Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Characteristics of Participants in the Singleton Arm

Characteristic	Singletons (n=46)
Sociodemographics	
Age, mean (SD)	54.0 (11.7)
Female Sex, No. (%)	28/46 (60.9)
Race/Ethnicity, No. (%)	
White non-hispanic	46/46 (100.0)
Education, No. (%)	
High school graduate	0/45 (0.0)
Some college	13/45 (28.9)
College graduate	32/45 (71.1)
Marital status, No. (%)	
Single	4/45 (8.9)
Married	36/45 (80.0)
Other	5/45 (11.1)
Annual household income, No. (%)	
Less than $55,000	6/35 (17.1)
$55,000 to $100,000	11/35 (31.4)
Greater than $100,000	18/35 (51.4)
Baseline measures	
Atrial fibrillation, No. (%)	1/46 (2.2)
Body mass index, mean (SD)	27.5 (5.7)
Cardiovascular disease, No. (%)	1/46 (2.2)
Current Smoker, No. (%)	2/45 (4.4)
Diabetes, No. (%)	3/45 (6.7)
Framingham Risk Score, mean (SD)	7.0 (7.0)
Hypertension, No. (%)	7/45 (15.6)
Hyperlipidemia, No. (%)	8/45 (17.8)
Physical activity measures	
Baseline step count, mean (SD)	7722 (3897)
Step Goal Selection	
33% step increase from baseline, No. (%)	15 (32.6%)
40% step increase from baseline, No. (%)	5 (10.9%)
50% step increase from baseline, No. (%)	4 (8.7%)
Set custom goal, No. (%)	22 (47.8%)
Increase from baseline to goal, mean steps (SD)	2397 (1222)
Step Tracking Device	
Wearable Device, No. (%)	32 (69.6)
Smartphone Application, No. (%)	14 (30.4)

*46 individuals still wanted to participant when another family member was not available or interested. We allowed these individuals to participate in a control arm that was not part of the main trial or analysis. This group was called the "singleton arm" and this process was approved by the institutional review boards. They received the same interventions as the control arm in the main trial (establish a baseline step count, select a goal, and receive daily performance feedback on goal attainment for 24 weeks) but participated alone rather than with their family.

eTable 2. Family Structure for Participants in the Control and Gamification Arms

Family Relation	Control (n = 102)	Gamification (n = 98)
Families of 2 persons		
Siblings	62	62
Spouses	6	4
Parent-child	16	14
Familes of 3 persons		
Siblings	12	12
Spouses	0	3
Parent-child	6	3

eTable 3. Characteristics of Participants That Received an Intervention Based on the Activity Tracking Device Used

Characteristic	Participanted as Team with Wearable (n=156)	Participanted as Team with Smartphone (n=44)	Participanted as Singleton with Wearable (n=32)	Participanted as Singleton with Smartphone (n=14)
Age, mean (SD)	50.1 (11.0)	48.7 (9.3)	47.1 (13.3)	46.7 (10.2)
Female Sex, n (%)	93/156 (59.6)	19/44 (43.2)	19/32 (59.4)	9/14 (64.3)
Race/Ethnicity, n (%)				
White non-hispanic	156/156 (100)	44/44 (100)	32/32 (100)	14/14 (100)
Education, n (%)				
Less than high school	0/150 (0.0)	0/40 (0.0)	0/32 (0.0)	0/13 (0.0)
High school graduate	10/150 (6.7)	1/40 (2.5)	0/32 (0.0)	0/13 (0.0)
Some college	33/150 (22.0)	6/40 (15.0)	10/32 (31.3)	3/13 (23.1)
College graduate	107/150 (71.3)	33/40 (82.5)	22/32 (68.8)	10/13 (76.9)
Marital status, n (%)				
Single	17/151 (11.3)	3/40 (7.5)	4/32 (12.5)	0/13 (0.0)
Married	123/151 (81.5)	34/40 (85.0)	26/32 (81.3)	10/13 (76.9)
Other	11/151 (7.3)	3/40 (7.5)	2/32 (6.3)	3/13 (23.1)
Annual household income, n (%)				
Less than $55,000	18/118 (15.3)	2/34 (5.9)	5/24 (20.8)	1/11 (9.1)
$55,000 to $100,000	43/118 (36.4)	10/34 (29.4)	6/24 (25.0)	5/11 (45.5)
Greater than $100,000	57/118 (48.3)	22/34 (64.7)	13/24 (54.2)	5/11 (45.5)
Baseline measures				
Atrial fibrillation, n (%)	1/156 (0.6)	1/44 (2.3)	1/32 (3.1)	0/14 (0.0)
Body mass index, mean (SD)	27.2 (5.2)	26.7 (4.0)	26.9 (4.5)	28.7 (8.0)
Cardiovascular disease, n (%)	6/156 (3.8)	3/44 (6.8)	0/32 (0.0)	1/14 (7.1)
Current Smoker, n (%)	8/151 (5.3)	1/40 (2.5)	2/32 (6.3)	0/13 (0.0)
Diabetes, n (%)	7/150 (4.7)	1/40 (2.5)	2/32 (6.3)	1/13 (7.7)
Framingham Risk Score, mean (SD)	10.8 (10.5)	12.0 (12.9)	8.7 (9.0)	7.1 (6.4)
Hypertension, n (%)	29/151 (19.2)	10/40 (25.0)	5/32 (15.6)	2/13 (15.4)
Hyperlipidemia, n (%)	26/151 (17.2)	14/40 (35.0)	7/32 (21.9)	1/13 (7.7)

