Electronic Supplementary Material (ESI) for Food & Function.
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Supplementary methods

Method for determination of pectin content

To determine the soluble pectin content, freeze dried samples were firstly refluxed with 80% (*v/v*) ethanol at 80 °C for 1 h to remove low molecular weight sugars. Then, the alcohol-insoluble residue was dissolved in hot water (90℃) for another 2 h. After centrifugation (4000 × g for 15 min), the extracts were concentrated and then precipitated with three volumes of 95% (*v/v*) ethanol overnight at 4℃. The precipitates were washed twice with 70% of ethanol and dissolved in deionised water. Finally, the water-soluble pectin fractions were freeze dried and used for determination of pectin content by *m*-hydroxydiphenyl method with galacturonic acid (GalA) as a standard according to a previous method with minor modifications[1]. In brief, 9 mg of freeze-dried pectin fraction from pulp or 6 mg of the pectin fraction from pulp + BC were dissolved in 10 mL deionised water, respectively. Then 100 µL samples were mixed with 1 mL of 12.5 mM sodium tetraborate in H_2SO_4, and then stirred vigorously and heated to 95℃ for 10 min. After cooling to room temperature, 20 µL of 0.15% (*w/v*) *m*-hydroxydiphenyl in 0.5% (*w/v*) NaOH was added and stirred by vortex mixing. The samples were then kept at room temperature for 10 min and absorbances were read at 525 nm.

Results

	Pulp	Pulp + BC	Placebo
Pectin (GalA content, mg GalA/g)	25.8 ± 1.0	51.1 ± 0.5	—

Values represent means ± standard errors. GalA, galacturonic acid. BC, Blackcurrant.

1. Filisetti-Cozzi, T.M.C.C. and N.C. Carpita, Measurement of uronic acids without Interference from neutral sugars. *Analytical Biochemistry*, 1991, **197**, 157-162.

Supplementary tables

Supplementary table 1. Formulation and nutritional composition of the test drinks.

Per 200 ml	GLU-FX study					GLU-MIX study		
	CON	**H-BC**	**L-BC**	**L-SO**	**H-Blend**	**CON2**	**F**	**BC+F**
Formulation								
BC extract, g	0.00	57.76	28.88	0.00	28.88	0.00	0.00	25.21
SO extract, g	0.00	0.00	0.00	0.87	0.87	0.00	0.00	0.00
Orange pulp, g	0.00	0.00	0.00	0.00	0.00	0.00	30.61	30.61
Glucose syrup, g	13.96	17.03	15.49	13.96	15.48	0.00	0.00	0.00
Glucose-fructose syrup, g	5.33	0.00	2.67	5.33	2.67	3.12	1.90	1.20
Granulated sugar	0.18	0.00	0.09	0.18	0.09	1.14	0.00	0.00
Maltodextrin	0.00	0.00	0.00	0.00	0.00	3.40	3.60	0.00
Nutritional composition								
Energy (kJ)	245.89	272.98	259.29	245.93	259.43	111.79	133.98	135.65
Energy, kcal	58.73	65.2	61.93	58.74	61.94	26.7	32.0	32.4
Carbohydrate, g	14.81	16.29	15.5	14.81	15.55	6.68	6.79	6.76
Total sugar (g)[1]	10.00	9.74	9.49	9.74	9.49	3.8	3.7	3.6
Glucose, g	5.05	5.05	5.05	5.05	5.05	1.32	1.19	1.03
Fructose, g	1.59	1.59	1.59	1.59	1.59	1.00	1.00	1.00
Maltose, g	2.67	3.12	2.89	2.67	2.89	0.10	0.06	0.28
Sucrose, g	0.18	0.19	0.18	0.18	0.18	1.37	1.42	1.30
Fat, g	0	0	0	0	0	0	0	0
Protein, g	0	0	0	0	0	0	0.34	0.34
Total dietary fibre (AOAC), g[2]	NA	NA	NA	NA	NA	0	1.5	1.5
Pectin, mg GalA[2]	NA	NA	NA	NA	NA	0	232	449
Phenolic composition								
Total polyphenols,	0	1600	800	800	1600	0	25	800

mg[3]								
Anthocyanin, mg[4]	0	1155	578	0	578	NA	NA	578
Hesperidin, mg	0	0	0	785	785	NA	NA	NA
pH	<4.1	<4.1	<4.1	<4.1	<4.1	2.78	3.35	3.39

CON, 0 mg of blackcurrant (BC) or sweet orange (SO) polyphenols; H-BC, 1600 mg of BC polyphenols; L-BC, 800 mg of BC polyphenols; L-SO, 800 mg of SO polyphenols; H-Blend, 800 mg BC polyphenols + 800 mg SO polyphenols; CON2, 0 mg BC polyphenols and 0 g fibre; F, 1.5 g total fibre; BC+F, 800 mg BC polyphenols + 1.5 g total fibre; NA, not analysed. Dietary fibre for BC+F and F treatments provided by orange pulp. [1]Sugars content analysed by ion exchange chromatography. [2]Fibre analysed by enzymatic-gravimetry (internal method, Eurofins Analisis Alimentario Nordeste SL, Barcelona, Spain) and pectin (GalA: galacturonic acid) by the *m*-hydroxydiphenyl method with galacturonic acid as a standard. [3]Total phenolics analysed by Folin—Ciocalteu method. [4]Total anthocyanins analysed by pH differential method and spectrophotometry.

Supplementary table 2. Nutritional composition of the *ad libitum* pasta meal.

Product	Ingredients amount (g)	Carbohydrate (g)	Protein (g)	Fat (g)	Fibre (g)	Energy (kcal)
Farfalle (dry)	500	341	60	10	24.5	1741
Tomato sauce	760	58	9.9	4.6	9.9	331
Olive oil	40	0	0	40	0	360
Grated hard cheese	40	1.2	18.3	14.9	0	212
Total		*400*	*88*	*70*	*34*	*2644*
Per 100g		*29.8*	*6.5*	*5.2*	*2.6*	*197*

Supplementary table 3 – GLU-MIX: cognitive testing outcomes

Cognitive Testing Outcomes		BC+F vs. CON2 Mean difference (95% CI)	P value
Choice Reaction Time	Percentage Accuracy (%)	-1.0 (-2.0, 1.0)	0.3138
	Reaction Time Overall (msec)	9.69 (-32.37, 36.88)	0.5888
	Reaction Time Correct Responses (msec)	6.10 (-38.05, 36.91)	0.7844
RVIP	Percentage Accuracy (%)	3.75 (-3.75, 10.00)	0.3323
	Reaction Time Correct Responses (msec)	0.90 (-43.20, 44.72)	0.9235
	Number of False Alarms	0.0 (-2.5, 2.5)	0.8471
Simple Reaction Time	Reaction Time Overall (msec)	-15.92 (-45.94, 12.28)	0.2868
Stroop	Percentage Accuracy (%) Overall	0.00 (-1.66, 0.84)	0.6047
	Reaction Time Overall (msec)	-36.81 (-101.7, 15.25)	0.1313
	Reaction Time Correct Responses (msec)	-45.83 (-107.5, 8.75)	0.0959
Four choice Reaction Time	Percentage Accuracy (%)	0.00 (-1.04, 1.05)	0.7715
	Reaction Time Overall (msec)	-41.89 (-97.18, -4.64)	**0.0295**
	Reaction Time Correct Responses (msec)	-40.90 (-96.59, -1.99)	**0.0407**
Serial Subtraction	Total Responses	-0.5 (-3.0, 2.0)	0.7444
	Correct Responses	1.0 (-2.0, 3.0)	0.6124
	Errors	-1.0 (-2.0, 0.0)	**0.0443**

BC+F, 800 mg BC polyphenols + 1.5 g total fibre; CON2, 0 mg BC polyphenols and 0 g fibre; RVIP, rapid visual information processing. Cognitive performance assessed using the Computerised Mental Performance Assessment System (COMPASS, Northumbria University, Newcastle Upon Tyne, UK). Reaction times were measured in milliseconds and accuracy was measured as a percentage of correct responses.

