AI-based Weight Maintenance Digital Platform For Bariatric Patient: A Multidisciplinary Approach

Sarfraz Khokhar, John Holden: Rasimo Systems, Rockford College of Medicine, University of Illinois, USA

Sarfraz Khokhar
Khokhar@rasimo.com

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[ ] I have no potential conflict of interest to report

[X] I have the following potential conflict(s) of interest to report:

- Type of affiliation / financial interest: Research Scientist at Rasimo Systems

Presenting

Kevin Lee

An AI Program

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Background: Key points

AI-based Digital Platform

individualized approaches to weight loss and maintenance through lifestyle intervention.

Weight Maintenance

Challenge regardless of the weight loss methodology.

Psychosocial Conditions

Motivation, self efficacy, cognitive framing, accountability, social support, health literacy

Sustained Energy Balance

Energy intake ≤ Energy expenditure

Desirable resetting body weight

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Objective

To validate and quantify the efficacy of an AI-based lifestyle intervention digital platform for nonmedical weight loss maintenance implementing multidisciplinary approach.

- This 24-week long study presented now, is the second phase focusing on weight maintenance.
- First phase focused on weight loss, achieved mean weight loss of 13.9% of initial weight for n =391. Results published on April 4, 2024 in Obesity Surgery Journal.

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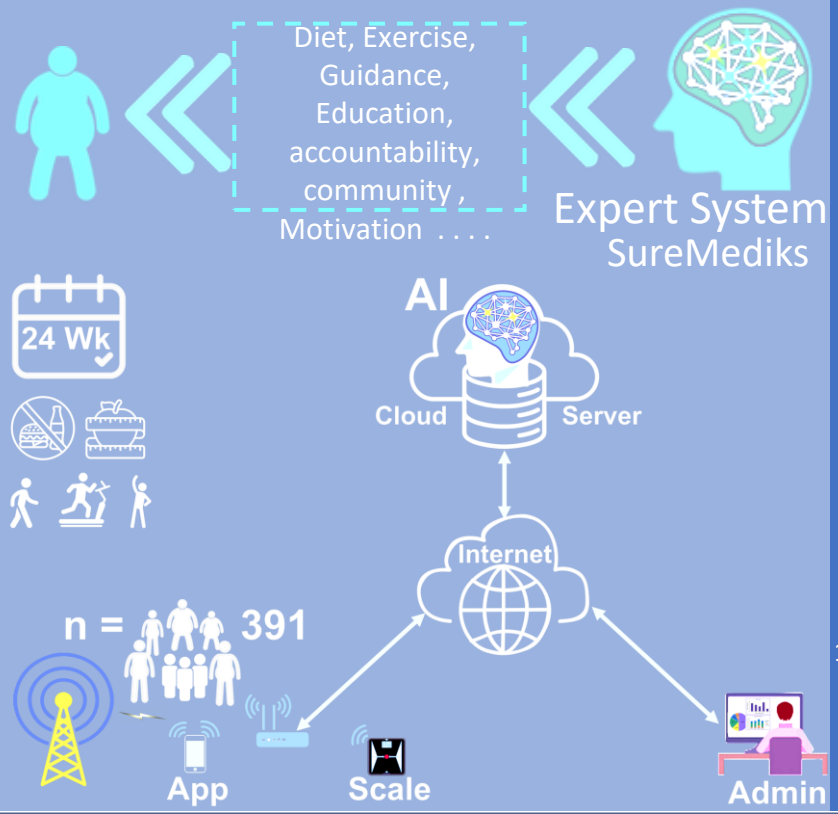
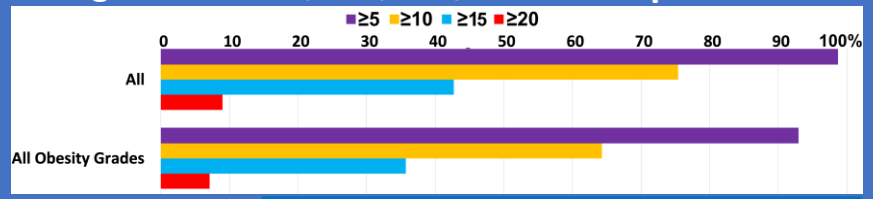
Weight loss with an AI-powered digital platform for lifestyle intervention

