 × 3	90	Drop jump	6 × 6	36	Step-ups	3 × 5	80-85
	0-15	1 × 4	60	Box jump	3 × 10	30	Hip flexion	3 × 5	80-85
	0-20	1 × 4	80 (275 m)	Bounding	3 × 10	30	Calf raise	3 × 5	80-85
5	0-5	2 × 5	50	Drop jump	3 × 8	24 (130)	Squats	3 × 4	90
	0-10	2 × 5	100	Box jump	5 × 9	45	Step-ups	3 × 4	90
	0-15	1 × 4	60	Bounding	4 × 8	32	Hip flexion	3 × 4	90
	0-20	1 × 4	80 (290 m)	Forward hop	4 × 8	32	Calf raise	3 × 4	90
6	0-5	3 × 4	60	Drop jump	4 × 7	28 (161)	Squats	3 × 4	90
	0-10	3 × 4	120	Box jump	5 × 9	45	Step-ups	3 × 4	90
	0-15	1 × 4	60	Bounding	5 × 8	40	Hip flexion	3 × 4	90
	0-20	1 × 4	80 (320 m)	Forward hop	5 × 8	40	Calf raise	3 × 4	90
				Drop jump	4 × 8	32 (181)			

PLIOMETRIA PESAS VELOCIDAD



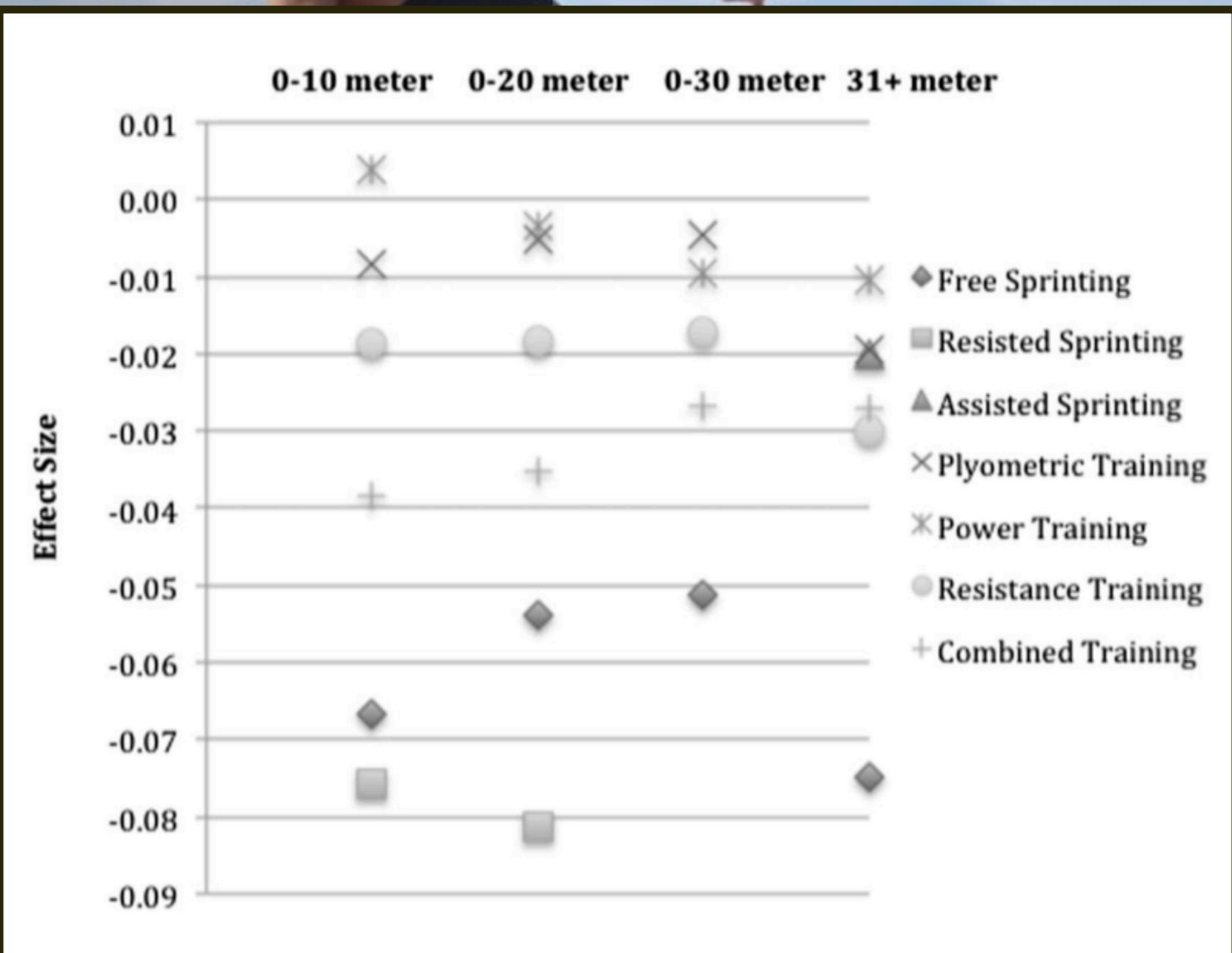
		FST (n = 9)	WT (n = 6)	PT (n = 9)	RST (n = 9)
BMI ($\text{m} \cdot [\text{kg}^2]^{-1}$)	Pre	24.78 ± 1.49	25.22 ± 2.74	24.83 ± 2.20	25.75 ± 2.71
	Post	24.87 ± 1.44	25.38 ± 2.56	24.76 ± 2.66	25.88 ± 2.47
	ES	0.06	0.06	0.03	0.05
0- to 5-m Velocity ($\text{m} \cdot \text{s}^{-1}$)	Pre	3.75 ± 0.20	3.68 ± 0.13	3.78 ± 0.18	3.81 ± 0.30
	Post [‡]	4.01 ± 0.19	4.03 ± 0.16	3.99 ± 0.25	4.08 ± 0.26
	ES	1.33	2.40	0.96	0.96
5- to 10-m Velocity ($\text{m} \cdot \text{s}^{-1}$)	Pre	6.65 ± 0.34	6.55 ± 0.11	6.62 ± 0.34	6.49 ± 0.30
	Post	6.79 ± 0.27	6.76 ± 0.18 [‡]	6.75 ± 0.28 [‡]	6.50 ± 0.78
	ES	0.46	1.41	0.42	0.02
0- to 10-m Velocity ($\text{m} \cdot \text{s}^{-1}$)	Pre	4.81 ± 0.28	4.72 ± 0.13	4.81 ± 0.23	4.79 ± 0.31
	Post [‡]	5.03 ± 0.21	5.05 ± 0.14	5.01 ± 0.24	5.06 ± 0.29
	ES	0.89	2.44	0.85	0.90

