

Supplementary material

Heat Stress impacts fatigue, vitality and risk-taking behaviour: A repeated-measures between-groups experiment

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Abbreviations

Testing before heat exposure (T1), during (T2) and post (T3), rate-of-fatigue (ROF), thermal comfort (TC), thermal sensation (TS), Short-Urgency-Premeditation-Perseverance-Sensation Seeking-Positive Urgency (SUPPS-P), Akaike information criterion (AIC), Bayesian information criterion (BIC), likelihood (LL), random effect (RE), fixed effect (FE), likelihood-ratio test (LRT), intraclass correlation (ICC), standard errors (*SE*), standard deviation (*SD*), 95% confidence intervals (CI), t-values (*t*), p-values (*p*), intraclass correlation (ICC) and r-squared (*r*² conditional and marginal)

Supplementary Table 1

Rate of Fatigue (ROF) Mixed Model comparison and the model building/selection process

Model	Nested / simpler Model	Random effects	Fixed effects	Model fit					LRT against nested	
				AIC	BIC	LL	df	deviance	X ²	p
Separate interaction	-	Intercept participants	Timepoint x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time + TS x group	234.35	304.09	-91.18	-	182.35	-	-
Separate interaction + triple interaction vitality	Separate interaction	Intercept participants	Timepoint x group + vitality + vitality x time x group + TC + TC x time + TC x group + TS + TS x time + TS x group	237.18	317.65	-88.59	4	177.18	5.17	.27
Separate interaction + triple interaction TC	Separate interaction	Intercept participants	Timepoint x group + vitality + vitality x time + vitality x group + TC + TC x time x group + TS + TS x time + TS x group	239.30	319.76	-89.65	4	179.30	3.05	.55
Separate interaction + triple interaction TS	Separate interaction	Intercept participants	Timepoint x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time x group	237.82	318.29	-88.91	4	177.82	4.53	.34
Triple interaction	Separate interaction	Intercept participants	Timepoint x group + vitality + vitality x time x group + TC + TC x time x group + TS + TS x time x group	241.66	343.58	-82.83	12	165.66	16.69	.16

ROF final model: Separate interaction					
Model parameter	Fixed Effects				
	Estimate/ β	SE	95% CI	<i>t</i>	<i>p</i>
Intercept	0.02	0.21	-0.41 – 0.44	0.08	.938
T2	-0.33	0.21	-0.74 – 0.08	-1.60	.114
T3	-0.50	0.21	-0.92 – -0.08	-2.37	.020
Group PHS	-0.37	0.29	-0.95 – 0.22	-1.25	.214
Group CHS	0.02	0.29	-0.55 – 0.59	0.07	.946
Group PHS X T2	0.80	0.37	0.06 – 1.54	2.16	.034
Group PHS X T3	0.95	0.30	0.36 – 1.55	3.18	.002
Group CHS X T2	-0.06	0.34	-0.74 – 0.62	-0.17	.866
Group CHS X T3	0.82	0.39	0.05 – 1.59	2.12	.037
Vitality	-0.98	0.17	-1.31 – -0.65	-5.87	<.001
Vitality X Group PHS	0.30	0.21	-0.11 – 0.72	1.45	.151
Vitality X Group CHS	0.21	0.20	-0.19 – 0.62	1.04	.303
Vitality X T2	0.42	0.15	0.13 – 0.71	2.84	.006
Vitality X T3	0.22	0.14	-0.05 – 0.50	1.60	.114
TC	0.25	0.21	-0.16 – 0.66	1.23	.224
TC X Group PHS	-0.27	0.22	-0.70 – 0.17	-1.22	.225
TC X Group CHS	-0.27	0.23	-0.74 – 0.19	-1.16	.248
TC X T2	-0.23	0.18	-0.60 – 0.14	-1.25	.214
TC X T3	0.00	0.20	-0.39 – 0.39	0.01	.993
TS	-0.16	0.16	-0.48 – 0.17	-0.96	.341

TS X Group PHS	0.06	0.24	-0.42 – 0.54	0.25	.802
TS X Group CHS	0.23	0.20	-0.17 – 0.63	1.13	0.260
TS X T2	0.33	0.16	-0.00 – 0.65	1.99	0.050
TS X T3	0.12	0.16	-0.20 – 0.44	0.77	0.441
Random Effects					
	Variance			SD	
Participant (Intercept)	0.19			0.44	
Residual	0.20			0.45	
Model fit					
	Marginal			Conditional	
<i>r</i> ²	.614			.801	
ICC (Participant)				.48	

The response ROF variable γ_i is modelled as:

$$\gamma(\text{ROF})_i = \beta_0 + \beta_1 * \text{time}_i + \beta_2 * \text{group}_i + \beta_3 * (\text{time}_i * \text{group}_i) + \beta_4 * \text{vitality}_i + \beta_5 * (\text{time}_i * \text{vitality}_i) + \beta_6 * (\text{group}_i * \text{vitality}_i) + \beta_7 * \text{TC}_i + \beta_8 * (\text{time}_i * \text{TC}_i) + \beta_9 * (\text{group}_i * \text{TC}_i) + \beta_{10} * \text{TS}_i + \beta_{11} * (\text{time}_i * \text{TS}_i) + \beta_{12} * (\text{group}_i * \text{TS}_i) + u_{i0} + \epsilon_i$$

- γ_i : response for the i -th observation.
- β : fixed intercept
- u_{i0} : random intercept for the i -th participant.
- ϵ_i : residual error term for the i -th observation.
- The random effects structure: $u_{i2} \sim N(0, \sigma^2)$

Note. All subjective variables (vitality, ROF, TS, TC) were z-standardised prior to the analysis. The β -values represent the standardized fixed effects predicting ROF. Random intercepts were specified for participants. Bootstrapping with 1000 iterations for all values was used. Results reaching the significance threshold of $p < .05$ were marked in bold.

