

SUPPLEMENTARY INFORMATION

Optimising a digitally delivered behavioural weight loss programme: a factorial cluster randomised controlled trial

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Section/topic	No	CONSORT 2025 checklist item description	Reported on page no.
Title and abstract			
Title and structured abstract	1a	Identification as a randomised trial	1
	1b	Structured summary of the trial design, methods, results, and conclusions	2
Open science			
Trial registration	2	Name of trial registry, identifying number (with URL) and date of registration	5
Protocol and statistical analysis plan	3	Where the trial protocol and statistical analysis plan can be accessed	5
Data sharing	4	Where and how the individual de-identified participant data (including data dictionary), statistical code and any other materials can be accessed	32
Funding and conflicts of interest	5a	Sources of funding and other support (eg, supply of drugs), and role of funders in the design, conduct, analysis and reporting of the trial	31
	5b	Financial and other conflicts of interest of the manuscript authors	31
Introduction			
Background and rationale	6	Scientific background and rationale	3-4
Objectives	7	Specific objectives related to benefits and harms	4
Methods			
Patient and public involvement	8	Details of patient or public involvement in the design, conduct and reporting of the trial	n/a
Trial design	9	Description of trial design including type of trial (eg, parallel group, crossover), allocation ratio, and framework (eg, superiority, equivalence, non-inferiority, exploratory)	5
Changes to trial protocol	10	Important changes to the trial after it commenced including any outcomes or analyses that were not prespecified, with reason	n/a
Trial setting	11	Settings (eg, community, hospital) and locations (eg, countries, sites) where the trial was conducted	7
Eligibility criteria	12a	Eligibility criteria for participants	5
	12b	If applicable, eligibility criteria for sites and for individuals delivering the interventions (eg, surgeons, physiotherapists)	n/a
Intervention and comparator	13	Intervention and comparator with sufficient details to allow replication. If relevant, where additional materials describing the intervention and comparator (eg, intervention manual) can be accessed	8-9
Outcomes	14	Prespecified primary and secondary outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final	10

		value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome	
Harms	15	How harms were defined and assessed (eg, systematically, non-systematically)	n/a
Sample size	16a	How sample size was determined, including all assumptions supporting the sample size calculation	11
	16b	Explanation of any interim analyses and stopping guidelines	n/a
Randomisation:			
Sequence generation	17a	Who generated the random allocation sequence and the method used	6
	17b	Type of randomisation and details of any restriction (eg, stratification, blocking and block size)	6
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Allocation concealment mechanism	18	Mechanism used to implement the random allocation sequence (eg, central computer/telephone; sequentially numbered, opaque, sealed containers), describing any steps to conceal the sequence until interventions were assigned	6
Implementation	19	Whether the personnel who enrolled and those who assigned participants to the interventions had access to the random allocation sequence	6
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		● for binary outcomes, presentation of both absolute and relative effect size	n/a
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Citation: Hopewell S, Chan AW, Collins GS, Hróbjartsson A, Moher D, Schulz KF, et al. CONSORT 2025 Statement: updated guideline for reporting randomised trials. BMJ. 2025; 388:e081123. <https://dx.doi.org/10.1136/bmj-2024-081123>

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*We strongly recommend reading this statement in conjunction with the CONSORT 2025 Explanation and Elaboration and/or the CONSORT 2025 Expanded Checklist for important clarifications on all the items. We also recommend reading relevant CONSORT extensions. See www.consort-spirit.org

Supplemental Tables

Supplementary Table 1: Results of mixed effects models examining effects of candidate components on weight loss over a 24-week period, using all available data (n = 1,335) or completers only (n =191).

Term	All Data (n = 1,335)				Completers only (n = 191)		
	Coef	90% CI	95% CI	P-value	Coef	90% CI	P-value
Week (ref = 0)							
4	-1.35	(-1.53,-1.18)	(-1.56,1.14)	<0.001	-1.59	(-1.98,-1.21)	<0.001
16	-2.63	(-2.87,-2.4)	(-2.91,2.35)	<0.001	-3.09	(-3.47, -2.71)	<0.001
24	-2.92	(-3.19,-2.66)	(-3.24,2.61)	<0.001	-3.68	(-4.06,-3.3)	<0.001
Week4:CS	-0.02	(-0.19,0.16)	(-0.23,0.19)	0.88	0.07	(-0.31,0.46)	0.75
Week4:FD	0.05	(-0.13,0.22)	(-0.16,0.26)	0.67	0.17	(-0.22,0.55)	0.48
Week4:GS	0.03	(-0.15,0.2)	(-0.18,0.24)	0.81	0.09	(-0.3,0.47)	0.71
Week4:HC	-0.06	(-0.24,0.12)	(-0.27,0.15)	0.59	-0.04	(-0.43,0.34)	0.85
Week4:CS:FD	-0.05	(-0.22,0.13)	(-0.26,0.16)	0.66	-	-	-
Week4:CS:GS	0.03	(-0.15,0.2)	(-0.18,0.24)	0.81	-	-	-
Week4:GS:FD	0.04	(-0.13,0.22)	(-0.17,0.25)	0.70	-	-	-
Week4:HC:CS	0.02	(-0.16,0.2)	(-0.19,0.23)	0.84	-	-	-
Week4:HC:FD	0.05	(-0.13,0.23)	(-0.16,0.26)	0.65	-	-	-
Week4:HC:GS	-0.03	(-0.2,0.15)	(-0.24,0.19)	0.82	-	-	-
Week4:CS:GS:FD	0.04	(-0.14,0.22)	(-0.17,0.25)	0.71	-	-	-
Week4:HC:CS:FD	0.04	(-0.14,0.21)	(-0.17,0.25)	0.74	-	-	-
Week4:HC:CS:GS	0.03	(-0.14,0.21)	(-0.18,0.24)	0.77	-	-	-
Week4:HC:GS:FD	0.00	(-0.17,0.18)	(-0.21,0.21)	0.97	-	-	-
Week4:HC:CS:GS:FD	-0.01	(-0.19,0.17)	(-0.22,0.2)	0.92	-	-	-
Week16:CS	-0.07	(-0.3,0.17)	(-0.35,0.22)	0.65	0.04	(-0.34,0.43)	0.86
Week16:FD	0.26	(0.03,0.5)	(-0.02,0.55)	0.07	0.44	(0.05,0.82)	0.07
Week16:GS	-0.22	(-0.45,0.02)	(-0.5,0.07)	0.14	-0.16	(-0.55,0.22)	0.50
Week16:HC	-0.22	(-0.46,0.01)	(-0.5,0.06)	0.13	-0.30	(-0.69,0.08)	0.20
Week16:CS:FD	-0.18	(-0.41,0.06)	(-0.46,0.11)	0.23	-	-	-
Week16:CS:GS	0.10	(-0.14,0.33)	(-0.18,0.38)	0.50	-	-	-
Week16:GS:FD	-0.17	(-0.41,0.06)	(-0.45,0.11)	0.23	-	-	-
Week16:HC:CS	-0.14	(-0.38,0.09)	(-0.42,0.14)	0.32	-	-	-
Week16:HC:FD	-0.01	(-0.25,0.22)	(-0.29,0.27)	0.93	-	-	-
Week16:HC:GS	-0.11	(-0.34,0.13)	(-0.39,0.17)	0.46	-	-	-
Week16:CS:GS:FD	0.23	(-0.01,0.46)	(-0.05,0.51)	0.12	-	-	-
Week16:HC:CS:FD	0.04	(-0.2,0.27)	(-0.24,0.32)	0.80	-	-	-
Week16:HC:CS:GS	0.16	(-0.08,0.4)	(-0.12,0.44)	0.27	-	-	-