		FST (n = 9)	WT (n = 6)	PT (n = 9)	RST (n = 9)
0- to 5-m SL(m)	Pre	1.14 ± 0.08	1.15 ± 0.10	1.18 ± 0.11	1.29 ± 0.13
	Post [‡]	1.32 ± 0.10	✓ 1.25 ± 0.10	✓ 1.31 ± 0.12	✓ 1.39 ± 0.11
	ES	1.99	1.00	1.13	0.83
5- to 10-m SL (m)	Pre	1.60 ± 0.13	1.62 ± 0.08	1.70 ± 0.13	1.71 ± 0.11
	Post [‡]	1.87 ± 0.21	✓ 1.87 ± 0.19	✓ 1.81 ± 0.14	✓ 1.90 ± 0.13
	ES	1.55	1.71	0.81	1.58
0- to 10-m SL (m)	Pre	1.37 ± 0.10	1.39 ± 0.08	1.44 ± 0.11	1.50 ± 0.11
	Post [‡]	1.60 ± 0.14	✓ 1.56 ± 0.14	✓ 1.56 ± 0.13	✓ 1.64 ± 0.10
	ES	1.89	1.49	1.00	1.33
0- to 5-m SF (Hz)	Pre	3.32 ± 0.20	3.22 ± 0.31	3.21 ± 0.23	2.97 ± 0.36
	Post	3.04 ± 0.30 [‡]	3.25 ± 0.29	3.07 ± 0.22	2.96 ± 0.34
	ES	1.10	0.10	0.62	0.03
5- to 10-m SF (Hz)	Pre	4.18 ± 0.29	4.05 ± 0.23	3.92 ± 0.33	3.80 ± 0.24
	Post	3.67 ± 0.41 [‡]	3.66 ± 0.40 [‡]	3.76 ± 0.24	3.44 ± 0.54
	ES	1.44	1.20	0.55	0.86
0- to 10-m SF (Hz)	Pre	3.52 ± 0.23	3.41 ± 0.22	3.35 ± 0.18	3.19 ± 0.26
	Post	3.17 ± 0.32 [‡]	3.27 ± 0.31	3.22 ± 0.17 [‡]	3.09 ± 0.29
	ES	1.26	0.52	0.74	0.36

		FST (n = 9)	WT (n = 6)	PT (n = 9)	RST (n = 9)
0- to 5-m CT (s)	Pre	0.144 ± 0.010	0.141 ± 0.014	0.143 ± 0.010	0.157 ± 0.019
	Post	0.155 ± 0.012 [‡]	0.145 ± 0.018	0.142 ± 0.007	0.156 ± 0.017
	ES	1.00	0.25	0.12	0.06
5- to 10-m CT (s)	Pre	0.123 ± 0.007	0.124 ± 0.011	0.122 ± 0.007	0.135 ± 0.019
	Post	0.127 ± 0.008	0.129 ± 0.019	0.122 ± 0.008	0.133 ± 0.017
	ES	0.53	0.32	0.00	0.11
0- to 10-m CT (s)	Pre	0.134 ± 0.008	0.133 ± 0.012	0.133 ± 0.007	0.146 ± 0.018
	Post	0.141 ± 0.009 [‡]	0.137 ± 0.018	0.132 ± 0.007	0.145 ± 0.015
	ES	0.82	0.26	0.14	0.06
0- to 5-m FT (s)	Pre	0.096 ± 0.014	0.089 ± 0.007	0.094 ± 0.016	0.094 ± 0.010
	Post	0.087 ± 0.012 [‡]	0.084 ± 0.009	0.095 ± 0.017	0.095 ± 0.011
	ES	0.69	0.62	0.06	0.10
5- to 10-m FT (s)	Pre	0.117 ± 0.016	0.118 ± 0.009	0.127 ± 0.012	0.122 ± 0.013
	Post	0.122 ± 0.020	0.112 ± 0.013	0.123 ± 0.019	0.121 ± 0.014
	ES	0.28	0.54	0.25	0.07
0- to 10-m FT (s)	Pre	0.107 ± 0.014	0.104 ± 0.007	0.111 ± 0.012	0.108 ± 0.005
	Post	0.105 ± 0.013	0.098 ± 0.010	0.109 ± 0.017	0.108 ± 0.011
	ES	0.15	0.70	0.14	0.00