METHOD



RESULTS

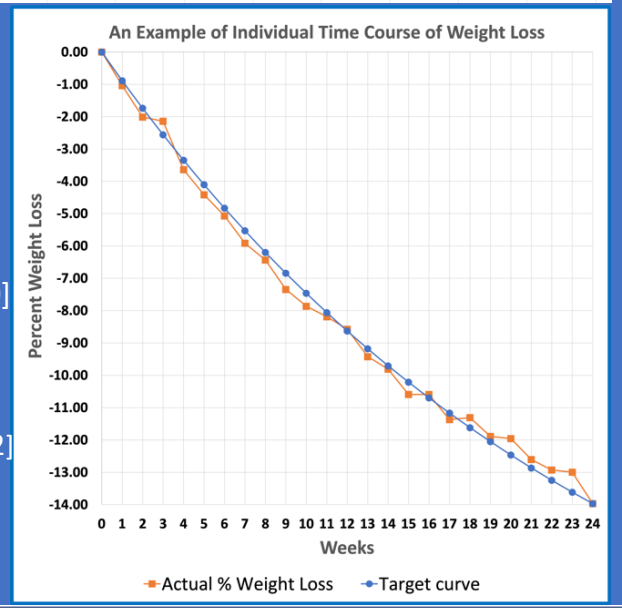
Weight Loss % ≥5, ≥10, ≥15, and ≥20 Population



Weight Loss

Percent
13.9 ± 4.4[3.8-22.0]

Kilograms
16.8 ± 7.11[3.5-37.2]



CONCLUSION

AI-assisted lifestyle intervention with user friendly personalized features has extensive benefit for obesity management

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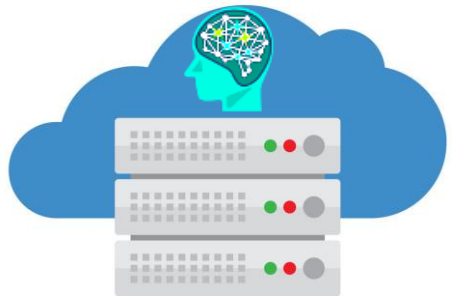
Method

- **n=357** (58.5% female, 41.5% male) : Control to treated ratio 1:2
- μ_{Age}= 43.56 , σ_{Age} =12.60 years, and range of 21-71 years
- 6 groups

Participants baseline weight (kg) and BMI

	Overweight 25 < BMI< 30		Obesity I 30 ≤ BMI < 35		Obesity II 35 ≤ BMI < 40		Obesity III 40 ≤ BMI < 50		Obesity IV 50 ≤ BMI < 60		Obesity V 60 ≤ BMI ≤ 70		Overall 25 < BMI ≤ 70	
	Treated	Control	Treated	Control	Treated	Control	Treated	Control	Treated	Control	Treated	Control	Treated	Control
No. of participants	21	10	33	17	31	16	72	37	43	22	37	18	237	120
Start weight mean, μ_{wt}	82.2	78.6	87.6	86.1	102.4	100.2	120.4	121.8	146.6	141.4	159.1	162.0	116.4	115
Start weight SD, σ_{wt}	10.1	10.7	10.5	10.4	13.2	9.3	17.4	17.7	18.3	17.5	12.1	7.5	13.6	73.1
Start BMI mean, μ_{BMI}	27.9	28	32.6	32.6	37.3	37.9	44.9	44.9	54.4	54.4	64.5	64.6	43.6	43.7
Start BMI SD, σ_{BMI}	1.5	1.6	1.5	1.6	1.6	1.5	2.8	2.9	2.8	3.0	2.9	2.8	2.2	2.2

Calories intake based on Effective Metabolic rate and weight maintenance performance