eTable 4. Characteristics of All Individuals That Were Invited to Participate and Comparisons to Those That Participated as a Team With Their Family and Those That Participated Individually

Characteristic	Invited to Participate (n=1212)	Invited But did NOT Participate (n=966)	Received Intervention as a Team (n=200)	Received Intervention as Singleton (n=46)
Age, mean (SD)	52.0 (13.3)	52.7 (13.8)	49.8 (10.6)	47.0 (12.4)
Female Sex, n (%)	626/1212 (51.7)	486/966 (50.3)	112/200 (56.0)	28/46 (60.9)
Race/Ethnicity, n (%)				
White non-hispanic	1212/1212 (100.0)	966/966 (100.0)	200/200 (100.0)	46/46 (100.0)
Education, n (%)				
Less than high school	7/1092 (0.6)	7/857 (0.8)	0/190 (0.0)	0/45 (0.0)
High school graduate	116/1092 (10.6)	105/857 (12.3)	11/190 (5.8)	0/45 (0.0)
Some college	308/1092 (28.2)	256/857 (29.9)	39/190 (20.5)	13/45 (28.9)
College graduate	661/1092 (60.5)	489/857 (57.1)	140/190 (73.7)	32/45 (71.1)
Marital status, n (%)				
Single	105/1078 (9.7)	81/842 (9.6)	20/191 (10.5)	4/45 (8.9)
Married	843/1078 (78.2)	650/842 (77.2)	157/191 (82.2)	36/45 (80.0)
Other	130/1078 (12.1)	111/842 (13.2)	14/191 (7.3)	5/45 (11.1)
Annual household income, n (%)				
Less than $55,000	127/752 (16.9)	101/565 (17.9)	20/152 (13.2)	6/35 (17.1)
$55,000 to $100,000	274/752 (36.4)	210/565 (37.2)	53/152 (34.9)	11/35 (31.4)
Greater than $100,000	351/752 (46.7)	254/565 (45.0)	79/152 (52.0)	18/35 (51.4)
Baseline measures				
Atrial fibrillation, n (%)	31/1212 (2.6)	28/966 (2.9)	2/200 (1.0)	1/46 (2.2)
Body mass index, mean (SD)	27.9 (5.4)	28.1 (5.4)	27.0 (5.0)	27.5 (5.7)
Cardiovascular disease, n (%)	78/1212 (6.4)	68/966 (7.0)	9/200 (4.5)	1/46 (2.2)
Current Smoker, n (%)	76/1081 (7.0)	65/845 (7.7)	9/191 (4.7)	2/45 (4.4)
Diabetes, n (%)	58/1091 (5.3)	47/856 (5.5)	8/190 (4.2)	3/45 (6.7)
Framingham Risk Score, mean (SD)	11.7 (12.0)	12.4 (12.6)	9.4 (9.5)	7.0 (7.0)
Hypertension, n (%)	309/1081 (28.6)	263/845 (31.1)	39/191 (20.4)	7/45 (15.6)
Hyperlipidemia, n (%)	302/1080 (28.0)	254/844 (30.1)	40/191 (20.9)	8/42 (19.0)

eTable 5. Missing Data Rates by Arm and Study Period

Period	Control (N=8568)		Intervention (N=8232)	
	N	%	N	%
Intervention (Weeks 1-12)				
Values missing	649	7.6%	559	6.8%
Values missing or < 1000 steps	1090	12.7%	835	10.1%
Follow-up (Weeks 13-24)				
Values missing	2865	33.4%	3280	39.8%
Values missing or < 1000 steps	3166	37.0%	3462	42.1%

*N refers to the number of participant days. For example, in the control arm there were 102 participants in a 12-week period. So 102 participants x 12 weeks x 7 days/per = 8568 participant-days

eTable 6. Adjusted Models Using Only Collected Data Without Multiple Imputation

Period (All Values)	Main Model[1]		Main Model Adjusted by Device[2]	
	Intervention Effect, Adjusted for Baseline[3] (95% CI)	P Value	Intervention Effect, Adjusted for Baseline[3] (95% CI)	P Value
Intervention (Weeks 1-12)				
Proportion of participant-days achieving goal	0.23 (0.16 - 0.39)	< 0.001	0.22 (0.15 - 0.29)	< 0.001
Steps per day	1149 (657 - 1642)	< 0.001	1218 (715 - 1721)	< 0.001
Follow-up (Weeks 13-24)				
Proportion of participant-days achieving goal	0.12 (0.06 - 0.17)	< 0.001	0.12 (0.06 - 0.18)	< 0.001
Steps per day	639 (105 - 1173)	0.02	683 (129 - 1239)	0.02

