

Table S1 distribution of patients with Hypertension between the two cohorts

			COHORT		All
			Generation	Validation	
Systemic hypertension	No	n	176	66	242
		%	96.7%	95.7%	96.4%
	Yes	n	6	3	9
		%	3.3%	4.3%	3.6%
	All	n	182	69	251
		%	100.0%	100.0%	100.0%

P=0.709

Table S2 distribution of patients by sex between the two cohorts

			COHORT		All
			Generation	Validation	
Sex	Female	n	88	34	122
		%	48.4%	49.3%	48.6%
	Male	n	94	35	129
		%	51.6%	50.7%	51.4%
	All	n	182	69	251
		%	100.0%	100.0%	100.0%

P=0.896

Table S3 distribution of patients by the international physical activity questionnaire (IPAQ-27) between the two cohorts

			COHORT		All
			Generation	Validation	
Physical activity Category	1	n	2	1	3
		%	1.1%	1.4%	1.2%
	2	n	51	20	71
		%	28.5%	29.0%	28.6%
	3	n	126	48	174
		%	70.4%	69.6%	70.2%
	All	n	179	69	248
		%	100.0%	100.0%	100.0%

P=0.973

Table S4 distribution of patients by site between the two cohorts

			COHORT		All
			Generation	Validation	
SITE	1	n	21	2	23
		%	11.5%	2.9%	9.2%
	2	n	86	33	119
		%	47.3%	47.8%	47.4%
	3	n	19	10	29
		%	10.4%	14.5%	11.6%
	4	n	10	4	14
		%	5.5%	5.8%	5.6%
	5	n	13	5	18
		%	7.1%	7.2%	7.2%
	6	n	14	3	17
		%	7.7%	4.3%	6.8%
	7	n	11	7	18
		%	6.0%	10.1%	7.2%
	8	n	8	5	13
		%	4.4%	7.2%	5.2%
All		n	182	69	251
		%	100.0%	100.0%	100.0%

P=0.439

Table S5 distribution of patients by age strata between the two cohorts

			COHORT		All
			Generation	Validation	
Age Strata	<26	n	27	12	39
	years	%	14.8%	17.4%	15.5%
	26-35	n	32	10	42
	years	%	17.6%	14.5%	16.7%
	36-45	n	50	21	71
	years	%	27.5%	30.4%	28.3%
	46-55	n	30	14	44
	years	%	16.5%	20.3%	17.5%
	56-65	n	24	6	30
	years	%	13.2%	8.7%	12.0%
	>65	n	19	6	25
	years	%	10.4%	8.7%	10.0%
	All	n	182	69	251
		%	100.0%	100.0%	100.0%

P=0.323

Table S6 distribution of patients by body Mass Index (BMI) strata between the two cohorts

			COHORTE		All
			Generation	Validation	
BMI Strata	18.5-24.9	n	98	42	137
	kg·m⁻²	%	53.8%	60.9%	54.6%
	25-29.9	n	60	22	82
	kg·m⁻²	%	33.0%	31.9%	32.7%
	30-34.9	n	24	5	29
	kg·m⁻²	%	13.2%	7.2%	11.6%
	All	n	182	69	251
		%	100.0%	100.0%	100.0%

