

MindManager: The Psychologically Informed App to Manage Weight Loss

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Abstract. Obesity is an increasing societal problem in the western world. The consequences of obesity can be physical, social, mental, and economical. The attempt to counteract these consequences has led to the vast production of knowledge, advice, weight-loss diets, and exercise regimes, all in the aim of helping people lose weight. The desire for people who are obese to lose weight is also high. Yet despite this, people often struggle to successfully lose weight. One prominent cause of this is the difficulties people generally have in managing their goals, setting realistic expectations, developing healthy habits to help achieve their goals, and keeping track of their progress. This has led to the development of psychologically based programs to help people reach their goals, with varying levels of success. The data from these programs have helped researchers narrow down key steps in successful goal management, such as: asking users to define and articulate a reason for their goal, breaking goals into achievable and concrete sub-goals, and enabling users to share their progress. This paper describes how these techniques have formed the foundation of a weight-loss app, *MindManager*, to help people lose weight and manage their progress effectively.

Keywords: Obesity, weight-loss, goal management, psychology, e-health.

1 Introduction

Obesity is an increasingly prevalent societal phenomenon. In 2016, 13% of the world population was obese [1]. The amount of people obese in the world has almost tripled since 1975. This is particularly the case in WEIRD (Western Education Industrial Richly Developed) societies, where socioeconomic developments in the last century have led to the production of cheap and widely available calorie dense foods and beverages. For example, in 2014, 51.6% of the population of Europe was overweight [2]. The unintended consequences of this is that people are far more likely to die by a heart attack or other obesity related issues, such as diabetes, than at any previous time in history. Convenience has come at a cost for many people in Western society.

Those who are obese do not only suffer physical consequences, but also suffer socially and mentally. People who are obese are seen on average as less attractive potential romantic partners than those who are not [3]. People who are obese are more likely to be targeted for bullying and harassment than those who are not [4]. People who are obese are more likely to be judged as having poor will or character from assumptions that they lack control over their mind or body. People who are obese are more likely to suffer from difficult mental health issues, such as depression and anxiety, which can cause the person to continue eating, exacerbating their weight difficulties [5]. People who are obese are on average less healthy, happier, sexually active, and mentally well than those who are leaner.

All these physical, mental, and social consequences have led to a different type of cost, economical. Over \$60 billion is spent each year in the USA alone, via Weight-watchers, mobile apps, technology, weight-loss apparatus, diets, weight programs, gym memberships, all in the aid of losing weight [6]. However, despite all of this, most people each year do not end up losing the weight they have gained. A significant portion of those who do lose weight tend to regain it within a few years [7].

2 Psychology of Weight Loss.

People are desperate to lose weight but seemed unequipped to actually achieve it. This is despite the range of potential methods at their disposal that have been shown to be reliable predictors of weight loss. Such methods can range from the dietary: simple calorie counting, low carbohydrate diets (e.g. Keto or Atkins), vegetarian or vegan diets. To eating restrictions: intermittent fasting. To increased physical exercise: taking up a sport, joining a couch to 25k program. To therapy and/or emotional support [8]. Other methods that are psychological/behavioural in nature have also proven effective, such as: reducing plate size in order to feel more satiated with servings or shopping on a full stomach in order to reduce the tendency to impulse buy high fat and high caloric sugar foods [9]. With the introduction of the internet and its contents (e.g. YouTube video, Podcasts, Forums for weight loss), there has never been a time where any individual person can learn more about their body and nutrition than ever before. And yet, despite this, our obesity problem remains.

From a psychological perspective, this indicates that it is not the information or methods that are the problem for people, but the way people are using this information to inform their goals and/or maintain those weight loss goals. Whilst it is clear that people routinely set weight loss as a primary objective to be reached, they may not be setting appropriate enough sub-goals in a way that meshes well with their underlying goal-monitoring systems. For example, people are more likely to achieve their goal (e.g. to lose 52lbs next year) if they break their goal into smaller-sized short-term sub-goals (e.g. to lose 1lb a week). This allows the person to have a concrete achievable goal within a short period of time, which if they achieve will more provide a sense of achievement and desire to keep on their goal path, and if they fail to achieve allows them to change their goal approach. However, people do not use this method for their goals. This is a failure in understanding their own psychological constitution.

