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ORIGINAL RESEARCH

Associations of Lifelong Exercise
Characteristics With Valvular Function and
Aortic Diameters in Patients With a Bicuspid
Aortic Valve

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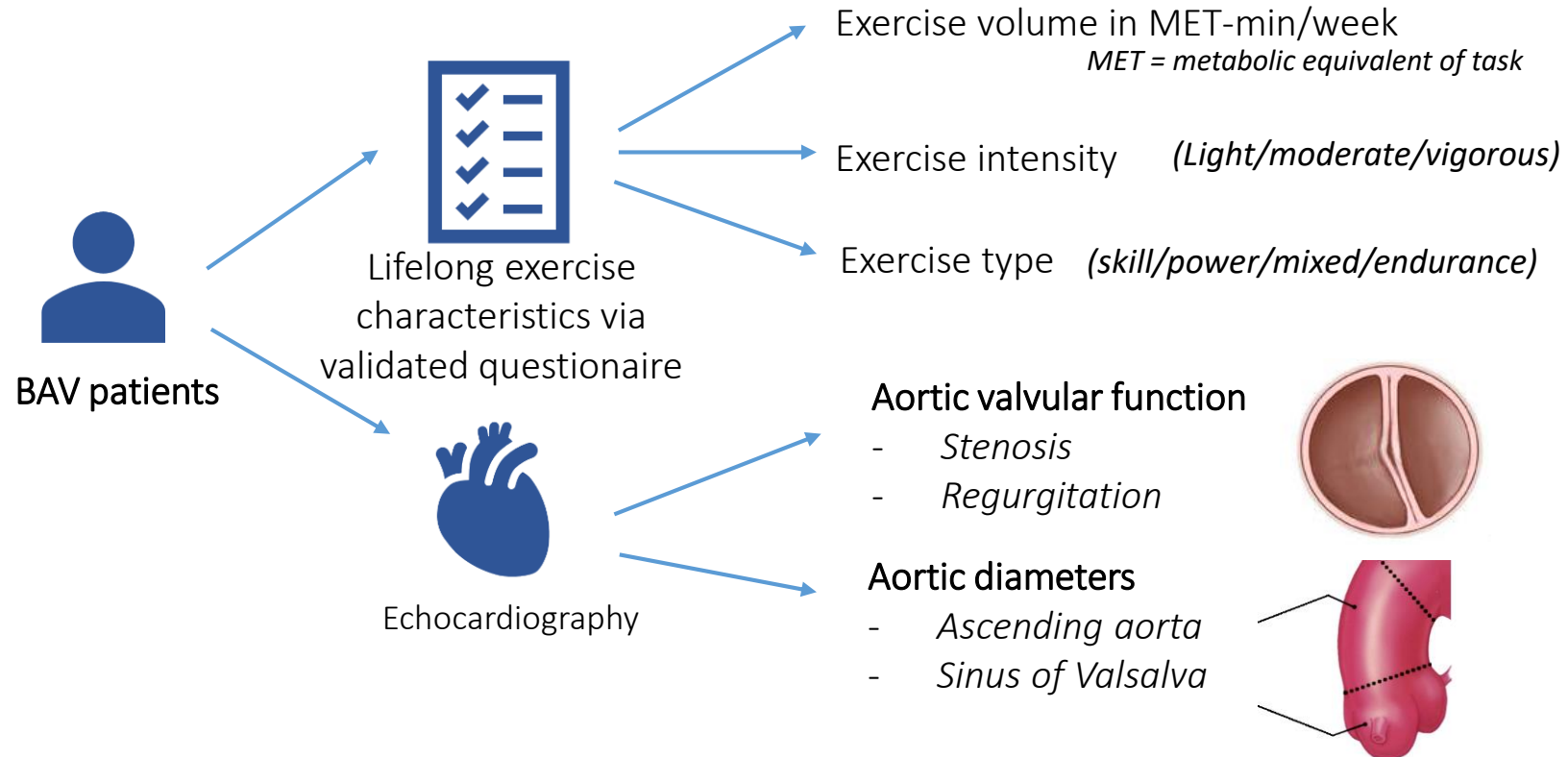
Bicuspid Aortic Valve