P=0.407

Table S7. Peak exercise variable percentiles by age

Variable	Age strata (years)	Percentiles						
		5	10	25	50	75	90	95
$\dot{V}O_2$ peak (l·min ⁻¹)	<26	2.02	2.08	2.24	2.37	3.43	3.65	3.72
	26-35	1.83	1.93	2.10	3.01	3.27	3.50	3.69
	36-45	1.58	1.69	1.78	2.55	2.92	3.06	3.18
	46-55	1.43	1.47	1.60	1.81	2.62	2.81	2.92
	56-65	1.26	1.35	1.44	1.87	2.43	2.64	2.85
	>65	0.87	1.06	1.27	1.86	2.11	2.47	2.55
$\dot{V}O_2$ peak (ml·min ⁻¹ ·kg ⁻¹)	<26	28.8	29.7	35.3	39.9	44.8	52.0	52.7
	26-35	30.9	31.8	35.8	40.5	43.5	45.8	48.4
	36-45	20.7	22.9	28.0	33.2	38.7	40.4	42.2
	46-55	18.3	20.4	25.2	27.6	31.3	35.2	37.2
	56-65	17.9	19.9	21.1	27.2	29.9	37.6	38.3
	>65	11.7	13.6	17.9	23.7	27.9	31.4	33.5
Peak work rate (W)	<26	141	147	168	189	253	315	321
	26-35	127	139	161	229	263	277	292
	36-45	103	110	131	181	236	253	259
	46-55	94	100	116	130	200	224	226
	56-65	66	81	93	137	184	200	232
	>65	40	48	80	127	150	195	215
RER at peak $\dot{V}O_2$	<26	1.10	1.10	1.11	1.19	1.25	1.28	1.33
	26-35	1.08	1.10	1.12	1.19	1.25	1.31	1.33
	36-45	1.10	1.11	1.15	1.22	1.25	1.33	1.39
	46-55	1.10	1.10	1.13	1.19	1.22	1.25	1.29
	56-65	1.07	1.10	1.13	1.20	1.25	1.31	1.38
	>65	1.07	1.09	1.11	1.13	1.16	1.24	1.32

RER: respiratory exchange ratio, $\dot{V}O_2$: oxygen uptake.

Table S8: Bivariate correlations between explicative variables and dependent variables

Variable	$\dot{V}O_2$ peak (l·min ⁻¹)		Peak Work rate (W)	
	r	p	r	p
Age (years)	-0.524	0.000	-0.517	0.000
Weight (kg)	0.420	0.000	0.339	0.000
Height (cm)	0.688	0.000	0.657	0.000
BMI (kg·m ⁻²)	0.013	0.832	-0.067	0.289
FFM (kg)	0.558	0.000	0.496	0.000
SEX	0.766	0.000	0.731	0.000
$\dot{V}O_2$ peak (l·min ⁻¹)	-	-	0.965	0.000
Peak Work rate (W)	0.965	0.000	-	-
IPAQ-27 category	-0.008	0.899	-0.004	0.945

$\dot{V}O_2$: oxygen uptake. IPAQ: international physical activity questionnaire- 27

Table S9. Agreement and correlation between different equations

	Intraclass correlation coefficient		Correlation Coefficient		Determination coefficient (R ²)
$\dot{V}O_2$ peak					
O-EQ1^a	0.967	(0.948 —0.980)	0.970	(0.912 —1.000)	0.941
O-EQ2	0.960	(0.948 —0.968)	0.961	(0.927 —0.995)	0.924
O- Hansen	0.958	(0.946 —0.967)	0.958	(0.922 —0.994)	0.918
O-FRIEND	0.952	(0.939 —0.962)	0.955	(0.918 —0.992)	0.912
EQ2-EQ1	1.000	(1.000 —1.000)	1.000	(1.000 —1.000)	1.000
EQ2-Hansen	0.984	(0.980 —0.988)	0.985	(0.964 —1.000)	0.970
EQ2-FRIEND	0.977	(0.971 —0.982)	0.984	(0.962 —1.000)	0.968
Hansen-FRIEND	0.976	(0.969 —0.981)	0.979	(0.954 —1.000)	0.958
Peak Work rate					
O-EQ1^a	0.923	(0.879 —0.952)	0.926	(0.836 —1.000)	0.857
O-EQ2	0.925	(0.905 0—.941)	0.927	(0.880 —0.974)	0.859
EQ1-EQ2	1.000	(1.000 —1.000)	1.000	(1.000 —1.000)	1.000
O $\dot{V}O_2$-PP			0.961	(0.927 —0.995)	0.924

