

Online Resource 1

Similar Mood Benefit, Unequal Retention: A Pooled Analysis of Two Pilot Randomized Trials of Virtual Reality Boxing in Autistic and Non-Autistic Young Adults

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Table S1 Sensitivity analyses of the group $\times$ population interaction for sleep quality, resting heart rate, and sitting time

Outcome	Analysis	Estimate [95% CI]	p
PSQI	Complete case	-0.99 [-4.68, 2.69]	.588
PSQI	HC3	-0.99 [-3.81, 1.82]	.489
PSQI	Two-stage	-0.99 [-3.73, 1.75]	.468
PSQI	Multiple imputation (ITT)	-1.50 [-4.82, 1.81]	.364
PSQI	BOCF	-0.38 [-3.45, 2.70]	.806
PSQI	Covariate adjusted	-0.06 [-4.44, 4.33]	.980
Resting heart rate (bpm)	Complete case	-4.3 [-22.4, 13.8]	.634
Resting heart rate (bpm)	HC3	-4.3 [-24.5, 15.9]	.676
Resting heart rate (bpm)	Two-stage	-4.3 [-21.3, 12.7]	.607
Resting heart rate (bpm)	Multiple imputation (ITT)	-5.2 [-21.8, 11.4]	.526
Resting heart rate (bpm)	BOCF	-3.4 [-16.8, 10.1]	.617
Resting heart rate (bpm)	Covariate adjusted	-7.9 [-30.0, 14.1]	.469
Sitting time (min/day)	Complete case	-287 [-470, -104]	.003
Sitting time (min/day)	Two-stage	-287 [-485, -89]	.007
Sitting time (min/day)	HC3	-287 [-504, -70]	.010
Sitting time (min/day)	BOCF	-244 [-396, -91]	.002
Sitting time (min/day)	Excluding one implausible value	-316 [-488, -145]	<.001

Note. Estimates are the difference in VR effects (autism trial minus non-autistic trial). The excluded value is an autistic control participant whose sitting time fell from 170 to 30 min/day. ITT = intention to treat; BOCF = baseline observation carried forward.

Table S2 Within-trial VR – control effects under complete-case and intention-to-treat analyses

Outcome	Analysis	Non-autistic trial [95% CI]	Autism trial [95% CI]
PHQ-9	Complete case	-1.99 [-4.36, 0.39]	-2.19 [-6.57, 2.19]
PHQ-9	Multiple imputation (ITT)	-1.99 [-4.37, 0.40]	-1.88 [-5.61, 1.86]
PHQ-9	BOCF	-1.99 [-4.36, 0.39]	-1.95 [-5.67, 1.76]
lnRMSSD	Complete case	-0.24 [-0.73, 0.26]	+0.29 [-0.27, 0.86]
lnRMSSD	Multiple imputation (ITT)	-0.23 [-0.71, 0.25]	+0.23 [-0.26, 0.72]
lnRMSSD	BOCF	-0.22 [-0.70, 0.25]	+0.20 [-0.27, 0.68]
PSQI	Complete case	-0.23 [-2.64, 2.17]	-1.23 [-2.71, 0.26]
PSQI	Multiple imputation (ITT)	-0.23 [-2.65, 2.18]	-1.74 [-3.61, 0.13]
PSQI	BOCF	-0.23 [-2.64, 2.17]	-0.61 [-1.73, 0.51]
Resting heart rate (bpm)	Complete case	+3.2 [-6.8, 13.3]	-1.0 [-15.6, 13.5]
Resting heart rate (bpm)	Multiple imputation (ITT)	+2.1 [-8.2, 12.5]	-3.1 [-16.6, 10.4]
Resting heart rate (bpm)	BOCF	+2.8 [-7.0, 12.5]	-0.6 [-8.9, 7.7]

Table S3 Bayesian estimates of the group $\times$ population interaction

Outcome	Prior	Posterior mean [95% CrI]	Posterior probability	BF ₀₁
PHQ-9	N(0, 2.43 ²)	-0.11 [-3.32, 3.09]	P($\Delta < 0$) = 0.53	6.6
lnRMSSD	N(0, 0.34 ²)	+0.23 [-0.27, 0.73]	P($\Delta > 0$) = 0.82	2.2
PSQI	N(0, 1.74 ²)	-0.47 [-2.93, 1.99]	P($\Delta < 0$) = 0.65	5.6

Note. Normal approximation to the likelihood combined with a normal prior centered on zero (SD = 0.5 $\times$ baseline SD). Δ = interaction (autism trial minus non-autistic trial). BF₀₁ approximated from the Bayesian information criterion.

Table S4 Autism status versus baseline level as moderators of the VR effect

Outcome	Model	Group $\times$ baseline [95% CI]	p	Group $\times$ population [95% CI]	p
lnRMSSD	Group $\times$ baseline only	-0.19 [-0.93, 0.56]	.614	—	—
lnRMSSD	Both terms	-0.04 [-0.82, 0.74]	.923	+0.51 [-0.32, 1.35]	.222
PHQ-9	Group $\times$ baseline only	-0.06 [-0.57, 0.45]	.801	—	—
PHQ-9	Both terms	-0.05 [-0.57, 0.46]	.841	-1.50 [-6.05, 3.05]	.508

Note. Pooled complete-case models with a common baseline slope: post $\sim$ centered baseline $\times$ group + population (+ group $\times$ population).

Table S5 Raw pre–post change, *M* (SD), by trial and arm among completers

Outcome	Non-autistic VR	Non-autistic control	Autism VR	Autism control	n (VR/control)
PHQ-9	-1.31 (3.50)	+0.93 (3.25)	-3.83 (4.58)	+0.12 (4.05)	16/14 $\cdot$ 6/8
lnRMSSD	-0.21 (0.65)	+0.10 (0.69)	+0.10 (0.85)	-0.21 (0.38)	16/12 $\cdot$ 6/8
PSQI	-0.50 (3.71)	-0.43 (2.82)	-1.00 (1.10)	+0.12 (1.46)	16/14 $\cdot$ 6/8
Resting heart rate (bpm)	+4.1 (13.5)	+0.7 (12.8)	+0.5 (7.7)	+0.6 (11.6)	16/12 $\cdot$ 6/8
Body fat (%)	+0.07 (1.65)	-1.41 (1.73)	-0.12 (0.90)	-1.01 (1.66)	16/14 $\cdot$ 5/8
Skeletal muscle index (kg/m ²)	+0.01 (0.23)	+0.03 (0.21)	-0.08 (0.13)	-0.10 (0.13)	16/14 $\cdot$ 5/8
Visceral fat level	+0.00 (1.10)	-0.57 (0.65)	-0.20 (0.45)	-0.38 (0.74)	16/14 $\cdot$ 5/8
BMI (kg/m ²)	+0.10 (0.61)	-0.14 (0.77)	-0.12 (0.33)	-0.45 (0.39)	16/14 $\cdot$ 5/8
Physical activity (MET-min/week)	+1122 (2901)	-241 (2540)	+1350 (3339)	-844 (1128)	16/14 $\cdot$ 6/8
Sitting time (min/day)	+90 (150)	-13 (95)	-152 (138)	+69 (154)	16/14 $\cdot$ 6/8

Table S6 PHQ-9 responders among completers

Reduction	Trial	VR	Control	Risk difference (pp)	Fisher p
≥ 3 points	Non-autistic	7/16	2/14	+29	.118
≥ 3 points	Autism	4/6	2/8	+42	.277
≥ 5 points	Non-autistic	2/16	0/14	+12	.485
≥ 5 points	Autism	1/6	1/8	+4	1.00