Supplementary Table 2

Vitality Mixed Model comparison and the model building/selection process

Model	Nested / simpler Model	Random effects	Fixed effects	Model fit					LRT against nested	
				AIC	BIC	LL	df	deviance	X ²	p
Separate interaction	-	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + TC + TC x time + TC x group + TS + TS x time + TS x group	213.58	283.32	-80.79	-	161.58	-	-
Separate interaction + triple interaction fatigue	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time x group + TC + TC x time + TC x group + TS + TS x time + TS x group	218.72	299.19	-79.36	4	158.72	76.08	.58
Separate interaction + triple interaction TC	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + TC + TC x time x group + TS + TS x time + TS x group	206.31	286.77	-73.16	4	146.31	15.27	.004
Separate interaction + triple interaction TS	Separate interaction + triple interaction TC	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + TC + TC x time + TC x group + TS + TS x time x group	219.55	300.01	-79.77	0	159.55	0	-
Triple interaction	Separate interaction + triple interaction TC	Intercept participants	Timepoint x group + fatigue + fatigue x time x group + TC + TC x time x group + TS + TS x time x group	215.49	317.41	-69.74	8	139.49	6.82	.56

Vitality final model: Separate interaction + triple interaction TC

Model parameter	Fixed Effects				
	Estimate/ β	SE	95% CI	<i>t</i>	<i>p</i>
Intercept	-0.12	0.22	-0.55 – 0.31	-0.57	.573
T2	-0.02	0.17	-0.36 – 0.33	-0.10	.922
T3	0.08	0.19	-0.31 – 0.46	0.41	.687
Group PHS	0.14	0.32	-0.49 – 0.77	0.44	.662
Group CHS	0.11	0.36	-0.62 – 0.83	0.29	.770
Group PHS X T2	-0.12	0.28	-0.67 – 0.43	-0.45	.657
Group PHS X T3	0.01	0.28	-0.54 – 0.56	0.03	.975
Group CHS X T2	0.32	0.30	-0.27 – 0.92	1.09	.280
Group CHS X T3	0.11	0.36	-0.62 – 0.83	0.29	.770
ROF	-0.22	0.10	-0.41 – -0.03	-2.34	.022
ROF X Group PHS	-0.39	0.17	-0.73 – -0.04	-2.23	.029
ROF X Group CHS	-0.13	0.14	-0.41 – 0.15	-0.94	.348
ROF X T2	-0.12	0.11	-0.34 – 0.10	-1.09	.279
ROF X T3	-0.32	0.11	-0.54 – -0.10	-2.94	.004
TC	0.59	0.16	0.28 – 0.91	3.74	<.001
TC X Group PHS	-0.70	0.21	-1.12 – -0.29	-3.36	.001
TC X Group CHS	-0.47	0.20	-0.86 – -0.07	-2.37	.020
TC X T2	-0.35	0.20	-0.74 – 0.05	-1.74	.086
TC X T3	-0.65	0.22	-1.08 – -0.21	-2.98	.004
TC X Group PHS X T2	0.54	0.27	0.00 – 1.08	2.01	.048

TC X Group PHS X T3	0.97	0.30	0.37 – 1.56	3.22	.002
TC X Group CHS X T2	0.71	0.28	0.16 – 1.26	2.55	.013
TC X Group CHS X T3	1.12	0.31	0.51 – 1.73	3.66	<.001
TS	-0.01	0.14	-0.29 – 0.27	-0.06	.950
TS X Group PHS	0.03	0.22	-0.42 – 0.47	0.12	.906
TS X Group CHS	0.15	0.18	-0.21 – 0.51	0.84	.404
TS X T2	-0.10	0.13	-0.36 – 0.16	-0.77	.443
TS X T3	0.07	0.12	-0.18 – 0.31	0.53	.595

Random Effects		
	Variance	SD
Participant (Intercept)	0.34	0.58
Residual	0.10	0.32
Model fit		
	Marginal	Conditional
r^2	.48	.88
ICC (Participant)		.77

The response vitality variable γ_i is modelled as:

$$\gamma(\text{vitality})_i = \beta_0 + \beta_1 * \text{time}_i + \beta_2 * \text{group}_i + \beta_3 * (\text{time}_i * \text{group}_i) + \beta_4 * \text{ROF}_i + \beta_5 * (\text{time}_i * \text{ROF}_i) + \beta_6 * (\text{group}_i * \text{ROF}_i) + \beta_7 * \text{TC}_i + \beta_8 * (\text{time}_i * \text{group}_i * \text{TC}_i) + \beta_{10} * \text{TS}_i + \beta_{11} * (\text{time}_i * \text{TS}_i) + \beta_{12} * (\text{group}_i * \text{TS}_i) + u_{i0} + \epsilon_i$$

- γ_i : response for the i -th observation.
- β : fixed intercept
- u_{i0} : random intercept for the i -th participant.
- ϵ_i : residual error term for the i -th observation.
- The random effects structure: $u_{i2} \sim N(0, \sigma^2)$

Note. All subjective variables (vitality, ROF, TS, TC) were z-standardised prior to the analysis. The β -values represent the standardized fixed effects predicting ROF. Random intercepts were specified for participants. Bootstrapping with 1000 iterations for all values was used. Results reaching the significance threshold of $p < .05$ were marked in bold.