^a: Validation cohort (n=69), EQ1: predictive equation derived from the generation cohort (table 3), EQ2: predictive equation derived from the whole sample (table 4), FRIEND: predicted values from the FRIEND equation³ Hansen: predicted values from Hansen et al² O: observed values in our cohort. PP: Peak Work rate $\dot{V}O_2$ peak: peak oxygen uptake:

Table S10. Mean differences between observed values in our cohort and predicted values from the different equations

	$\dot{V}O_2$ peak (l·min ⁻¹) EQ1	Peak Work rate (W) EQ1	$\dot{V}O_2$ peak (l·min ⁻¹) EQ2	Peak Work rate (W) EQ2	$\dot{V}O_2$ peak (l·min ⁻¹) Hansen	$\dot{V}O_2$ peak (l·min ⁻¹) FRIEND	$\dot{V}O_2$ peak (l·min ⁻¹) EQ2-Hansen	$\dot{V}O_2$ peak (l·min ⁻¹) EQ2-FRIEND
Average	0,001	-3	0,014	0	0,159	-0,137	0,144	-0,138
Standard deviation	0,167	22	0,178	22	0,187	0,197	0,118	0,197
Maximum	0,381	38	0,510	67	0,835	0,549	0,394	0,549
Minimum	-0,326	-47	-0,505	-58	-0,427	-0,629	-0,213	-0,629
LL95%CI bilateral	-0,326	-47	-0,334	-43	-0,208	-0,524	-0,087	-0,523
LL95%CI unilateral	-0,274	-40	-0,278	-36	-0,149	-0,461	-0,050	-0,461

EQ2: predictive equation derived from the whole sample (table 4). Hansen²: Predicted values from Hansen et al², FRIEND: Predicted values from the FRIEND equation³, EQ2-FRIEND equation: differences between the predicted values based on our cohort (table 4) and the predicted values from the FRIEND equation¹, EQ2-Hansen differences between the predicted values based on our cohort (table 4) and the predicted values from Hansen et al², LL95%CI bilateral: lower limit of the 95% confidence interval of the difference, $\dot{V}O_2$ peak: peak oxygen uptake.

Table S11. Observed values in the Spanish cohort as percentage of the predicted values from Hansen et al² and FRIEND equations³

	$\dot{V}O_2$ peak (l·min ⁻¹) Hansen et al	$\dot{V}O_2$ peak (l·min ⁻¹) FRIEND equation	$\dot{V}O_2$ peak (l·min ⁻¹) EQ2-Hansen	$\dot{V}O_2$ peak (l·min ⁻¹) EQ2-FRIEND
Average	108%	95.1%	103.5%	96.8%
Standard deviation	10%	8.9%	2.9%	4.9%
Maximum	142%	123.5%	111.2%	111.4%
Minimum	86%	73.3%	93.1%	81.6%
UL95%CI bilateral	127%	112.5%	109.1%	106.4%
LL95%CI bilateral	90%	77.8%	97.9%	87.2%
LL95%CI unilateral	92.6%	80.6%	98.8%	88.7%

EQ2: predictive equation derived from the whole sample (table 4). Hansen²: Predicted values from Hansen et al², FRIEND: Predicted values from the FRIEND equation³, EQ2-FRIEND equation: differences between the predicted values based on our cohort (table 4) and the predicted values from the FRIEND equation¹, EQ2-Hansen: differences between the predicted values based on our cohort (table 4) and the predicted values from Hansen et al², LL95%CI bilateral: lower limit of the 95% confidence interval of the difference, $\dot{V}O_2$ peak: peak oxygen uptake.