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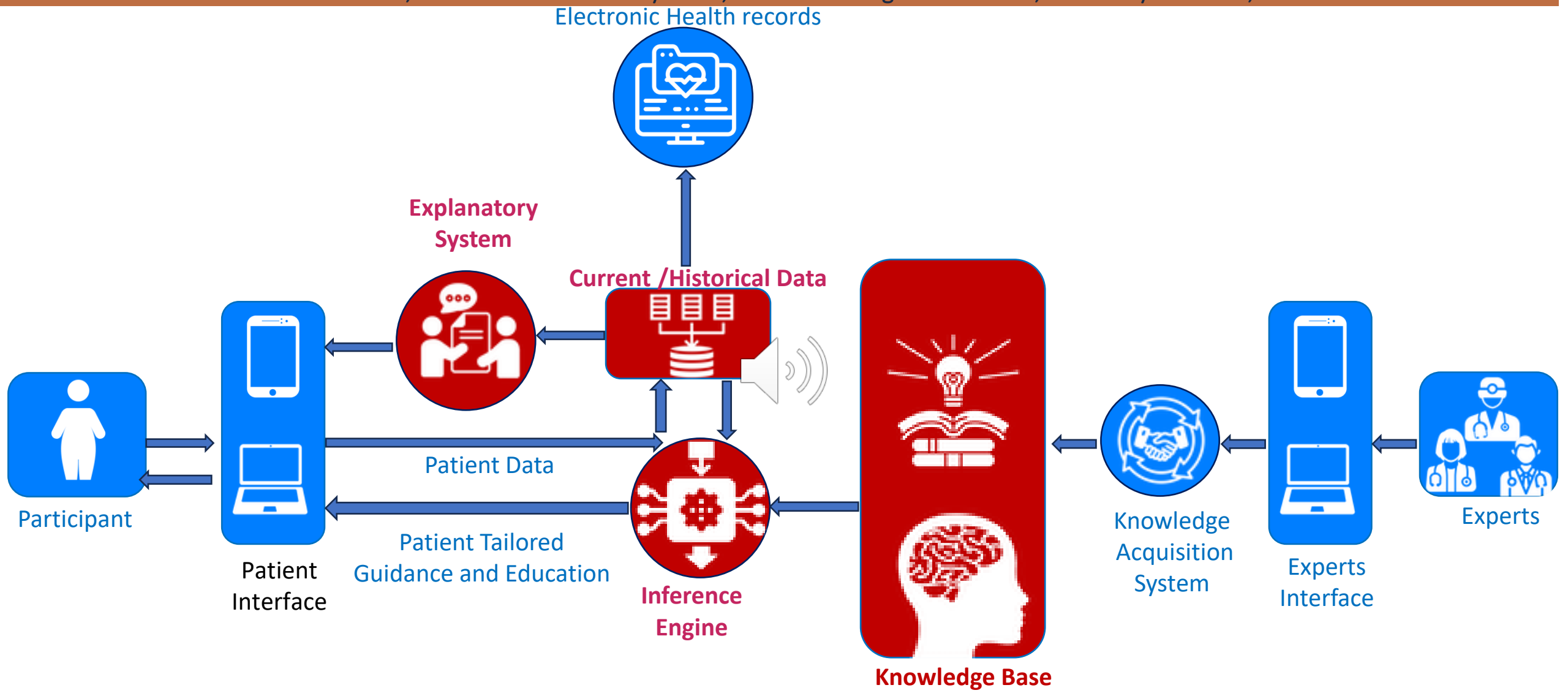

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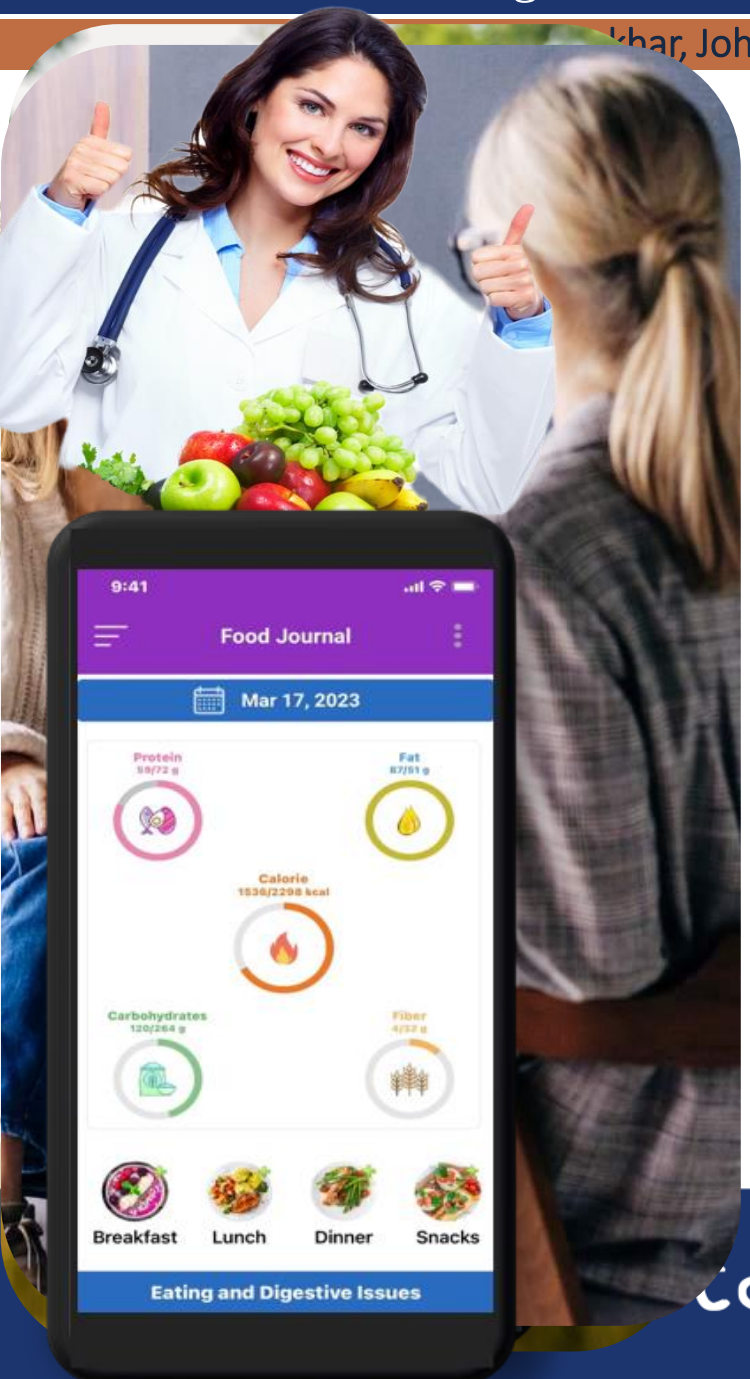