	Low risk	Low-intermediate risk	Intermediate risk	High risk
Diagnosis	<ul style="list-style-type: none"> Aorta <40 mm in BAV or tricuspid valve Turner syndrome without aortic dilatation 	<ul style="list-style-type: none"> MFS or other HTAD syndrome without aortic dilatation Aorta 40–45 mm in BAV or tricuspid valve After successful thoracic aorta surgery for BAV or other low risk situation 	<ul style="list-style-type: none"> Moderate aortic dilatation (40–45 mm in MFS or other HTAD; 45–50 mm in BAV or tricuspid valve, Turner syndrome ASI 20–25 mm/m², tetralogy of Fallot <50 mm) After successful thoracic aorta surgery for MFS or HTAD 	<ul style="list-style-type: none"> Severe aortic dilatation (>45 mm in MFS or other HTAD, >50 mm in BAV or tricuspid valve, Turner syndrome ASI >25 mm/m², tetralogy of Fallot >50 mm) After surgery with sequelae
Advice	<ul style="list-style-type: none"> All sports permitted with preference for endurance over power sports 	<ul style="list-style-type: none"> Avoid high and very high intensity exercise, contact, and power-sports. Preference for endurance over power sports 	<ul style="list-style-type: none"> Only skill sports or mixed or endurance sports at low intensity 	<ul style="list-style-type: none"> Sports are (temporarily) contra-indicated
Follow-up	Every 2–3 years	Every 1–2 years	Every 6 months to 1 year	Re-evaluation after treatment

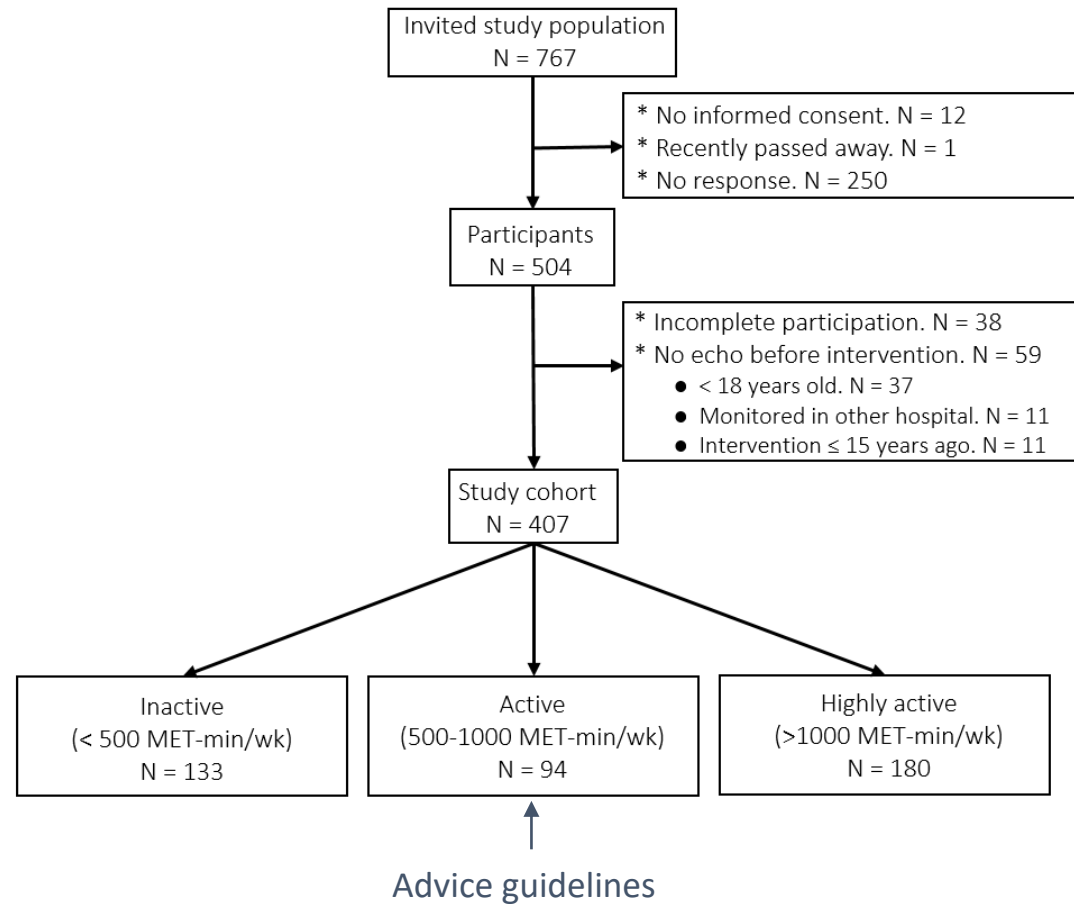
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Currently, expert consensus panels advise a cautious approach to sports activities when the ascending aorta is above the normal limits (see [section 5.4](#)). In the absence of aortopathy, exercise recommendations for individuals with BAV are identical to those in individuals with tricuspid aortic valve dysfunction.