PLIOMETRIA PESAS VELOCIDAD



PUBERES VS PREPUBERES

PRE PHV

PLIOMETRIA

VELOCIDAD

COMBINADO

SIN ESTUDIOS DE FUERZA,
POTENCIA, ASISTIDO, RESISTIDO

MID PHV

PLIOMETRIA

FUERZA

COMBINADO

SIN ESTUDIOS DE
VELOCIDAD

POST PHV

COMBINADO

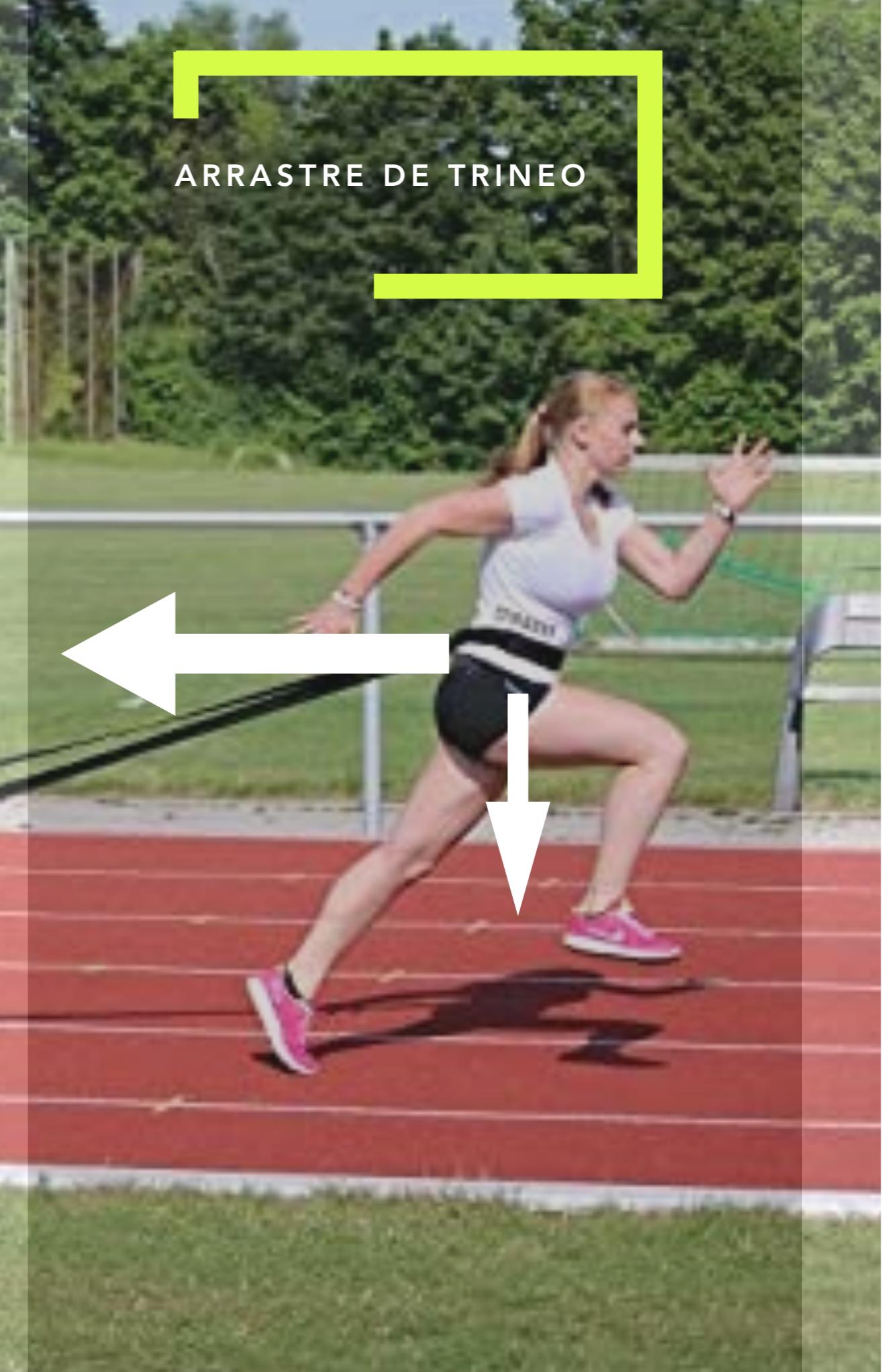
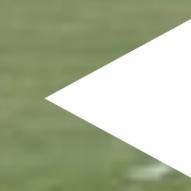
FUERZA