Supplementary Table 3

Balloon Analogue Risk Task (BART) Mixed Model comparison and the model building/selection process

Model	Nested / simpler Model	Random effects	Fixed effects	Model fit					LRT against nested	
				AIC	BIC	LL	df	deviance	X ²	p
Separate interaction	-	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	-59.01	32.19	63.50	-	-127.01	-	-
Separate interaction + triple interaction fatigue	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	-55.64	46.28	65.82	4	-131.64	4.63	.33
Separate interaction + triple interaction vitality	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time x group + TC + TC x time + TC x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	-61.11	40.81	68.55	4	-137.11	10.10	.038
Separate interaction + triple interaction TC	Separate interaction + triple interaction vitality	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time + vitality x group + TC + TC x time x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	-57.44	44.49	66.72	0	-133.44	0	-

Separate interaction + triple interaction TS	Separate interaction + triple interaction vitality	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time x group + SUPPS-P x sens seeking x risk	-65.45	36.47	70.73	0	-141.45	0	-
Separate interaction + triple interaction vitality & TS	Separate interaction + triple interaction TS	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time x group + TC + TC x time + TC x group + TS + TS x time x group + SUPPS-P x sens seeking x risk	-59.64	53.01	71.82	4	-143.64	2.19	.70
Triple interaction	Separate interaction + triple interaction TS	Intercept participants	Timepoint x group + fatigue + fatigue x time x group + vitality + vitality x time x group + TC + TC x time x group + TS + TS x time x group + SUPPS-P x sens seeking x risk	-51.15	82.96	75.57	12	-151.15	9.69	.64

BART final model: Separate interaction + triple interaction TS

Model parameter	Fixed Effects				
	Estimate/ β	SE	95% CI	<i>t</i>	<i>p</i>
Intercept	2.56	0.39	1.79 – 3.33	6.61	<.001
T2	0.01	0.04	-0.07 – 0.08	0.23	.816
T3	-0.02	0.04	-0.11 – 0.06	-0.57	.571
Group PHS	0.00	0.13	-0.26 – 0.26	0.00	.997
Group CHS	-0.07	0.12	-0.32 – 0.17	-0.60	.552
Group PHS X T2	0.13	0.09	-0.05 – 0.31	1.43	.158
Group PHS X T3	0.06	0.06	-0.07 – 0.19	0.93	.355
Group CHS X T2	0.01	0.06	-0.11 – 0.14	0.24	.808
Group CHS X T3	0.17	0.07	0.02 – 0.31	2.32	.023
SUPPS-P	0.23	0.16	-0.08 – 0.54	1.51	.135
Sensation seeking	0.06	0.08	-0.10 – 0.22	0.79	.433
Risk-taking	-0.04	0.04	-0.11 – 0.04	-0.96	.342
Vitality	0.02	0.04	-0.06 – 0.10	0.48	.629
Group PHS X Vitality	-0.03	0.06	-0.14 – 0.08	-0.54	.593
Group CHS X Vitality	0.03	0.06	-0.09 – 0.16	0.53	.597
Vitality X T2	-0.00	0.03	-0.07 – 0.07	-0.05	.963
Vitality X T3	-0.09	0.04	-0.16 – -0.02	-2.55	.013
ROF	0.04	0.03	-0.02 – 0.09	1.41	.162
Group PHS X ROF	-0.05	0.05	-0.15 – 0.05	-0.95	.348
Group CHS X ROF	0.01	0.05	-0.09 – 0.10	0.15	.880

ROF X T2	-0.04	0.03	-0.11 – 0.02	-1.25	.215
ROF X T3	-0.10	0.04	-0.17 – -0.02	-2.54	.013
TC	-0.00	0.04	-0.08 – 0.08	-0.01	.993
Group PHS X TC	0.01	0.04	-0.07 – 0.09	0.23	.816
Group CHS X TC	0.02	0.05	-0.08 – 0.11	0.32	.747
TC X T2	-0.05	0.03	-0.11 – 0.02	-1.51	.135
TC X T3	0.02	0.04	-0.05 – 0.09	0.64	.526
TS	0.04	0.03	-0.03 – 0.11	1.26	.213
Group PHS X TS	0.01	0.06	-0.11 – 0.13	0.10	.923
Group CHS X TS	-0.11	0.05	-0.21 – -0.02	-2.35	.022
TS X T2	0.03	0.05	-0.07 – 0.12	0.55	.583
TS X T3	-0.02	0.04	-0.11 – 0.07	-0.52	.607
Group PHS X TS X T2	-0.27	0.08	-0.42 – -0.11	-3.32	.001
Group PHS X TS X T3	-0.07	0.06	-0.20 – 0.06	-1.11	.271
Group CHS X TS X T2	0.01	0.07	-0.12 – 0.15	0.18	.861
Group CHS X TS X T3	0.04	0.06	-0.08 – 0.16	0.69	.491

Random Effects

	Variance	SD
Participant (Intercept)	0.06	0.24
Residual	0.004	0.07

Model fit

	Marginal	Conditional
r^2	.13	.93

The response variable adjusted average pumps (AAP) γ_i is modelled as:

$$\gamma(\log(\text{AAP}))_i = \beta_0 + \beta_1 * \text{time}_i + \beta_2 * \text{group}_i + \beta_3 * (\text{time}_i * \text{group}_i) + \beta_4 * \text{SUPPSP}_i + \beta_5 * \text{SensSeeking}_i + \beta_6 * \text{Risk} \\ + \beta_7 * \text{ROF}_i + \beta_8 * (\text{time}_i * \text{ROF}_i) + \beta_9 * (\text{group}_i * \text{ROF}_i) + \beta_{10} * \text{vitality}_i + \beta_{11} * (\text{time}_i * \text{vitality}_i) + \beta_{12} * (\text{group}_i * \text{vitality}_i) + \beta_{13} * \text{TC}_i + \beta_{14} * (\text{time}_i \\ * \text{TC}_i) + \beta_{15} * (\text{group}_i * \text{TC}_i) + \beta_{16} * \text{TS}_i + \beta_{17} * (\text{time}_i * \text{group}_i * \text{TS}_i) + u_{i0} + \epsilon_i$$

- γ_i : response for the i -th observation.
- β : fixed intercept
- u_{i0} : random intercept for the i -th participant.
- ϵ_i : residual error term for the i -th observation.
- The random effects structure: $u_{i2} \sim N(0, \sigma^2)$

Note. All subjective variables (vitality, ROF, TS, TC) were z-standardised prior to the analysis. The β -values represent the standardized fixed effects predicting ROF. Random intercepts were specified for participants. Bootstrapping with 1000 iterations for all values was used. Results reaching the significance threshold of $p < .05$ were marked in bold.