Exercise in bicuspid aortic valve subjects



Exercise in bicuspid aortic valve subjects



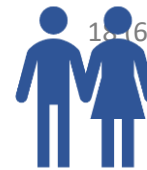
Results – Patient characteristics



N = 407



42 ± 17 years

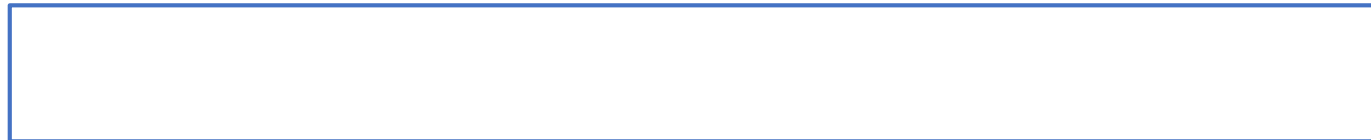


60 : 40

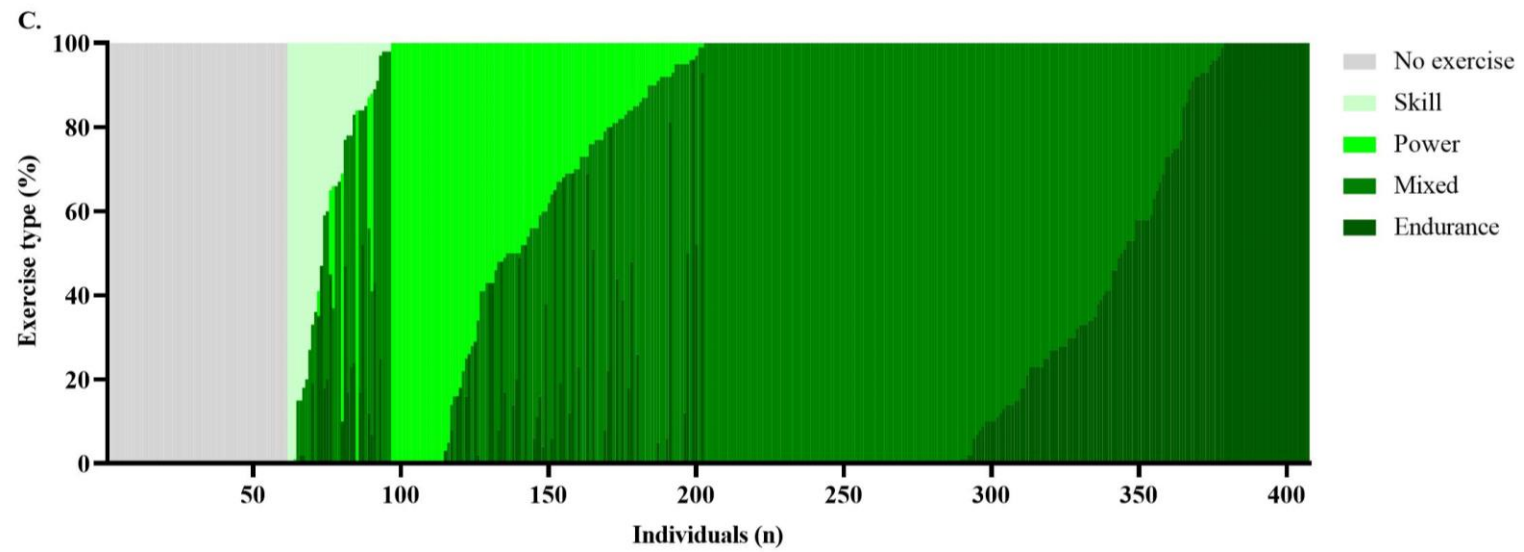


30 ± 17 years

