

Supplemental Table 1. The Effect of Freezing Status on DTC Gait Outcomes

DTC Variable	Domain	F	Sig.	Point Estimate (Eta Sq.)	95% CI Lower	95% CI Upper
Foot Strike Angle	Lower Body	10.57	0.00	0.170	0.051	0.289
Stride Length	Lower Body	8.37	0.00	0.140	0.032	0.255
Toe Off Angle	Lower Body	5.89	0.00	0.103	0.012	0.211
Foot Strike Angle SD	Variability	4.11	0.02	0.074	0.001	0.174
Arm ROM	Upper Body	3.78	0.03	0.068	0.000	0.166
Arm ROM SD	Variability	1.67	0.19	0.031	0.000	0.109
Trunk Transverse ROM SD	Variability	1.59	0.21	0.030	0.000	0.106
Turn Duration	Turning	1.49	0.23	0.028	0.000	0.104
Trunk Sagittal ROM SD	Variability	1.20	0.30	0.023	0.000	0.093
Gait Speed	Lower Body	1.16	0.32	0.022	0.000	0.091
Gait Cycle Duration	Lower Body	1.01	0.37	0.019	0.000	0.086
Trunk Coronal ROM	Upper Body	1.01	0.37	0.019	0.000	0.085
Step Duration	Lower Body	0.97	0.38	0.018	0.000	0.084
Gait Speed SD	Variability	0.96	0.38	0.018	0.000	0.084
Stride Length SD	Variability	0.71	0.49	0.014	0.000	0.073
Turn Duration SD	Variability	0.32	0.73	0.006	0.000	0.050
Trunk Coronal ROM SD	Variability	0.29	0.75	0.006	0.000	0.048
Trunk Transverse ROM	Upper Body	0.21	0.81	0.004	0.000	0.041
Double Support Time	Lower Body	0.19	0.83	0.004	0.000	0.038
Turn Velocity SD	Variability	0.10	0.90	0.002	0.000	0.027
Trunk Sagittal ROM	Upper Body	0.10	0.90	0.002	0.000	0.026
Cognitive # Correct	Cognitive	0.1	0.90	0.002	0.000	0.027
Step Duration SD	Variability	0.05	0.95	0.001	0.000	0.013
Toe Off Angle SD	Variability	0.04	0.96	0.001	0.000	0.007
Double Support Time SD	Variability	0.02	0.98	0.000	0.000	0.000
Turn Velocity	Turning	0.01	0.99	0.000	0.000	0.000
Gait Cycle Duration SD	Variability	0.00	1.00	0.000	0.000	0.000

One-way ANOVA assessed the effect of freezing status (definite freezer, possible freezer, or non-freezer) on the DTC of the 26 gait measures and one cognitive measure

Supplemental Table 2. Mean and standard deviation of Single task (ST), Dual task (DT) and Dual Task Cost (DTC) for each gait metric across freezing groups

