EC Nutrition Special Issue - 2017

Long-Term Weight Loss by Mobile App: Current Status and Future Perspectives

Peregrín-Alvarez José M*

Sabbatical Scientist, Granada, Spain

***Corresponding Author:** Peregrín-Alvarez José M, Sabbatical Scientist, Granada, Spain.

Received: November 28, 2017; **Published:** December 01, 2017

Abstract

Background: Weight loss interventions can be delivered through various mediums including, increasingly, mobile phones. The number of downloadable health-related apps for smartphones may already be of an order of hundred thousands.

Objective: This review assesses the efficacy of mHealth weight loss interventions as well as the future perspectives of these new mobile technologies.

Methods: Text-mining qualitative studies on mHealth weight loss/management.

Results: Interestingly, out of the huge number of downloadable apps, effective mHealth long-term weight loss interventions using scientifically-driven approaches was only associated with the app "One Click to Health". Many areas of improvement are identified setting up the bases for further experimental studies and future mHealth developments.

Conclusions: This review highlight the urge of implementing collaborative efforts for the future development and testing of high-quality scientifically-driven mobile apps applied to mHealth weight management interventions before they are distributed into commercial markets.

Keywords: *Ideal Weight; Healthiest Weight; Weight Management; Lipostat Theory; Weight Loss; Health-Related Apps; mHealth*

Abbreviations

mHealth: Delivered via Mobile Phone and Internet; BMI: Body Mass Index; WHO: World Health Organization

Introduction

mHealth approaches for weight management can be effective for improving health outcomes in adults and adolescents, and are pursued as a cost-effective and scalable intervention for combating overweight and obesity. The number of downloadable health-related apps for smartphones or tablets may already be of an order of hundred thousands (~100K). These digital goods can help you to monitor your physical activity, plan healthier meals, track your BMI, weight and other personal data. Despite the increasing number of available apps, it has been shown [1] that the most downloaded iTunes and Google Play apps are not necessarily the most usable or weight management effective. Search algorithms for iTunes and Google Play seem to be biased toward apps' titles and keywords that do not accurately define the real functionality of the apps. So what can we really expect from these apps? Yet, only a few studies have "proved" that using these apps can really help us to improve our health. A recent article [2] has shown that people who used MyFitnessPal app for some period of time, were able to lose a few pounds, but so did the people in the study who did not use the app. This suggests that mobile apps for weight management may be useful for persons who are ready to self-monitor calories, but introducing a mobile app is unlikely to produce substantial weight changes for most patients. Weight loss associated with different patterns of self-monitoring using the mobile app "My Meal Mate" was also recently reported [3]. However, the duration of this clinical trial study lasted only 6 months,

with no reported follow-up analyses showing the long-term effectivity of this mHealth approach. In summary, it looks like, until now, the only advantage of using any of these apps is the fact that you can keep track of what you eat and how much you actually exercise. Furthermore, a part from mostly attempting short-term goals, even the commercial (non-free) mobile apps designed for mHealth weight management lack important science-based features, do not involve any health care expertise in their development process, and have not undergone rigorous scientific testing [4]. This really questions the validity of these apps regarding their effectiveness and safety, at a time when the availability and growth in adoption of these mHealth digital goods is fast increasing. An integrative approach by collaborative efforts between developers, scientists and users for mHealth developments combined with a science-based approach for testing and further validation is probably the missing step for achieving much better and reliable results.

Methods

Google, specialized journals and the database PubMed (Medline) were searched for relevant qualitative studies on mHealth weight loss/management.

Results

Interestingly, out of the hundred thousands of available health-related apps available in all mobile markets analyzed by the current literature, effective long-term weight loss interventions using mHealth science-based approaches was only associated with one single easy-to-use and intuitive app, "One Click to Health" (1C2H) [5]. This app has been developed based on a recently published long-term weight loss and maintenance study [6] showing that the application of "the Healthiest Area" (HA, a normalized BMI new measurement), and the responsible and consistent use of this new mobile app can really make a difference in our lives.

What makes this new mHealth approach (and app) unique in comparison to the hundreds of approaches and thousands of similar health-related apps available in the current online markets is summarized in the following sections:

An Integrative Approach

This new mHealth Weight Management approach put together a number of elements that have been found to be key in very recent studies, such as the importance of motivation, self-monitoring, milestone implementation, evidence-based approach, etc.

