



ORIGINAL ARTICLE

BODY WEIGHT OUTCOMES AMONG G-PLAN APPLICATION USERS: A RETROSPECTIVE STUDY

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ABSTRACT

Objective: G-plan is a personalized weight management mobile application solution. This study aimed to report G-plan weight-loss outcomes and characterize those factors with major positive correlations to weight loss.

Place of Study: G-plan app users, G-plan is a tailored weight management mobile application solution.

Study Design: A retrospective cross-sectional study

Duration of Study: April 2015 to May 2020

Methodology: A retrospective analysis was performed with results obtained between April 2015 to May 2020 with participants (N=794) enrolled in a G-plan program which included the mobile app. The study followed a Non-probability consecutive sampling design, both males and females aged between 18-60 years were enrolled. Participants had initial weight of >80 lbs and <350 lbs. Percentage of participants who achieved 5% or greater weight loss were classified as successful participants. Characterized behaviors were evaluated, including self-monitoring through weight logs, number of weeks using the app, as well as other characteristics of the population (sex, weight, body fat). Statistical analysis was performed using Microsoft Excel and RegressIt (version 2020.03.04).

Results: Among the participants, 47.79% reported a decrease in body weight while they were using the app with 4.04% experiencing more than 5% weight loss compared with baseline weight. Among the participants, 37.78% of male experienced a weight loss of <5%, in comparison to female who experienced a decrease of <5% weight loss in 44.21% of cases. No male experienced a decrease between 5-10%, with 3.74% of female experiencing a weight loss between 5-10%

Conclusion: Further research is needed to produce clinically significant results for users, emphasizing the effects of weight and daily caloric intake registration as significantly related to weight loss.

Keywords: Mobile apps, Nutritional management, Overweight and obesity, Physical activity, Weight loss programs, Weight trajectory, Nutritional Counseling

INTRODUCTION

Obesity is linked with serious health hazards that growing into a worldwide epidemic. World Health Organization (WHO) report, 1.5 billion persons were overweight, over 500 million of them were obese, and the prevalence of obesity is expected to increase in the coming up years. (1) One of the main factors contributing to illnesses and mortality is obesity, which is generally rising tremendously. The main risk factors for the development of overweight are thought

to be sedentary lifestyle, junk food, and bad eating habits. (2)

Obesity has been linked to number of metabolic illnesses, including dyslipidemia, diabetes, cancer, hypertension, cardiovascular disease, and even some types of cancer and has been acknowledged in the literature as having negative effects on health. In wealthy, obesity normally affects middle-aged people (especially women), but in high-income countries, it affects both sexes and all ages. (3) Different interventions have been proven successful, although, they can be expensive, time consuming or not scalable. Major challenges may develop when individual interventions are used to prevent or cure obesity because they may need to address numerous layers of social, and environmental variables. (4)

The use of mobile health technology is common in many techniques under this paradigm to control or target

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unhealthy habits. Prior research has demonstrated that people with chronic conditions can manage their health using Health apps on smart phones. (5) Within this framework, health technologies present the potential for patient-centered, cost-effective solutions to increase disease awareness, disease tracking and adherence, encourage healthy lifestyles and instigate positive behaviour changes in patients. (6) Previous studies have tried to assess the impact of weight loss mobile apps measuring the outcome of weight loss for participants. (7-9) The majority of weight loss apps do not support joint efforts between researchers and clinicians, which are required to develop and test high-quality, evidence-based mobile apps for weight loss/management before they are widely disseminated in commercial markets, so there is insufficient evidence to support massive scale systems. (10) The goal of this study is to elaborate the benefits of mobile apps for weight loss.

METHODOLOGY

G-plans is a popular weight loss app was designed with the support Dr. Goglia, a registered nutritionist for over 20 years. G-plans offer four different modalities for users (G-Plan Food Management, G-Plans Maintain, G-plan Customized Nutrition Programs, and G-Plans Managed plan) which are designed from different types of clients

Ethical permission was obtained for using app data from director (IRB No: 1621/20) and then participants were enrolled according to inclusion and exclusion criteria. The study followed a Nonprobability consecutive sampling design. Both males and females aged between 18-60 years were enrolled. Inclusion criteria included those participants who had an initial and final weight between ≥ 80 lbs and ≤ 350 lbs, had signed up for the program between April 2015 to May 2020, spend at least 1 week with the app.