Week16:HC:GS:FD	0.1	(-0.13,0.34)	(-0.18,0.39)	0.48	-	-	-
Week16:HC:CS:GS:FD	-0.03	(-0.26,0.21)	(-0.31,0.25)	0.85	-	-	-
Week24:CS	-0.25	(-0.51,0.02)	(-0.57,0.07)	0.13	-0.33	(-0.71, 0.05)	0.16
Week24:FD	0.37	(0.11,0.64)	(0.06,0.69)	0.02	0.44	(0.05, 0.82)	0.06
Week24:GS	-0.07	(-0.34,0.19)	(-0.39,0.24)	0.65	-0.15	(-0.53, 0.24)	0.53
Week24:HC	-0.5	(-0.76,-0.23)	(-0.82,-0.18)	0.002	-0.61	(-1.0,-0.22)	0.01
Week24:CS:FD	-0.5	(-0.77,-0.24)	(-0.82,-0.19)	0.002	-	-	-
Week24:CS:GS	-0.11	(-0.37,0.16)	(-0.42,0.21)	0.52	-	-	-
Week24:GS:FD	-0.14	(-0.4, 0.13)	(-0.45,0.18)	0.41	-	-	-
Week24:HC:CS	-0.2	(-0.46, 0.07)	(-0.51,0.12)	0.23	-	-	-
Week24:HC:FD	0.22	(-0.05, 0.48)	(-0.1,0.53)	0.18	-	-	-
Week24:HC:GS	-0.1	(-0.37, 0.17)	(-0.42,0.22)	0.54	-	-	-
Week24:CS:GS:FD	0.17	(-0.1,0.43)	(-0.15,0.48)	0.31	-	-	-
Week24:HC:CS:FD	0.15	(-0.12, 0.41)	(-0.17,0.46)	0.37	-	-	-
Week24:HC:CS:GS	-0.08	(-0.35, 0.18)	(-0.4,0.23)	0.62	-	-	-
Week24:HC:GS:FD	0.15	(-0.11, 0.42)	(-0.17,0.47)	0.36	-	-	-
Week24:HC:CS:GS:FD	-0.12	(-0.39, 0.14)	(-0.44,0.19)	0.46	-	-	-

Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size in kg. The completers analysis included main effects only in the model due to limited data for estimating higher order interactions. Significant effects ($p < .10$) are highlighted in bold. Conventional 95% confidence intervals are also reported as exploratory for the primary analysis. Abbreviations: CS = coaching drop-in webchat sessions; FD = food diary review plus feedback; GS = goal setting statements; HC = health coach introductory video call.

Supplementary Table 2: Results of mixed effects models examining effects of candidate components on weight loss over a 24-week period, using different missing data approaches.

Term	BOCF (n = 1,335)			LOCF (n = 1,335)		
	Coef	90% CI	P-value	Coef	90% CI	P-value
Week (ref = 0)						
4	-0.71	(-0.8,-0.62)	<0.001	-0.71	(-0.8,-0.62)	<0.001
16	-0.78	(-0.87,-0.68)	<0.001	-1.09	(-1.18,-1.0)	<0.001
24	-0.60	(-0.69,-0.51)	<0.001	-1.18	(-1.27,-1.09)	<0.001
Week4:CS	0	(-0.1,0.09)	0.95	0	(-0.09,0.09)	0.95
Week4:FD	0.05	(-0.04,0.14)	0.37	0.05	(-0.04,0.14)	0.35
Week4:GS	0.01	(-0.08,0.11)	0.81	0.01	(-0.08,0.1)	0.81
Week4:HC	-0.03	(-0.13,0.06)	0.55	-0.03	(-0.12,0.06)	0.54
Week4:CS:FD	-0.06	(-0.15,0.03)	0.31	-0.06	(-0.15,0.03)	0.29
Week4:CS:GS	0.05	(-0.04,0.14)	0.38	0.05	(-0.04,0.14)	0.37
Week4:GS:FD	0.02	(-0.07,0.11)	0.74	0.02	(-0.07,0.11)	0.74
Week4:HC:CS	-0.03	(-0.12,0.06)	0.57	-0.03	(-0.12,0.06)	0.56
Week4:HC:FD	0.05	(-0.04,0.14)	0.37	0.05	(-0.04,0.14)	0.35
Week4:HC:GS	0.01	(-0.08,0.1)	0.84	0.01	(-0.08,0.1)	0.84
Week4:CS:GS:FD	0.04	(-0.05,0.13)	0.48	0.04	(-0.05,0.13)	0.47
Week4:HC:CS:FD	0.02	(-0.07,0.11)	0.71	0.02	(-0.07,0.11)	0.70
Week4:HC:CS:GS	0.02	(-0.08,0.11)	0.78	0.02	(-0.07,0.1)	0.77
Week4:HC:GS:FD	0.02	(-0.07,0.11)	0.72	0.02	(-0.07,0.11)	0.71
Week4:HC:CS:GS:FD	-0.01	(-0.11,0.08)	0.81	-0.01	(-0.1,0.08)	0.81
Week16:CS	-0.01	(-0.1,0.08)	0.82	-0.02	(-0.11,0.06)	0.65
Week16:FD	0.11	(0.03,0.21)	0.03	0.12	(0.03,0.21)	0.03
Week16:GS	-0.08	(-0.17,0.01)	0.16	-0.06	(-0.15,0.03)	0.25
Week16:HC	-0.05	(-0.14,0.04)	0.39	-0.06	(-0.15,0.03)	0.29
Week16:CS:FD	-0.08	(-0.17,0.02)	0.17	-0.09	(-0.18,-0.0)	0.10
Week16:CS:GS	0.03	(-0.06,0.12)	0.61	0.06	(-0.03,0.15)	0.27
Week16:GS:FD	-0.03	(-0.12,0.06)	0.63	-0.03	(-0.12,0.06)	0.58
Week16:HC:CS	-0.06	(-0.15,0.03)	0.27	-0.06	(-0.15,0.03)	0.27
Week16:HC:FD	0.01	(-0.08,0.1)	0.87	0.05	(-0.04,0.14)	0.38
Week16:HC:GS	0.02	(-0.07,0.12)	0.66	0.02	(-0.07,0.11)	0.77
Week16:CS:GS:FD	0.14	(0.05,0.23)	0.01	0.14	(0.05,0.23)	0.01
Week16:HC:CS:FD	0	(-0.09,0.09)	0.96	0.01	(-0.07,0.1)	0.79
Week16:HC:CS:GS	0.04	(-0.06,0.13)	0.53	0.05	(-0.04,0.14)	0.34
Week16:HC:GS:FD	0.06	(-0.03,0.15)	0.30	0.05	(-0.03,0.14)	0.32
Week16:HC:CS:GS:FD	0	(-0.09,0.09)	0.98	0.01	(-0.08,0.1)	0.83
Week24:CS	-0.04	(-0.13,0.05)	0.48	-0.06	(-0.15,0.03)	0.29