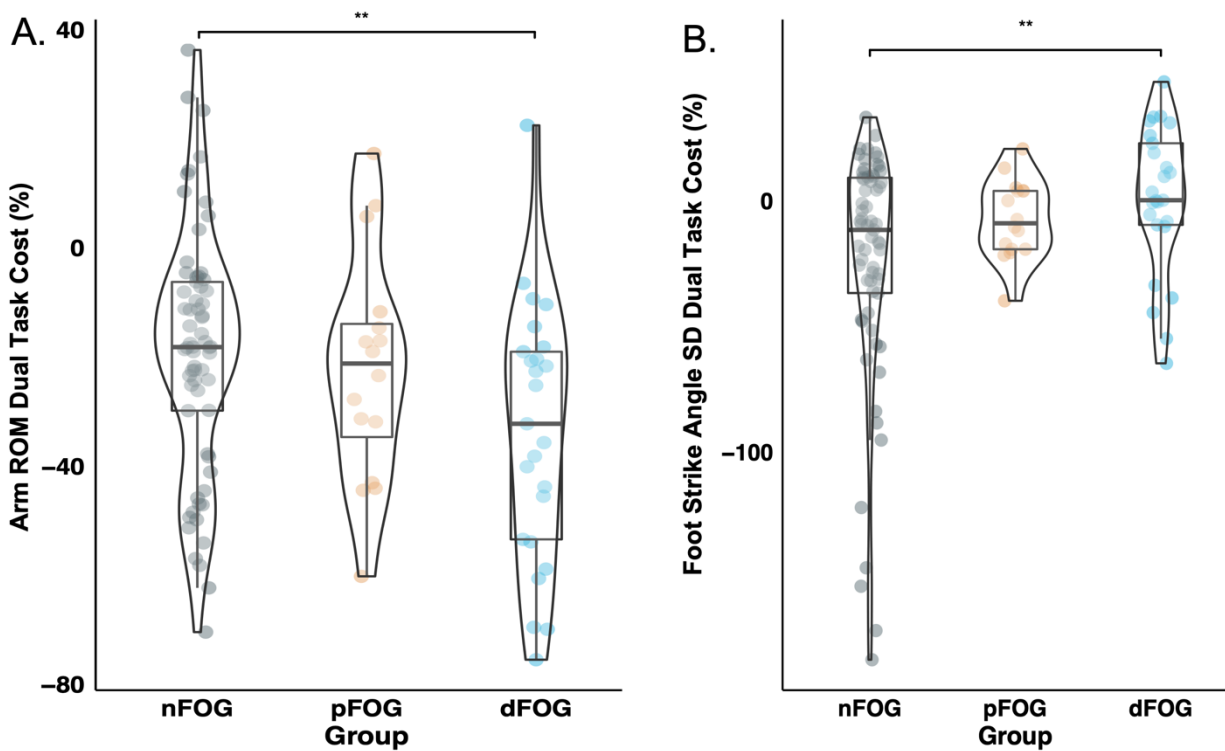
Measure	Group	ST	DT	t	p	DTC	DTC t-test	t	p
Arm ROM*	nFOG	29.76 (13.04)	24.24 (12.82)	-2.43	0.016	-19.17 (22.6)	nFOG-pFOG	0.52	0.61
	pFOG	28.52 (11.4)	21.93 (8.83)	-1.83	0.078	-22.22 (20.86)	pFOG-dFOG	1.64	0.11
	dFOG	22.36 (13.64)	14.23 (8.9)	-2.5	0.017	-33.76 (23.58)	dFOG-nFOG	2.66	0.01
Arm ROM SD	nFOG	6.11 (3.93)	4.98 (4.62)	-1.5	0.136	12.01 (45.16)	nFOG-pFOG	-0.53	0.60
	pFOG	5.39 (2.3)	4.04 (2.28)	-1.66	0.106	18.86 (46.84)	pFOG-dFOG	-0.85	0.40
	dFOG	5.75 (4.28)	3.25 (2.49)	-2.53	0.016	31.67 (46.86)	dFOG-nFOG	-1.80	0.08
Double Support Time	nFOG	22.33 (5.17)	25.31 (6.87)	2.79	0.006	-13.18 (12.82)	nFOG-pFOG	-0.45	0.66
	pFOG	23.23 (3.76)	26.09 (7.75)	1.33	0.198	-11.04 (17.9)	pFOG-dFOG	0.48	0.63
	dFOG	24.17 (3.89)	27.49 (5.85)	2.37	0.023	-13.62 (14.41)	dFOG-nFOG	0.13	0.90
Double Support Time SD	nFOG	1.64 (1.2)	1.91 (1.68)	1.05	0.298	-27.15 (119.81)	nFOG-pFOG	-0.18	0.86
	pFOG	1.77 (0.66)	2.24 (1.5)	1.13	0.273	-23.51 (56.13)	pFOG-dFOG	-0.07	0.95
	dFOG	2.34 (1.19)	2.62 (1.07)	0.87	0.389	-22.3 (54.01)	dFOG-nFOG	-0.26	0.79
Foot Strike Angle*	nFOG	13.84 (4.61)	11.97 (5.08)	-2.2	0.03	-17.02 (27.27)	nFOG-pFOG	-1.30	0.21