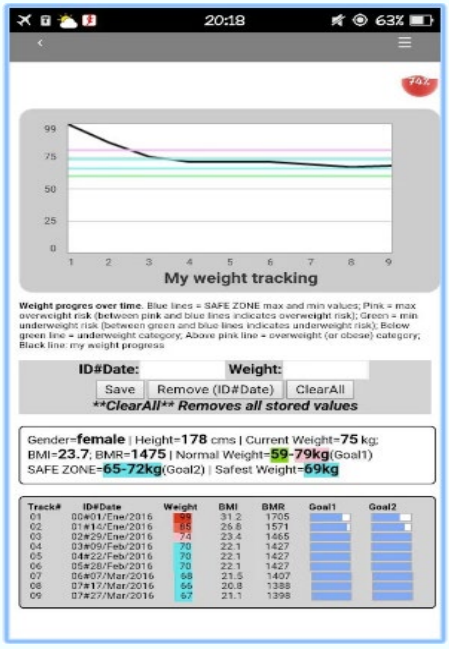
- **Evidence-based approach:** As opposed to the approaches used by the other currently available apps not been developed, supervised or reviewed by any experts in the area of study, 1C2H approach has been experimentally validated prior to the app development and version release.
- **Self-experimental validation:** The validation was conducted by self-experimentation, i.e. experimentation in which the experimenter, a scientist, for the very first time decide to conducts the experiments on himself instead of his traditional bacteria collection.
- **HA:** This mHealth approach uses sub-categorization of BMI values and further validation of HA, a more stringent and efficient BMI-related category. HA facilitated long-term weight loss maintenance (weight-presetting), consistent with the "Lipostat theory" [7], an interesting theory about a sort of "weight-memory" residing in the hypothalamus, not yet reported in humans.
- **Food/Activity:** The implementation of any choice of food/activity demonstrated to be more encouraging than any pre-determined diet or activity.
- **Milestones:** The use of time milestones provided with a robust and efficient way of gradually driving a person's weight to the desired values while costing less than conventional treatments [8]. Food/activity ratio was adapted during the different milestones.
- **Autonomy, habit and motivation:** Successful implementation of autonomy, habit formation and motivation was achieved by implementing rewarding strategies, calorie compensation and psychological reinforcement (see below). This is also consistent with the "self-determination theory" [9], proving that individuals fully endorsing weight loss-related behavioural goals and feeling more competent and autonomous are more likely to result in long-lasting behaviour change.
- **Rewarding:** Effective mHealth implementation of motivation and healthy habits by mean of rewarding strategies (e.g. during the

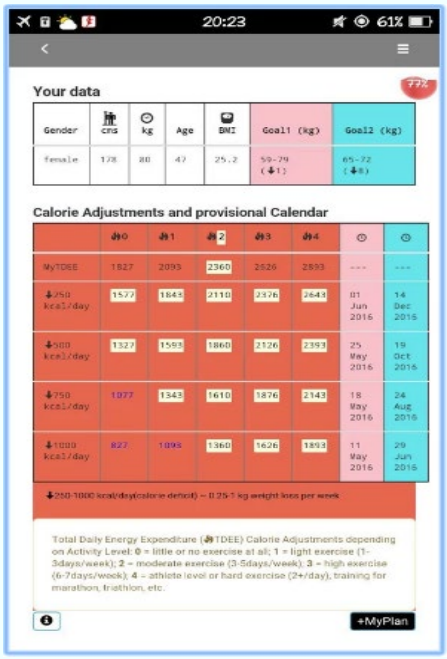
first milestone any choice of vigorous activity (e.g: running vs walking) was recorded as 2X calories out).

- **Calorie compensation:** A gradual calorie compensation (from zero compensation during the first milestone to total compensation during the last one) was applied in order to favor a negative energy balance and effective weight loss.
- **Self-monitoring and tracking:** By utilizing only two easy-to-use mobile apps: Fitbit [10], for recording and tracking meals and workouts (only subjected to calibration in case of metabolic adaptation); and 1C2H app, for weight recording and calculating and tracking HA.
- **Automatic expert feedback:** The app incorporate a simple decision-making algorithm capable of providing personalized automatic-expert advice based on ongoing results.
- **Date estimation:** 1C2H provides with the estimated dates to achieve milestones and goals, allowing the monitoring and potential correction and adaptation of mHealth interventions.