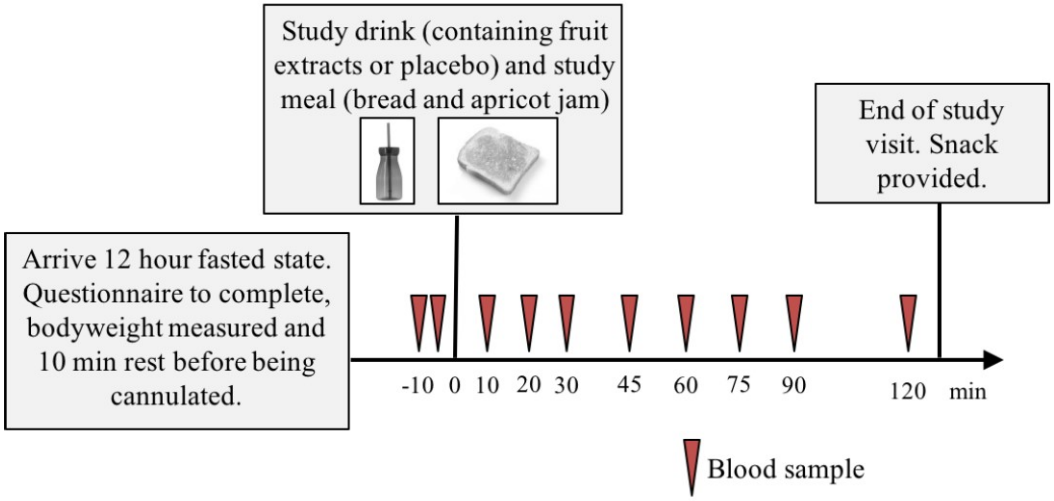
Supplementary table 4 – GLU-MIX: Ad Libitum Energy Intake

	BC+F (N=37)	F (N=37)	CON2 (N=38)
Total pasta consumed (g)			
Adjusted Mean (95% CI)	668.65 (576.52,760.78)	641.70 (549.24,734.16)	672.57 (580.11,765.03)
Energy intake (kcal)			
Adjusted Mean (95% CI)	1317 (1136, 1499)	1264 (1082, 1446)	1325 (1143, 1507)

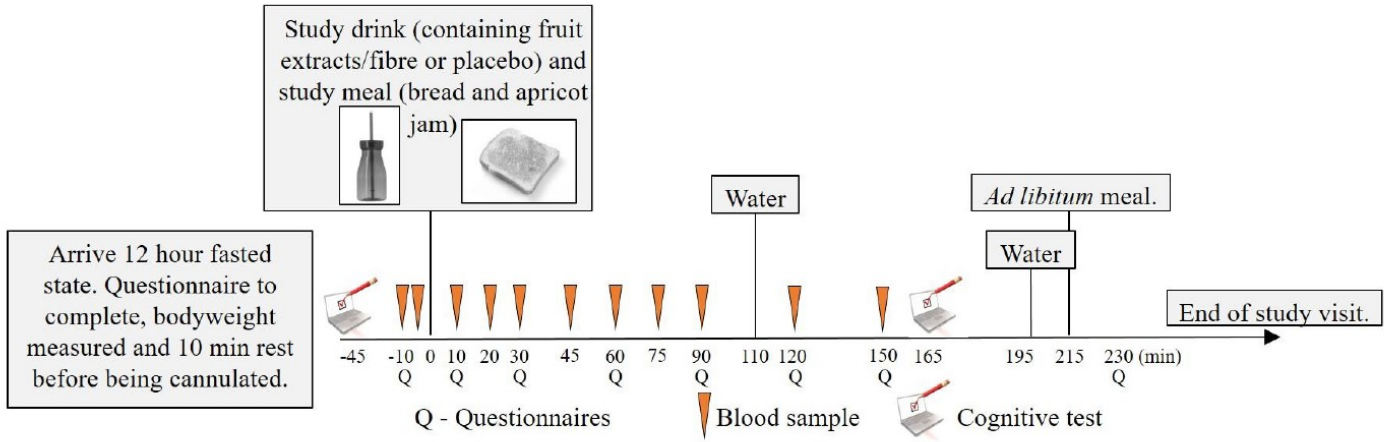
Adjusted Mean represents the adjusted mean from a linear mixed model with fixed factors for treatment and period, and subject as a random effect. CON2, 0 mg BC polyphenols and 0 g fibre; F, 1.5 g total fibre; BC+F, 800 mg BC polyphenols + 1.5 g total fibre.

Supplementary figures

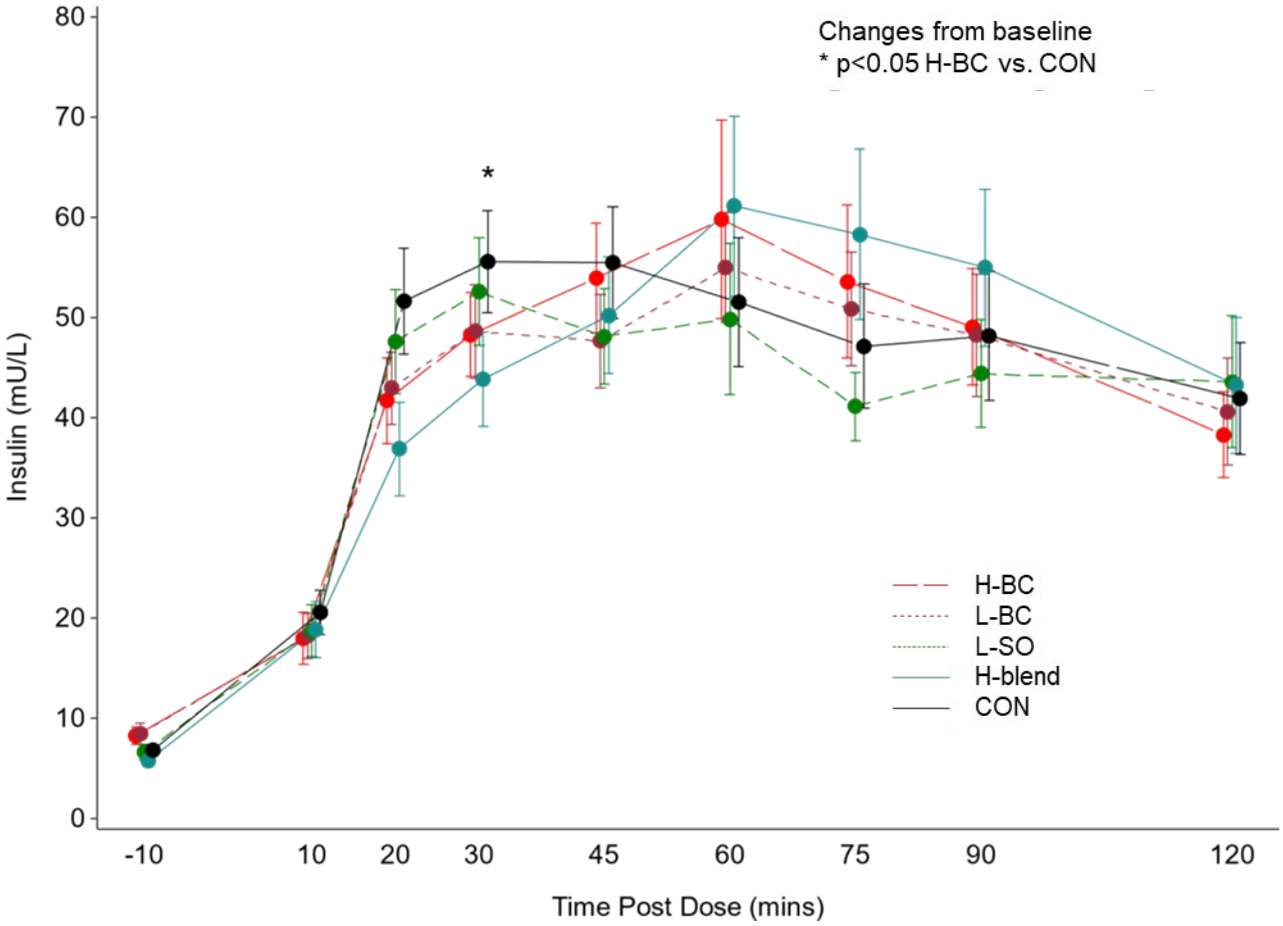
Supplementary Figure 1. Study visit protocol for the GLU-FX study.