Supplementary Table 4

Beads Task (BT) Mixed Model comparison and the model building/selection process

Model	Nested / simpler Model	Random effects	Fixed effects	Model fit					LRT against nested	
				AIC	BIC	LL	df	deviance	X ²	p
Separate interaction	-	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	59.62	150.82	4.18	-	-8.38	-	-
Separate interaction + triple interaction fatigue	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	62.51	164.43	-13.49	4	-13.49	5.11	.28
Separate interaction + triple interaction vitality	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time x group + TC + TC x time + TC x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	64.42	166.34	5.79	4	-11.58	3.20	.52
Separate interaction + triple interaction TC	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time + vitality x group + TC + TC x time x group + TS + TS x time + TS x group + SUPPS-P x sens seeking x risk	63.75	165.67	6.13	4	-12.25	3.88	.42

Separate interaction + triple interaction TS	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time + fatigue x group + vitality + vitality x time + vitality x group + TC + TC x time + TC x group + TS + TS x time x group + SUPPS-P x sens seeking x risk	64.31	166.23	5.84	4	-11.69	3.31	.51
Triple interaction	Separate interaction	Intercept participants	Timepoint x group + fatigue + fatigue x time x group + vitality + vitality x time x group + TC + TC x time x group + TS + TS x time x group + SUPPS-P x sens seeking x risk	77.65	211.76	11.17	16	-22.35	13.97	.60

BT final model: Separate interaction

Model parameter	Fixed Effects				
	Estimate/ β	SE	95% CI	<i>t</i>	<i>p</i>
Intercept	2.72	0.63	1.47 – 3.97	4.33	<.001
T2	-0.01	0.07	-0.14 – 0.13	-0.13	.898
T3	0.02	0.07	-0.12 – 0.16	0.32	.748
Group PHS	-0.21	0.22	-0.64 – 0.22	-0.97	.337
Group CHS	-0.11	0.20	-0.52 – 0.29	-0.55	.585
Group PHS X T2	0.02	0.15	-0.28 – 0.32	0.13	.894
Group PHS X T3	-0.05	0.11	-0.27 – 0.17	-0.46	.645
Group CHS X T2	0.01	0.12	-0.22 – 0.25	0.11	.910
Group CHS X T3	-0.00	0.14	-0.28 – 0.27	-0.02	.986
SUPPS-P	-0.32	0.25	-0.82 – 0.18	-1.26	.211
Sensation seeking	0.08	0.13	-0.18 – 0.34	0.62	.540
Risk-taking	-0.04	0.06	-0.17 – 0.08	-0.71	.479
Vitality	0.07	0.08	-0.08 – 0.23	0.91	.368
Group PHS X Vitality	0.02	0.10	-0.19 – 0.23	0.20	.840
Group CHS X Vitality	-0.14	0.12	-0.37 – 0.09	-1.19	.237
Vitality X T2	0.02	0.07	-0.12 – 0.15	0.26	.797
Vitality X T3	-0.03	0.07	-0.16 – 0.11	-0.38	.708
ROF	-0.00	0.05	-0.10 – 0.10	-0.06	.950
Group PHS X ROF	-0.15	0.10	-0.35 – 0.05	-1.48	.143
Group CHS X ROF	-0.04	0.09	-0.21 – 0.14	-0.44	.665

ROF X T2	-0.01	0.06	-0.13 – 0.11	-0.20	.845
ROF X T3	-0.01	0.07	-0.15 – 0.14	-0.11	.910
TC	0.01	0.08	-0.15 – 0.16	0.09	.926
Group PHS X TC	-0.21	0.08	-0.37 – -0.05	-2.59	.012
Group CHS X TC	0.01	0.09	-0.17 – 0.18	0.08	.936
TC X T2	-0.01	0.06	-0.13 – 0.12	-0.13	.896
TC X T3	-0.05	0.07	-0.18 – 0.09	-0.69	.492
TS	-0.03	0.07	-0.17 – 0.10	-0.49	.626
Group PHS X TS	-0.16	0.10	-0.36 – 0.04	-1.60	.113
Group CHS X TS	0.01	0.08	-0.16 – 0.18	0.12	.909
TS X T2	0.07	0.06	-0.04 – 0.19	1.27	.210
TS X T3	0.03	0.05	-0.08 – 0.13	0.55	.583
Random Effects					
	Variance			SD	
Participant (Intercept)	0.15			0.38	
Residual	0.019			0.14	
Model fit					
	Marginal			Conditional	
<i>r</i> ²	0.18			.91	
ICC (Participant)				.89	

The response variable draws to decision (DTD) γ_i is modelled as:

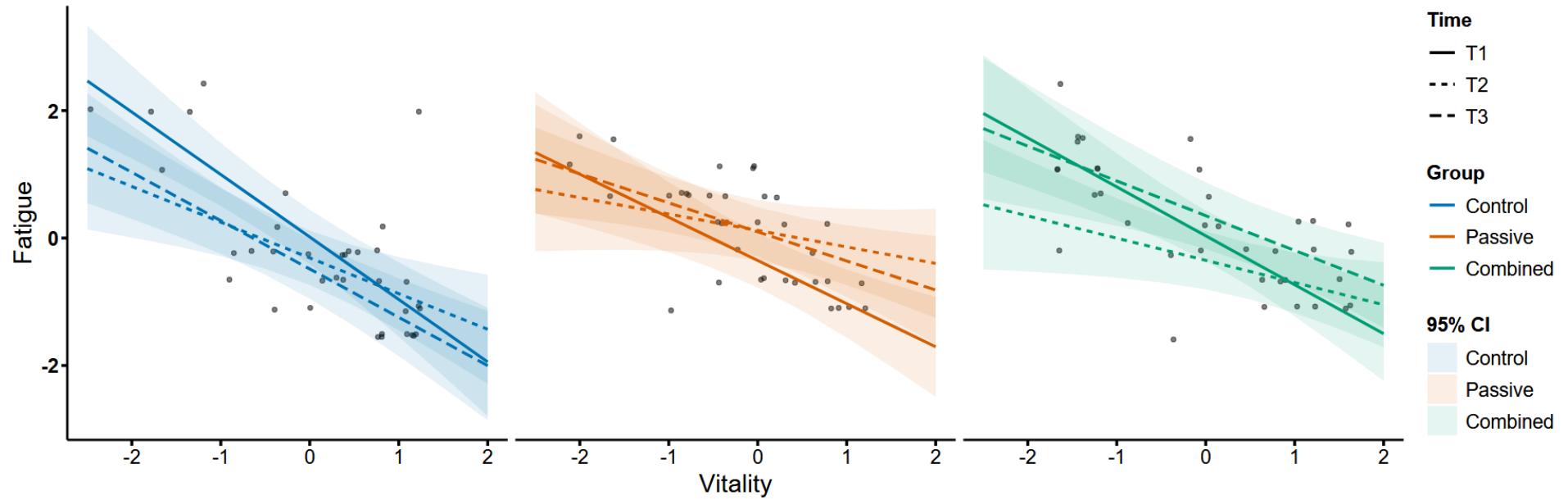
$$\gamma(\log(\text{DTD}))_i = \beta_0 + \beta_1 * \text{time}_i + \beta_2 * \text{group}_i + \beta_3 * (\text{time}_i * \text{group}_i) + \beta_4 * \text{SUPPSP}_i + \beta_5 * \text{SensSeeking}_i + \beta_6 * \text{Risk} \\ + \beta_7 * \text{ROF}_i + \beta_8 * (\text{time}_i * \text{ROF}_i) + \beta_9 * (\text{group}_i * \text{ROF}_i) + \beta_{10} * \text{vitality}_i + \beta_{11} * (\text{time}_i * \text{vitality}_i) + \beta_{12} * (\text{group}_i * \text{vitality}_i) + \beta_{13} * \text{TC}_i + \beta_{14} * (\text{time}_i \\ * \text{TC}_i) + \beta_{15} * (\text{group}_i * \text{TC}_i) + \beta_{16} * \text{TS}_i + \beta_{17} * (\text{time}_i * \text{TS}_i) + \beta_{18} * (\text{group}_i * \text{TS}_i) + u_{i0} + \epsilon_i$$

-
- y_i : response for the i -th observation.
 - β : fixed intercept
 - u_{i0} : random intercept for the i -th participant.
 - ϵ_i : residual error term for the i -th observation.
 - The random effects structure is represented by: $u_{i2} \sim N(0, \sigma^2)$
-

Note. All subjective variables (vitality, ROF, TS, TC) were z-standardised prior to the analysis. The β -values represent the standardized fixed effects predicting ROF. Random intercepts were specified for participants. Bootstrapping with 1000 iterations for all values was used. Results reaching the significance threshold of $p < .05$ were marked in bold.

APPENDIX FIGURE 1

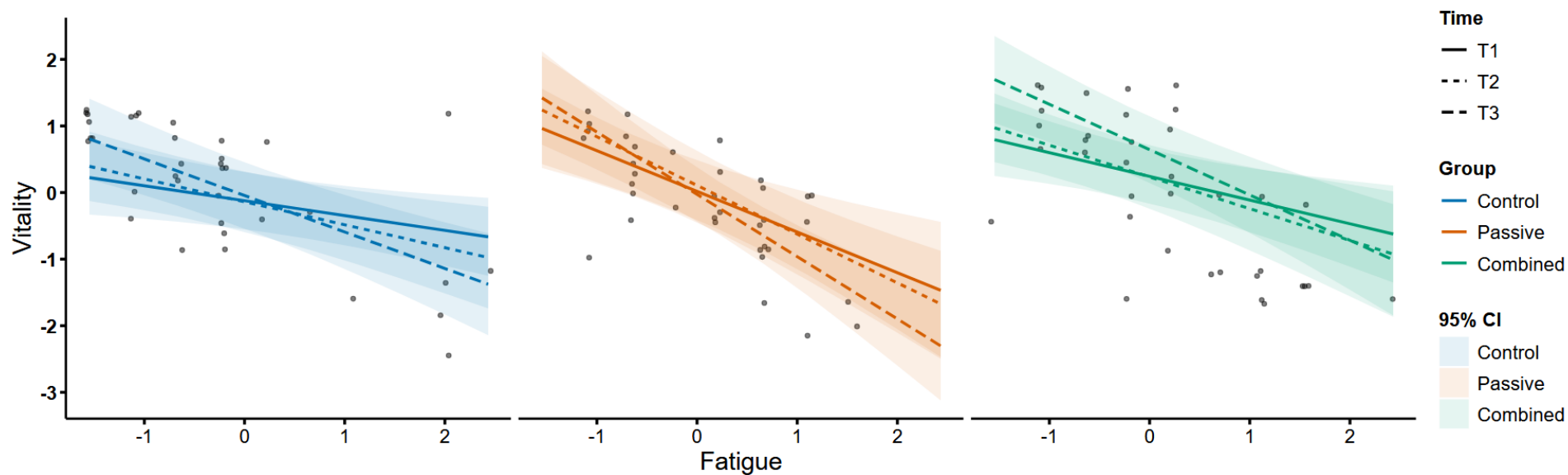
Interaction effect fatigue - time x group x vitality



Note. Linear mixed model results for subjective perception of fatigue. Graphics show the fixed effects as the coloured bold line for fatigue interacting with vitality, with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.