Multidisciplinary Support for the Participants

Complete Diet and Exercise, plans, journaling and tracking

Sticking to diet plans and physical activity, metabolic rate calories, and balanced macronutrients

Implied psychosocial coaching

Self-efficacy, stress management, cognitive framing, Health literacy, social support

Motivation

Daily motivational messages, implied motivation in AI feedback and short-term goals achievement

Weight maintenance algorithm to avoid weight regain

Weight maintenance to avoid weight regain, using an intelligent algorithm

Accountability and community support

Sharing progress with accountability circle members,, sharing experience, message board, positive influence, gamification

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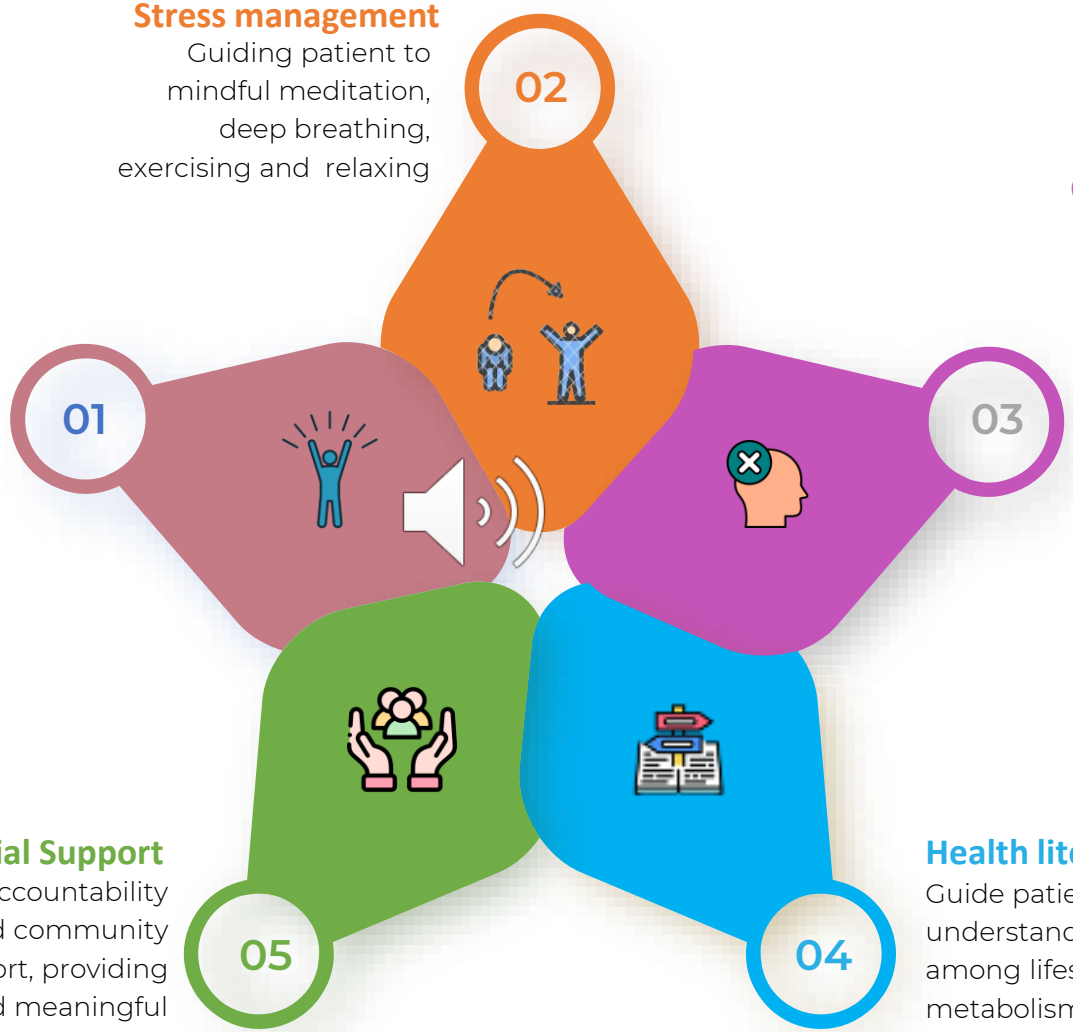
Implied Psychosocial Coaching