Week24:FD	0.12	(0.03,0.21)	0.03	0.14	(0.05,0.23)	0.01
Week24:GS	-0.01	(-0.1,0.08)	0.86	-0.04	(-0.13,0.04)	0.42
Week24:HC	-0.1	(-0.19,-0.01)	0.07	-0.13	(-0.22,-0.04)	0.02
Week24:CS:FD	-0.11	(-0.21,-0.02)	0.04	-0.12	(-0.21,-0.03)	0.04
Week24:CS:GS	-0.03	(-0.12,0.07)	0.64	0.03	(-0.06,0.12)	0.56
Week24:GS:FD	0	(-0.09,0.09)	0.96	-0.01	(-0.1,0.08)	0.86
Week24:HC:CS	-0.02	(-0.11,0.07)	0.68	-0.05	(-0.14,0.04)	0.38
Week24:HC:FD	0.08	(-0.01,0.17)	0.15	0.11	(0.02,0.2)	0.04
Week24:HC:GS	0.03	(-0.06,0.12)	0.56	0	(-0.09,0.09)	0.97
Week24:CS:GS:FD	0.08	(-0.02,0.17)	0.18	0.13	(0.04,0.22)	0.02
Week24:HC:CS:FD	0.01	(-0.08,0.1)	0.86	0.02	(-0.07,0.11)	0.77
Week24:HC:CS:GS	-0.07	(-0.16,0.02)	0.23	0.04	(-0.05,0.13)	0.47
Week24:HC:GS:FD	0.08	(-0.01,0.17)	0.16	0.05	(-0.04,0.13)	0.41
Week24:HC:CS:GS:FD	0	(-0.09,0.1)	0.95	-0.01	(-0.1,0.08)	0.82

Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size. Missing data were imputed by carrying forward the baseline weight (BOCF) or carrying forward the last-measured weight (LOCF). Significant effects ($p < .10$) are highlighted in bold. Abbreviations: BOCF = baseline observation carried forward; CS = coaching drop-in webchat sessions; FD = food diary review and feedback; GS = goal setting statements; HC = health coach introductory video call; LOCF: last observation carried forward.

Supplementary Table 3: Subgroup analysis by gender. Results of mixed effects models examining effects of candidate components on weight loss over a 24-week period, comparing females (n = 1205) to males (n = 130).

Term	All Data (n = 1,335)		
	Coef	90% CI	P-value
Week (ref = 0)			
4	-1.31	(-1.5, -1.12)	<0.001
16	-2.58	(-2.83, -2.34)	<0.001
24	-2.89	(-3.17, -2.61)	<0.001
Gender (ref = female)			
Male	16.42	(13.4, 19.44)	<0.001
Interaction terms			
Week4:Male	-0.39	(-1.07, 0.29)	0.35
Week4:CS	-0.05	(-0.24, 0.14)	0.66
Week4:Male:CS	0.15	(-0.53, 0.82)	0.72
Week4:FD	0.05	(-0.14, 0.23)	0.68
Week4:Male:FD	-0.09	(-0.81, 0.64)	0.84
Week4:GS	0.07	(-0.12, 0.26)	0.53
Week4:Male:GS	-0.34	(-1.04, 0.35)	0.41
Week4:HC	-0.04	(-0.22, 0.15)	0.76
Week4:Male:HC	-0.35	(-1.06, 0.37)	0.42
Week16:Male	-0.64	(-1.58, 0.3)	0.27
Week16:CS	-0.1	(-0.34, 0.15)	0.53
Week16:Male:CS	0.55	(-0.34, 1.44)	0.31
Week16:FD	0.18	(-0.07, 0.43)	0.24
Week16:Male:FD	0.80	(-0.11, 1.71)	0.15
Week16:GS	-0.16	(-0.4, 0.09)	0.30
Week16:Male:GS	-0.17	(-1.17, 0.83)	0.78
Week16:HC	-0.26	(-0.5, -0.01)	0.09
Week16:Male:HC	0.61	(-0.3, 1.53)	0.27
Week24:Male	0.26	(-0.91, 1.43)	0.72
Week24:CS	-0.25	(-0.53, 0.03)	0.14
Week24:Male:CS	0.56	(-0.49, 1.62)	0.38
Week24:FD	0.31	(0.04, 0.59)	0.06
Week24:Male:FD	-0.16	(-1.24, 0.93)	0.81
Week24:GS	0.03	(-0.25, 0.31)	0.87
Week24:Male:GS	-1.54	(-2.74, -0.35)	0.034
Week24:HC	-0.58	(-0.86, -0.3)	<0.001
Week24:Male:HC	0.84	(-0.22, 1.9)	0.19

Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size. Significant effects ($p < .10$) are highlighted in bold. Subgroup effects were tested by adding gender into the primary linear mixed-effect model and estimating three-way interactions between time, intervention component, and gender. Abbreviations: CS = coaching drop-in webchat sessions; FD = food diary review and feedback; GS = goal setting statements; HC = health coach introductory video call.

Supplementary Table 4 : Subgroup analysis by age. Results of mixed effects models examining effects of candidate components on weight loss over a 24-week period, comparing participants above (n = 684) and below (n = 632) the median age of 50 years.

Term	All Data (n = 1,316)		
	Coef	90% CI	P-value
Week (ref = 0)			
4	-1.28	(-1.53, -1.04)	<0.001
16	-2.38	(-2.70, -2.06)	<0.001
24	-2.41	(-2.77, -2.06)	<0.001
Age (ref = > 50 years)			
Age <50 years	2.88	(1.08, 4.69)	0.01
Interaction terms			
Week4:Age <50 years	-0.17	(-0.53, 0.20)	0.45
Week4:CS	-0.08	(-0.33, 0.17)	0.59
Week4:Age <50 years:CS	0.12	(-0.25, 0.49)	0.60
Week4:FD	-0.04	(-0.29, 0.21)	0.77
Week4:Age <50 years:FD	0.17	(-0.20, 0.54)	0.45
Week4:GS	0.06	(-0.19, 0.31)	0.69
Week4:Age <50 years:GS	-0.06	(-0.43, 0.31)	0.79
Week4:HC	-0.02	(-0.27, 0.23)	0.88
Week4:Age <50 years:HC	-0.07	(-0.44, 0.29)	0.75
Week16:Age <50 years	-0.69	(-1.18, -0.21)	0.02
Week16:CS	-0.24	(-0.56, 0.08)	0.22
Week16:Age <50 years:CS	0.53	(0.04, 1.02)	0.08
Week16:FD	0.21	(-0.11, 0.53)	0.28
Week16:Age <50 years:FD	-0.12	(-0.61, 0.37)	0.70
Week16:GS	-0.21	(-0.54, 0.11)	0.28
Week16:Age <50 years:GS	0.21	(-0.28, 0.70)	0.48
Week16:HC	-0.17	(-0.49, 0.16)	0.40
Week16:Age <50 years:HC	-0.20	(-0.68, 0.29)	0.50
Week24:Age <50 years	-1.18	(-1.72, -0.64)	<0.001
Week24:CS	-0.19	(-0.55, 0.18)	0.40
Week24:Age <50 years:CS	0.06	(-0.49, 0.60)	0.87
Week24:FD	0.26	(-0.11, 0.62)	0.25
Week24:Age <50 years:FD	0.01	(-0.55, 0.56)	0.99
Week24:GS	-0.14	(-0.51, 0.23)	0.52
Week24:Age <50 years:GS	0.22	(-0.33, 0.77)	0.51
Week24:HC	-0.46	(-0.82, -0.09)	0.04

Week24:Age <50 years:HC	-0.15	(-0.70, 0.39)	0.65
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Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size. Significant effects ($p < .10$) are highlighted in bold. Subgroups were determined based on the median age of the study population (50 years). Subgroup effects were tested by adding age subgroup into the primary linear mixed-effect model and estimating three-way interactions between time, intervention component, and age subgroup. $n = 19$ had missing data for age. Abbreviations: CS = coaching drop-in webchat sessions; FD = food diary review and feedback; GS = goal setting statements; HC = health coach introductory video call.