APPENDIX FIGURE 2

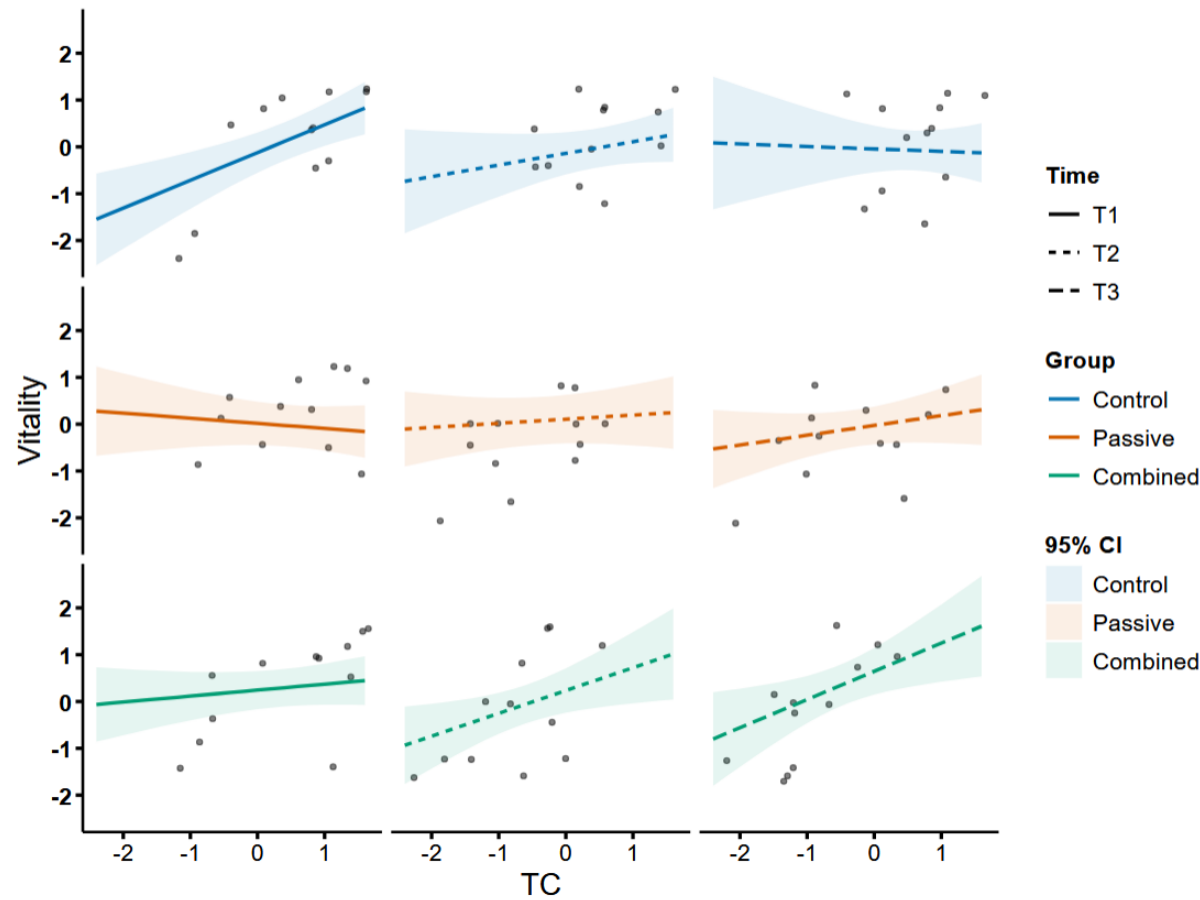
Interaction effect vitality - time x group x fatigue



Note. Linear mixed model results for subjective perception of vitality. Graphics show the fixed effects as the coloured bold line for vitality interacting with fatigue, with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.

APPENDIX FIGURE 3

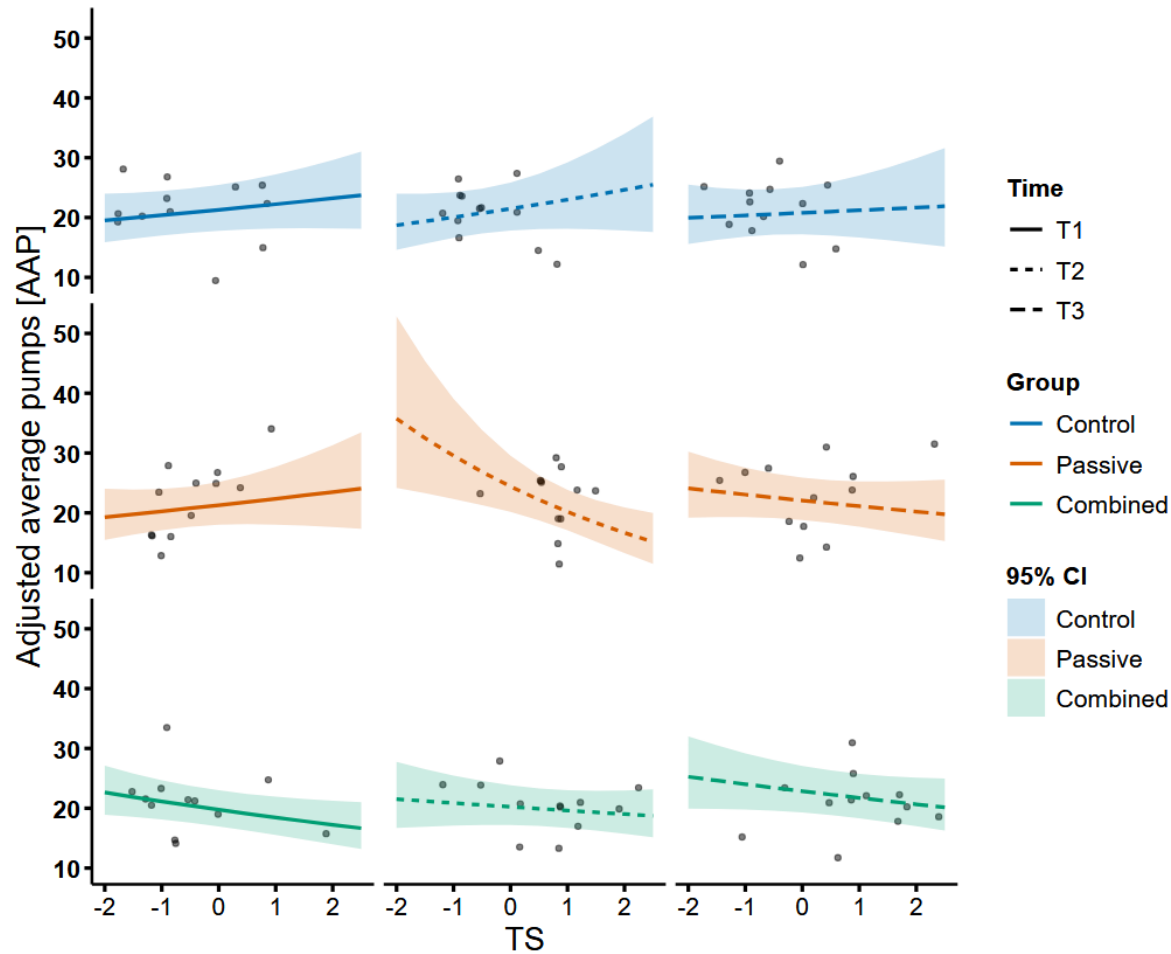
Interaction effect vitality - time x group x TC