3 *MindManager*

How can the psychological mechanisms and goal-monitoring interventions that predict better chance of successful weight loss be implemented into an app that will be able to help manage people's weight loss? This paper introduces the *MindManager* app as a way to incorporate these mechanisms. The app is a chat based system that attempts to aid the user into articulating the reasons as to why they want to achieve their weight loss goal, identify particular methods and techniques to achieve that goal, set concrete but semi-flexible sub-goals in their tasks, develop habits in order to change their mindsets and behaviours, and monitors their progress and provides feedback in order to allow the person to optimize their weight loss progress.

The design of the system is based off on several theoretical/empirical theories. *MindManager* makes use of the empirical literature found on the importance of goal articulation. This is why the system asks users to provide a semi-detailed reason as to why they want to achieve the goal. The system also asks users to imagine their best possible future if they were to achieve their goal (i.e. if they could have what they want, what would that look like?). It also asks them to imagine a worst possible future if they were not to achieve their goal (e.g. I gain more weight, I become unattractive to my partner, I get diagnosed with diabetes, I suffer from a heart attack, etc.). This is to encourage the users to think of reasons to positively approach their goal and negative reasons to avoid their undesired future.

Another reason as to why the system includes an interactive writing exercise is that it encourages intrinsic motivation and promotes better well-being. Multiple writing programs have been developed, such as those developed by the research teams under Psychologists James Pennebaker and Jordan Peterson [10] [11]. Both have been found to improve performance on their respective output tasks. Pennebaker's research has found that those who disclosed negative emotional experiences in a way that encouraged them to make a coherent narrative of their memory, enjoyed numerous physical and mental health benefits in the future compared to those who did not. Peterson's *Self Authoring Program*, which in its initial phase focused more on academic performance and young-adult self-improvement, found that participants were able to significantly boost their grades and reduce drop-out rates. This applied for students in multiple universities cross culturally. Peterson's research also found that the more people disclosed in their writing program, the better the effect was. In order to perform difficult tasks over long-period of times in order to achieve an abstract goal, people need a strong articulated reason as to why that goal is beneficial and why it is meaningful to each person.

However, where the *MindManager* differs in comparison with these other writing programs is its use of repeated feedback, developing of habits, and goal-updating input. Self-Authoring, for example, is a one-time writing program (albeit it can be carried out at the user's own pace over several days and even weeks). It is a low frequency, high intensity program. *MindManager* however is a high frequency, low intensity program. Users are asked to give relative quick and short answers at each particular period. The *MindManager* system uses language analysis, Likert-scales, personality information, to make informed decisions about the well-being of the user. It will seek further information from the user periodically (which can vary depending on the particular user and

their goals). The benefit of this is that the system can dynamically adapt to the ongoing situation of the person.

4 Production and Testing

The *MindManager* system is still in its early stage of production but based on the substantial evidence found in previous research, there is optimism for its success. From their meta-analysis of the literature, researchers found several key factors that promoted successful goal attainment [12]. These were: the ability to broadcast and share results socially, incorporating both outcome goals (e.g. I want to 50 lbs. slimmer) with behavior goals/habits (e.g. I want to eat more fruit and vegetables), it incorporates sub-goals, it provides feedback to the user, and it encourages users to provide routine feedback on their goal-status. The system also incorporates methods of Cognitive-Behavioral Therapy to encourage the user to identify why they are not successfully pursuing the goal and what potential inhibiting behaviors and/thoughts are getting in their way (e.g. the tendency to catastrophize over failures). The system then attempts to help the user navigate those behaviors and thoughts in a goal-oriented manner.

The *MindManager* system will be tested with research participants. Whilst the full details of the research study have not been yet worked out, there is a basic structure that will be followed. Once a full prototype mobile app has been developed participants will be recruited who express an interest in weight loss. Participants will be assigned to one of two groups. One group will be assigned to a pen and paper app weight loss program/or an app-based program that is high intensity and low frequency. The other group will be assigned to use the *MindManager* app. Participants in each group will be asked to track their weight over 12 weeks. Both programs will use similar features, writing tasks, identifying goals and sub-goals, but their goal-monitoring and goal-updating approaches will be different.

5 Conclusion

The *MindManager* App will implement multiple effective goal-monitoring methods in the aid of helping people manage their weight loss. The chat-based system encourages users to articulate their goals and reasons for such goals, develop plans of actions to move towards those goals, developing healthy and functional habits, and the system provides updates and feedback based on their progress. Testing of the *MindManager* will begin at some point in 2019.

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