[1]Adjusted for baseline step count, repeated measures, calendar month fixed effects, and team random effect

[2]Adjusted for baseline step count, repeated measures, calendar month fixed effects, team random effect, and activity tracking device

[3]Intervention arm relative to the control arm during the specified time period; CI = confidence interval; confidence intervals obtained using the bootstrap procedure

eTable 7. Adjusted Models Using Only Collected Data Without Multiple Imputation but Excluding Values Less Than 1000

Period (Excludes Values < 1000)	Main Model[1]		Main Model Adjusted by Device[2]	
	Intervention Effect, Adjusted for Baseline[3] (95% CI)	P Value	Intervention Effect, Adjusted for Baseline[3] (95% CI)	P Value
Intervention (Weeks 1-12)				
Proportion of participant-days achieving goal	0.25 (0.11 - 0.38)	< 0.001	0.24 (0.10 - 0.39)	< 0.001
Steps per day	1025 (552 - 1499)	< 0.001	1079 (600 - 1559)	< 0.001
Follow-up (Weeks 13-24)				
Proportion of participant-days achieving goal	0.14 (0.08 - 0.20)	< 0.001	0.14 (0.08 - 0.20)	< 0.001
Steps per day	443 (-59 - 946)	0.08	476 (-32 - 984)	0.07

[1]Adjusted for baseline step count, repeated measures, calendar month fixed effects, and team random effect

[2]Adjusted for baseline step count, repeated measures, calendar month fixed effects, team random effect, and activity tracking device

[3]Intervention arm relative to the control arm during the specified time period; CI = confidence interval; confidence intervals obtained using the bootstrap procedure

eTable 8. Safety Data

| Period | # Survey Responses | Self-Reported Events | | | | ER or Hospital Visit Descriptions |
		Muscle or Joint Injury	Fall	Other Medical Injury	ER or Hospital Visit	
Intervention[1]						
Control	85	2	1	0	5	Hernia repair; detached retina
Intervention	76	5	1	1	3	Cholecystectomy; adverse reaction to a bee sting; hernia surgery unrelated to study
Singletons	34	0	0	1	3	COPD exacerbation; knee pain from arthritis; umbilical hernia repair
Follow-Up[2]						
Control	96	6	0	0	7	Fever and muscle aches; retina issue; uterine polyp surgery; sprained foot and ankle unrelated to study; sinus/ear infection; Broken shoulder from fall in garage; hysterectomy
Intervention	82	1	1	0	7	Cholecystectomy; hernia surgery and pneumonia; Planned hernia repair; thumb laceration; vomiting; unspecified surgery; diverticulitis
Singletons	38	1	0	0	2	Thyroid cyst; heart catherization

[1]Upon further investigation by calling participants, two participants reported that their events were thought to be related to the study but both resolved by the time of the call. One participant had knee pain and one had hip pain.

[2]Upon further investigation by calling participants, none of the participants contacted reported that they believed the events were due to the study

Each participant was asked to complete a self-reported survey after completion of the intervention and follow-up periods. On that survey, they could report events related to injury or hospital visits. The following table displays the number of self-report events and the results of follow-up phone calls by the study team to investigate the events.

eTable 9. Participant End of Study Survey Responses by Arm

Arm	Response	I enjoyed participating in BE FIT	BE FIT helped me to increase my physical activity	I was satisfied with my experience using Way to Health	I will continue to use my activity tracker to monitor my daily step counts
Control Arm	Strongly disagree	1.1%	1.1%	0.0%	1.1%
	Disagree	4.2%	6.3%	5.3%	10.5%
	Neutral	11.6%	20.0%	21.1%	8.4%
	Agree	34.7%	43.2%	43.2%	34.7%
	Strongly agree	48.4%	29.5%	30.5%	45.3%
Gamification Arm	Strongly disagree	1.2%	2.5%	1.2%	2.5%
	Disagree	1.2%	4.9%	4.9%	7.4%
	Neutral	8.6%	13.6%	13.6%	11.1%
	Agree	50.6%	44.4%	46.9%	33.3%
	Strongly agree	38.3%	34.6%	33.3%	45.7%
Singleton Arm	Strongly disagree	0.0%	0.0%	0.0%	0.0%
	Disagree	2.6%	10.5%	5.3%	10.5%
	Neutral	21.1%	21.1%	23.7%	10.5%
	Agree	39.5%	47.4%	44.7%	36.8%
	Strongly agree	36.8%	21.1%	26.3%	42.1%

eFigure. Coffee Mug Reward for Participants in the Gamification Arm Ending the Intervention in the Gold or Platinum Status