Note. Linear mixed model results for subjective perception of vitality. Graphics show the fixed effects as the coloured bold line for vitality interacting with thermal comfort (TC), with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.

APPENDIX FIGURE 4

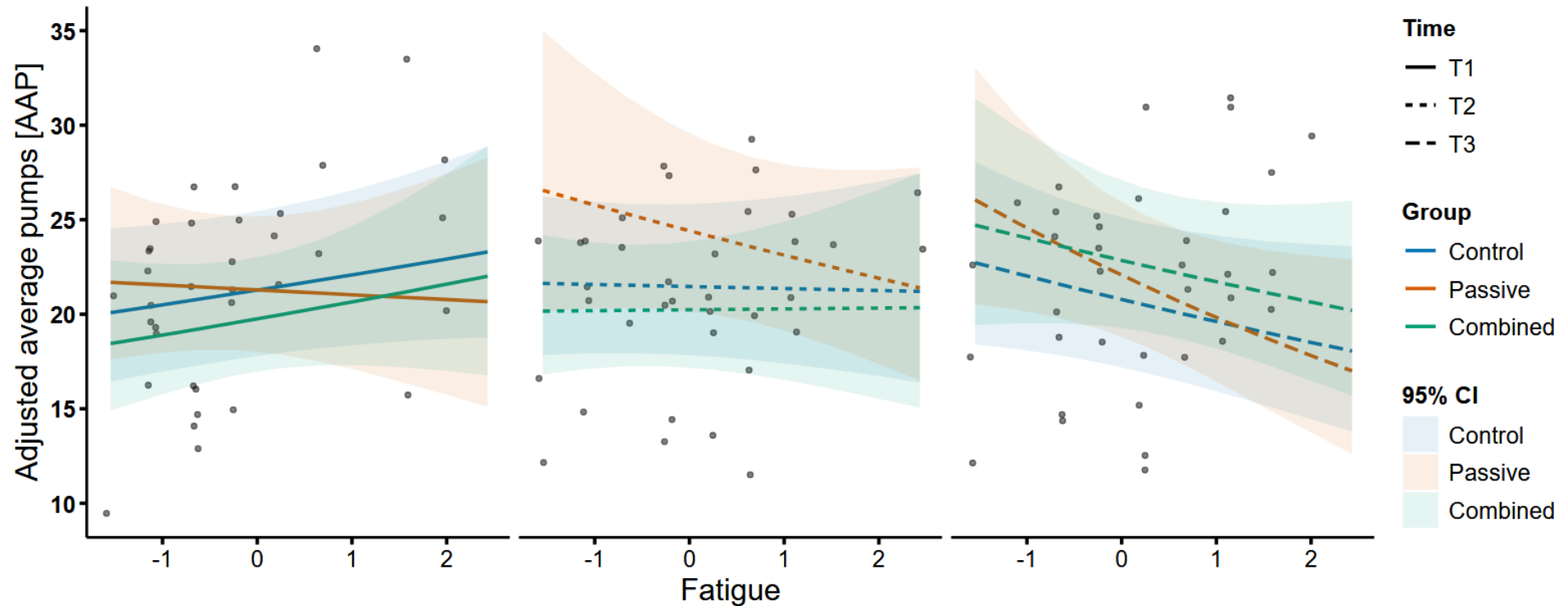
Interaction effect risk-taking behaviour - time x group x TS



Note. Linear mixed model results for risk-taking behaviour. The Balloon Analogue Risk Task (BART) measured risk-taking behaviour in adjusted average pumps (AAP). Graphics show the fixed effects as the coloured bold line for risk-taking interacting with thermal sensation (TS), with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.