Supplementary Table 5: Subgroup analysis by IMD tertile. Results of mixed effects models examining effects of candidate components on weight loss over a 24-week period, comparing participants with IMD 1-6 (n = 404), to participants with IMD 6-8 (n = 403) and participants with IMD 8-10 (n = 403).

Term	All Data (n = 1,210)		
	Coef	90% CI	P-value
Week (ref = 0)			
4	-1.37	(-1.7, -1.05)	<0.001
16	-3.43	(-3.86, -2.99)	<0.001
24	-3.41	(-3.9, -2.92)	<0.001
IMD Tertile (ref = Low [1-6])			
IMD_Medium (6-8)	-1.94	(-4.25, 0.38)	0.17
IMD_High (8-10)	-4.37	(-6.69, -2.05)	0.002
Interaction terms			
Week4:IMD_Medium	-0.03	(-0.49, 0.44)	0.92
Week4:IMD_High	-0.03	(-0.49, 0.44)	0.92
Week4:CS	-0.01	(-0.34, 0.31)	0.94
Week4:IMD_Medium:CS	0.03	(-0.43, 0.5)	0.91
Week4:IMD_High:CS	-0.15	(-0.61, 0.31)	0.60
Week4:FD	-0.06	(-0.39, 0.26)	0.75
Week4:IMD_Medium:FD	0.20	(-0.26, 0.67)	0.48
Week4:IMD_High:FD	0.09	(-0.37, 0.56)	0.74
Week4:GS	-0.13	(-0.45, 0.19)	0.51
Week4:IMD_Medium:GS	0.26	(-0.2, 0.73)	0.35
Week4:IMD_High:GS	0.23	(-0.23, 0.69)	0.40
Week4:HC	-0.12	(-0.45, 0.21)	0.55
Week4:IMD_Medium:HC	0.11	(-0.36, 0.58)	0.70
Week4:IMD_High:HC	-0.04	(-0.5, 0.43)	0.89
Week16:IMD_Medium			
Week16:IMD_High	1.16	(0.54, 1.78)	0.002
Week16:CS	-0.36	(-0.79, 0.07)	0.17
Week16:IMD_Medium:CS	0.52	(-0.09, 1.14)	0.16
Week16:IMD_High:CS	0.04	(-0.58, 0.65)	0.92
Week16:FD	0.06	(-0.38, 0.5)	0.81
Week16:IMD_Medium:FD	0.32	(-0.31, 0.94)	0.40
Week16:IMD_High:FD	0.20	(-0.42, 0.82)	0.60
Week16:GS	-0.69	(-1.12, -0.26)	0.009
Week16:IMD_Medium:GS	0.68	(0.07, 1.3)	0.07
Week16:IMD_High:GS	0.60	(-0.01, 1.22)	0.11
Week16:HC	0.01	(-0.43, 0.45)	0.97
Week16:IMD_Medium:HC	-0.27	(-0.89, 0.35)	0.48

Week16:IMD_High:HC	-0.32	(-0.94, 0.3)	0.39
Week24:IMD_Medium	0.23	(-0.45, 0.91)	0.58
Week24:IMD_High	0.31	(-0.4, 1.03)	0.47
Week24:CS	-0.66	(-1.15, -0.17)	0.03
Week24:IMD_Medium:CS	0.69	(0.01, 1.37)	0.10
Week24:IMD_High:CS	0.58	(-0.13, 1.29)	0.18
Week24:FD	-0.04	(-0.54, 0.45)	0.89
Week24:IMD_Medium:FD	0.26	(-0.42, 0.95)	0.53
Week24:IMD_High:FD	0.92	(0.21, 1.63)	0.034
Week24:GS	-1.39	(-1.88, -0.91)	<0.001
Week24:IMD_Medium:GS	1.74	(1.06, 2.42)	<0.001
Week24:IMD_High:GS	2.01	(1.3, 2.72)	<0.001
Week24:HC	-0.39	(-0.89, 0.12)	0.21
Week24:IMD_Medium:HC	0.11	(-0.58, 0.79)	0.80
Week24:IMD_High:HC	-0.65	(-1.37, 0.07)	0.14

Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size. Significant effects ($p < .10$) are highlighted in bold. Subgroups were determined based on tertiles from the total study population. The lowest tertile included IMD 1-6, the middle tertile included IMD 6-8, and the highest tertile included IMD 8-10. Subgroup effects were tested by adding IMD subgroup into the primary linear mixed-effect model and estimating three-way interactions between time, intervention component, and IMD subgroup. $n = 125$ had missing data for IMD. Abbreviations: CS = coaching drop-in webchat sessions; FD = food diary review and feedback; GS = goal setting statements; HC = health coach introductory video call; IMD = index of multiple deprivation.

Supplementary Table 6: Subgroup analysis by BMI category. Results of mixed effects models examining effects of candidate components on weight loss over a 24-week period, comparing participants with BMI 21-25kg/m² (n = 119), to participants with overweight BMI 25-30 kg/m² (n = 454) and participants with obesity BMI > 30kg/m² (n = 758).

Term	All Data (n = 1,331)		
	Coef	90% CI	P-value
Week (ref = 0)			
4	-1.02	(-1.68, -0.37)	0.01
16	-1.77	(-2.69, -0.84)	0.002
24	-1.67	(-2.61, -0.73)	0.003
BMI Category (ref = 21-25kg/m²)			
Overweight (BMI 25-30 kg/m²)	10.58	(8.01, 13.14)	<0.001
Obesity (BMI > 30kg/m²)	34.49	(32.03, 36.96)	<0.001
Interaction terms			
Week4:Overweight	-0.11	(-0.83, 0.61)	0.80
Week4:Obesity	-0.54	(-1.23, 0.16)	0.20
Week4:CS	-0.02	(-0.68, 0.64)	0.97
Week4:Overweight:CS	0.02	(-0.71, 0.75)	0.96
Week4:Obesity:CS	-0.01	(-0.71, 0.69)	0.98
Week4:FD	0.13	(-0.54, 0.8)	0.74
Week4:Overweight:FD	-0.24	(-0.98, 0.49)	0.59
Week4:Obesity:FD	-0.01	(-0.72, 0.7)	0.97
Week4:GS	-0.22	(-0.89, 0.45)	0.59
Week4:Overweight:GS	0.23	(-0.5, 0.96)	0.61
Week4:Obesity:GS	0.29	(-0.42, 1.0)	0.50
Week4:HC	-0.11	(-0.79, 0.56)	0.79
Week4:Overweight:HC	0.02	(-0.72, 0.76)	0.96
Week4:Obesity:HC	0.05	(-0.67, 0.76)	0.91
Week16			
Week16:Overweight	-0.22	(-1.23, 0.78)	0.72
Week16:Obesity	-1.39	(-2.37, -0.42)	0.02
Week16:CS	0.36	(-0.59, 1.31)	0.54
Week16:Overweight:CS	-0.41	(-1.45, 0.62)	0.51
Week16:Obesity:CS	-0.48	(-1.48, 0.53)	0.44
Week16:FD	0.26	(-0.68, 1.2)	0.65
Week16:Overweight:FD	-0.37	(-1.39, 0.65)	0.55
Week16:Obesity:FD	0.14	(-0.85, 1.13)	0.81
Week16:GS	-0.19	(-1.14, 0.77)	0.75
Week16:Overweight:GS	-0.20	(-1.23, 0.84)	0.76
Week16:Obesity:GS	0.05	(-0.95, 1.06)	0.93
Week16:HC	-0.66	(-1.6, 0.28)	0.25