Science-Driven App

A new integrative mHealth evidence-based approach transformed into a digital good. 1C2H app put together all the above key elements (Figure 1). The app emphasizes in motivation by the implementation of rewarding incentives and motivational pop-up messages, given the importance of motivation for keeping people engaged and focused in a long run. In addition, the author of this study was the one coding and developing 1C2H app. The author had to learn how to program on different coding languages in order to build the app, suggesting that anyone could, in principle, build their own apps to satisfy their needs. This is something very unique as well since most apps available in current online markets are built by specialized third-parties. But this is not all, the application comes with a family of other apps that the author has been developing and releasing during the realization of this study aiming to reproduce the results on a larger scale and measuring the effectivity of this new mHealth science-based approach: "Healthy Eating Quiz" app (for auto-educating and memorizing basic health concepts), "Smart Vibes" app (an original pedometer integrated into a smart watch display plus calorie calculator), "Distance calorie" app (in case you forget using your pedometer this app allows you to build your walking or running route in a map and calculate your traveled distance and calorie consumption), "Calorie Breaker" app (split your recommended daily calorie intake into nutrients needs following WHO guidelines), "Weight Checker" app (uses weight-loss weekly rate to check if the followed weight management program is effectively working or not), "Weight Loss Motivator" (measures your level of motivation and provides with useful tips for building up your inner motivation and successfully achieving long-term weight loss and maintenance), "Future Weight" (by providing a desired weight and date goal, the app provides tips for successfully achieving these goals by following WHO guidelines), and "Weight Burner" (quantify daily/weekly habits into "real" weight loss)[[11].





Discussion

HA was successfully achieved and maintained with the help of 1C2H app. HA measurement has many advantages compared to the use of BMI: HA warns about situations such as overweight/underweight risks, it avoids misclassification (e.g. cases close to Normal BMI), and it works in conjunction with BMI by establishing max/min limits. Experiment tracking was crucial for the successful implementation of this new mHealth approach. 1C2H self-monitoring allowed a close interaction with the user, providing autonomy and strengthening mo-

tivation. Self-monitoring has also been identified in recent studies as an essential behavioral strategy for effective mHealth weight loss programs. Personalization, feedback, bar code scanning, synchronization, engagement/entertainment, goal setting, ability to motivate, educate and remind, frequency of use, and a simple ease of use design were also found key elements for an effective mHealth self-monitoring implementation during weight loss interventions [1,3,12,13]. Interestingly, most of these key elements were already introduced in 1C2H. While studies show that ~80% of people are not able to keep weight loss for long-term, likely due to lack of motivation over time, the implementation of any choice of food/activity (personal preference vs pre-established diets/routines) and simple rewarding strategies are probably the keys for building up positive-thinking and long-term motivation, as well as successful habit-formation, achieved 8 - 10 weeks after 1C2H implementation. This is consistent with recent studies showing that smartphone technology facilitates health-related behavior changes [14]. This study represents the first successful mHealth long-term human self-experiment involving weight loss, metabolic adaptation and weight-presetting. Giving the simplicity of this mHealth science-based approach, in principle, anyone could try to reproduce it on their own, unless there is a medical condition that might prohibit it. This study set up the bases for the systematic implementation of efficient mHealth weight management programs. With sufficient funding these results can be adapted and reproduced on a larger scale. Future studies should be able to further validate these results by different computational and experimental approaches and be able to answer some interesting questions raised in this study such as the exact timing the hypothalamus ("Lipostat") requires for the effective implementation of long-term healthy weight maintenance. Alternatively, mHealth initiatives such as "Free Healthy Communities Program" [15] or "Motivate Me" [16] if implemented by governments or non-lucrative organizations we would likely be able to facilitate the implementation and further reproduction of these results. Future mHealth developments include making 1C2H app more independent by incorporating meals and workouts log features, integration or fusion with features of the most downloaded apps, as well as the development of sensors for incorporating real-time data, BIG DATA analytics and machine learning, aiming to obtain the very first Artificial Intelligent Weight Loss Prototype [17].