S12. $\dot{V}O_2$ peak ($\text{ml}\cdot\text{min}^{-1}\cdot\text{kg}^{-1}$) percentile comparison between observed and FRIEND observed values¹

Age group	Percentile		
	10	50	90
<29	31.2	40.6	51.3
30-39	28.3	37.7	44.8
40-49	21.9	30.8	39.3
50-59	20.2	27.6	36.5
60-69	17.8	24.7	34.2
>69	12.5	23.4	30.0
FRIEND equation			
<29	29.5	41.9	55.5
30-39	21.8	30.1	41.7
40-49	20.6	27.1	37.1
50-59	20.4	24.8	34.0
60-69	17.3	22.4	29.9
>69	15.6	19.9	26.9
Absolute Difference			
<29	1.7	-1.3	-4.2
30-39	6.5	7.6	3.1
40-49	1.3	3.7	2.2
50-59	-0.2	2.8	2.5
60-69	0.5	2.3	4.3
>69	-3.1	3.4	3.2
Difference as percentage			
<29	6%	-3%	-8%
30-39	30%	25%	8%
40-49	6%	13%	6%
50-59	-1%	11%	7%
60-69	3%	10%	14%
>69	-20%	17%	12%

Table S13. Predicted $\dot{V}O_2$ peak ($l \cdot \text{min}^{-1}$) from our whole cohort, Hansen et al² and FRIEND equations³ for men of healthy weight.

Age (yr)	Height (m)					
	1,6	1,65	1,7	1,75	1,8	1,85
EQ2						
25	3,01	3,09	3,18	3,26	3,35	3,43
30	2,89	2,98	3,06	3,15	3,23	3,32
35	2,78	2,86	2,95	3,03	3,12	3,20
40	2,66	2,75	2,83	2,92	3,00	3,09
45	2,55	2,63	2,72	2,80	2,89	2,97
50	2,43	2,52	2,60	2,69	2,77	2,86
55	2,32	2,40	2,49	2,57	2,66	2,74
60	2,20	2,29	2,37	2,46	2,54	2,63
55	2,09	2,17	2,26	2,34	2,43	2,51
70	1,97	2,06	2,14	2,23	2,31	2,40
75	1,86	1,94	2,03	2,11	2,20	2,28
Hansen et al						
25	2,72	2,88	3,05	3,21	3,38	3,54
30	2,60	2,76	2,91	3,07	3,22	3,38
35	2,48	2,63	2,77	2,92	3,07	3,22
40	2,35	2,50	2,64	2,78	2,92	3,06
45	2,23	2,37	2,50	2,64	2,77	2,90
50	2,11	2,24	2,36	2,49	2,62	2,74
55	1,99	2,11	2,23	2,35	2,47	2,59
60	1,87	1,98	2,09	2,20	2,31	2,43
55	1,74	1,85	1,95	2,06	2,16	2,27
70	1,62	1,72	1,82	1,91	2,01	2,11
75	1,50	1,59	1,68	1,77	1,86	1,95
FRIEND BMI (20 kg·m⁻²)						
25	2,59	2,77	2,95	3,14	3,33	3,53
30	2,50	2,67	2,85	3,03	3,22	3,41
35	2,41	2,58	2,75	2,92	3,10	3,29
40	2,32	2,48	2,65	2,82	2,99	3,17
45	2,23	2,38	2,54	2,71	2,88	3,05
50	2,14	2,29	2,44	2,60	2,76	2,93
55	2,05	2,19	2,34	2,49	2,65	2,81
60	1,96	2,10	2,24	2,39	2,54	2,69
55	1,87	2,00	2,14	2,28	2,42	2,57
70	1,78	1,91	2,04	2,17	2,31	2,45
75	1,69	1,81	1,94	2,07	2,20	2,33
FRIEND BMI (25 kg·m⁻²)						
	2,96	3,15	3,34	3,53	3,73	3,92
25	2,85	3,03	3,22	3,40	3,59	3,77
30	2,74	2,91	3,09	3,27	3,45	3,62
35	2,63	2,79	2,96	3,13	3,30	3,47
40	2,52	2,67	2,84	3,00	3,16	3,33
45	2,40	2,56	2,71	2,86	3,02	3,18
50	2,29	2,44	2,58	2,73	2,88	3,03
55	2,18	2,32	2,46	2,60	2,74	2,88
60	2,07	2,20	2,33	2,46	2,59	2,73
55	1,96	2,08	2,20	2,33	2,45	2,58
70	1,84	1,96	2,08	2,19	2,31	2,43
75	2,96	3,15	3,34	3,53	3,73	3,92

BMI: Body mass index

Table S14. Predicted $\dot{V}O_2$ peak ($l \cdot \text{min}^{-1}$) from our whole cohort, Hansen et al² and FRIEND equations³ for women of healthy weight.