	pFOG	13.64 (6.02)	11.97 (5.56)	-0.81	0.422	-2.23 (43.41)	pFOG-dFOG	3.35	<0.01
	dFOG	8.45 (4.91)	5.56 (4.64)	-2.13	0.038	-45.53 (35.19)	dFOG-nFOG	3.65	<0.01
Foot Strike Angle SD*	nFOG	1.84 (0.57)	2.22 (0.9)	2.87	0.005	-25.36 (47.78)	nFOG-pFOG	-2.54	0.01
	pFOG	1.96 (0.52)	2.12 (0.73)	0.75	0.461	-7.36 (15.57)	pFOG-dFOG	-1.11	0.28
	dFOG	2.25 (0.56)	2.16 (0.58)	-0.55	0.586	0.42 (29.23)	dFOG-nFOG	-3.10	<0.01
Gait Cycle Duration	nFOG	1.08 (0.09)	1.19 (0.16)	4.51	<0.001	-9.37 (9.64)	nFOG-pFOG	0.48	0.64
	pFOG	1.1 (0.12)	1.25 (0.36)	1.54	0.14	-12.48 (25.66)	pFOG-dFOG	-0.90	0.38
	dFOG	1.09 (0.13)	1.16 (0.19)	1.47	0.149	-6.24 (13.09)	dFOG-nFOG	-1.09	0.28
Gait Cycle Duration SD	nFOG	0.03 (0.01)	0.05 (0.03)	4.35	<0.001	-83.44 (164.92)	nFOG-pFOG	-0.07	0.94
	pFOG	0.04 (0.01)	0.07 (0.11)	1.31	0.209	-79.41 (209.6)	pFOG-dFOG	0.03	0.98
	dFOG	0.04 (0.03)	0.07 (0.04)	2.11	0.041	-81.18 (156.12)	dFOG-nFOG	-0.06	0.95
Gait Speed	nFOG	0.99 (0.17)	0.84 (0.19)	-4.69	<0.001	-15.46 (10.43)	nFOG-pFOG	0.05	0.96
	pFOG	0.96 (0.21)	0.82 (0.25)	-1.65	0.109	-15.64 (14.43)	pFOG-dFOG	0.88	0.39

