LEEDS BECKETT UNIVERSITY
CARNEGIE SCHOOL OF SPORT

Project progress report: Combined effects of programmed exercise and brown seaweed extract consumption on exercise capacity, cardiometabolic and gut health, and psychological predictors of exercise adherence.

Sport, Exercise & Health Sciences

Carnegie School of Sport

Dr Steven Trangmar

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Project background

In the UK, approximately 2/3 adults are overweight or living with obesity, placing a huge socio-economic burden on the government and associated healthcare systems. This burden is ever increasing, in-part due to large proportions of the population not meeting recommended physical activity guidelines in the UK. Whilst diet and programmed exercise interventions are traditionally used to support the health of those obese/overweight, administration of novel functional foods, such as a nutraceutical composition of bioactive extracts can have an additional benefit beyond exercise and may contribute to improved adherence to any exercise programme through reducing acute inflammation and metabolic abnormalities that may arise during early engagement.

This work will address important knowledge gaps (i.e., the triangular associations among the gut microbiome, recovery from exercise and psychological correlates of exercise adherence) and will be the first study to investigate the associations between immune, metabolic and the gut microbiome, as well as pinpointing how this association relates to diet, exercise, and health. Hence, our work will not only advance theoretical frameworks characterising interactions between sustainable diet and health, but also, with the help of microbiome component, move fundamental wellbeing research towards translational applications that could be used for other disorders. The use of multiple components will increase the likelihood for a strong impact beyond the immediate research field to the fields of translational research, with potential for scientific innovation and important implications for both applied and basic science.

Project aim

The aim of the present project is to explore the combined effects of a novel blend of Ascophyllum nodosum extract supplementation, concurrent to an aerobic exercise programme, on exercise capacity, cardiometabolic and gut health, and psychological predictors of exercise adherence.

Project objectives

1. Assess the impact of brown seaweed extract, in combination with aerobic endurance training, on aerobic exercise capacity, subjective recovery from exercise training and cardiometabolic health;
2. Monitoring the impact of these extracts on inflammatory biomarkers across the exercise programme;
3. Understand the metabolic profile associated with the administration of these bioactive extracts alongside an aerobic exercise programme;
4. Assess the impact of these blends on psychological predictors of exercise adherence

Current testing report

Ethical approval

Ethical approval was gained in the summer of 2024, prior to baseline testing.

Participants

Despite the challenges to the project timeline, ethical approval was granted on-time, and we currently have 35 individuals (15 male, 20 women) enrolled on the study. 30 are complete, with 5 drop-outs. Subject to approval from the industry partner, we are planning to recruit the final 5 pp's starting Autumn/Winter 2025 (total n=35).

Current findings

Inflammatory biomarkers

Blood samples at baseline, 6, 9 and 12 weeks have been obtained in the initial cohort. Following initial processing, they are currently frozen and awaiting shipment to University of Roehampton, for wide-panel cytokine analysis. We expect to analyse these samples once the full cohort is complete.

Gut microbiota analysis

Samples from the initial cohort have been shipped to University of Roehampton, where DNA extraction has taken place. Final stool samples have been shipped, ready for DNA extraction and full cohort analysis when recruitment is complete.

Psychological data analysis

Psychological metrics from the completed cohort have been completed (see below findings).

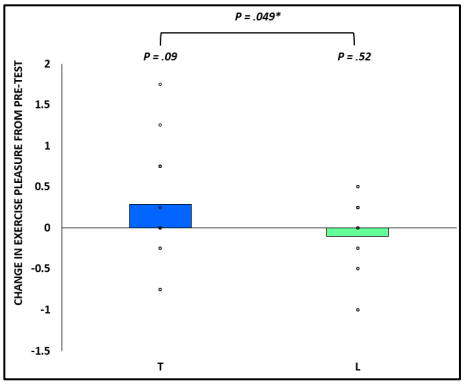
Body composition and physiological data

Variable		Pre	Post	Δ (%)	Pre-post (p value)	Group difference (interaction) (p value)
Body mass (kg)	**L**	71.8	71.8	0.1	0.886	
	T	75.1	73.9	-1.2	0.064	0.032
Body fat (%)	**L**	25.2 ± 9.2	24.7 ± 9.1	0.1	0.795	
	T	27.0 ± 9.1	25.5 ± 8.6	-1.2	0.003	0.267
VO_{2max} (ml/kg/min)	**L**	35.8 ± 8.4	35.8 ± 8.4	0.1	0.841	
	T	33.4 ± 10.7	35.7 ± 11.1	1.6	0.011	0.089
Peak Power (W)	**L**	192.8 ± 63.5	203.4 ± 67.6	10	0.037	
	T	207.5 ± 76.6	213.4 ± 79.6	5.9	0.050	0.451
HbA1C (mmol/L)	**L**	34.2 ± 2.3	34.1 ± 2.3	-0.1	0.770	
	T	36.0 ± 2.1	35.5 ± 2.1	-0.5	0.027	0.567
Fasting glucose (mmol/L)	**L**	5.2 ± 0.7	4.6 ± 0.5	-0.5	0.057	
	T	4.9 ± 0.5	4.9 ± 0.4	0.1	0.353	0.049
Total cholesterol (mmol/L)	**L**	4.4 ± 1.0	4.4 ± 0.9	0.1	0.384	
	T	4.9 ± 1.4	4.7 ± 1.5	-0.2	0.270	0.281
LDL (mmol/L)	**L**	2.5 ± 0.9	2.5 ± 0.8	0.2	0.288	
	T	3.1 ± 1.1	3.1 ± 1.0	-0.1	0.542	0.512