Stress management
Guiding patient to mindful meditation, deep breathing, exercising and relaxing

Cognitive framing
Encouraging patient to change negative thoughts into positive ones, chores to opportunity for selfcare and enjoyment

Self-efficacy
Making the patient believe in his/her ability to make and sustain positive health behavior

Social Support
Through accountability and community support, providing strong and meaningful connections

Health literacy
Guide patients to understand connection among lifestyle choices, metabolism, and cardiovascular health

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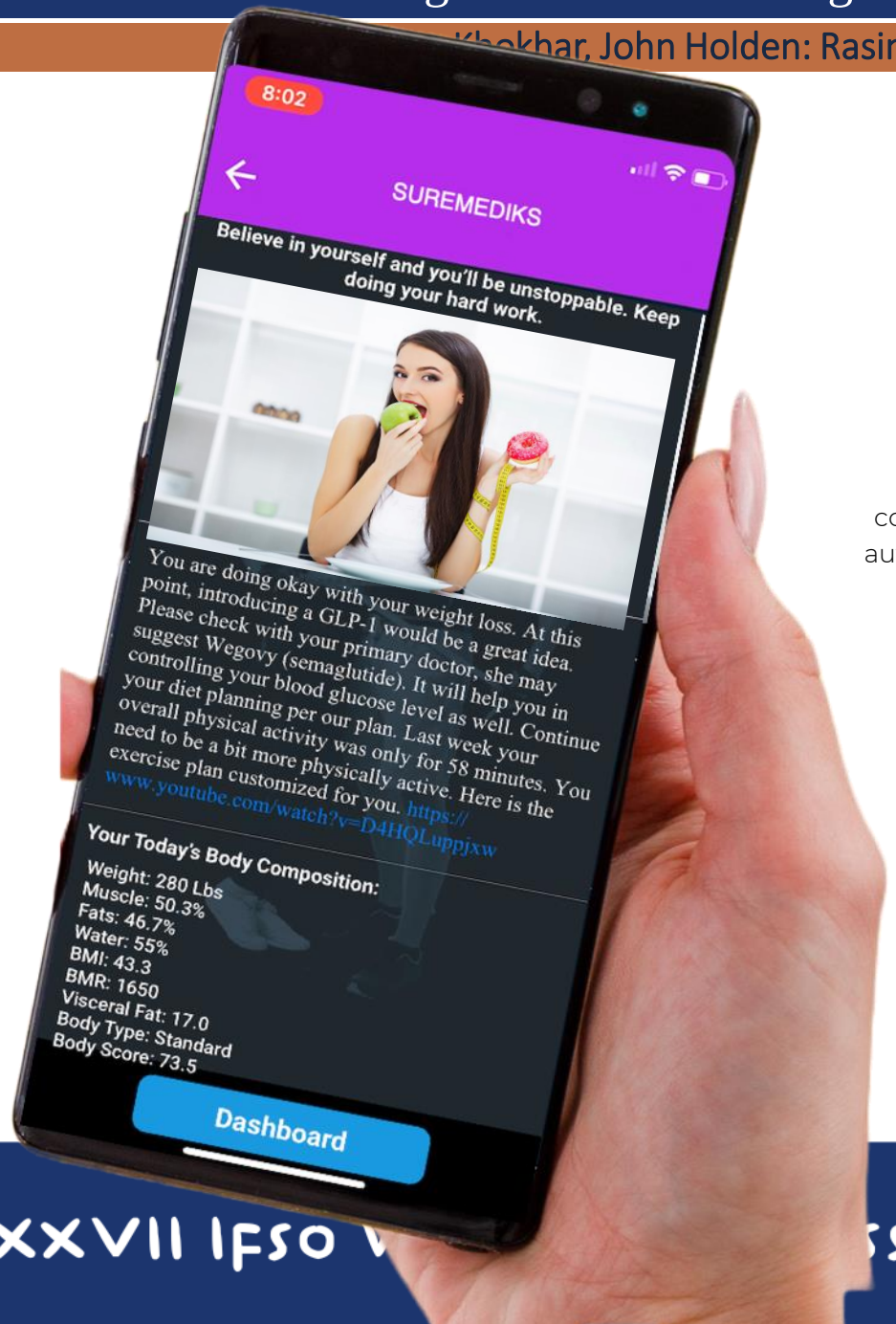