Week16:Overweight:HC	0.52	(-0.5, 1.54)	0.40
Week16:Obesity:HC	0.39	(-0.6, 1.38)	0.52
Week24:Overweight	-0.60	(-1.64, 0.44)	0.34
Week24:Obesity	-1.92	(-2.92, -0.92)	0.002
Week24:CS	0.20	(-0.84, 1.24)	0.75
Week24:Overweight:CS	-0.40	(-1.54, 0.73)	0.56
Week24:Obesity:CS	-0.51	(-1.61, 0.59)	0.44
Week24:FD	0.49	(-0.57, 1.56)	0.45
Week24:Overweight:FD	-0.39	(-1.55, 0.76)	0.58
Week24:Obesity:FD	-0.14	(-1.26, 0.99)	0.84
Week24:GS	-0.69	(-1.77, 0.39)	0.29
Week24:Overweight:GS	0.56	(-0.61, 1.73)	0.43
Week24:Obesity:GS	0.68	(-0.46, 1.82)	0.32
Week24:HC	-0.57	(-1.64, 0.5)	0.38
Week24:Overweight:HC	0.43	(-0.72, 1.59)	0.54
Week24:Obesity:HC	-0.33	(-1.46, 0.8)	0.63

Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size. Significant effects ($p < .10$) are highlighted in bold. Subgroup effects were tested by adding BMI category into the primary linear mixed-effect model and estimating three-way interactions between time, intervention component, and BMI category. $n = 4$ had missing data for height so baseline BMI could not be calculated. Abbreviations: BMI = body mass index; CS = coaching drop-in webchat sessions; FD = food diary review and feedback; GS = goal setting statements; HC = health coach introductory video call.

Supplementary Table 7. Mean (SD) weight change (kg) at 4, 16 and 24 weeks by intention-to-treat and per-protocol populations

Component	Week	Mean weight change from baseline (kg)				n in PP (Adh / Non-adh)
		ITT Off	ITT On	PP Adherents	PP Non-adherents	
Health coach introductory video call	4	-1.29 (1.44)	-1.44 (1.72)	-1.37 (1.73)	-1.48 (1.71)	139 / 206
	16	-2.69 (3.44)	-3.16 (3.54)	-2.92 (3.61)	-3.34 (3.50)	75 / 98
	24	-2.44 (3.88)	-3.55 (5.31)	-2.91 (5.35)	-3.99 (5.28)	52 / 78
Coaching drop-in webchat sessions	4	-1.34 (1.58)	-1.39 (1.58)	-1.42 (1.33)	-1.35 (1.83)	185 / 163
	16	-2.87 (3.52)	-2.97 (3.48)	-2.76 (3.07)	-3.24 (3.94)	99 / 79
	24	-2.89 (4.97)	-3.07 (4.39)	-3.12 (4.00)	-3.01 (4.87)	77 / 62
Goal-setting statements	4	-1.41 (1.70)	-1.32 (1.46)	-1.55 (1.46)	-1.24 (1.46)	88 / 264
	16	-2.75 (3.62)	-3.08 (3.38)	-3.00 (3.28)	-3.12 (3.43)	58 / 126
	24	-3.00 (4.76)	-2.97 (4.59)	-3.05 (4.90)	-2.94 (4.46)	45 / 90
Food diary review and feedback	4	-1.43 (1.59)	-1.30 (1.57)	-1.57 (1.39)	-1.22 (1.62)	78 / 266
	16	-3.16 (3.66)	-2.65 (3.29)	-3.22 (3.28)	-2.39 (3.27)	52 / 114
	24	-3.37 (4.81)	-2.56 (4.48)	-3.05 (4.76)	-2.35 (4.36)	37 / 88

“ITT off” includes all participants randomised not to receive the component. “ITT on” includes all participants randomised to receive the component, regardless of engagement. “PP adherents” are participants who completed the minimum level of engagement with each component (e.g., attended the introductory video call, completed ≥1 drop-in session, completed ≥1 goal-setting statement, or logged and had a reviewed ≥1 food diary entry). “PP non-adherents” are participants randomised to receive the component but who did not meet these engagement criteria. n represents the number of participants in the per-protocol analyses who also had a recorded weight available for calculating mean weight change. ITT = intention-to-treat; PP = per-protocol

Supplementary Table 8: Association between candidate components and likelihood of programme cancellation at 4, 16, and 24 weeks.

	Programme cancellation at 4 weeks			Programme cancellation at 16 weeks			Programme cancellation at 24 weeks		
Term	OR	90% CI	P- val	OR	90% CI	P-val	OR	90% CI	P- val
CS	1.29	(1.05,1.58)	0.05	1.10	(0.92,1.32)	0.38	1.05	(0.87,1.26)	0.68
FD	1.13	(0.92,1.39)	0.33	1.17	(0.97,1.4)	0.16	1.13	(0.94,1.36)	0.26
GS	1.03	(0.83,1.26)	0.84	1.08	(0.9,1.3)	0.48	1.02	(0.85,1.22)	0.88
HC	1.21	(0.99,1.49)	0.12	1.04	(0.86,1.24)	0.74	1.00	(0.83,1.2)	0.99
CS:FD	0.93	(0.76,1.15)	0.59	0.99	(0.83,1.19)	0.94	1.00	(0.83,1.19)	0.97
CS:GS	1.14	(0.93,1.41)	0.29	1.01	(0.84,1.21)	0.95	1.05	(0.87,1.26)	0.67
GS:FD	0.97	(0.79,1.2)	0.83	1.08	(0.9,1.3)	0.47	1.08	(0.9,1.29)	0.51
HC:CS	0.74	(0.6,0.9)	0.01	0.87	(0.73,1.05)	0.22	0.96	(0.8,1.15)	0.69
HC:FD	1.13	(0.92,1.4)	0.32	1.09	(0.91,1.31)	0.43	1.13	(0.95,1.36)	0.25
HC:GS	1.12	(0.91,1.37)	0.38	1.17	(0.97,1.4)	0.16	1.22	(1.02,1.47)	0.07
CS:GS: FD	1.16	(0.94,1.42)	0.25	1.12	(0.93,1.35)	0.3	1.07	(0.9,1.29)	0.51
HC:CS: FD	0.98	(0.8,1.21)	0.88	0.94	(0.79,1.13)	0.61	0.93	(0.78,1.12)	0.52
HC:CS: GS	1.05	(0.86,1.3)	0.68	1.26	(1.05,1.51)	0.04	1.29	(1.07,1.54)	0.02
HC:GS: FD	1.05	(0.86,1.3)	0.68	0.96	(0.8,1.15)	0.69	0.95	(0.79,1.14)	0.66
HC:CS: GS:FD	0.89	(0.72,1.09)	0.35	0.92	(0.77,1.1)	0.44	0.92	(0.77,1.1)	0.46

Odds ratios (OR) were calculated using independent logistic regression models at each timepoint (4, 16, and 24 weeks). Significant effects ($p < .10$) are highlighted in bold. Abbreviations: CS = coaching drop-in webchat sessions; FD = food diary review plus feedback; GS = goal setting statements; HC = health coach introductory video call; OR: odds ratio.