Supplementary figure 2. Study visit protocol for the GLU-MIX study.

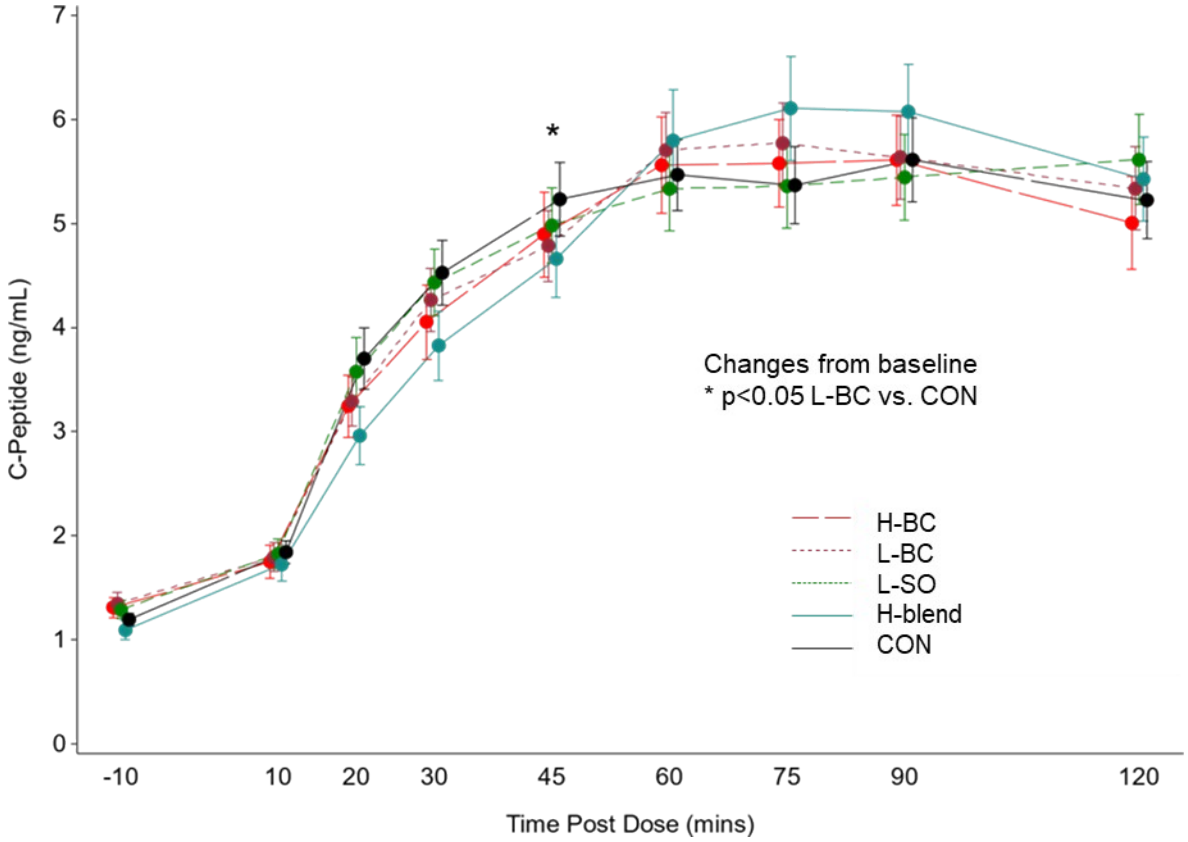


Supplementary figure 3 – GLU-FX: mean serum insulin concentrations over time by treatment



Error bars represent standard error. CON, 0 mg of blackcurrant (BC) or sweet orange (SO) polyphenols; H-BC, 1600 mg of BC polyphenols; L-BC, 800 mg of BC polyphenols; L-SO, 800 mg of SO polyphenols; H-Blend, 800 mg BC polyphenols + 800 mg SO polyphenols.

Supplementary figure 4 – GLU-FX: mean serum C-peptide concentrations over time by treatment



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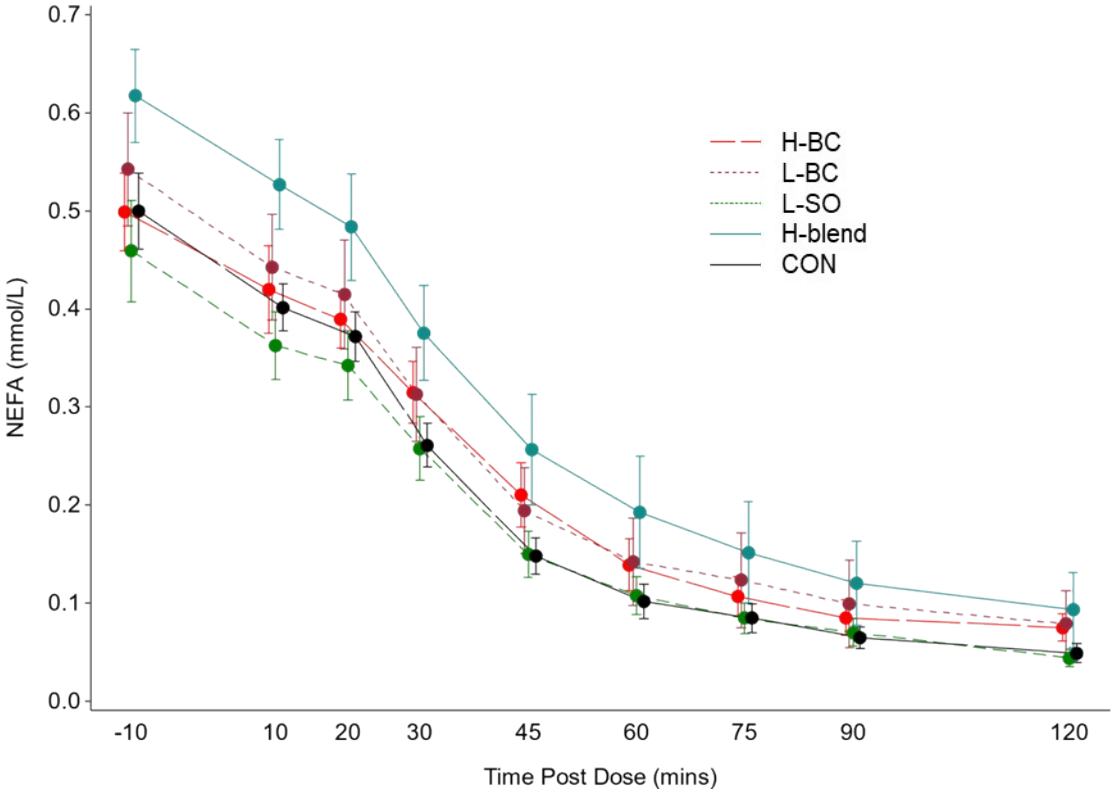
Supplementary figure 5 – GLU-FX: mean serum non-esterified fatty acids over time by treatment intent to treat population