INSTANT AI GUIDANCE AND FEEDBACK

Guidance and education

Tailored and customized guidance and education

Effective treatment delivery

Effective, comprehensive, and automatic treatment delivery

Wide variety of media

All type of media options: video, webpage, PDF, text, audio

Additional Auidance supplements and medications

Excellent medium for new services, supplements, and medication

Instant feedback at every scale step in

Every time patent steps on scale, AI provides instant and tailored feedback

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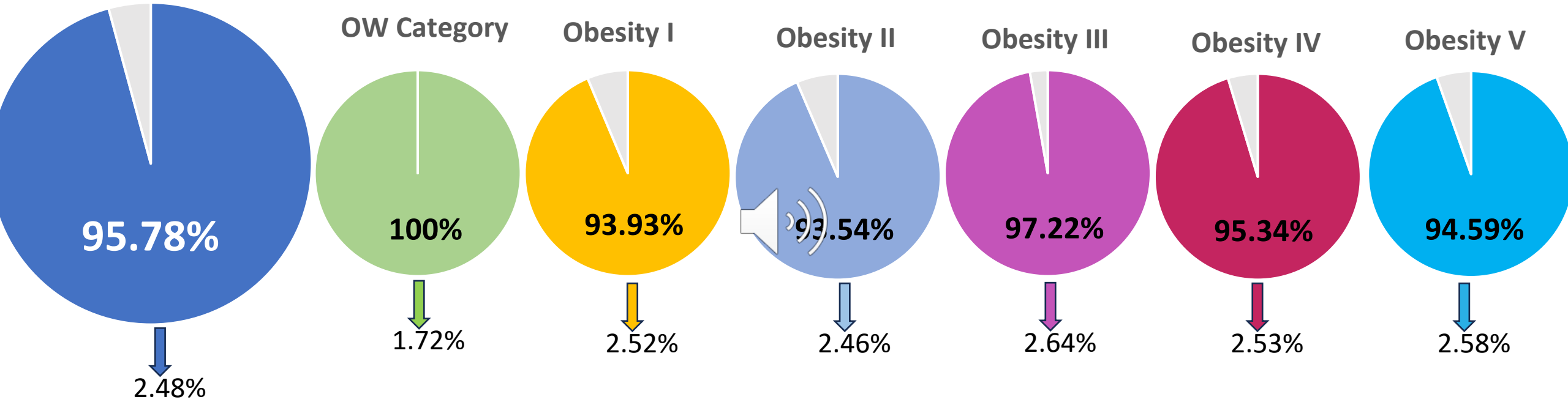
Results

Weight Maintenance along with Additional Weight Loss (AWL)

p-value < 0.00001



SD= 1.58, 95% confidence interval (CI): 2.27% - 2.68%

SD= 0.78, 95% CI: 1.6% -1.8%,

SD= 2.29, 95% CI: 1.71% -3.3%

SD = 1.50, 95% CI: 1.91% - 3.01%

SD = 1.42, 95% CI: 2.30% - 2.97%

SD = 1.44, 95% CI: 2.10% -3.00 %

SD = 1.60, 95% CI: 2.0% - 3.12%

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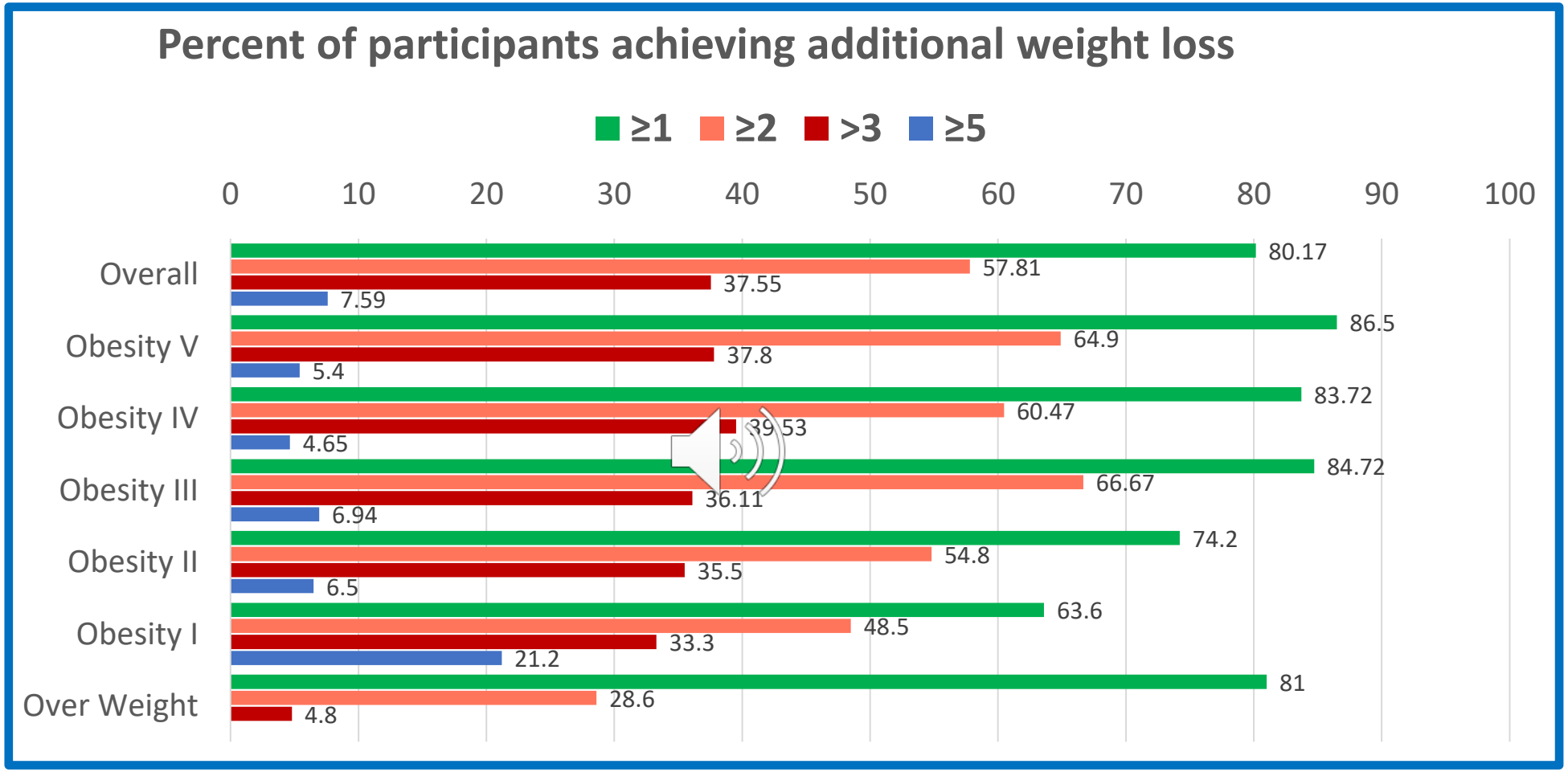
Results(2)