We analysed data including sex, weight, body fat % of participants, and number of weeks with the app. Input frequency represented how often the app user participated in self-monitoring of weight each week (WLPW), defined as the number of weight reports recorded per week in the app. Changes of body weight was defined as a difference of more than ± 0.1 lbs change while the participants were using the app in comparison with their baseline body weight. Additionally, clients would have registered a weekly weight difference between -4 lbs and +4 lbs were excluded as it reflected a manual input mistake. Participants included have registered their weight at least 2 times per month (+0.5 Weight Log Per Week, WPLP) and have registered their waist and hips data and obtained body fat data results from the app at least 2 times during the study. (N=794). A decreasing number of participants was related to study design and is not directly related to a dropout in the app usage.

RESULTS

Demographic characteristics of the participants are enlisted in the Table 1. The analysis comprised of a total of 793 participants, 6% of the participants were males while 94% were females. The average time spent using the programme was 7.42 weeks (51.94 days), with male participants using it more frequently than female ones (8.41 vs. 7.36 weeks). Initial average weight was 214.0 lbs. for males and 173.9 lbs. for females. Among the participants, 47.79% reported reduction of weight while using the app, among them 4.04% participants reported more than 5% reduction in weight. Weight loss was more in females as compared to males i.e., 48.26% and 40% respectively.

Baseline mean BMI was $29.65 \pm 5.68 \text{ kg/m}^2$ for males and $29.27 \pm 5.90 \text{ kg/m}^2$ for females. After using the app mean final BMIs of males was $30.92 \pm 5.29 \text{ kg/m}^2$ and $29.00 \pm 5.88 \text{ kg/m}^2$ for females (Table 2).

Additionally, 37.78% of male experienced a weight loss of $< 5\%$, in comparison to female who experienced a decrease of $< 5\%$ weight loss in 44.21% of cases. No male experienced a decrease between 5-10%, with 3.74% of female experiencing a weight loss between 5-10% (Table 3).

As shown in Fig 1, the biggest percentage of total users within the study who lost weight were on the $< 5\%$ weight loss range. With a decreasing percentage of total participants losing (5-10%), (10-15%) and ($> 15\%$) of their initial weight, respectively.

The individual variables contributing to weight loss were assessed using univariate linear regression. Among the factors which contributed to weight loss, the number of weight logs registered with the app played a significant role, meaning the number of times the users registered their weight using the application, was found both statistically and significantly associated with weight loss. Other factors such as Initial BMI and Initial Weight were also found positively correlated with weight loss although the p values were lower than 0.05 (Table 4).

DISCUSSION

We discussed the clinical value of a smartphone app for users (both males & females) who successfully lost weight, which was more prevalent among those who frequently checked their weight. The findings of current study revealed that, the proper utilization of weight loss app is necessary to provide average results related to weight loss for the complete population. During the study, although a significant weight loss was not achieved in all the participants, a significant proportion of participants both males and females experienced weight loss accordingly, (18 males, 362 females), these results emphasize the importance of proper app utilization according to different parameters which include but are not limited to: weight input frequency, daily calorie intake input frequency, meal

calorie intake input frequency, as well as other parameters which may be included depending on the characteristics of the weight loss app. (4,5) On the other hand, previous studies also documented significant weight loss among app users. (6-7) As per goal of current study, weight loss in overweight and obese individuals has many advantages, including increased sensitivity to insulin, heart function and cholesterol. (8,9)

Obesity is a chronic condition that physiologically, socially, and mentally affects the quality of individual life, despite of cultural, financial, or ethnic background. (10) Excess body fat not only affects the quality of life, but also enhances both the costs related with healthcare and the risk of death. (11) The occurrence of many health conditions, including diabetes, cardiovascular complications, cancer, asthma, sleep disorders, and infertility, is significantly linked with obesity. (12) Researchers have emphasised the value of efficient patient communication to minimize the health care stress. Digital technology offers simple cost-effective and immersive communication. Smart phones have emerged as a possible tool for health maintenance intervention and showed promising results for weight loss and increased physical activity. (1,2,3,4,5,11) A mobile app can be tailor-made for the user, and information can be transmitted more effectively than normal in the delivery of information.