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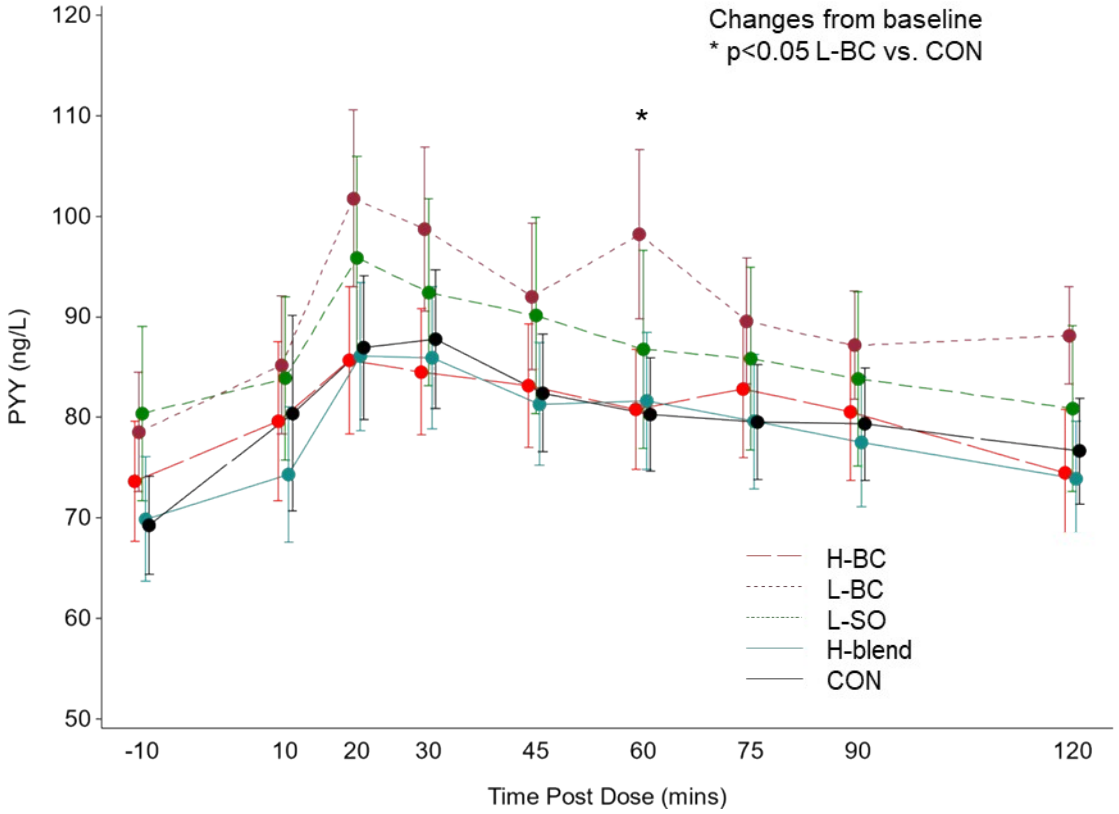
Supplementary figure 6 – GLU-FX: mean plasma PYY concentrations over time by treatment



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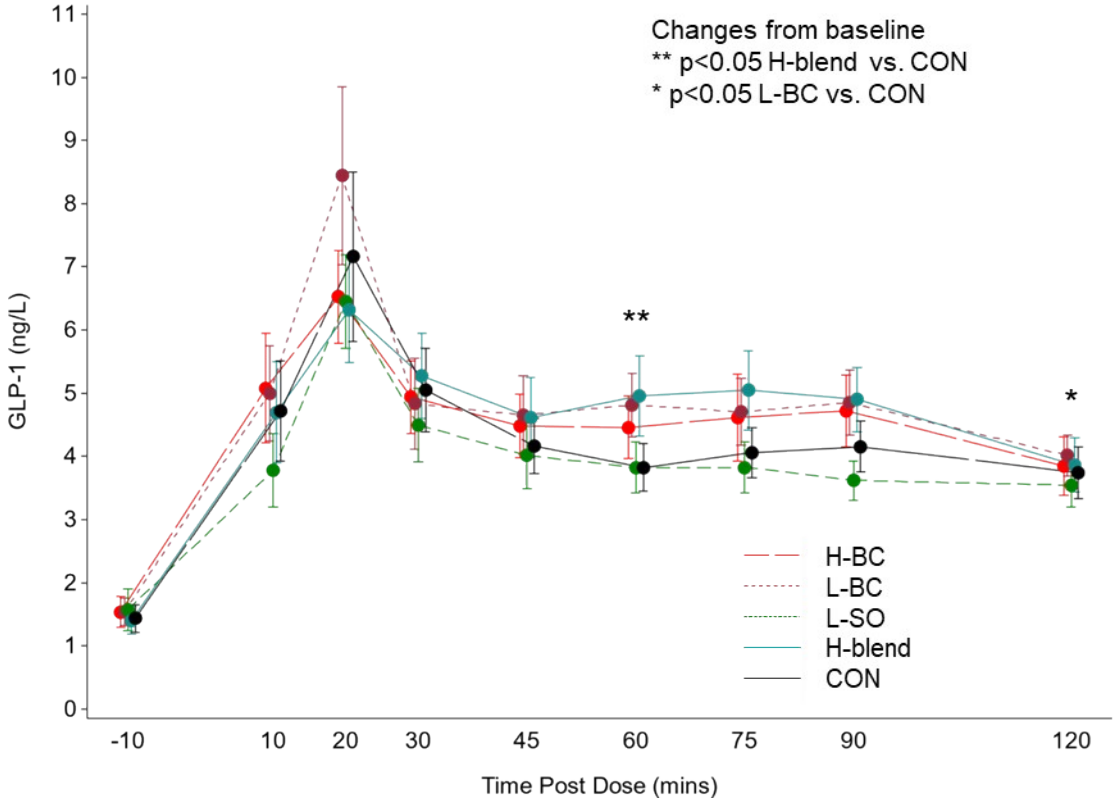
Supplementary figure 7 – GLU-FX: mean plasma GLP-1 concentrations over time by treatment



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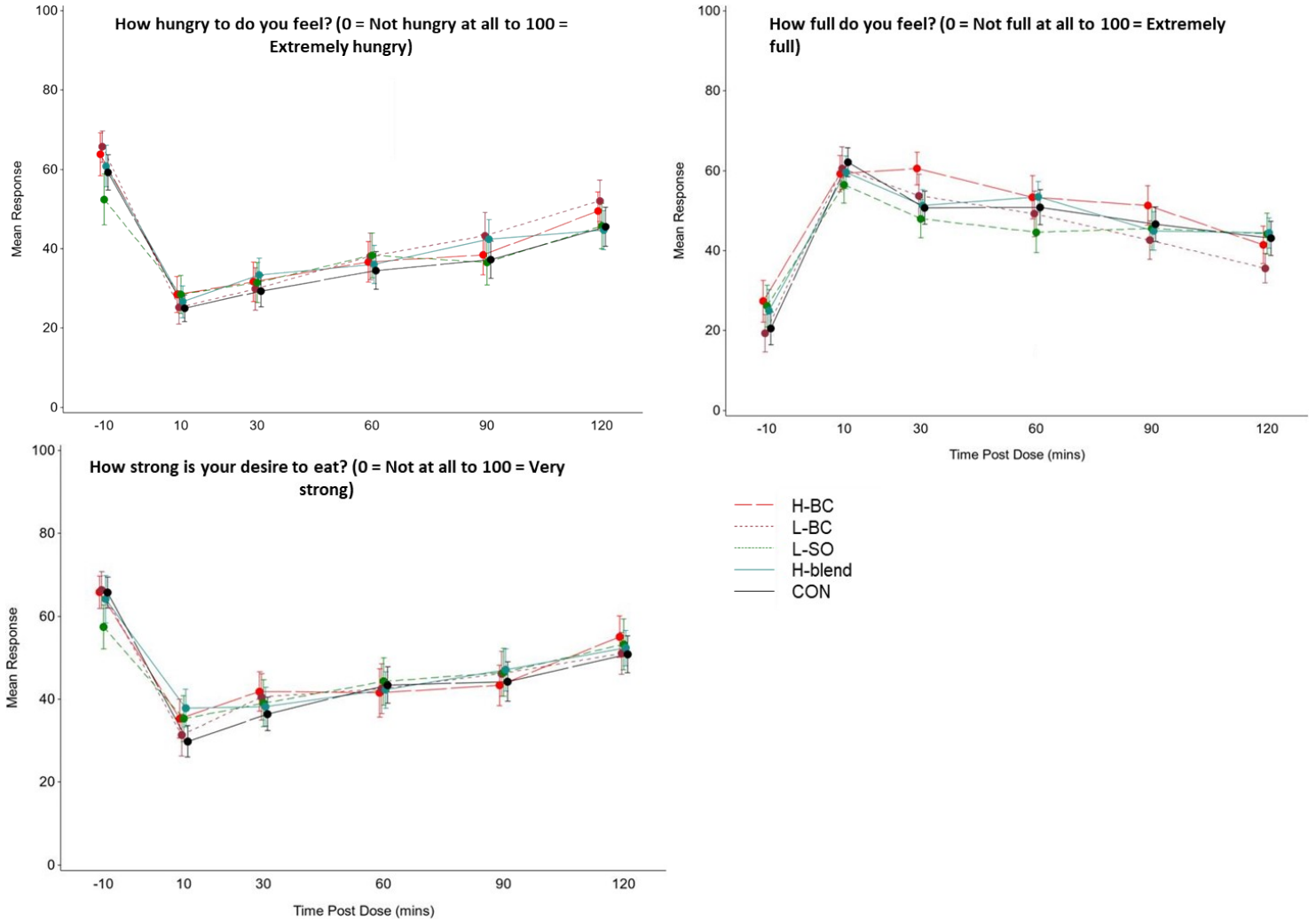
Supplementary figure 8 – GLU-FX Study: postprandial hunger, desire to eat and fullness scores by treatment.