Age (yr)	Height (m)					
	1,55	1,60	1,65	1,70	1,75	1,80
EQ2						
25	2,06	2,15	2,23	2,32	2,40	2,49
30	1,95	2,03	2,12	2,20	2,29	2,37
35	1,83	1,92	2,00	2,09	2,17	2,26
40	1,72	1,80	1,89	1,97	2,06	2,14
45	1,60	1,69	1,77	1,86	1,94	2,03
50	1,49	1,57	1,66	1,74	1,83	1,91
55	1,37	1,46	1,54	1,63	1,71	1,80
60	1,26	1,34	1,43	1,51	1,60	1,68
55	1,14	1,23	1,31	1,40	1,48	1,57
70	1,03	1,11	1,20	1,28	1,37	1,45
75	0,91	1,00	1,08	1,17	1,25	1,34
Hansen et al						
25	1,87	1,93	1,99	2,05	2,11	2,17
30	1,78	1,84	1,90	1,96	2,01	2,07
35	1,70	1,75	1,81	1,86	1,92	1,97
40	1,61	1,67	1,72	1,77	1,82	1,87
45	1,53	1,58	1,63	1,67	1,72	1,77
50	1,44	1,49	1,53	1,58	1,63	1,67
55	1,36	1,40	1,44	1,49	1,53	1,57
60	1,27	1,31	1,35	1,39	1,43	1,47
55	1,18	1,22	1,26	1,30	1,34	1,37
70	1,10	1,13	1,17	1,20	1,24	1,28
75	1,01	1,05	1,08	1,11	1,14	1,18
FRIEND BMI (19 kg·m⁻²)						
25	2,33	2,50	2,67	2,85	3,04	3,23
30	2,25	2,41	2,58	2,76	2,94	3,12
35	2,17	2,33	2,49	2,66	2,84	3,01
40	2,09	2,24	2,40	2,57	2,73	2,91
45	2,01	2,16	2,31	2,47	2,63	2,80
50	1,93	2,07	2,22	2,37	2,53	2,69
55	1,85	1,99	2,13	2,28	2,43	2,58
60	1,77	1,90	2,04	2,18	2,33	2,48
55	1,69	1,82	1,95	2,09	2,22	2,37
70	1,61	1,73	1,86	1,99	2,12	2,26
75	1,53	1,65	1,77	1,89	2,02	2,15
FRIEND BMI (24 kg·m⁻²)						
25	2,71	2,90	3,08	3,27	3,47	3,66
30	2,61	2,79	2,97	3,15	3,34	3,53
35	2,51	2,68	2,86	3,03	3,21	3,39
40	2,41	2,57	2,74	2,91	3,08	3,25
45	2,31	2,47	2,63	2,79	2,95	3,12
50	2,21	2,36	2,51	2,67	2,82	2,98
55	2,11	2,25	2,40	2,55	2,70	2,85
60	2,01	2,14	2,28	2,42	2,57	2,71
55	1,91	2,04	2,17	2,30	2,44	2,57
70	1,81	1,93	2,05	2,18	2,31	2,44
75	1,70	1,82	1,94	2,06	2,18	2,30

BMI: Body mass index

Table S15. Predicted $\dot{V}O_2$ peak ($l \cdot \text{min}^{-1}$) from de our whole cohort compared to the predicted values from Hansen et al² and FRIEND equations³ for men of healthy weight.