Supplementary Table 9: Summary of intervention component uptake

Intervention Component	n participants randomised to receive component	n (%) met minimum engagement	Average number completed per participant, mean (SD)	Additional Details
Health Coach Introductory Call	666	221 (33%) scheduled call 185 (28%) attended call	-	Mean (SD) duration of the attended call: 24.4 (5.1) min
Coaching Drop-In Webchat Sessions	674	228 (34%) attended ≥1 session	Sessions attended per participant: 0.67 (1.53)	Range: 0 to 15 sessions attended per participant
Goal Setting Statements	665	104 (16%) completed ≥1 goal statement 95 (14%) completed ≥1 reflection statement	Goal statements completed: 0.25 (0.60) Reflection statements completed: 0.25 (0.84)	Range: 0 to 5 goal setting statements completed per participant; 0 to 9 reflection statement completed per participant
Food Diary Review Plus Feedback	675	87 (13%) completed ≥1 food diary	Diary entries completed: 24 (68)	N (%) reviews completed by timepoint: 64 (9%) at 4 weeks; 25 (4%) at 7 weeks; 19 (3%) at 11 weeks

Supplementary Table 10: Results of mixed effects models examining effects of candidate components on engagement over a 24-week period, using all available data (n = 1,335).

Term	All Data (n = 1,335)		
	Coef	90% CI	P-value
Week (ref = 0)			
4	132.73	(119.35,146.11)	<0.001
16	264.51	(251.13,277.9)	<0.001
24	305.21	(291.83,318.59)	<0.001
Week4:CS	1.82	(-11.56,15.2)	0.82
Week4:FD	-2.88	(-16.26,10.5)	0.72
Week4:GS	-3.82	(-17.2,9.56)	0.64
Week4:HC	0.64	(-12.74,14.02)	0.94
Week4:CS:FD	1.97	(-11.41,15.35)	0.81
Week4:CS:GS	-1.95	(-15.33,11.43)	0.81
Week4:GS:FD	-0.23	(-13.61,13.15)	0.98
Week4:HC:CS	3.76	(-9.62,17.14)	0.65
Week4:HC:FD	-4.33	(-17.71,9.05)	0.60
Week4:HC:GS	-2.68	(-16.06,10.7)	0.74
Week4:CS:GS:FD	-5.4	(-18.78,7.98)	0.51
Week4:HC:CS:FD	-1.89	(-15.27,11.49)	0.82
Week4:HC:CS:GS	-3.74	(-17.12,9.64)	0.65
Week4:HC:GS:FD	3.51	(-9.87,16.89)	0.67
Week4:HC:CS:GS:FD	-2.51	(-15.89,10.87)	0.76
Week16:CS	8.31	(-5.07,21.69)	0.31
Week16:FD	-12.07	(-25.45,1.31)	0.14
Week16:GS	-7.28	(-20.66,6.1)	0.37
Week16:HC	6.72	(-6.66,20.1)	0.41
Week16:CS:FD	3.89	(-9.49,17.27)	0.63
Week16:CS:GS	-9.27	(-22.65,4.11)	0.26
Week16:GS:FD	-2.36	(-15.74,11.02)	0.77
Week16:HC:CS	4.64	(-8.74,18.02)	0.57
Week16:HC:FD	-7.94	(-21.32,5.44)	0.33
Week16:HC:GS	-13.66	(-27.04,-0.28)	0.10
Week16:CS:GS:FD	-18.85	(-32.23,-5.47)	0.02
Week16:HC:CS:FD	0.08	(-13.3,13.46)	0.99
Week16:HC:CS:GS	-8.71	(-22.1,4.67)	0.29
Week16:HC:GS:FD	-0.44	(-13.82,12.94)	0.96
Week16:HC:CS:GS:FD	-10.5	(-23.88,2.88)	0.20

Week24:CS	13.13	(-0.25,26.51)	0.11
Week24:FD	-15.61	(-28.99,-2.23)	0.06
Week24:GS	-8.22	(-21.6,5.16)	0.32
Week24:HC	8.64	(-4.74,22.02)	0.29
Week24:CS:FD	2.67	(-10.71,16.05)	0.74
Week24:CS:GS	-10.2	(-23.58,3.18)	0.21
Week24:GS:FD	-3.52	(-16.9,9.86)	0.67
Week24:HC:CS	2.81	(-10.57,16.19)	0.73
Week24:HC:FD	-8.46	(-21.84,4.92)	0.30
Week24:HC:GS	-15.75	(-29.13,-2.37)	0.06
Week24:CS:GS:FD	-22.57	(-35.95,-9.19)	0.01
Week24:HC:CS:FD	3.45	(-9.93,16.83)	0.67
Week24:HC:CS:GS	-10.94	(-24.33,2.44)	0.18
Week24:HC:GS:FD	-3.62	(-17.0,9.76)	0.66
Week24:HC:CS:GS:FD	-16.37	(-29.75,-2.99)	0.05

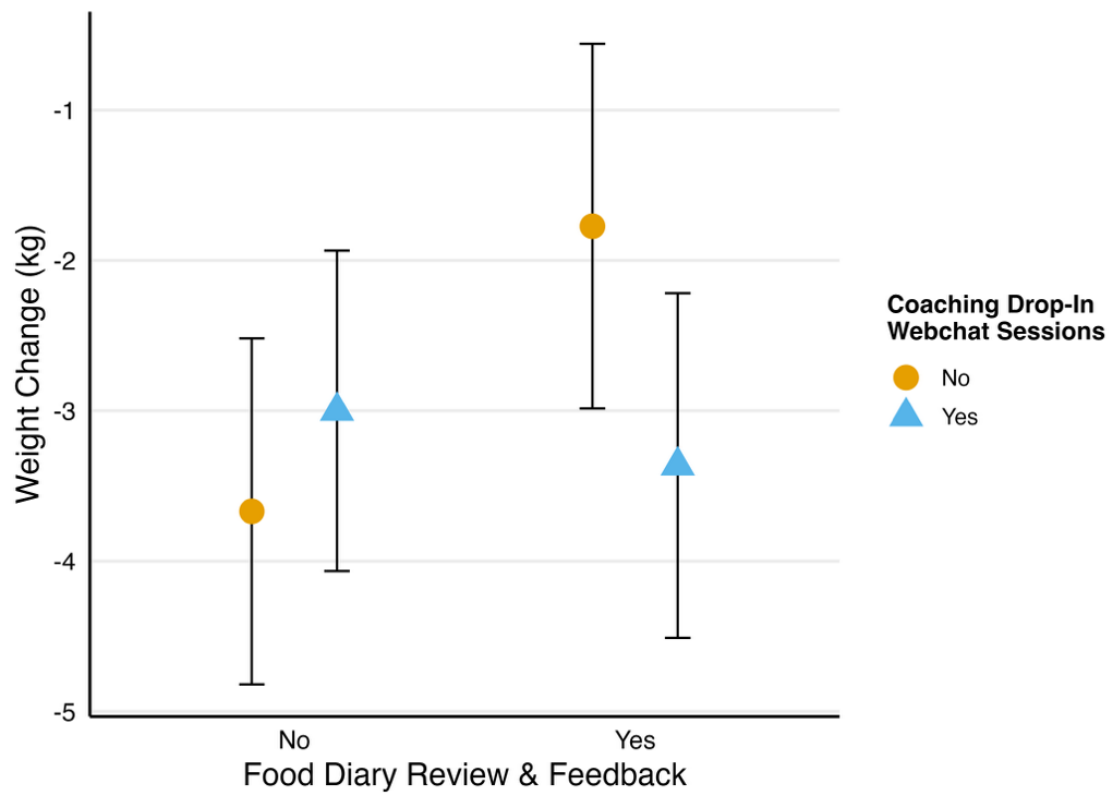
Main effects at baseline (time zero) do not test the hypotheses of interest and have been omitted from the table for brevity. All models used effect coding. Reported coefficients represent half the difference between component levels; multiply by 2 for the full effect size. Significant effects ($p < .10$) are highlighted in bold. Abbreviations: CS = coaching drop-in webchat sessions; FD = food diary review plus feedback; GS = goal setting statements; HC = health coach introductory video call.