Participants of G-plan lost an average weight <5%. Weight loss was prominent among females than males i.e. 44.12% and 37.78% respectively. Females experienced more weight loss than male participants. This difference may be due to

more weight loss opportunities for females than males. (12,13) Previous findings also document more weight loss among females than males. (14,15,16,17) Contradictory findings were reported in Retrofit study population where males experienced more weight loss than females. (18) Current study findings also reported that 3.74% female experienced weight loss between 5-10%. Weight loss at >5% is highly significant to reduce comorbidities associated with overweight and obesity. (19, 20)

Additionally, adherence to weight loss app, as defined in this study as the number of weeks a person used the application with at least 2 registrations per month, has also shown to be an important factor related to weight loss. Previous studies also reported statistically significant effects correlated with weight loss logs and app usage as per findings of current study. (18, 20)

CONCLUSION

In conclusion, current study highlighted the clinical effectiveness of a mobile app with a large percentage of users who tracked their weight more regularly. Further studies will be necessary to develop different methods which promote adherence to self-monitoring apps as well as good practices such as: constant registration of parameters (calorie intake, weight, sleep hours, etc). Finally, this study aims to add knowledge to the existent body of information related to the usage of digital apps to tackle obesity trends worldwide.

Table 1: Baseline characteristics of the study participants

Characteristics	Male 45	Female 748	Total 793
Height (In)	69.69 ± 2.28	64.81 ± 2.79	65.09 ± 2.98
Weight (Lbs.)	214.04 ± 40.26	173.87 ± 36.49	176.15 ± 37.85
Baseline BMI kg/m ²)	29.65 ± 5.68	29.27 ± 5.90	29.22 ± 5.92
Underweight (BMI<18.5)	0.00%	0.13%	0.13%
Normal (18.5~25)	24.44%	26.47%	26.99%
Overweight (25~30)	28.89%	33.69%	33.67%
Obesity class I (30~35)	33.33%	24.60%	24.21%
Obesity class II (35~40)	11.11%	9.76%	9.71%
Obesity class III (>40)	2.22%	5.35%	5.30%

Table 2: Clinical course of the study participants.