From control population (n= 120) 3% participants maintained their weight

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Results(4)

Features Correlation Matrix with p-values

	WL%	Gender	Age	BMI	Accountability circle members	Participation in gamification
WL%	1					
Gender	-0.0348242 0.59373007	1				
Age	-0.024826 0.70377485	0.02957402 0.65056446	1			
BMI	0.01118249 0.86402928	-0.0395937 0.54414829	-0.0671671 0.30314117	1		
Accountability circle size	0.78257761 2.836E-50	-0.0003332 0.99592894	-0.0640225 0.32639033	0.13149389 0.04313404	1	
Participation in gamification	0.66636133 8.5669E-32	-0.0258365 0.69231865	-0.0154766 0.81264597	0.1920321 0.00299411	0.72163621 2.09443E-39	1

Strong correlation with large significance

AWL% ←→ Accountability, Gamification Accountability ←→ Gamification

Significant correlation

BMI ←→ Accountability, Gamification

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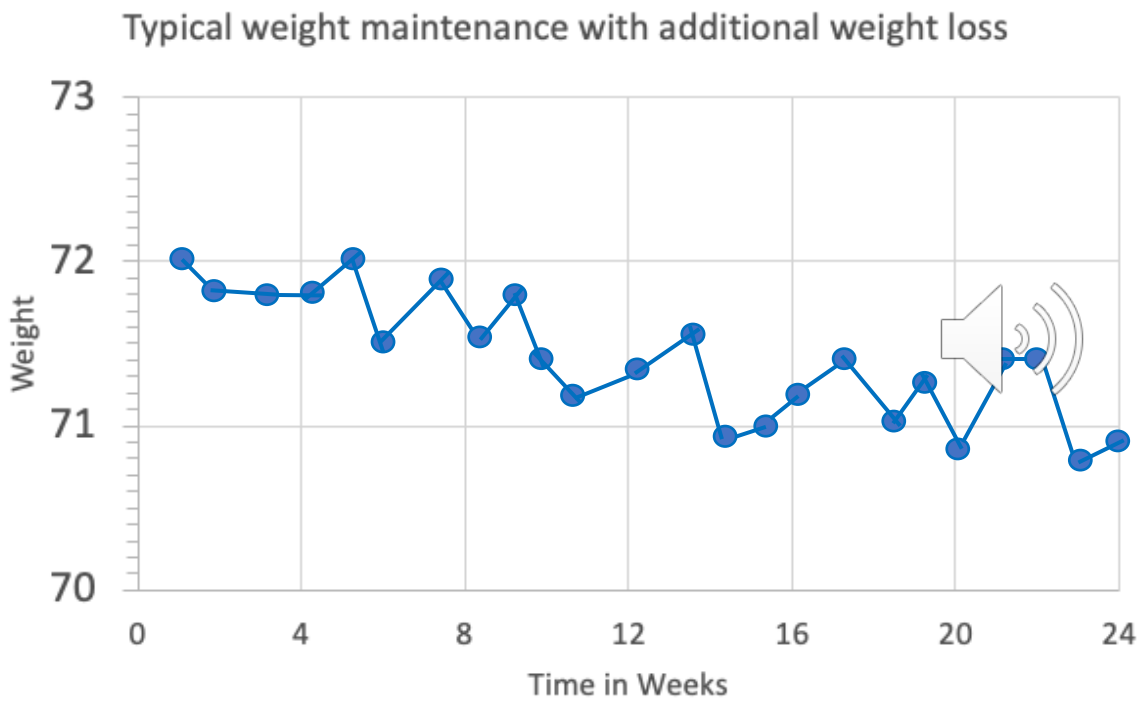
Results (5)