ANALISIS DE LOS MEDIOS





ARRASTRE DE TRINEO





ARRASTRE DE
COMPAÑERO

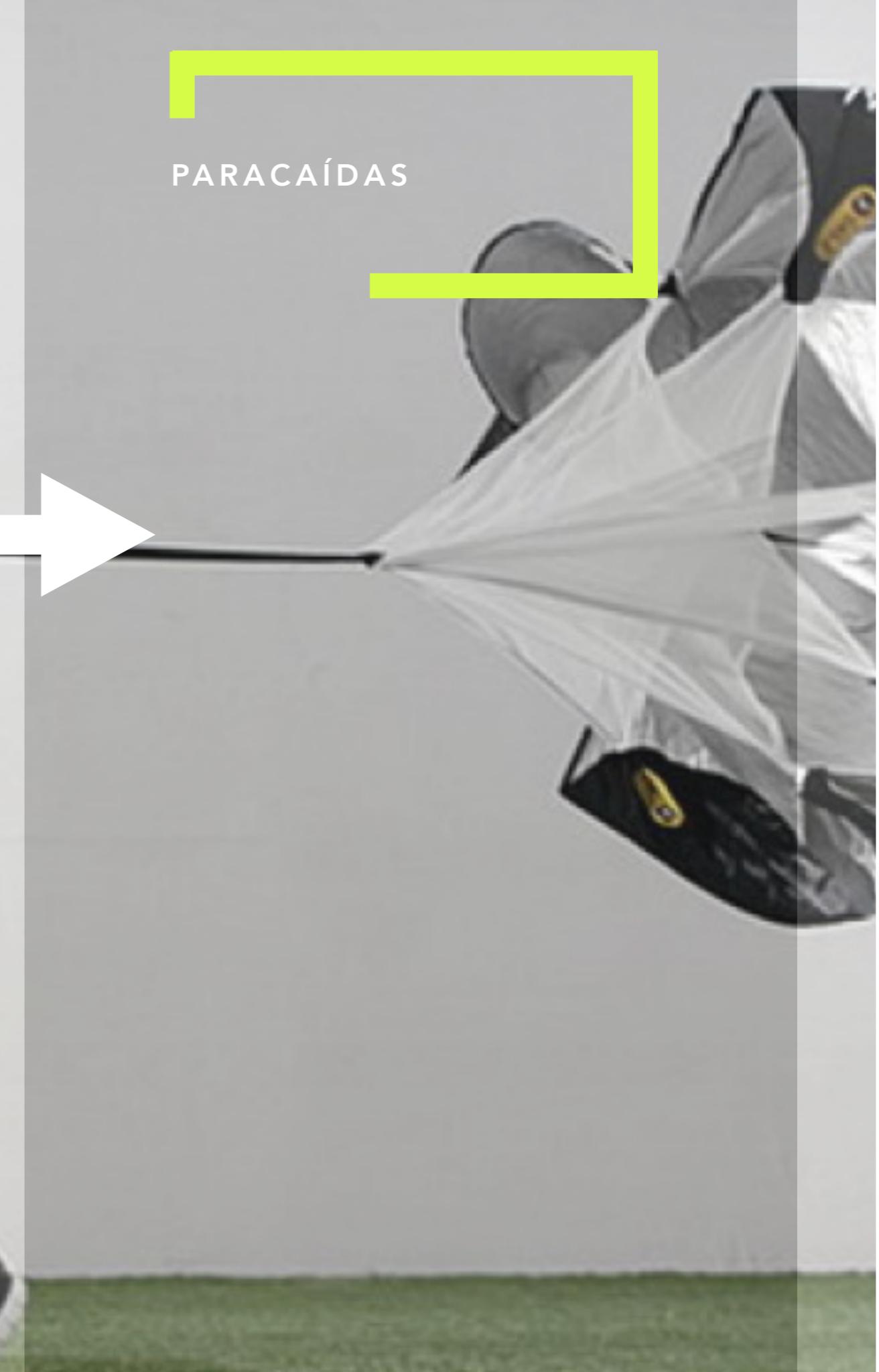


EMPUJE DE TRINEO





PARACAÍDAS





CHALECO



DIFERENCIAS

Variable		Unloaded	Sled	Parachute	Weight belt
Velocity, $\text{m}\cdot\text{s}^{-1}$		9.3 ± 0.4	$8.2 \pm 0.3^*$	$8.8 \pm 0.4^*$	9.0 ± 0.3
Velocity decrease, %		—	$12 \pm 3^*$	$5 \pm 2^*$	3 ± 1
Stride length, m		2.13 ± 0.09	$1.95 \pm 0.12^*$	2.04 ± 0.13	2.08 ± 0.12
Stride frequency, Hz		4.5 ± 0.3	4.3 ± 0.3	4.5 ± 0.3	4.3 ± 0.4
Variable	Time	Unloaded	Sled	Parachute	Weight belt
COM velocity ($\text{m}\cdot\text{s}^{-1}$)	T_{down}	9.3 ± 0.4	$8.4 \pm 0.4^*$	9.0 ± 0.4	9.2 ± 0.5
	T_{mid}	9.3 ± 0.5	$8.2 \pm 0.5^*$	8.8 ± 0.4	9.0 ± 0.4
	T_{off}	9.7 ± 0.5	$8.8 \pm 0.7^*$	9.3 ± 0.7	9.5 ± 0.6
Body lean (°)	T_{down}	11 ± 3	$16 \pm 5^*$	14 ± 3	11 ± 3
	T_{mid}	11 ± 3	$16 \pm 6^*$	13 ± 2	11 ± 4
	T_{off}	9 ± 4	$15 \pm 5^*$	12 ± 3	11 ± 5
Thigh angle (°)	T_{down}	61 ± 5	60 ± 5	62 ± 6	61 ± 5
	T_{mid}	81 ± 3	79 ± 5	81 ± 6	82 ± 5
	T_{off}	113 ± 7	113 ± 4	114 ± 5	112 ± 8
Shank angle (°)	T_{down}	0 ± 5	$7 \pm 7^*$	4 ± 5	0 ± 7
	T_{mid}	25 ± 6	26 ± 5	25 ± 6	26 ± 5
	T_{off}	51 ± 6	48 ± 5	48 ± 4	48 ± 6
Hip angle velocity ($^{\circ}\cdot\text{s}^{-1}$)	T_{down}	390 ± 110	480 ± 100	430 ± 90	450 ± 110
	T_{mid}	560 ± 80	570 ± 100	580 ± 110	610 ± 70
	T_{off}	260 ± 110	320 ± 140	310 ± 190	320 ± 200
Knee angle velocity ($^{\circ}\cdot\text{s}^{-1}$)	T_{down}	190 ± 110	-6 ± 90	40 ± 140	40 ± 200
	T_{mid}	-20 ± 110	-90 ± 110	-110 ± 130	-100 ± 110
	T_{off}	160 ± 170	5 ± 210	90 ± 350	120 ± 310
COM distance (cm)	T_{down}	-37 ± 7	-29 ± 6	-31 ± 9	-37 ± 10
	T_{off}	54 ± 9	53 ± 7	53 ± 7	50 ± 12

HOMBRES

DIFERENCIAS

Variable	Unloaded	Sled	Parachute	Weight belt
Velocity ($m \cdot s^{-1}$)	7.9 ± 0.4	$6.7 \pm 0.3^*$	7.4 ± 0.4	7.6 ± 0.3
Velocity decrease (%)	–	$14 \pm 2^*$	6 ± 4	3 ± 3
Stride length (m)	1.88 ± 0.10	$1.72 \pm 0.11^*$	1.85 ± 0.13	1.87 ± 0.09
Stride frequency (Hz)	4.2 ± 0.3	4.0 ± 0.4	4.1 ± 0.3	4.1 ± 0.3

MUJERES

Variable	Time	Unloaded	Sled	Parachute	Weight belt
COM vel ($m \cdot s^{-1}$)	T_{down}	8.1 ± 0.6	$6.9 \pm 0.4^*$	7.4 ± 0.4	7.8 ± 0.4
	T_{mid}	7.8 ± 0.4	$6.7 \pm 0.3^*$	$7.2 \pm 0.5^*$	7.6 ± 0.3
	T_{off}	8.2 ± 0.5	$7.1 \pm 0.4^*$	7.5 ± 0.4	7.9 ± 0.5
Body lean (°)	T_{down}	12 ± 3	17 ± 3	12 ± 5	10 ± 5
	T_{mid}	12 ± 4	16 ± 3	13 ± 3	9 ± 5
	T_{off}	10 ± 4	14 ± 3	13 ± 4	9 ± 4
Thigh angle (°)	T_{down}	56 ± 3	58 ± 5	56 ± 6	56 ± 2
	T_{mid}	77 ± 4	76 ± 7	78 ± 6	79 ± 4
	T_{off}	112 ± 3	$118 \pm 4^*$	112 ± 3	112 ± 4
Shank angle (°)	T_{down}	3 ± 3	7 ± 5	4 ± 4	0 ± 3
	T_{mid}	29 ± 4	29 ± 4	29 ± 5	27 ± 4
	T_{off}	48 ± 5	50 ± 3	47 ± 5	47 ± 3
Hip angle velocity ($^{\circ} \cdot s^{-1}$)	T_{down}	360 ± 60	370 ± 100	400 ± 90	360 ± 100
	T_{mid}	600 ± 90	560 ± 110	570 ± 70	590 ± 60
	T_{off}	380 ± 70	$240 \pm 60^*$	360 ± 30	450 ± 130
Knee angle velocity ($^{\circ} \cdot s^{-1}$)	T_{down}	180 ± 80	110 ± 130	60 ± 70	150 ± 170
	T_{mid}	-120 ± 90	-210 ± 110	-120 ± 110	-100 ± 50
	T_{off}	90 ± 80	80 ± 140	70 ± 40	130 ± 110
COM distance (cm)	T_{down}	-34 ± 3	-29 ± 6	-35 ± 6	-37 ± 3
	T_{off}	47 ± 5	53 ± 4	46 ± 3	43 ± 5

ARRASTRE DE TRINEOS



LIVIANO VS PESADO

DEPORTISTAS DE CAMPO
AVANZADOS Y RECREACIONALES

43% PC

↓ 30%
VELOCIDAD

13% PC

↓ 10%
VELOCIDAD

	Heavy group (<i>n</i> = 10)	Light group (<i>n</i> = 11)
Sample size by level of sports participation		
Competitive	5	8
Recreational	5	3
Characteristics		
Age (y)	22.8 ± 3.3	22.3 ± 5.2
Height (m)	1.79 ± 0.08	1.83 ± 0.07
Body mass (kg)	77.5 ± 7.3	82.7 ± 9.0
10-m sprint time (s)	2.05 ± 0.07	2.06 ± 0.10
Concurrent involvement in weight training (% of sample)	80	73