	dFOG	0.8 (0.23)	0.64 (0.21)	-2.6	0.013	-19.8 (15.38)	dFOG-nFOG	1.30	0.20
Gait Speed SD	nFOG	0.06 (0.02)	0.06 (0.02)	0.26	0.795	-7.96 (42.65)	nFOG-pFOG	-2.06	0.04
	pFOG	0.06 (0.02)	0.06 (0.02)	-0.39	0.696	6.71 (19.14)	pFOG-dFOG	0.85	0.40
	dFOG	0.06 (0.02)	0.06 (0.02)	-0.67	0.506	-1.3 (40.83)	dFOG-nFOG	-0.68	0.50
Step Duration	nFOG	0.54 (0.04)	0.59 (0.08)	4.44	<0.001	-9.2 (9.51)	nFOG-pFOG	0.46	0.65
	pFOG	0.55 (0.06)	0.62 (0.18)	1.52	0.147	-12.27 (26.16)	pFOG-dFOG	-0.87	0.39
	dFOG	0.54 (0.07)	0.58 (0.09)	1.46	0.152	-6.15 (12.8)	dFOG-nFOG	-1.08	0.29
Step Duration SD	nFOG	0.02 (0.01)	0.03 (0.02)	3.16	<0.001	-65.72 (119.86)	nFOG-pFOG	0.15	0.88
	pFOG	0.02 (0.01)	0.04 (0.06)	1.31	0.211	-72.66 (173.18)	pFOG-dFOG	0.03	0.97
	dFOG	0.03 (0.02)	0.04 (0.02)	2.54	0.015	-74.31 (107.13)	dFOG-nFOG	0.33	0.74
Stride Length*	nFOG	1.06 (0.14)	0.97 (0.15)	-3.5	<0.001	-8.63 (7.07)	nFOG-pFOG	-0.03	0.98
	pFOG	1.03 (0.16)	0.95 (0.17)	-1.48	0.148	-8.57 (6.81)	pFOG-dFOG	2.74	0.01
	dFOG	0.86 (0.23)	0.72 (0.23)	-2.13	0.038	-16.3 (11.24)	dFOG-nFOG	3.18	<0.01
Stride Length SD	nFOG	0.05 (0.02)	0.05 (0.02)	1.38	0.172	-16.49 (51.54)	nFOG-pFOG	-1.48	0.15
	pFOG	0.05 (0.02)	0.06 (0.03)	0.42	0.68	-2.18 (28.9)	pFOG-dFOG	0.64	0.53
	dFOG	0.06 (0.02)	0.06 (0.02)	0.19	0.851	-9.01 (39.64)	dFOG-nFOG	-0.73	0.47
Toe Off Angle*	nFOG	31.86 (3.89)	30 (3.99)	-2.7	0.008	-5.84 (5.3)	nFOG-pFOG	-1.09	0.28
	pFOG	30.98 (4.29)	29.62 (4.62)	-0.86	0.394	-4.56 (3.88)	pFOG-dFOG	2.92	0.01
	dFOG	27.68 (5.96)	24.9 (5.99)	-1.64	0.107	-10.14 (8.22)	dFOG-nFOG	2.43	0.02
Toe Off Angle SD	nFOG	1.55 (0.47)	1.68 (0.52)	1.45	0.149	-12.17 (32.68)	nFOG-pFOG	-0.21	0.83
	pFOG	1.49 (0.39)	1.62 (0.52)	0.78	0.441	-10.32 (30.92)	pFOG-dFOG	0.02	0.98
	dFOG	1.74 (0.58)	1.85 (0.64)	0.67	0.503	-10.56 (29.32)	dFOG-nFOG	-0.23	0.82
Trunk Coronal ROM	nFOG	4.06 (1.54)	4.04 (1.49)	-0.06	0.952	-0.89 (17.27)	nFOG-pFOG	0.95	0.36
	pFOG	4.11 (1.36)	4.3 (1.31)	0.41	0.685	-8.98 (32.97)	pFOG-dFOG	-0.94	0.36
	dFOG	3.93 (1.99)	3.93 (2.27)	-0.01	0.994	-0.11 (23.32)	dFOG-nFOG	-0.15	0.88
Trunk Coronal ROM SD	nFOG	0.78 (0.3)	0.79 (0.31)	0.13	0.898	-5.45 (35.74)	nFOG-pFOG	0.53	0.60
	pFOG	0.77 (0.26)	0.84 (0.37)	0.6	0.551	-10.32 (32.04)	pFOG-dFOG	-0.86	0.40
	dFOG	0.75 (0.24)	0.76 (0.27)	0.11	0.913	-2.33 (24.06)	dFOG-nFOG	-0.48	0.63