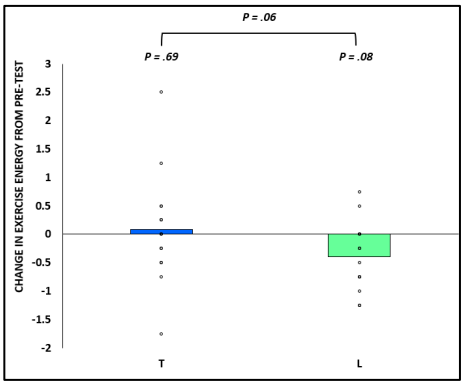
Orange = trend towards significance
Aqua = significance

Psychological data

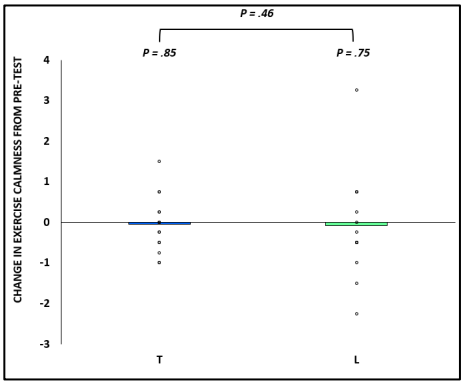
Exercise Pleasure: Condition T increased and Condition L decreased perceived pleasure gained from exercising across the intervention, with a **significant** difference in change scores between the two conditions



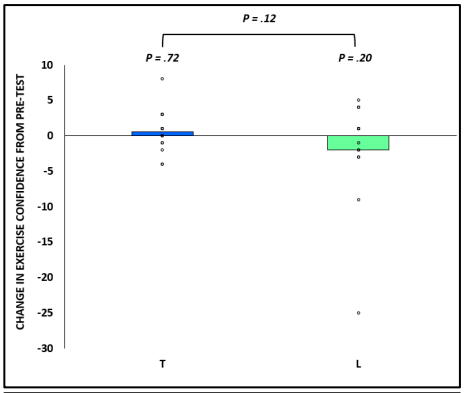
Post-Exercise Energy: Condition T increased and Condition L decreased perceived energy after exercising across the intervention, with change scores not significantly different between the two conditions



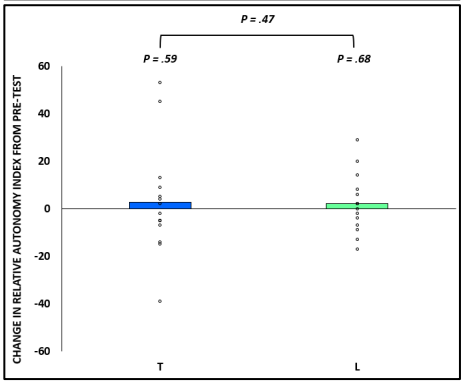
Calmness: Both conditions decreased in perceived calmness derived from exercising across the intervention, with change scores not significantly different between the two conditions



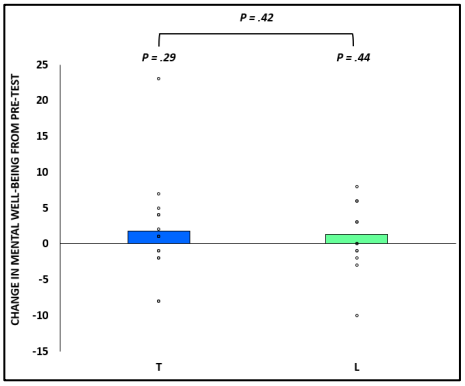
Exercise Self-Efficacy: Condition T increased and Condition L decreased perceived self-efficacy (confidence) to exercise across the intervention, with change scores not significantly different between the two conditions



Self-Determination: Conditions T and L increased perceived self-determination to exercise across the intervention, with no difference in change scores between the two conditions



Mental Well-Being: Conditions T and L increased perceived mental well-being across the intervention, with change scores not significantly different between the two conditions



Notes:

1) Currently uneven groups comparison (L N=14; T N=16)

Future planning

We aim to continue recruitment to the study into the Autumn/Winter of 2025, where we aim to reach our intended total sample size (n=40) (subject to funding availability). Recruitment/data collection beyond our current cohort has extend beyond the official INFORM project end-date (March 31st 2025); however, the overlap of the direct collaboration agreement may provide additional time beyond this end-date. Our current post-doc research fellow is no longer in place, but is supporting a transition to the PI and PhD student with experience in clinical trials who can complete the final five participants.