Week	Repetition × distance (m)	Total number of repetitions	Total distance (m)
1	3 × 5 3 × 10 3 × 15	9	90
2	3 × 5 4 × 10 3 × 15	10	100
3	3 × 5 5 × 10 3 × 15	11	110
4	3 × 5 3 × 10 3 × 15	9	90
5	4 × 5 4 × 10 4 × 15	12	120
6	4 × 5 5 × 10 4 × 15	13	130
7	4 × 5 6 × 10 4 × 15	14	140
8	3 × 5 3 × 10 3 × 15	9	90

LIVIANO VS PESADO

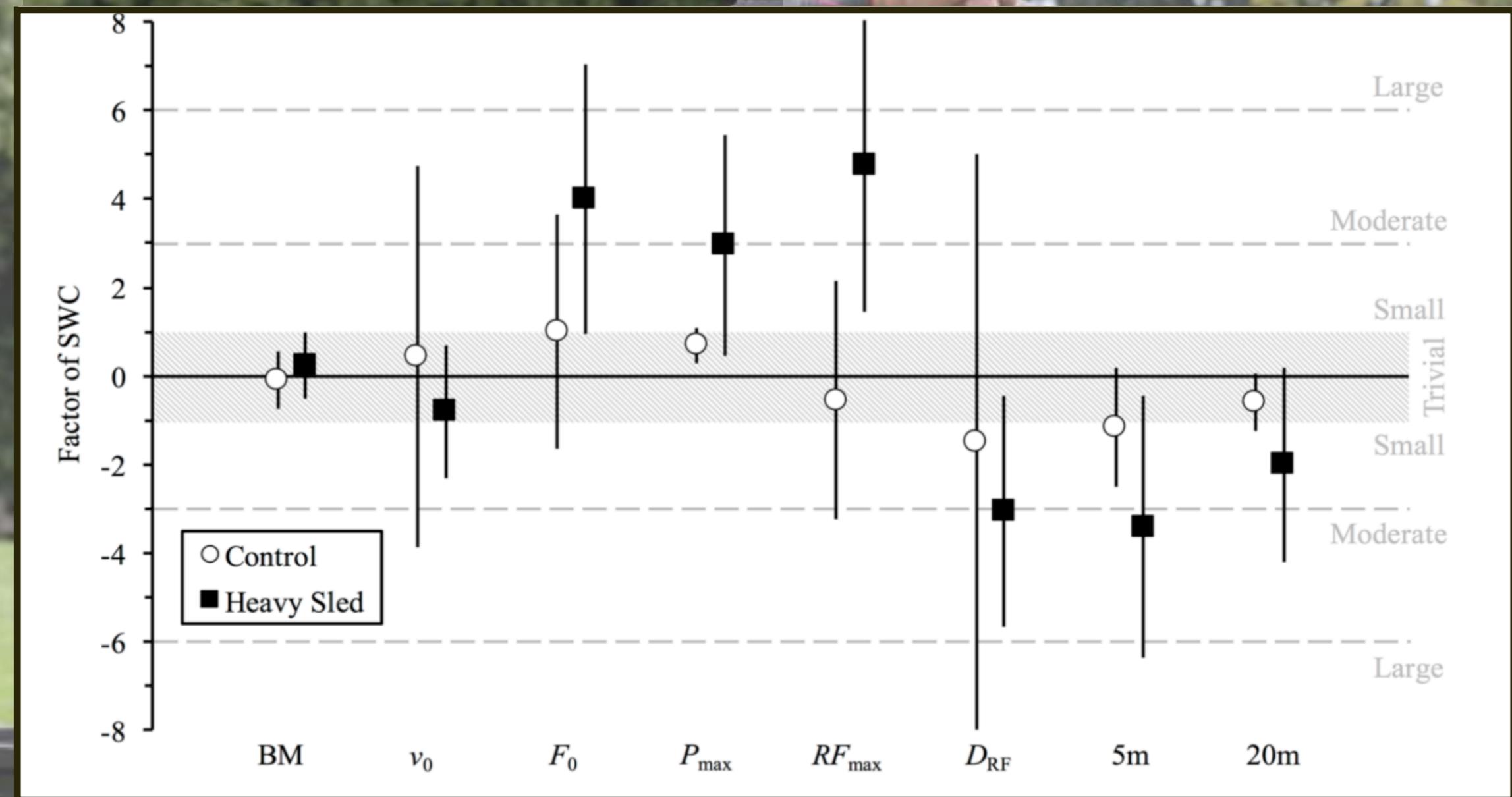
DEPORTISTAS DE CAMPO
AVANZADOS Y RECREACIONALES

Variable (s)	Heavy group (<i>n</i> = 10)		Light group (<i>n</i> = 11)		Interaction
	Pretest	Posttest	Pretest	Posttest	
5-m time	1.28 ± 0.06	1.21 ± 0.07*	1.28 ± 0.08	1.24 ± 0.07	0.260
10-m time	2.05 ± 0.07	1.94 ± 0.08*	2.06 ± 0.10	2.00 ± 0.10*	0.151
		+5.7 (5.7)			
		+5.0 (3.5)			+3.0 (3.5)
Variable	Heavy group (<i>n</i> = 10)		Light group (<i>n</i> = 11)		Interaction
	Pretest	Posttest	Pretest	Posttest	
Sagittal-plane video data					
Step frequency (Hz)	4.02 ± 0.40	4.33 ± 0.36*	4.06 ± 0.31	4.11 ± 0.37	0.160
Step length (m)	1.68 ± 0.13	1.72 ± 0.15	1.64 ± 0.09	1.72 ± 0.14*	0.390
Ground reaction force data ($m \cdot s^{-1}$)					
Relative resultant impulse	2.51 ± 0.22	2.39 ± 0.11*	2.45 ± 0.15	2.49 ± 0.18	0.023†
Relative vertical impulse	0.92 ± 0.14	0.80 ± 0.06*	0.81 ± 0.11	0.82 ± 0.14	0.020†
Relative net horizontal impulse	0.39 ± 0.06	0.41 ± 0.05	0.37 ± 0.06	0.37 ± 0.08	0.439
Relative braking impulse	-0.06 ± 0.02	-0.06 ± 0.02	-0.07 ± 0.02	-0.08 ± 0.02	0.254
Relative propulsive impulse	0.45 ± 0.05	0.47 ± 0.04	0.44 ± 0.06	0.45 ± 0.07	0.812

10% PC

VS

80% PC



JUGADORES DE FUTBOL
AMATEUR

8 SEMANAS
2 X SEMANA
10 X 20 METROS

•[4] Morin JB. Et al (2016)

ARRASTRE MUY PESADO



LIVIANO VS PESADO

ARRASTRE MUY
PESADO

HASTA EL 100%
DEL PC

Category	%BM	%V _{dec}
Light (L)	<10.0	<10.0
Moderate (M)	10.0–19.9	10.0–14.9
Heavy (H)	20.0–29.9	15.0–29.9
Very heavy (VH)	>30.0	>30.0

ALTA FUERZA A
BAJA
VELOCIDAD

FUERZA
HORIZONTAL

TRABAJO EN
CADENA
POSTERIOR

¿CÓMO PRESCRIBIR LA CARGA?