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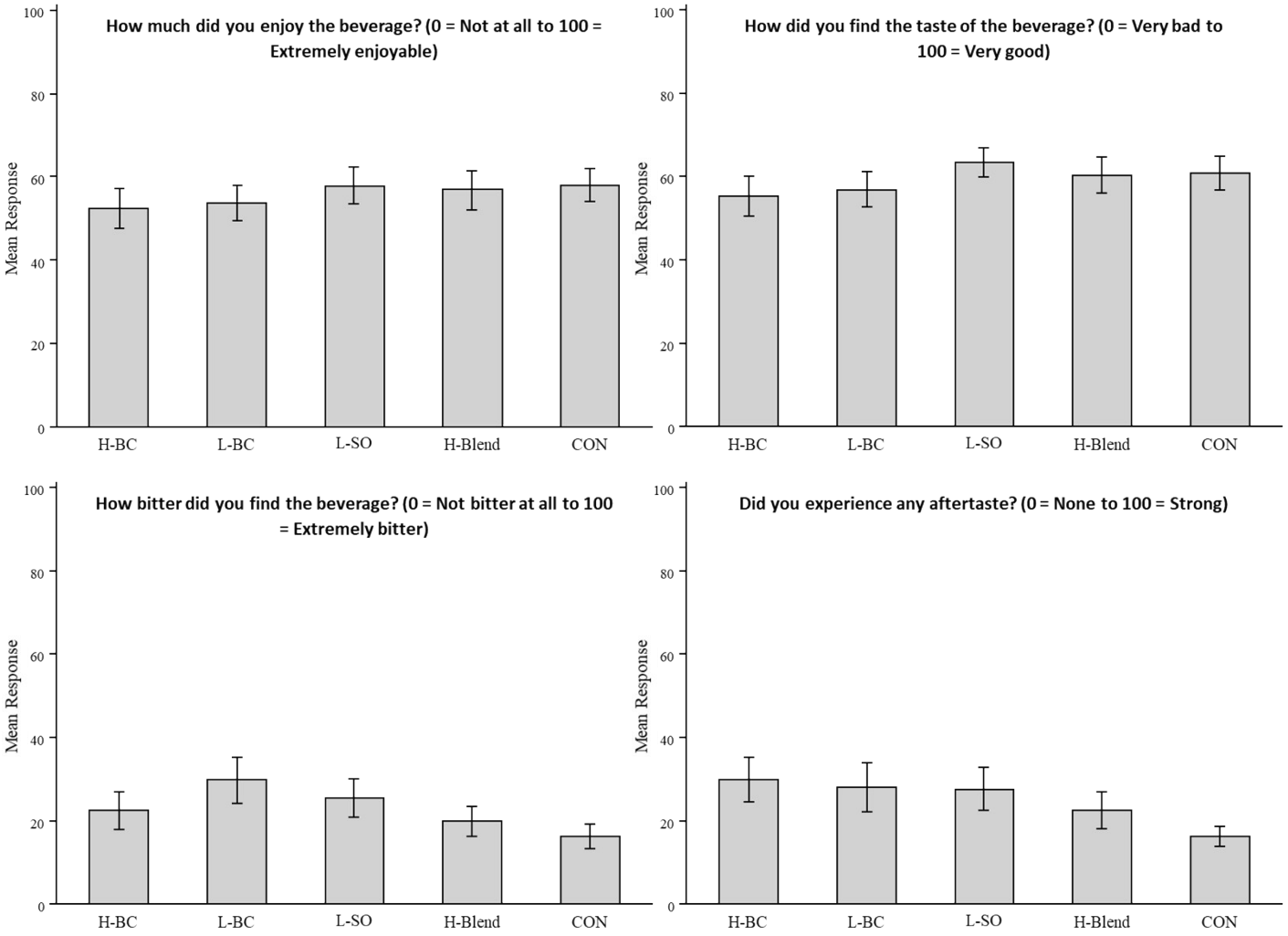
Supplementary figure 9 - GLU-FX Study: Ratings of enjoyment, taste, bitterness and aftertaste of the test drinks.



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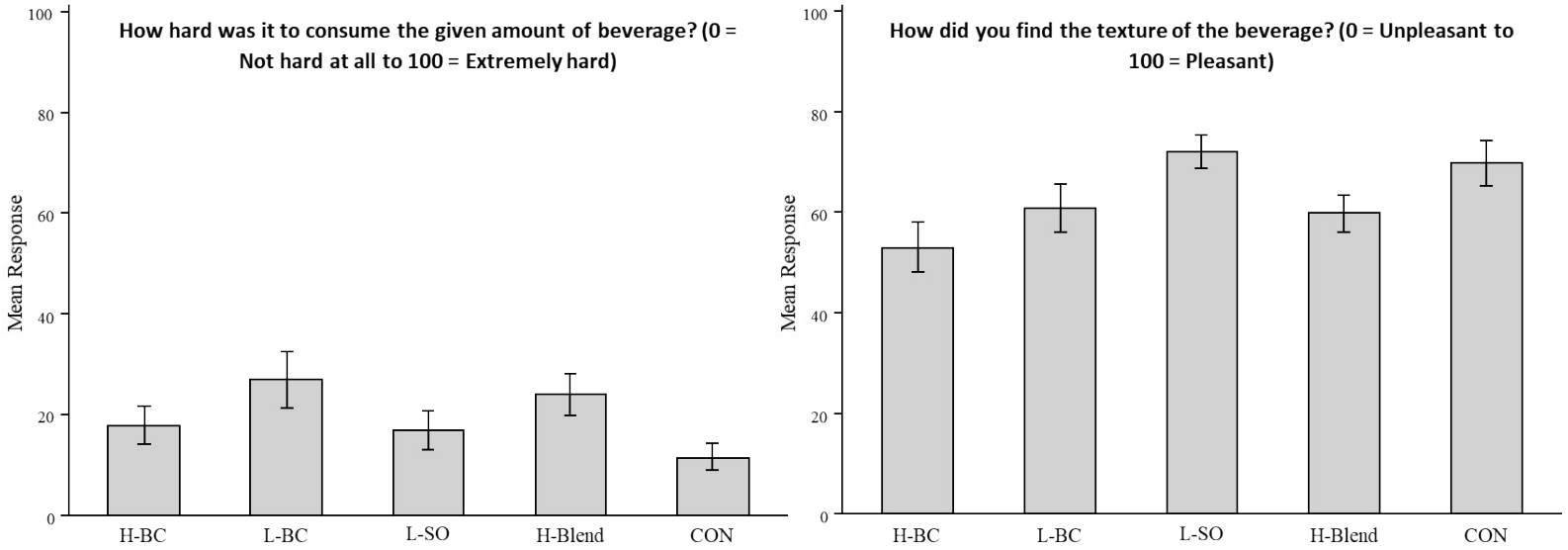
Supplementary figure 10 - GLU-FX Study: Ratings of difficulty to consume and texture of the test drinks.