Trunk Sagittal ROM	nFOG	3.96 (1.05)	3.91 (0.94)	-0.3	0.768	-0.16 (14.03)	nFOG-pFOG	-0.50	0.62
	pFOG	4.01 (0.98)	3.92 (0.97)	-0.25	0.802	1.5 (11.34)	pFOG-dFOG	0.28	0.78
	dFOG	3.57 (0.86)	3.53 (0.84)	-0.16	0.873	0.45 (12.68)	dFOG-nFOG	-0.20	0.85
Trunk Sagittal ROM SD	nFOG	1.01 (0.47)	0.96 (0.4)	-0.68	0.496	-1.02 (38.4)	nFOG-pFOG	0.93	0.36
	pFOG	0.92 (0.41)	0.97 (0.44)	0.33	0.747	-8.56 (26.35)	pFOG-dFOG	-2.02	0.05
	dFOG	0.88 (0.24)	0.8 (0.25)	-1.13	0.263	7.8 (23.73)	dFOG-nFOG	-1.31	0.19
Trunk Transverse ROM	nFOG	7.74 (2.28)	7.72 (2.31)	-0.07	0.946	-0.48 (14.54)	nFOG-pFOG	-0.68	0.50
	pFOG	6.81 (2.3)	6.67 (2.06)	-0.18	0.855	1.51 (9.14)	pFOG-dFOG	0.06	0.95
	dFOG	6.49 (1.61)	6.38 (1.67)	-0.25	0.8	1.27 (15.68)	dFOG-nFOG	-0.48	0.63
Trunk Transverse ROM SD	nFOG	1.33 (0.4)	1.42 (0.56)	1.04	0.299	-6.97 (23.79)	nFOG-pFOG	1.15	0.26
	pFOG	1.18 (0.3)	1.39 (0.53)	1.39	0.178	-15.69 (27.98)	pFOG-dFOG	-1.64	0.11
	dFOG	1.33 (0.36)	1.32 (0.38)	-0.07	0.946	-1.52 (25.43)	dFOG-nFOG	-0.93	0.36
Turn Duration	nFOG	2.46 (0.36)	2.67 (0.45)	2.96	<0.001	-8.9 (11.47)	nFOG-pFOG	-2.00	0.05
	pFOG	2.78 (0.58)	2.87 (0.63)	0.43	0.67	-3.51 (9.13)	pFOG-dFOG	0.21	0.84
	dFOG	3.04 (0.6)	3.1 (0.54)	0.33	0.742	-4.51 (20.93)	dFOG-nFOG	-0.98	0.34
Turn Duration SD	nFOG	0.32 (0.13)	0.35 (0.19)	1.11	0.269	-22.87 (78.51)	nFOG-pFOG	0.54	0.60
	pFOG	0.31 (0.12)	0.35 (0.15)	0.77	0.446	-37.94 (105.4)	pFOG-dFOG	-0.67	0.51
	dFOG	0.44 (0.26)	0.4 (0.33)	-0.37	0.714	-14.3 (115.91)	dFOG-nFOG	-0.33	0.74
Turn Velocity	nFOG	150.19 (34.46)	137.83 (31.99)	-2.12	0.036	-7.83 (10.75)	nFOG-pFOG	-0.14	0.89
	pFOG	133.26 (32.58)	124.18 (33.98)	-0.77	0.446	-7.44 (9.81)	pFOG-dFOG	0.15	0.88
	dFOG	111.3 (28.87)	102.55 (27)	-1.1	0.278	-7.93 (10.95)	dFOG-nFOG	0.04	0.97
Turn Velocity SD	nFOG	16.64 (7.08)	14.89 (8.82)	-1.24	0.217	2.85 (87.04)	nFOG-pFOG	0.48	0.63
	pFOG	14.93 (5.6)	14.28 (8.29)	-0.26	0.795	-4.74 (46.28)	pFOG-dFOG	0.00	1.00
	dFOG	12.54 (6.42)	10.68 (7.25)	-0.95	0.348	-4.63 (89.03)	dFOG-nFOG	0.36	0.72
Cognitive task	nFOG	30.18 (10.05)	30.85 (10.26)	0.37	0.71	6.82 (31.16)	nFOG-pFOG	-0.56	0.58
	pFOG	26.44 (9.48)	27.81 (7.75)	0.45	0.66	11.4 (28.75)	pFOG-dFOG	0.22	0.82
	dFOG	29.32 (9.93)	29.64 (9.91)	0.11	0.91	8.58 (52.21)	dFOG-nFOG	-0.16	0.88

Mean and standard deviation of Single-, Dual-task and Dual Task Cost for each gait metric across freezing groups. The first t-test indicates the within-task difference between single vs DT performance. The 2nd t-test indicates changes in DTC across FOG groups. * indicates variables in which a significant effect of freezing status on DTC was observed via one-way ANOVA analyses). Bold represents statistically significant findings at the $p < 0.05$ level.

Supplemental Figure 1



Supplemental Figure 1. Distribution of dual task cost (DTC) metrics across Freezing groups (nFOG-non-freezers, pFOG-potential freezers and dFOG-definite freezers). The violin plot shows the distribution of DTC. Boxplot shows the median and interquartile range. Asterisks indicate significant differences in post-hoc paired comparisons (** $p < 0.001$, *** $p < 0.0001$)