% PESO CORPORAL

%↓ VELOCIDAD

~~MASA ABSOLUTA~~

% DE PC

% PESO CORPORAL

ATLETA 1

%10 PC

FUERTE A BAJA
VELOCIDAD

ATLETA 2

10% PC

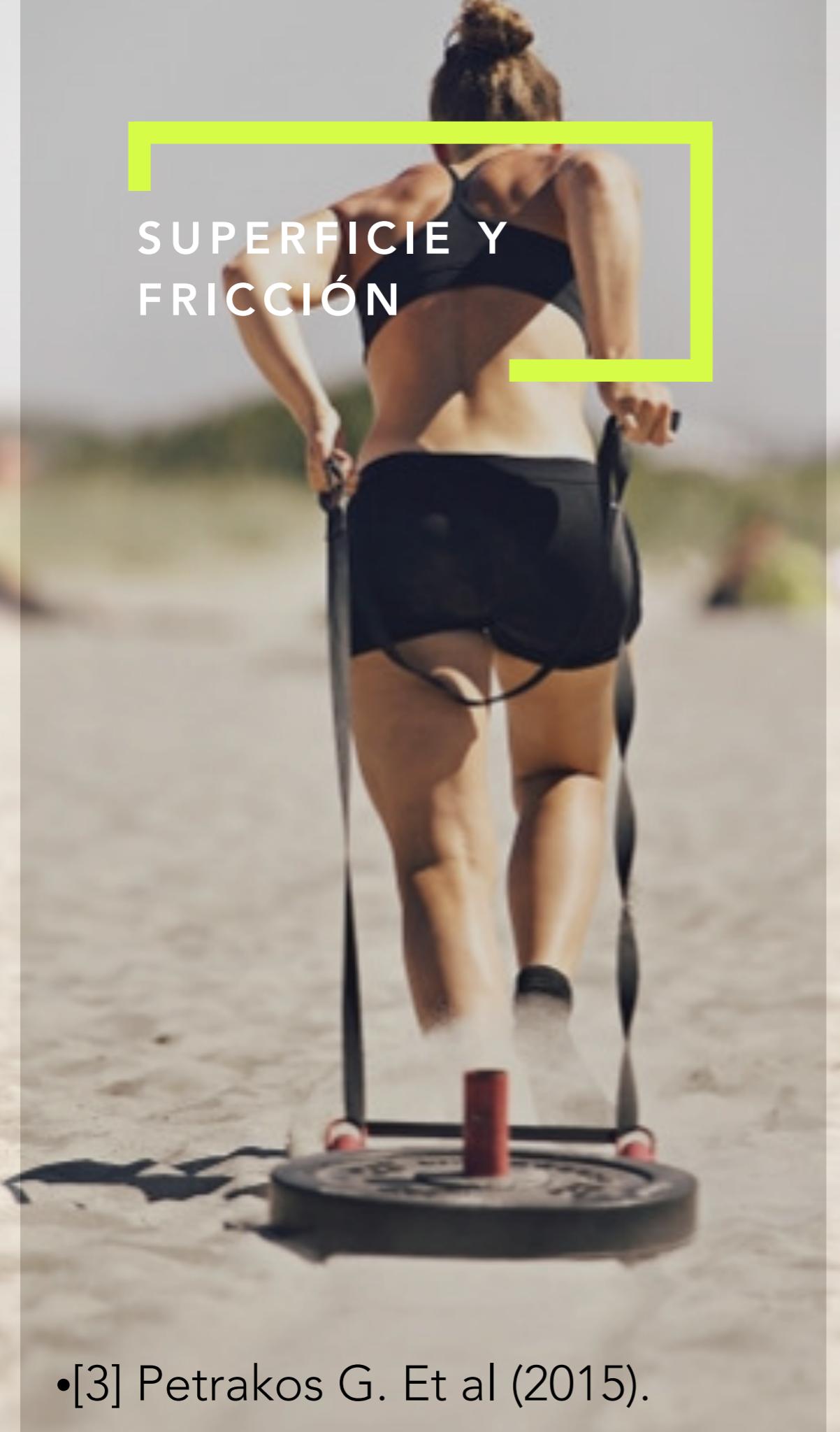
FUERTE A ALTA
VELOCIDAD

≠ ESTIMULO DE ENTRENAMIENTO

% DE VELOCIDAD

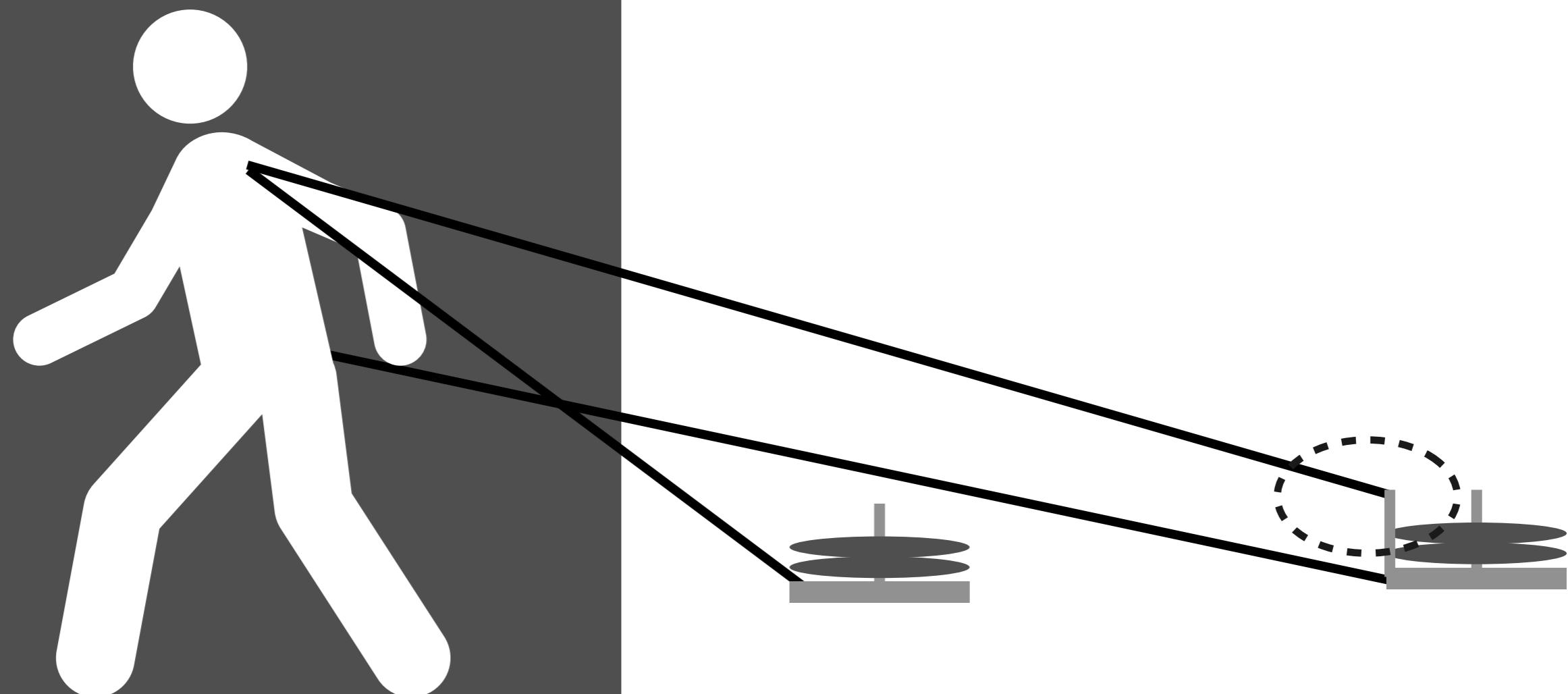
Individual body mass (kg)	Maximum velocity percentage		
	90%	92.5%	95%
120	15.11	9.23	3.35
115	14.48	8.84	3.21
110	13.85	8.46	3.07
105	13.22	8.07	2.93
100	12.59	7.69	2.79
95	11.96	7.31	2.65
90	11.33	6.92	2.51
85	10.70	6.54	2.37
80	10.07	6.15	2.23
75	9.44	5.77	2.09
70	8.81	5.38	1.95
65	8.18	5.00	1.81
60	7.55	4.61	1.67
55	6.92	4.23	1.53
50	6.30	3.85	1.40
45	5.67	3.46	1.26

SUPERFICIE Y FRICCIÓN



•[3] Petrakos G. Et al (2015).

¿DONDE LO
UBICO?



ASISTIDO



ASISTIDO VS RESISTIDO

JUGADORAS DE FUTBOL
FEMENINO (DIVISION 1A)

Distance	AST		RST		TST	
	PRE	POST	PRE	POST	PRE	POST
5 yd (4.6 m)	3.12 ± 0.18	3.58 ± 0.20‡	3.15 ± 0.26	3.15 ± 0.28	3.01 ± 0.44	2.99 ± 0.48
15 yd (13.7 m)	1.96 ± 0.09	2.12 ± 0.08‡	1.95 ± 0.16	1.92 ± 0.12	1.88 ± 0.22	1.89 ± 0.23
5–15 yd (9.1 m)	0.94 ± 0.08	1.01 ± 0.09§	0.95 ± 0.10	0.94 ± 0.10	0.94 ± 0.14	0.95 ± 0.13
15–25 yd (9.1 m)	0.46 ± 0.10	0.38 ± 0.11§	0.44 ± 0.08	0.51 ± 0.07§	0.46 ± 0.10	0.47 ± 0.11
25–40 yd (13.7 m)	0.25 ± 0.05	0.23 ± 0.04	0.24 ± 0.04	0.30 ± 0.04	0.27 ± 0.05	0.26 ± 0.05



CONTRAS

SALVO TECNOLOGIA AVANZADA,
ES COMPLEJO MEDIR
ASISTENCIA

COLINA ARRIBA



A photograph showing a group of people jogging on a green grassy hillside. In the background, there is a white building with many windows and bare trees. A yellow rectangular frame surrounds the top left portion of the image.