Supplementary Table 11: Perceived helpfulness questionnaire scores by intervention component

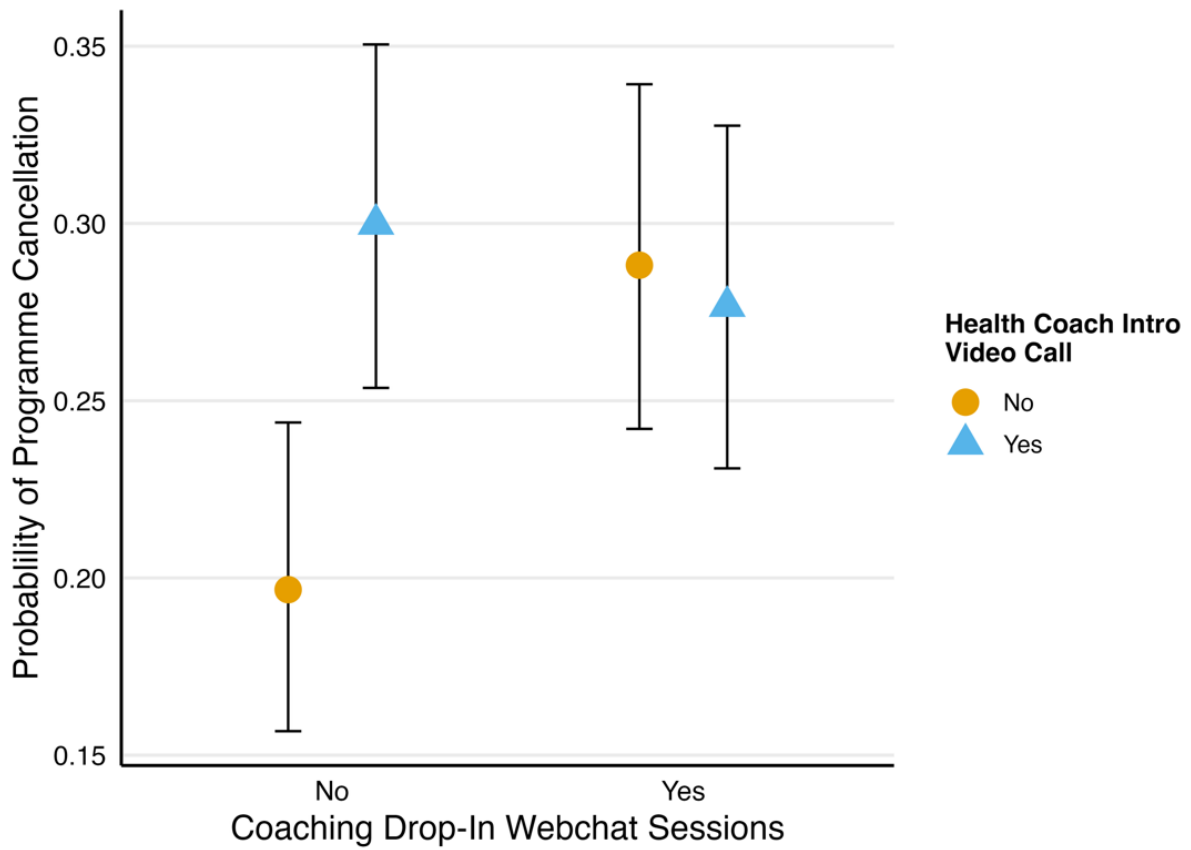
Acceptability construct	Intervention components			
	Health coach intro video call (n = 73)	Coaching drop-in webchat sessions (n= 66)	Goal setting statements (n= 54)	Food diary review plus feedback (n= 67)
Perceived helpfulness of overall Second Nature programme, N (%)				
Very helpful	32 (43.8)	26 (39.4)	18 (33.3)	21 (31.3)
Helpful	16 (21.9)	15 (22.7)	14 (25.9)	21 (31.3)
Neutral	20 (27.4)	18 (27.3)	17 (31.5)	19 (28.4)
Unhelpful	4 (5.5)	6 (9.1)	4 (7.4)	5 (7.5)
Very unhelpful	1 (1.4)	1 (1.5)	1 (1.9)	1 (1.5)
How likely are you to recommend the Second Nature programme, N (%)				
Very likely	33 (42.5)	31 (47)	22 (40.7)	30 (44.8)
Likely	20 (27.5)	20 (30.3)	19 (35.2)	20 (29.9)
Neutral	14 (19.2)	9 (13.6)	7 (13)	12 (17.9)
Unlikely	5 (6.8)	5 (7.6)	5 (9.3)	4 (6)
Very unlikely	1 (1.4)	1 (1.5)	1 (1.9)	1 (1.5)
Perceived helpfulness of health coach, N (%)				
Very helpful	34 (46.6)	31 (47)	22 (40.7)	25 (37.3)
Helpful	25 (34.2)	22 (33.3)	20 (37)	25 (37.3)
Neutral	10 (13.7)	9 (13.6)	8 (14.8)	13 (19.4)
Unhelpful	3 (4.1)	3 (4.5)	3 (5.6)	3 (4.5)
Very unhelpful	1 (1.4)	1 (1.5)	1 (1.9)	1 (1.5)
Perceived helpfulness of intervention component, N (%)				
Very helpful	31 (42.5)	29 (43.9)	10 (18.5)	19 (28.4)
Helpful	14 (19.2)	13 (19.7)	18 (33.3)	16 (23.9)
Neutral	14 (19.2)	13 (19.7)	17 (31.5)	24 (35.8)
Unhelpful	0 (0)	4 (6.1)	6 (11.1)	3 (4.5)