APPENDIX FIGURE 5

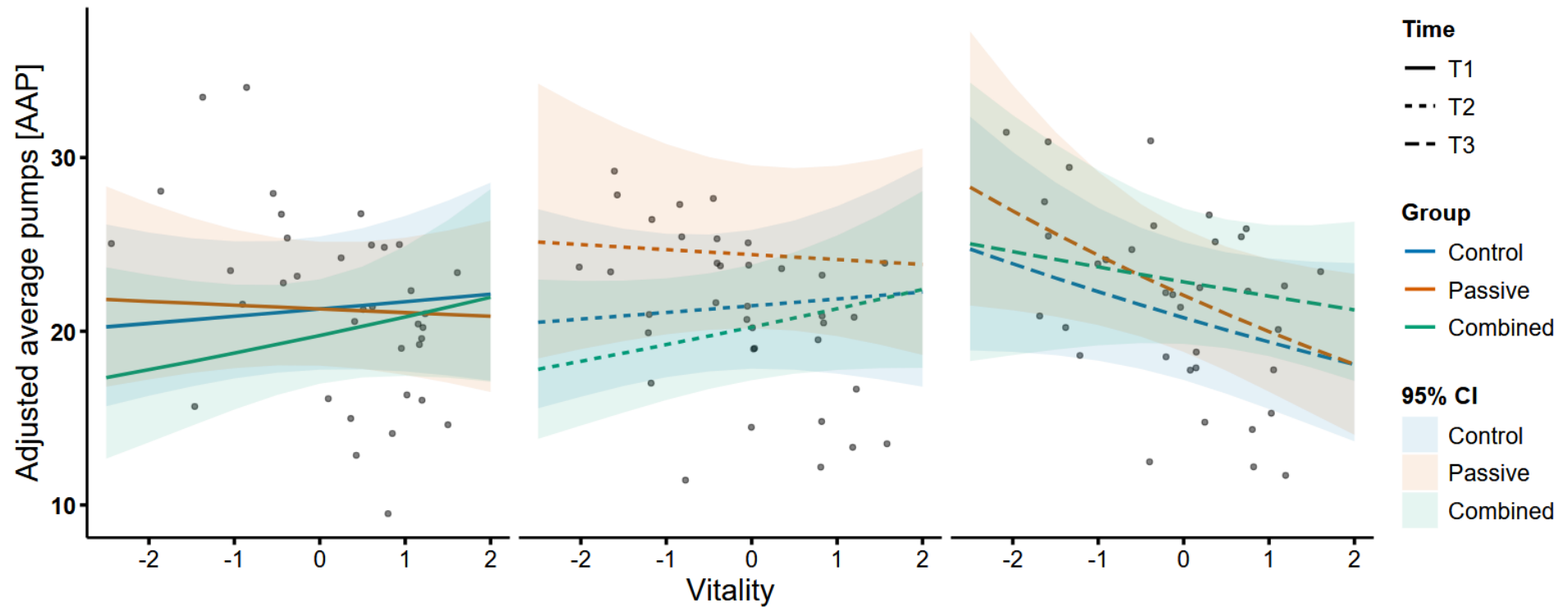
Interaction effect risk-taking behaviour - time x group x fatigue



Note. Linear mixed model results for risk-taking behaviour. The Balloon Analogue Risk Task (BART) measured risk-taking behaviour in adjusted average pumps (AAP). Graphics show the fixed effects as the coloured bold line for risk-taking interacting with fatigue, with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.

APPENDIX FIGURE 6

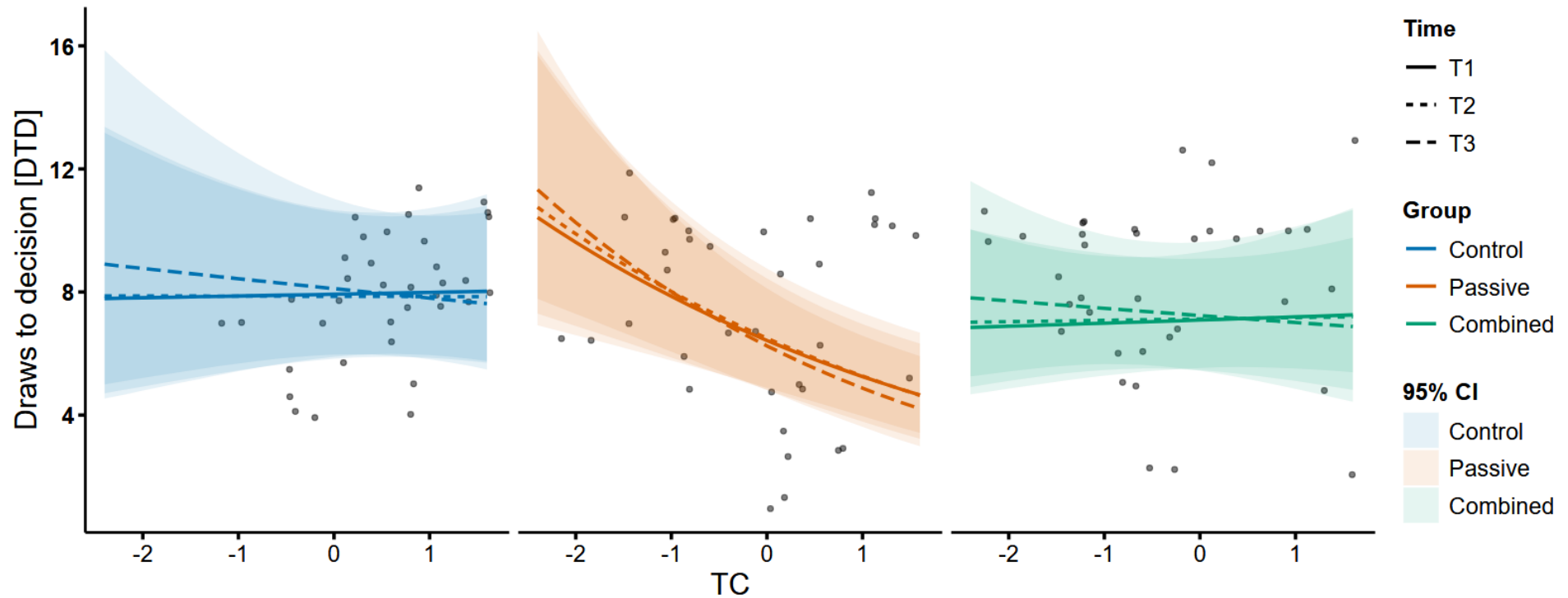
Interaction effect risk-taking behaviour - time x group x vitality



Note. Linear mixed model results for risk-taking behaviour. The Balloon Analogue Risk Task (BART) measured risk-taking behaviour in adjusted average pumps (AAP). Graphics show the fixed effects as the coloured bold line for risk-taking interacting with vitality, with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.

APPENDIX FIGURE 7

Interaction effect reflection impulsivity - time x group x TC



Note. Linear mixed model results for reflection impulsivity. The Beads Taks (BT) measured reflection impulsivity in draws to decision (DTD). Graphics show the fixed effects as the coloured bold line for risk-taking interacting with vitality, with 95% confidence intervals (CI) represented in the shaded areas. Respectively, the difference between control, passive and combined group is illustrated, as well as the time (T1, pre intervention; T2, during intervention; T3, post intervention). The grey points represent individuals of the groups over time.