BENEFICIOS

DISMINUCIÓN
EN 1 M/S DE LA
VELOCIDAD

= FRECUENCIA
DE PASO

> LONGITUD DE
PASO

> FLEXIÓN DE
CADERA

> INCLINACIÓN
DE TRONCO

AUMENTAR LA LONGITUD DE PASO



CONTRAS

ENCONTRAR UNA CUESTA CON
LA INCLINACIÓN ADECUADA

OTRAS SUPERFICIES





ARENA VS PASTO

Training intervention	Sand times (s)			Sand changes (s)		
	Week 0	Week 4	Week 8	Week 0–4	Week 4–8	Week 0–8
SAND						
Mean	3.82	3.73	3.67	-0.09	-0.06	-0.15
SD	0.27	0.27	0.26	0.04	0.05	0.05
p	n/a	n/a	n/a	0.003	0.05	0.001
% Chance	n/a	n/a	n/a	(97, 3, 0)‡	(62, 38, 0)	(100, 0, 0)‡
GRASS						
Mean	3.67	3.71	3.67	0.04	-0.04	0.00
SD	0.21	0.20	0.18	0.03	0.08	0.07
p	n/a	n/a	n/a	0.032	0.458	0.869
% Chance	n/a	n/a	n/a	(0, 79, 21)	(40, 58, 2)	(7, 85, 8)
SAND vs. GRASS						
Mean	-0.15	-0.02	-0.01	-0.13	-0.02	-0.15
SD	0.35	0.35	0.34	0.05	0.09	0.09
p	0.141	0.441	0.783	0.002	0.699	0.013
% Chance	(74, 15, 11)	(42, 26, 32)	(38, 27, 35)	(99, 1, 0)‡	(19, 74, 7)	(97, 3, 0)‡
Grass times (s)			Grass changes (s)			
Training intervention	Week 0	Week 4	Week 8	Week 0–4	Week 4–8	Week 0–8
SAND						
Mean	3.57†	3.46†	3.41†	-0.11	-0.04	-0.16
SD	0.23	0.21	0.22	0.14	0.03	0.11
p	n/a	n/a	n/a	0.026	0.062	0.020
% Chance	n/a	n/a	n/a	(88, 11, 1)‡	(33, 67, 0)	(96, 4, 0)‡
GRASS						
Mean	3.46†	3.40†	3.32†	-0.06	-0.08	-0.14
SD	0.18	0.15	0.12	0.06	0.06	0.06
p	n/a	n/a	n/a	0.046	0.027	0.011
% Chance	n/a	n/a	n/a	(70, 30, 0)	(84, 16, 0)‡	(97, 3, 0)‡
SAND vs. GRASS						
Mean	-0.11	-0.06	-0.09	-0.05	0.03	-0.02
SD	0.33	0.27	0.28	0.17	0.6	0.12
p	0.192	0.238	0.112	0.345	0.267	0.748
% Chance	(66, 20, 14)	(53, 28, 19)	(64, 23, 13)	(50, 40, 10)	(1, 29, 70)	(12, 37, 31)