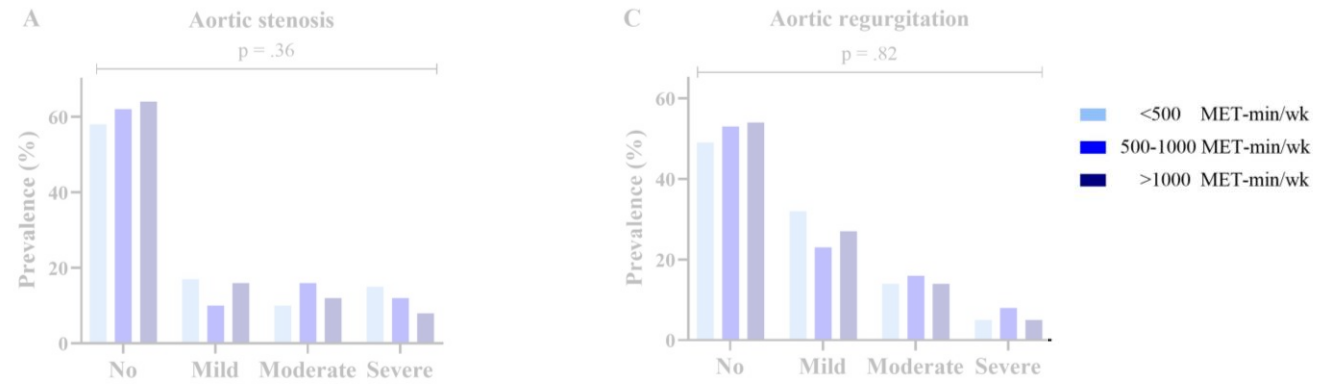
Characteristics	Lifelong physical activity (MET-min/week)			P-value
	<500 (n= 133)	500-1000 (n= 94)	>1000 (n=180)	
Age	49 [35-59]	51 [39-59]	29 [22-50]	<.001*
Gender, male (%)	15 (52%)	18 (62%)	16 (59%)	.72



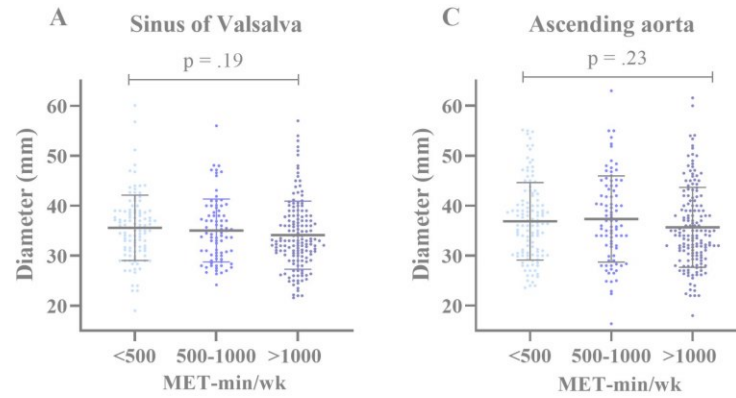
Exercise in bicuspid aortic valve subjects