AI-based digital features brought down the rising weight gain trends

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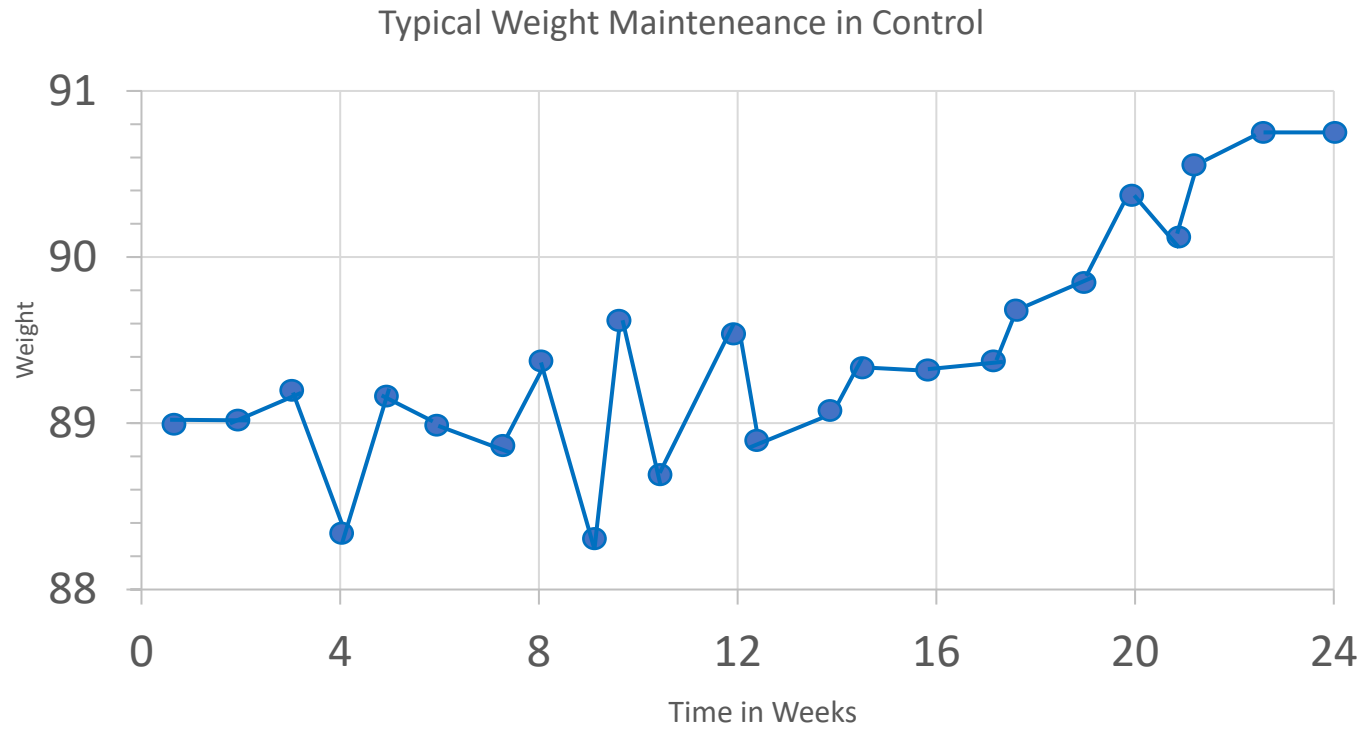
Results (11)



- Phase 1 study average weight loss of this control population =13.7%
- Phase 2 study average weight gain of this control population = 5.35%

From control population (n= 120) 3% participants maintained their weight

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Conclusion and Future Work

Conclusion

- Using an AI-assisted lifestyle intervention, with user-friendly and personalized features, people with all levels of obesity can maintain their weight loss. This type of intervention not only can help maintain the weight loss but also can contribute to additional weight drop.

Future Work

- We are planning to use this very AI-based digital system platform, to run a field study to test, and validate, its efficacy in complementing GLP-1 weight loss and weight maintenance.
- Another future work in planning is to test the efficacy of the platform post-metabolic surgery, exclusively.

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Thank you!

Questions?