ARENA VS PASTO

JUGADORES DE HOCKEY
SOBRE CÉSPED Y NETBALL

Variable	Group	Pre	Post	Time		Interaction	
				P	η^2	P	η^2
Leg press (kg)	SAND	242 ± 53	281 ± 47	0.001†	0.649	0.775	0.004
	GRASS	239 ± 44	274 ± 52				
SJ (W)	SAND	849 ± 315	917 ± 300	0.001†	0.592	0.511	0.020
	GRASS	801 ± 140	854 ± 169				
CMJ (W)	SAND	1003 ± 349	1063 ± 327	0.001†	0.467	0.220	0.068
	GRASS	945 ± 164	979 ± 182				
Agility (s)	SAND	6.96 ± 0.54	6.74 ± 0.52	0.005†	0.307	0.654	0.009
	GRASS	6.92 ± 0.37	6.76 ± 0.28				
20 m sprint							
5 m (s)	SAND	1.24 ± 0.08	1.21 ± 0.06	0.020†	0.224	0.280	0.053
	GRASS	1.18 ± 0.07	1.17 ± 0.05				
10 m (s)	SAND	2.08 ± 0.10	2.03 ± 0.08	0.001†	0.459	0.237	0.063
	GRASS	2.00 ± 0.10	1.97 ± 0.09				
20 m (s)	SAND	3.58 ± 0.17	3.49 ± 0.16	0.001†	0.443	0.049‡	0.164
	GRASS	3.44 ± 0.16	3.41 ± 0.15				

8 SEMANAS
3 X SEMANA (2 ESPECÍFICOS + 1 DE
CAMPO)
HIIT/RSA/CODS/SSG/SAPD



BENEFICIOS

> FRECUENCIA
DE PASO

< LONGITUD DE
ZANCADA

> ACTIVIDAD
EMG SM Y BF

> FLEXIÓN DE
CADERA

> FLEXIÓN
PLANTAR

> INCLINACIÓN
DE TRONCO

CONTRAS

NO TODOS VIVIMOS CERCA DE
LA PLAYA



CHALECOS



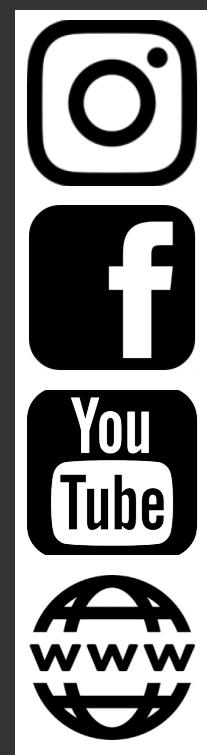
CHALECOS VS LIBRE

Load (kg)	Control Group (N = 7)		Experimental Group (N = 7)	
	Pre	Post	Pre	Post
0	41.7 6.9	41.4 5.5	42.9 8.2	47.4* 8.0
5	38.4 6.6	38.6 6.6	40.5 8.1	43.2† 8.1
10	35.5 6.3	34.8 4.8	37.4 8.6	41.1‡ 9.0
20	29.9 5.4	29.6 4.3	30.8 8.1	33.9† 8.1
50	18.5 3.8	18.1 3.8	20.8 5.8	22.3‡ 6.0
80	—	—	15.5 1.3	18.2‡ 1.7

[10] Bosco C. Et al (1986).

REFERENCIAS

- [1] Kawamori N. Et al (2014). Effects of weighted sled towing with heavy versus light load on sprint acceleration ability. JSCR.
- [2] Dawes J. & ¹ Lentz D. (2012). Methods of Developing Power to Improve Acceleration for the Non-Track Athlete. NSCA.
- [3] Petrakos G. Et al (2015). Resisted Sled Sprint Training to Improve Sprint Performance: A Systematic Review.
- [4] Morin JB Et al (2016). VERY-HEAVY SLED TRAINING FOR IMPROVING HORIZONTAL FORCE OUTPUT IN SOCCER PLAYERS.
- [5] Binnie M. Et al (2013). EFFECT OF SURFACE-SPECIFIC TRAINING ON 20-M SPRINT PERFORMANCE ON SAND AND GRASS SURFACES. JSCR.
- [6] Pinnington H. Et al (2005). Kinematic and electromyography analysis of submaximal differences running on a firm surface compared with soft, dry sand. JAP.
- [7] Binnie M. Et al (2013). Effect of sand versus grass training surfaces during an 8-week pre-season conditioning programme in team sport athletes. JSC.
- [8] Lockie R. Et al (2012). The effects of different speed training protocols on sprint acceleration kinematics and muscle strength and power in field sport athletes. JSCR.
- [9] Rumpf M. Et al (2015). The effect of different sprint training methods on sprint performance over various distances: a brief review. JSCR.
- [10] Bosco C. Et al (1986). The effect of extra-load conditioning on muscle performance in athletes. MSSE.
- [11] Rumpf M. Et al (2012). Effect of Different Training Methods on Running Sprint Times in Male Youth. HK.
- [12] Alcaraz P. Et al (2009). DETERMINING THE OPTIMAL LOAD FOR RESISTED SPRINT TRAINING WITH SLED TOWING. JSCR.
- [13] Alcaraz P. Et al (2008). EFFECTS OF THREE TYPES OF RESISTED SPRINT TRAINING DEVICES ON THE KINEMATICS OF SPRINTING AT MAXIMUM VELOCITY. JSCR.
- [14] UPTON D. (2011). THE EFFECT OF ASSISTED AND RESISTED SPRINT TRAINING ON ACCELERATION AND VELOCITY IN DIVISION I A FEMALE SOCCER ATHLETES



LIC. FEDERICO PÉREZ MANETTI
@FEDEPEREZMANETTI
FEDEPEREZMANETTI.COM.AR