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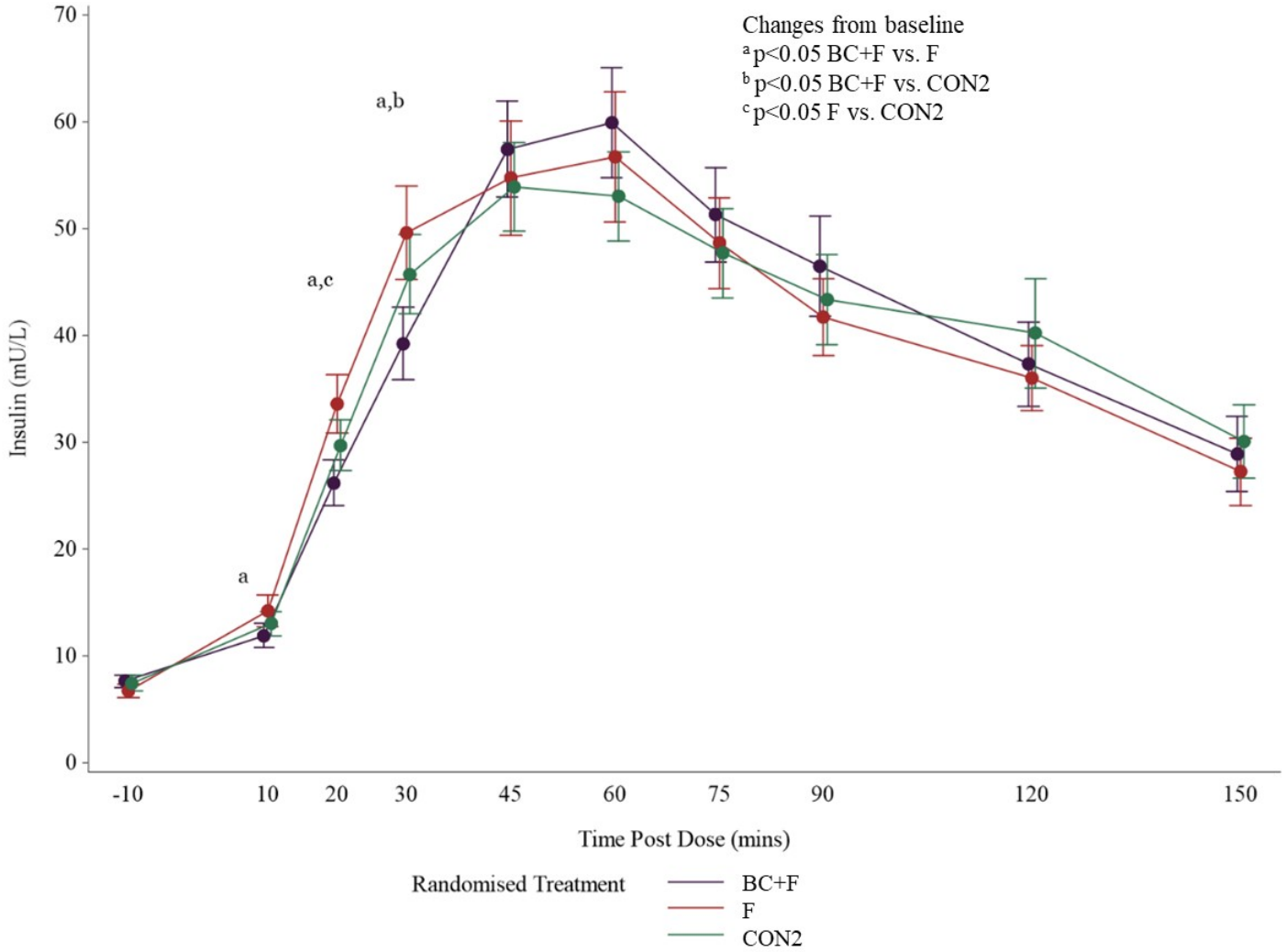
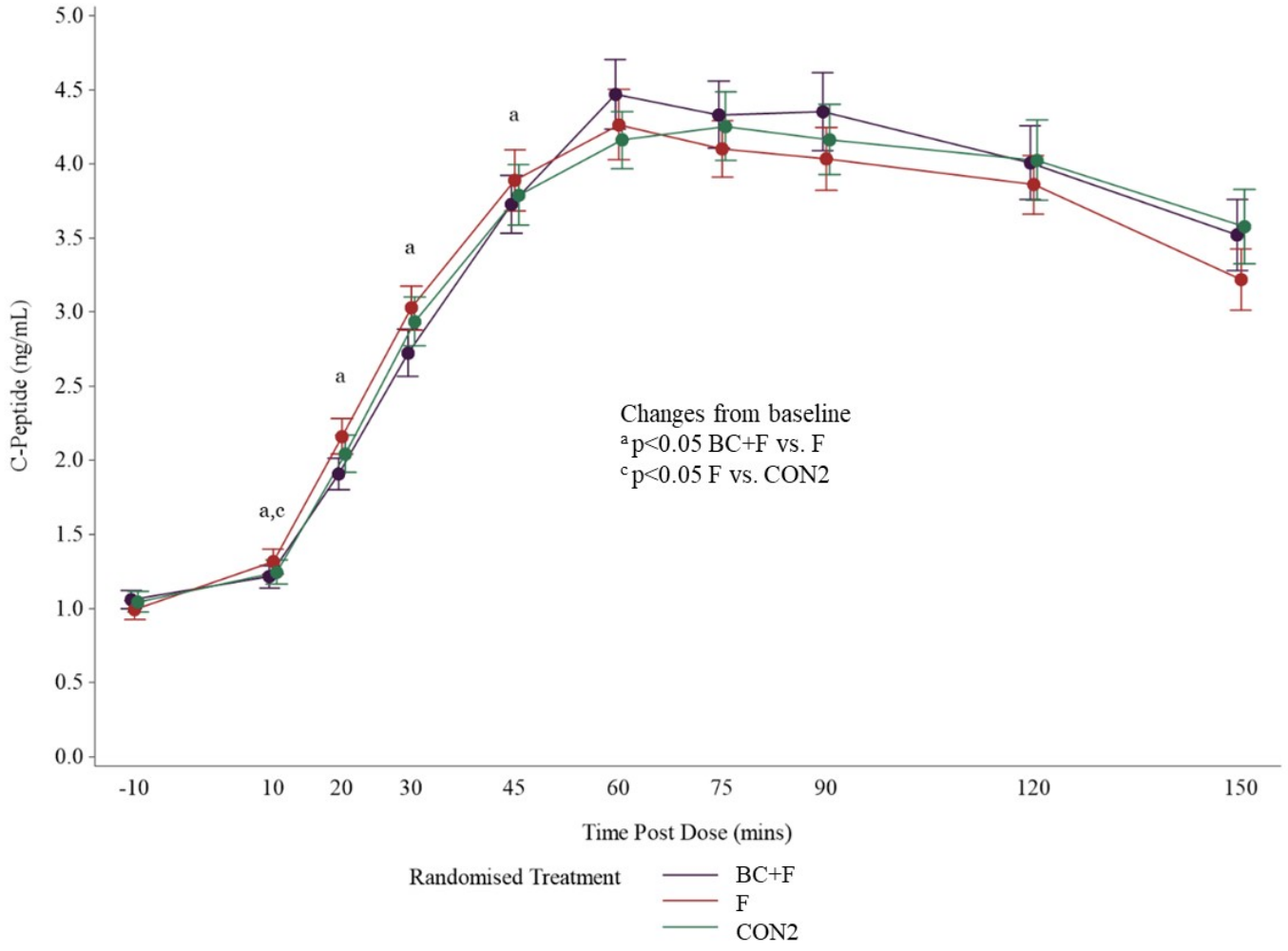
Supplementary figure 11 – GLU-MIX: mean serum insulin concentrations over time by treatment



CON2, 0 mg BC polyphenols and 0 g fibre; F, 1.5 g total fibre; BC+F, 800 mg BC polyphenols + 1.5 g total fibre. Dietary fibre for BC+F and F treatments provided by orange pulp.