Acceptability construct	Intervention components			
	Health coach intro video call (n = 73)	Coaching drop-in webchat sessions (n= 66)	Goal setting statements (n= 54)	Food diary review plus feedback (n= 67)
Very unhelpful	4 (5.5)	0 (0)	2 (3.7)	2 (3)
Did not know this was a feature	10 (13.7)	7 (10.6)	1 (1.9)	3 (4.5)
Perceived burden of intervention component, N (%)				
No effort at all	22 (30.1)	18 (27.3)	3 (5.6)	8 (11.9)
A little effort	21 (28.8)	25 (37.9)	15 (27.8)	17 (25.4)
Neutral	16 (21.9)	15 (22.7)	18 (33.3)	21 (31.3)
A lot of effort	5 (6.8)	2 (3)	14 (25.9)	15 (22.4)
Huge effort	0 (0)	0 (0)	2 (3.7)	3 (4.5)
Did not know this was a feature	9 (12.3)	6 (9.1)	2 (3.7)	3 (4.5)

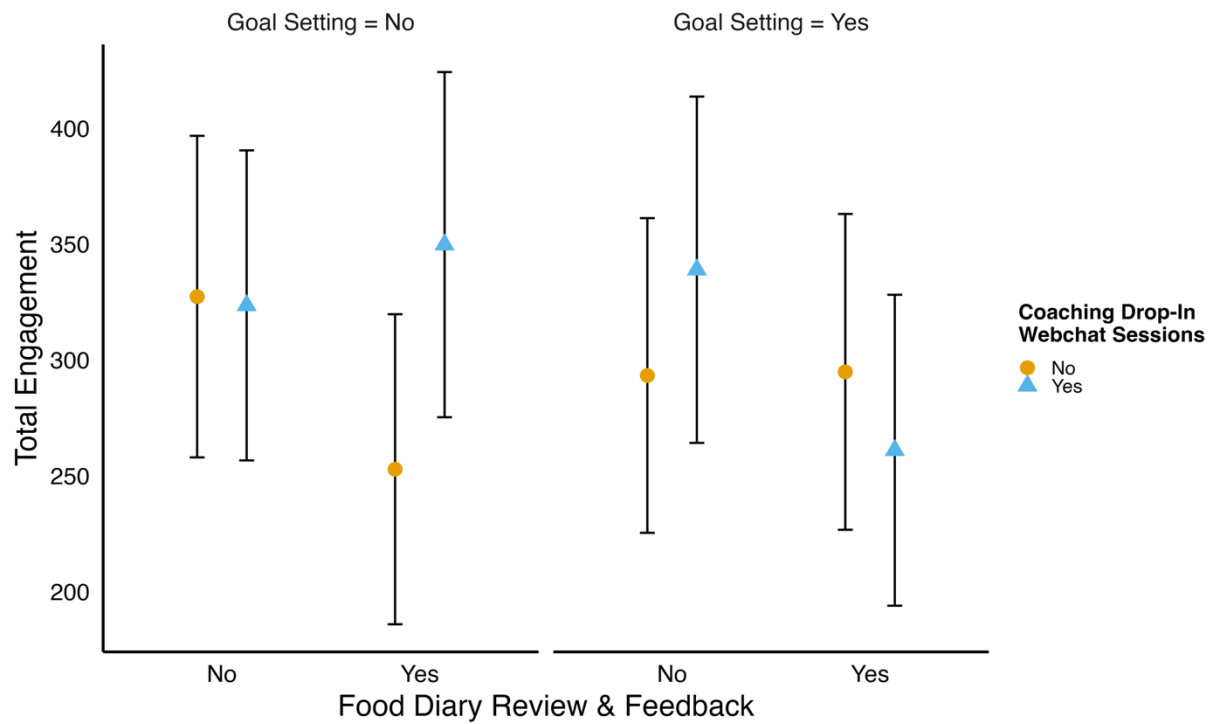
Supplemental Figures



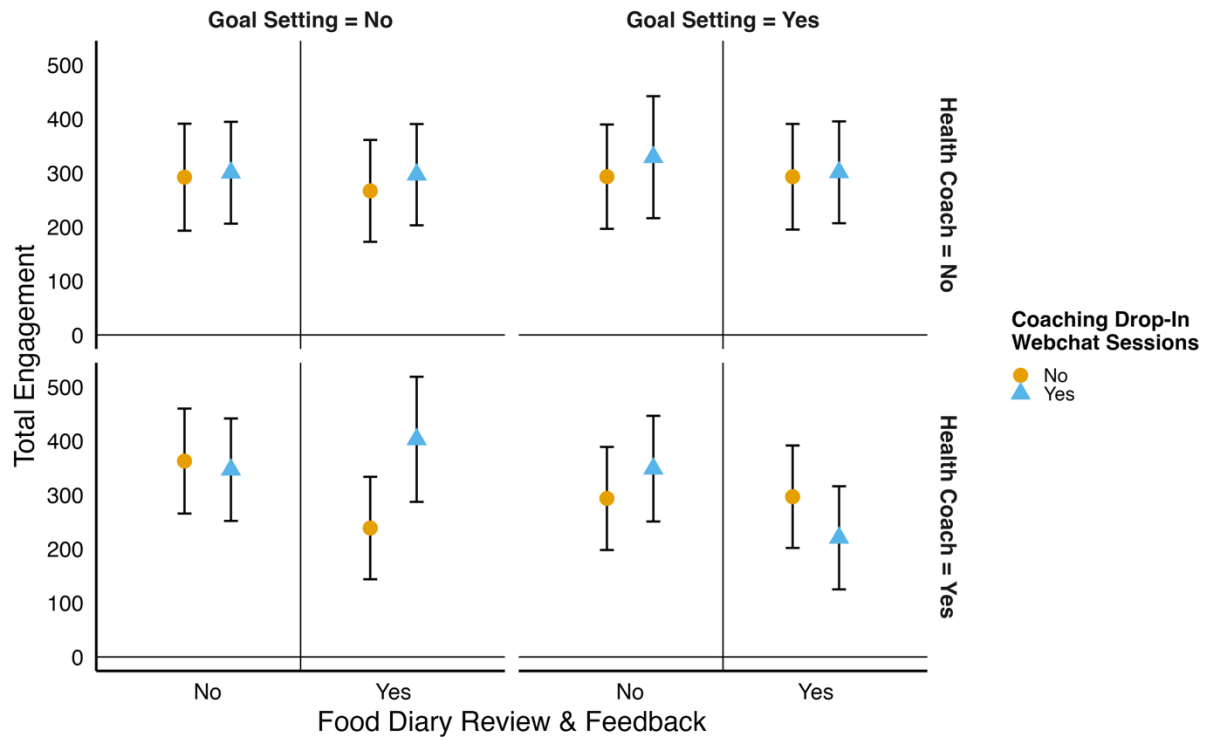
Supplementary Figure 1: Effect of food diary review × coaching drop-in webchat sessions interaction on weight change (kg) at 24 weeks. Values represent estimated marginal means and error bars depict the 90% confidence intervals.



Supplementary Figure 2: Effect of health coach intro video call × coaching drop-in webchat sessions interaction on probability of programme cancellation at 4 weeks. Values represent predicted probabilities and error bars depict the 90% confidence intervals.



Supplementary Figure 3: Three-way interaction between coaching drop-in sessions, goal setting statements, and food diary review on total engagement at 24 weeks. Values represent estimated marginal means and error bars depict the 90% confidence intervals.



Supplementary Figure 4: Four-way interaction between health coach intro call, coaching drop-in sessions, goal setting statements, and food diary review on total engagement at 24 weeks. Values represent estimated marginal means and error bars depict the 90% confidence intervals.