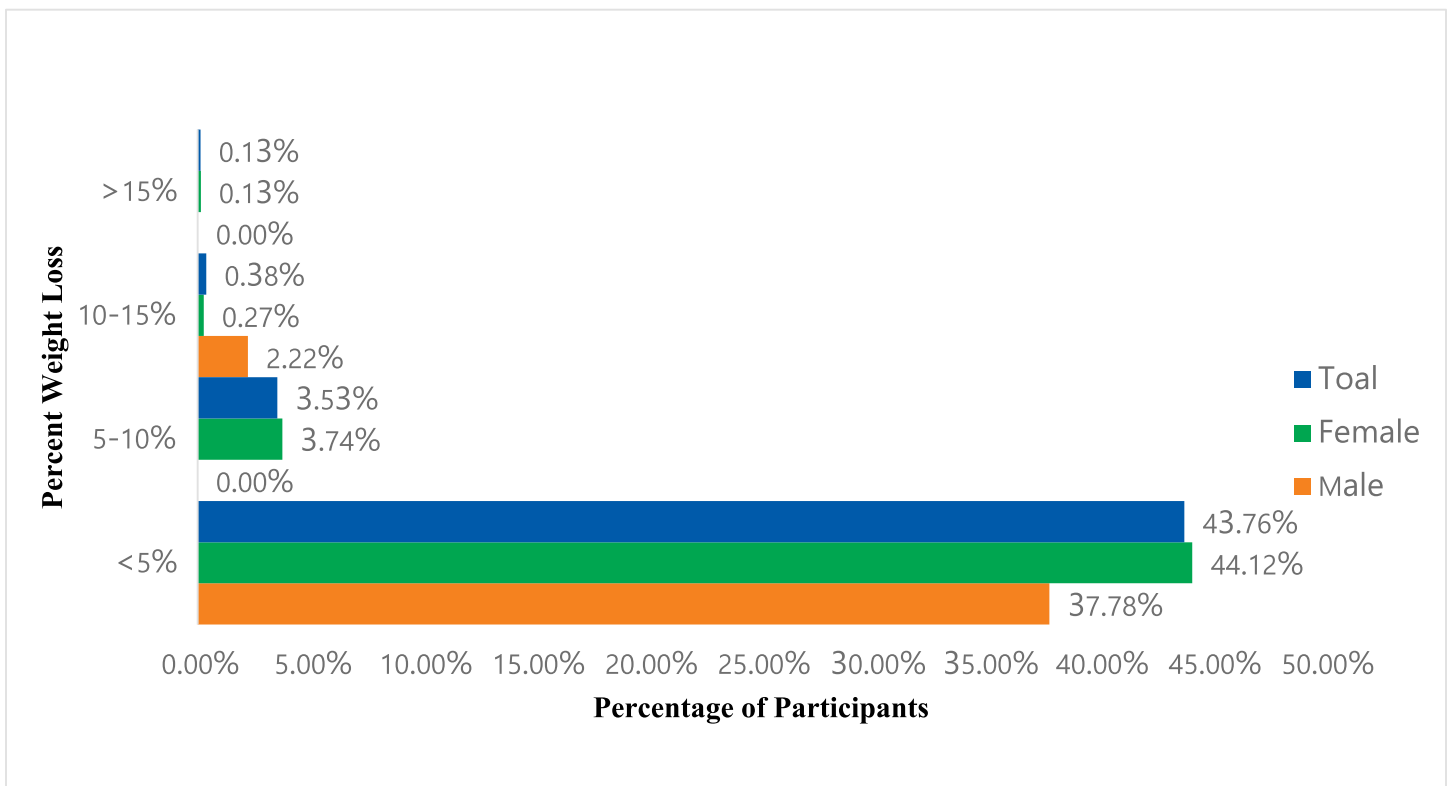
Characteristics	Male 45	Female 748	Total 793
Person-Day	2,649	38,547	41,196
Follow Up Days (Mean)	58.87	51.53	51.94
Weight Change			
Weight Input Frequency	1.13 ± 0.47	1.24 ± 0.51	1.12 ± 0.50
Final Weight (Lbs.)	214.10 ± 40.07	173.18 ± 35.90	175.50 ± 37.35
Final BMI (kg/m ²)	30.92 ± 5.29	29.00 ± 5.86	29.11 ± 5.84
Underweight (BMI<18.5)	0.00%	0.27%	0.25%
Normal (18.5~25)	11.11%	27.27%	26.36%
Overweight (25~30)	40.00%	34.36%	34.68%
Obesity class I (30~35)	24.44%	24.87%	24.84%
Obesity class II (35~40)	17.78%	8.29%	8.83%
Obesity class III (>40)	6.67%	4.95%	5.04%

Table 3: Distribution of Weight Loss Among App users.

Weight Loss	Male	Male %	Female	Female %	Total N	Total %
No Loss	27	60.00%	387	51.74%	414	52.21%
<5%	17	37.78%	330	44.12%	347	43.76%
5-10%	0	0.00%	28	3.74%	28	3.53%
10-15%	1	2.22%	2	0.27%	3	0.38%
>15%	0	0.00%	1	0.13%	1	0.13%
Total	45	100%	748	100%	793	100%

Table 4: Factors contributing to the weight loss.

Coefficient Estimates: Regression Analysis for WEIGHT_LOSS (7 variables, n=793)								
Variable	Coefficient	Std.Err.	t-Statistic	P-value	Lower1%	Upper1%	VIF	Std. Coeff.
WEIGHT_LOGS	-0.152	0.049	-3.122	0.002	-0.152	-0.151		
IN_BMI	-0.043	0.042	-1.037	0.300	-0.044	-0.043		
IN_WEIGHT	-0.006	0.006	-0.918	0.359	-0.006	-0.006		
IN_BODY_FAT	0.010	0.010	0.917	0.359	0.009	0.010		
WEEKS_APP	0.098	0.041	2.409	0.016	0.098	0.099		
WLPW	0.473	0.234	2.018	0.044	0.470	0.475		
SEX	0.853	0.459	1.860	0.063	0.847	0.858		
Constant	1.384	0.594	2.329	0.020	1.377	1.391	0.000	0.000

Figure 1. Distribution of weight loss among app users.

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Conflict of Interest: None

Patient Consent: Inform Consent were taken

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Author's Contribution:

TJG & BHA: Study design, data collection and analysis

AA, BHA & MA: Manuscript preparation, drafting and revising

TJG, MA & AA: Review and final approval of manuscript

Disclaimer: The data, findings and results presented in the above manuscript are sole responsibility of the authors.

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