Supplementary figure 12 – GLU-MIX: mean serum C-peptide concentrations over time by treatment



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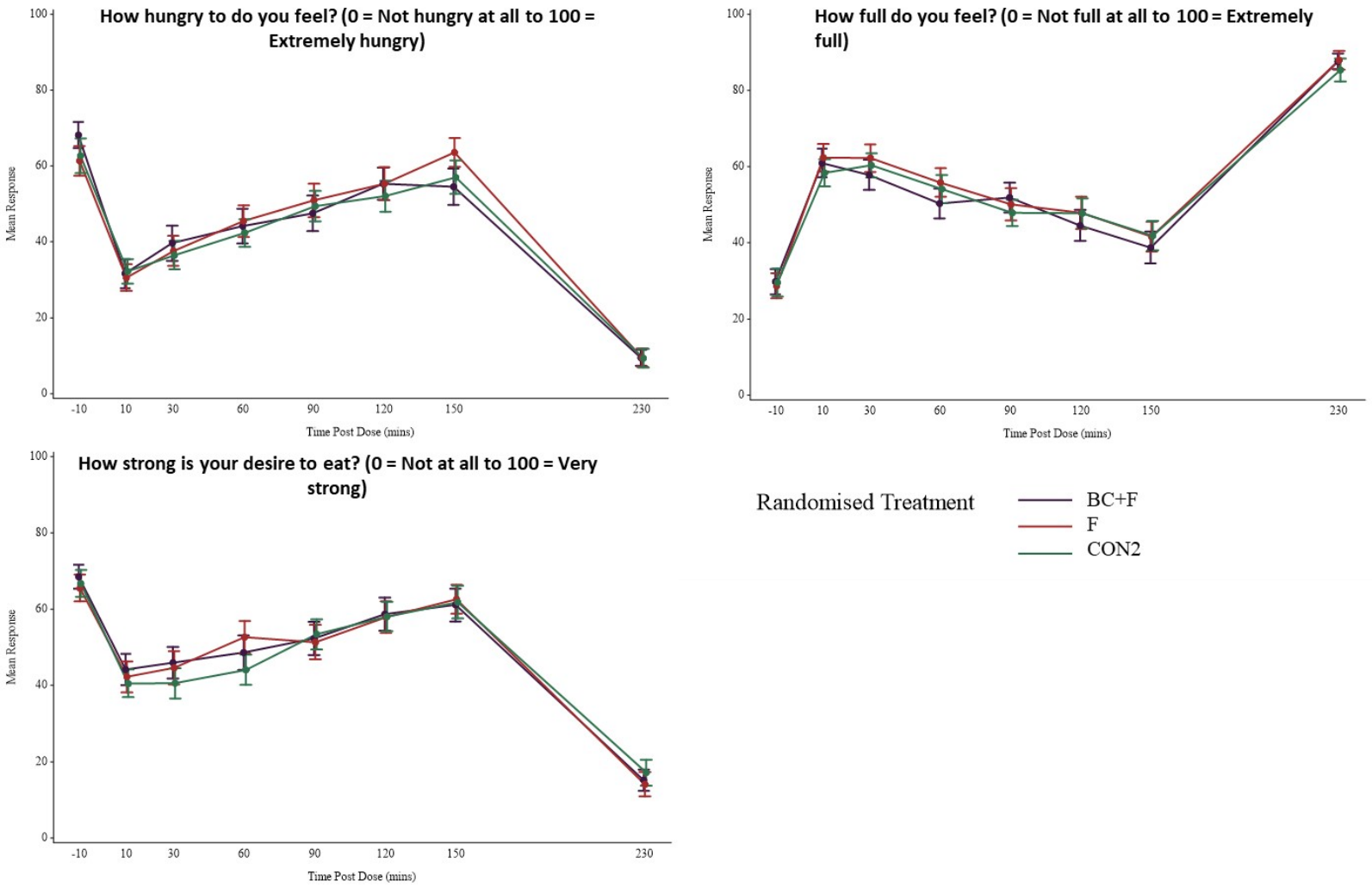

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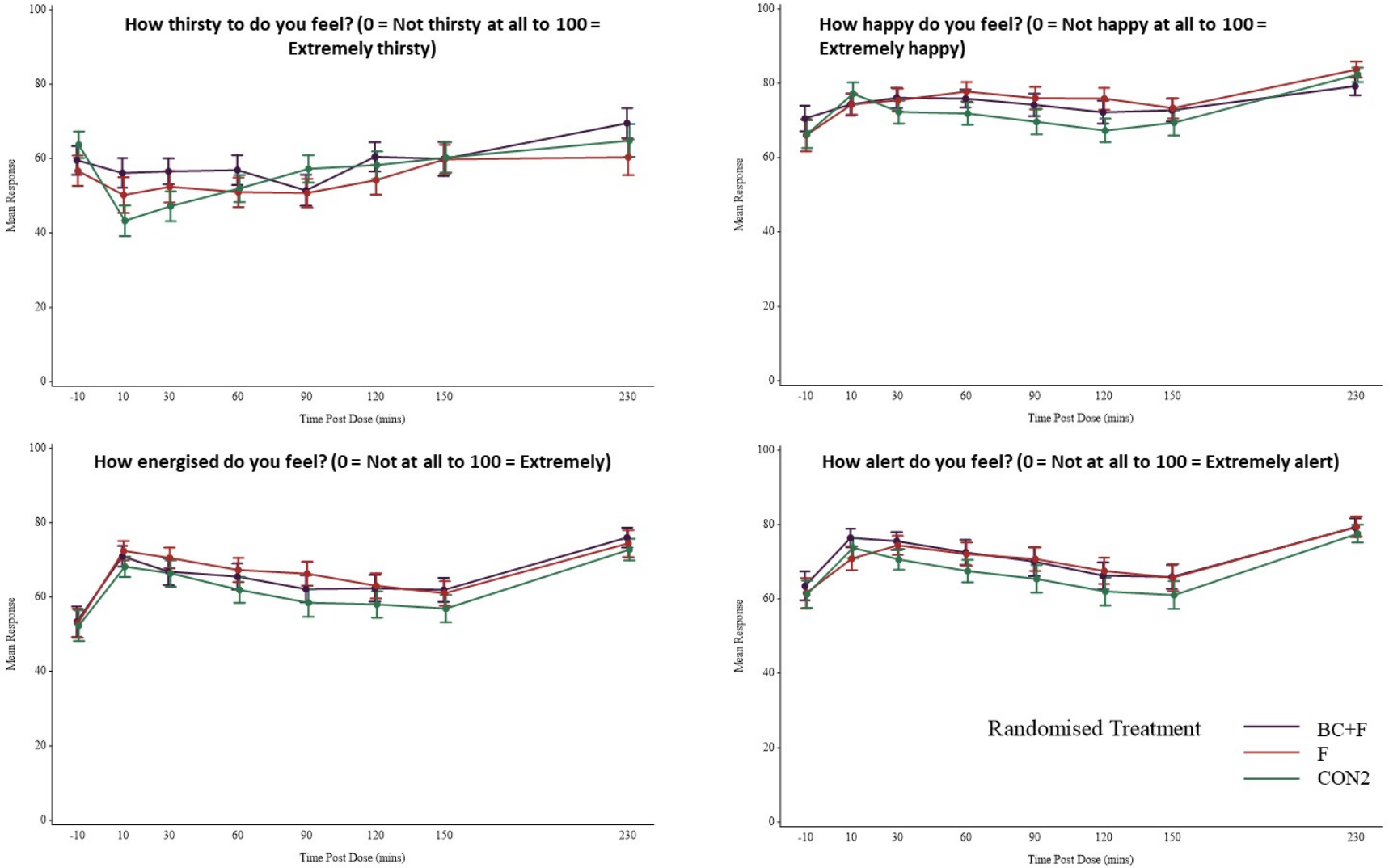