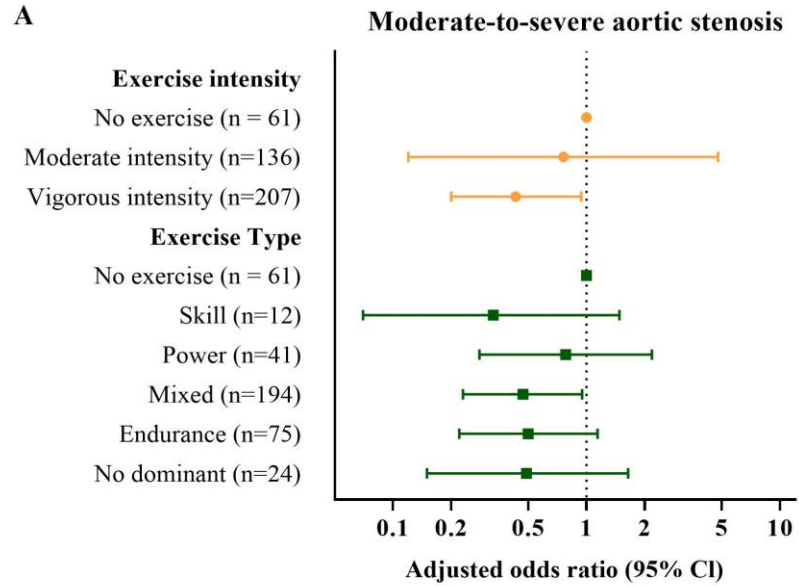
Exercise volume – valve dysfunction



Exercise volume – aortic dilatation



Exercise intensity and type



No association with aortic regurgitation or aortic dilatation

Subgroup > 35 years

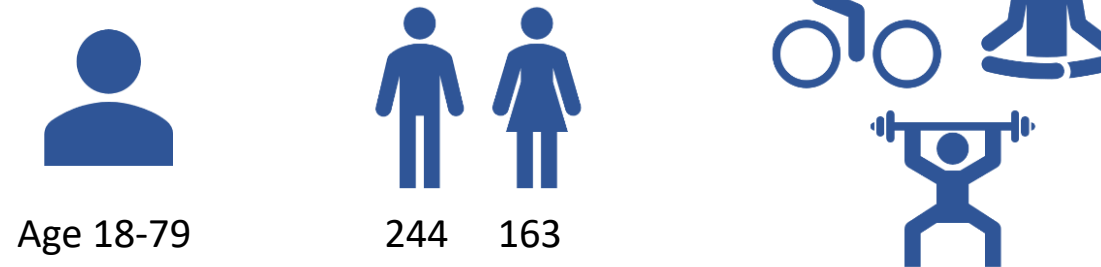
	Lifelong physical activity (MET-min/week)			P-value
	<500 (n= 100)	500-1000 (n= 75)	>1000 (n=73)	
Age	54 [46-61]	54 [47-61]	53 [44-61]	.90
Gender, male (%)	51 (51.0)	46 (61.3)	49 (67.1)	.09
Hypertension, n (%)	53 (53.0)	39 (52.0)	25 (34.2)	.031*
Current smoker, n (%)	10 (10.1)	5 (6.7)	3 (4.2)	.34
Dyslipidaemia, n (%)	20 (20.0)	10 (13.3)	7 (9.6)	.15
Diabetes, n (%)	7 (7.0)	3 (4.0)	1 (1.4)	.21
Systolic blood pressure, mmHg	133 [123-146]	130 [118-143]	127 [120-141]	.22
Heart rate, beats/minute	71 [62-78]	68 [60-80]	68 [61-76]	.64
Intervention aortic valve, n (%)	32 (32.0)	20 (26.7)	23 (31.5)	.72
Intervention aorta, n (%)	19 (19.0)	9 (12.0)	14 (19.2)	.39

Subgroup > 35 years

	Lifelong physical activity (MET-min/week)			P-value
	<500 (n= 100)	500-1000 (n= 75)	>1000 (n=73)	
Aortic stenosis				.40
None, n (%)	51 (51.5)	42 (56.0)	37 (50.7)	
Mild, n (%)	17 (17.2)	7 (9.3)	12 (16.4)	
Moderate, n (%)	11 (11.1)	15 (20.0)	14 (19.2)	
Severe, n (%)	20 (20.2)	11 (14.7)	10 (13.7)	
Aortic regurgitation				.36
None, n (%)	50 (50.5)	36 (48.0)	43 (58.9)	
Mild, n (%)	32 (32.3)	19 (25.3)	14 (19.2)	
Moderate, n (%)	14 (14.1)	14 (18.7)	11 (15.1)	
Severe , n (%)	3 (3.0)	6 (8.0)	5 (6.8)	
	Lifelong physical activity (MET-min/week)			P-value
	<500 (n= 100)	500-1000 (n= 75)	>1000 (n=73)	
Diameter sinuses of Valsalva, mm	36.4 ± 5.9	36.2 ± 6.3	37.2 ± 6.8	.65
Diameter ascending aorta, mm	38.5 ± 7.3	39.4 ± 8.0	39.8 ± 7.2	.53
Z-score sinuses of Valsalva	1.2 ± 1.6	0.8 ± 1.5	1.0 ± 1.5	.31
Z-score ascending aorta	2.3 ± 1.8	2.2 ± 1.7	2.3 ± 1.5	.95

Discussion

- No deleterious associations between exercise characteristics and BAV valvulo-aortopathy
- Vigorous intensity and mixed sports not associated with a higher risk for moderate-to-severe aortic stenosis
 - Representative population
 - Large, heterogeneous cohort



- Yet data remain retrospective
- <https://doi.org/10.1161/JAHA.123.031850>