Conclusions and Future Perspectives

Weight management mobile apps are widely available and are very popular but currently they lack professional content expertise. Only ~0.05% of apps has been developed with an identifiable professional input [18]. Encouraging app development based on mHealth evidence-based approaches would assure content quality, allowing healthcare professionals to recommend their use and greatly facilitate their professional interventions. Personal contact and frequent interactions in interventions have also been associated with weight reduction [19]. By conducting literature and clinical trial searches, a recent study [20] found very few active, completed, or published studies testing the efficacy of mobile apps using randomized controlled trials. Research efforts should focus on demonstrating the efficacy of behavioral interventions and remote self-monitoring for mHealth weight management treatments using effective, randomized controlled trials. Furthermore, an article [21] has shown that pretty much all the currently available apps collecting dietary intake use the same nutrition assessment methods (i.e. food diary record) and technologies for data input (i.e. text search and barcode scanner). However, emerging technologies, such as image recognition, natural language processing, and artificial intelligence, has not yet been identified. Furthermore, except 1C2H app that was not captured by this article, none of the available apps have a decision-making engine capable of providing personalized expert advice. Collaborative efforts between developers, researchers, clinicians, and patients will be highly recommended in order to develop and test high-quality science-based mobile apps for the effective implementation of mHealth weight management programs before they can be widely distributed into online markets [4].

Conflicts of Interest

None.

Bibliography

1. Zaidan S and Roehrer E. "Popular Mobile Phone Apps for Diet and Weight Loss: A Content Analysis". *JMIR Mhealth Uhealth* 4.3 (2016): e80.

2. Laing BY. "Effectiveness of a smartphone application for weight loss compared with usual care in overweight primary care patients: a randomized, controlled trial". *Annals of Internal Medicine* 161.10 (2014): S5-S12.

3. Carter MC., *et al*. "Weight Loss Associated with Different Patterns of Self-Monitoring Using the Mobile Phone App My Meal Mate". *JMIR Mhealth Uhealth* 5.2 (2017): e8.

4. Rivera J., *et al*. "Mobile Apps for Weight Management: A Scoping Review". *JMIR Mhealth Uhealth* 4.3 (2016): e87.

5. One Click to Health. Google Play.

6. Peregrin-Alvarez JM. "Self-Experiencing 'The Healthiest Weight'". *Journal of Obesity and Overweight* 3.1 (2017): 101.

7. Kennedy GC. "The role of depot fat in the hypothalamic control of food intake in the rat". *Proceedings of the Royal Society of London B: Biological Sciences* 140.901 (1953): 578-596.

8. Jakicic JM., *et al*. "Effect of a Stepped-Care Intervention Approach on Weight Loss in Adults: The Step-Up Study Randomized Trial". *JAMA* 307.24 (2012): 2617-2626.

9. Teixeira PJ., *et al*. "Motivation, self-determination, and long-term weight control". *International Journal of Behavioral Nutrition and Physical Activity* 9 (2012): 22.

10. Diaz KM., *et al*. "Fitbit®: An accurate and reliable device for wireless physical activity tracking". *International Journal of Cardiology* 185 (2015): 138-140.

11. One Click to Health complementary apps. Google Play.

12. Lyzwinski LN., *et al*. "Consumer perspectives on mHealth for weight loss: a review of qualitative studies". *Journal of Telemedicine and Telecare* (2017).

13. Hutchesson MJ., *et al*. "Enhancement of Self-Monitoring in a Web-Based Weight Loss Program by Extra Individualized Feedback and Reminders: Randomized Trial". *Journal of Medical Internet Research* 18.4 (2016): e82.

14. Ipjian ML and Johnston CS. "Smartphone technology facilitates dietary change in healthy adults". *Nutrition* 33 (2017): 343-347.

15. "Free Community programs". *Virtual Personal Trainer*.

16. "Motivate Me channel". *Virtual Personal Trainer*.

17. e-Health and BIG DATA Open Call. https://www.virtual-personaltrainer.com/e-health-big-data/

18. Nikolaou CK and Lean ME. "Mobile applications for obesity and weight management: current market characteristics". *International Journal of Obesity* 41.1 (2017): 200-202.

19. Schippers M., *et al*. "A meta-analysis of overall effects of weight loss interventions delivered via mobile phones and effect size differences according to delivery mode, personal contact, and intervention intensity and duration". *Obesity Reviews* 18.4 (2017): 450-459.

20. Sutton EF and Redman LM. "Smartphone applications to aid weight loss and management: current perspectives". *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy* 9 (2016): 213-216.

21. Franco RZ., *et al*. "Popular Nutrition-Related Mobile Apps: A Feature Assessment." *JMIR Mhealth Uhealth* 4.3 (2016): e85. PMID: 27480144

© All rights reserved by Peregrín-Alvarez José M.

Citation: Peregrín-Alvarez José M. "Long-Term Weight Loss by Mobile App: Current Status and Future Perspectives". EC Nutrition SI.01 (2017): 41-46.