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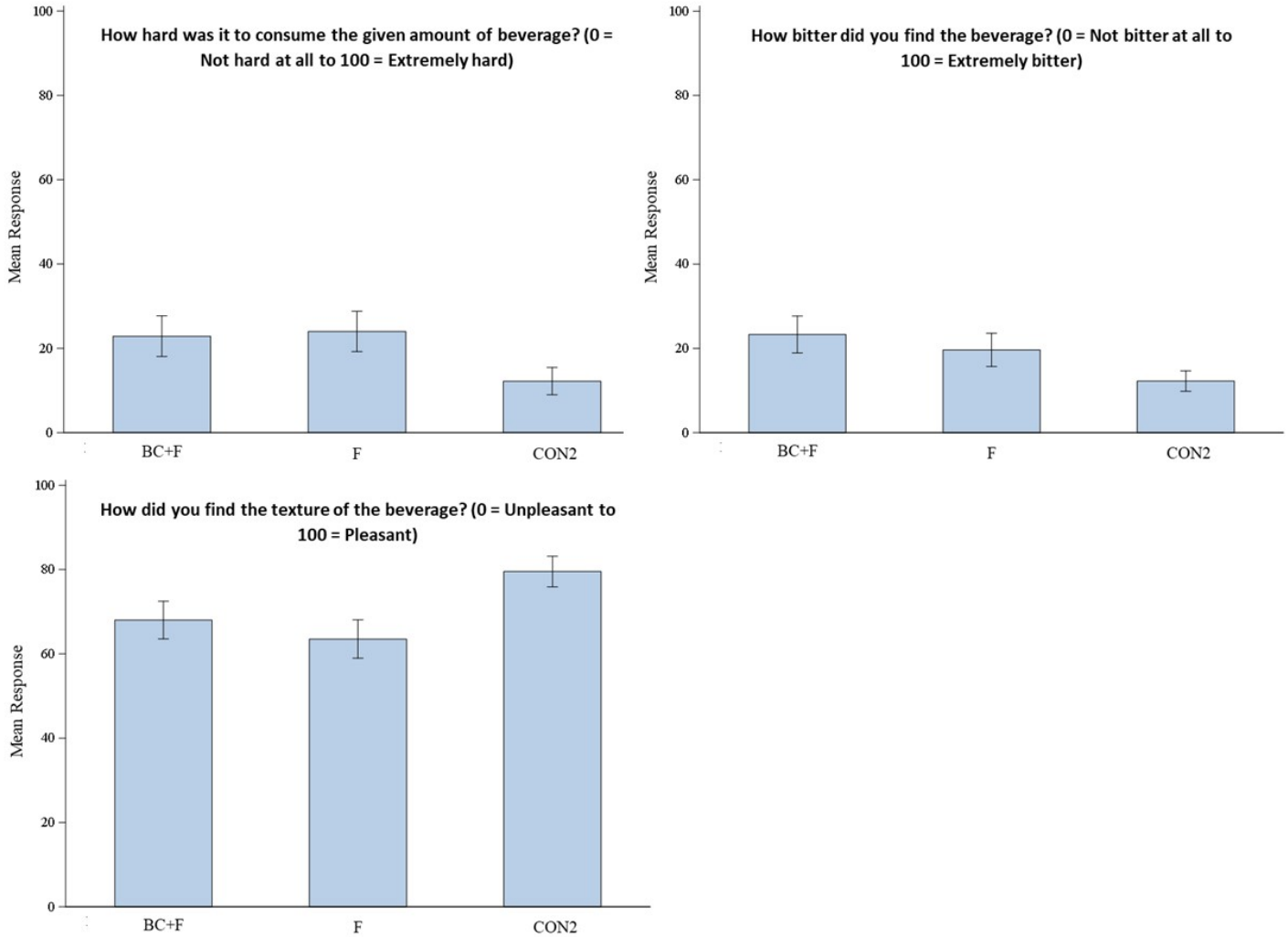

CON2, 0 mg BC polyphenols and 0 g fibre; F, 1.5 g total fibre; BC+F, 800 mg BC polyphenols + 1.5 g total fibre. Dietary fibre for BC+F and F treatments provided by orange pulp.

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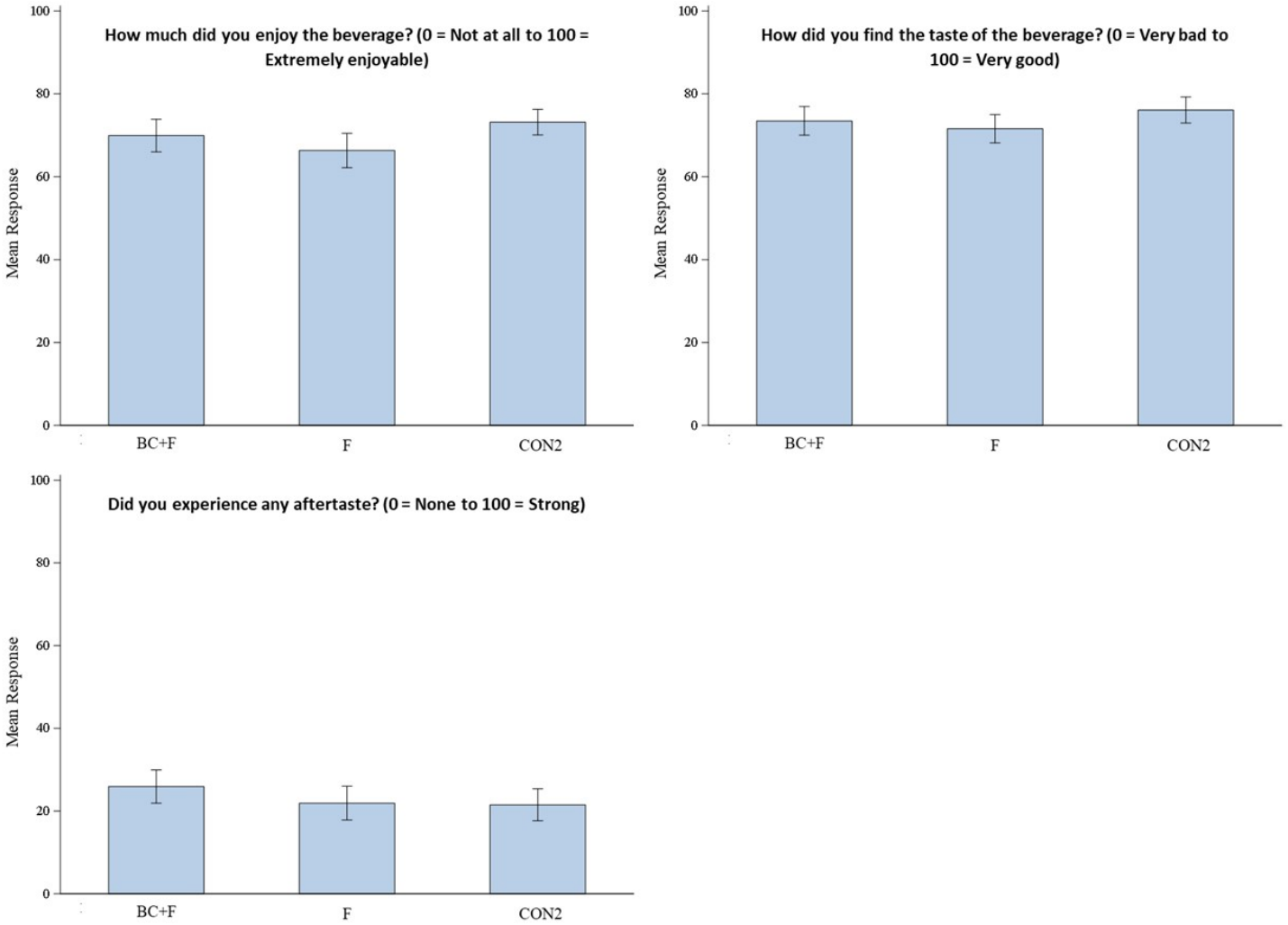

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