Age (yr)	Height (m)					
	1,6	1,65	1,7	1,75	1,8	1,85
Hansen et al						
25	110%	107%	104%	102%	99%	97%
30	111%	108%	105%	103%	100%	98%
35	112%	109%	106%	104%	101%	99%
40	113%	110%	107%	105%	103%	101%
45	114%	111%	109%	106%	104%	102%
50	115%	113%	110%	108%	106%	104%
55	117%	114%	112%	110%	108%	106%
60	118%	116%	113%	112%	110%	108%
55	120%	117%	116%	114%	112%	111%
70	122%	120%	118%	116%	115%	114%
75	124%	122%	121%	119%	118%	117%
FRIEND BMI (20 kg·m⁻²)						
25	116%	112%	108%	104%	101%	97%
30	116%	111%	108%	104%	100%	97%
35	115%	111%	107%	104%	100%	97%
40	115%	111%	107%	104%	100%	97%
45	114%	110%	107%	103%	100%	98%
50	114%	110%	106%	103%	100%	98%
55	113%	109%	106%	103%	100%	98%
60	112%	109%	106%	103%	100%	98%
55	112%	108%	105%	103%	100%	98%
70	111%	108%	105%	102%	100%	98%
75	110%	107%	105%	102%	100%	98%
FRIEND BMI (25 kg·m⁻²)						
25	101%	98%	95%	92%	90%	87%
30	101%	98%	95%	93%	90%	88%
35	101%	98%	96%	93%	91%	89%
40	101%	98%	96%	93%	91%	89%
45	101%	98%	96%	94%	92%	90%
50	101%	99%	96%	94%	92%	91%
55	101%	99%	97%	95%	93%	91%
60	101%	99%	97%	95%	94%	92%
55	101%	99%	97%	96%	94%	93%
70	101%	99%	98%	96%	95%	94%
75	101%	99%	98%	97%	96%	95%

BMI: Body mass index

Table S16. Predicted $\dot{V}O_2$ peak ($l \cdot \text{min}^{-1}$) from de Spanish whole cohort compared to the predicted values from Hansen et al² and FRIEND equations³ for women of healthy weight

Age (yr)	Height (m)					
	1,55	1,60	1,65	1,70	1,75	1,80
Hansen et al						
25	110%	111%	112%	113%	114%	114%
30	109%	110%	111%	112%	113%	114%
35	108%	109%	111%	112%	113%	114%
40	106%	108%	110%	111%	113%	114%
45	105%	107%	109%	111%	113%	114%
50	103%	106%	108%	110%	112%	114%
55	101%	104%	107%	109%	112%	114%
60	99%	102%	105%	108%	111%	114%
55	96%	100%	104%	107%	111%	114%
70	93%	98%	102%	106%	110%	114%
75	90%	95%	100%	105%	109%	114%
FRIEND BMI (19 kg·m⁻²)						
25	88%	86%	83%	81%	79%	77%
30	86%	84%	82%	80%	78%	76%
35	84%	82%	80%	78%	77%	75%
40	82%	80%	78%	77%	75%	74%
45	80%	78%	77%	75%	74%	72%
50	77%	76%	74%	73%	72%	71%
55	74%	73%	72%	71%	70%	69%
60	71%	70%	70%	69%	69%	68%
55	67%	67%	67%	67%	67%	66%
70	64%	64%	64%	64%	64%	64%
75	59%	60%	61%	62%	62%	62%
FRIEND BMI (24 kg·m⁻²)						
25	76%	74%	72%	71%	69%	68%
30	74%	73%	71%	70%	68%	67%
35	73%	71%	70%	69%	68%	67%
40	71%	70%	69%	68%	67%	66%
45	69%	68%	67%	67%	66%	65%
50	67%	67%	66%	65%	65%	64%
55	65%	65%	64%	64%	63%	63%
60	63%	62%	62%	62%	62%	62%
55	60%	60%	60%	61%	61%	61%
70	57%	58%	58%	59%	59%	59%
75	53%	55%	56%	57%	57%	58%

BMI: Body mass index

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