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Addiction Model Intervention for Obesity Implemented as a Smartphone App: a Pilot Study

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BACKGROUND

Current interventions for obesity are only marginally successful, with poor long term results. Emerging evidence is pointing to dependence on highly pleasurable foods (addiction) as a significant cause of obesity.[1, 2, 3] In one study, 61% of overweight individuals (n=84) indicated they have a problem with mainly one food. Candy, chocolate, fast food, chips, ice cream, and pizza top their list.[1] Therefore, an addiction-based intervention is warranted.

Food Addiction Model: It is hypothesized that obesity is due to a mixture of: 1) overeating of highly pleasurable "problem" foods to cope with conditions such as depression, stress, and boredom (comfort eating - the pleasure of such foods briefly cancels negative emotions); and 2) displacement activity eating (akin to nail biting and similar to an addiction). Brain changes take place to keep the comfort and displacement activity eating going, resulting in an actual addiction, leading to obesity. Thus, if affected individuals could break their addiction to their problem food(s), and curb displacement activity eating, they would gain control of their weight.

MATERIALS AND METHODS

An intervention was developed, based on the above Food Addiction Model, and implemented as an iPhone app. Forty-four obese individuals (mean BMI: 39.2, range 25-63), ages 10-21, 19 males, 25 females, with a committed desire to lose weight, were recruited via newspaper/radio ads for an 18 week pilot study. The study consists of two phases: Phase 1, a problem food, comfort eating intervention, and Phase 2, a food amount, displacement activity intervention. Forty participants were lent an iPhone 4 and four an iPod Touch 4, with the app installed. Phase 1 results, at 10 weeks, are presented.

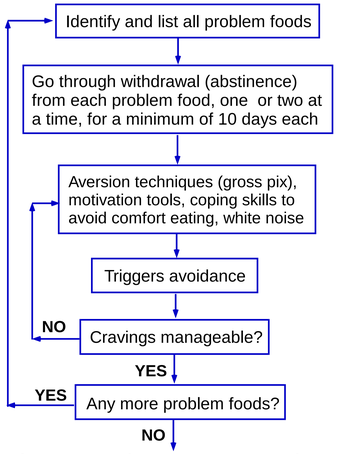
A flowchart of the intervention is shown at right. In Phase 1 participants identify their problem foods, then proceed through withdrawal from each food for a minimum of 10 days, one or two foods at a time.

Definition of a problem food:
a. I have cravings for the food.
b. I eat the food when I'm sad, stressed, or bored.
c. I can't resist the food or control my eating of the food.
d. I eat the food even when I'm not hungry.
e. I know I shouldn't eat the food, but I eat it anyway and then feel bad that I did eat it.
f. I binge on the food.
g. I sneak or hoard the food.

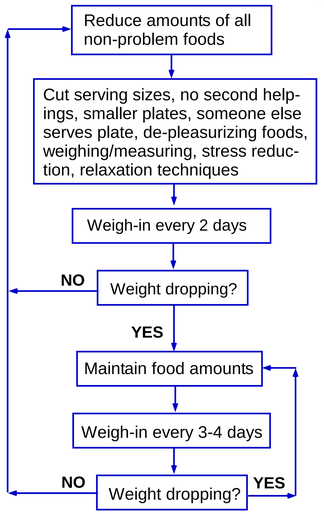
Each day participants responded to automatic questions in the app with regard to their progress, and they weighed-in weekly, otherwise the app reminded them to do both (electronic accountability). Participants also learned to avoid their triggers and to cope with unpleasant emotions, such as sadness, stress, and boredom without turning to pleasurable foods, by following their self-journaled plans in the app. Mentors interacted with participants daily via app "eRoom" messages. Face to face contact with mentors consisted of only an initial group orientation meeting and an exit meeting. The app was connected to a secure network for real time access to participant data by mentors. As further support, all participants were assigned a weight loss buddy within the group, with whom they interacted via the app. Extensive social networking support was available in the app, as well.

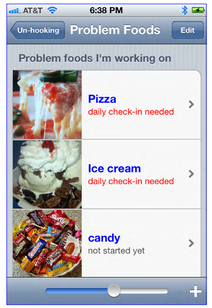
Intervention Phases

Phase 1: Problem Foods Intervention 10 weeks (comfort eating addiction)

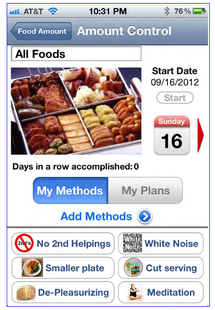


Phase 2: Food Amounts Intervention 8 weeks (displacement activity eating)

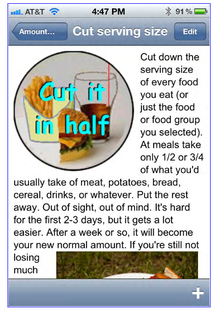


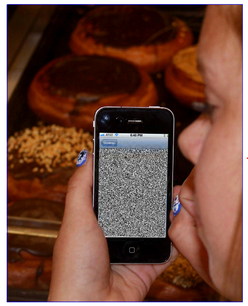


Problem Foods Control Panel: User lists problem foods, snaps photos, selects deconditioning methods (e.g. gross pix), and goes through withdrawal / abstinence for each food, one-by-one

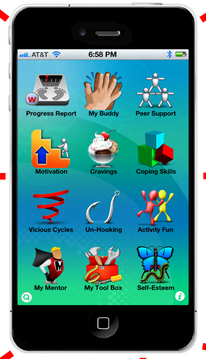


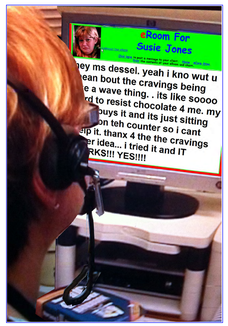
Food Amount Control Panel: User cuts down on all foods, a food category, or a specific food, selects cutting down methods, and proceeds to decrease the amounts



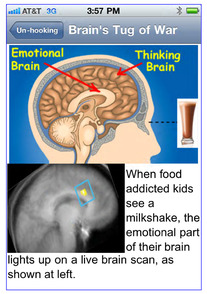


Cravings: Participant uses White Noise pattern to quell a craving

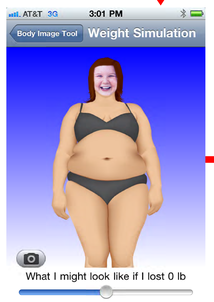


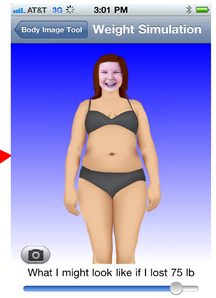


Support: weight loss buddy chats and mentor eRoom messages



Education: Neurological basis of food addiction





Motivational tool: iPhone self-photo of face is inserted on body images of varying BMI's to simulate weight loss

Motivation: User enters dislikes about being overweight

RESULTS (10 WEEKS)

Six (13%) participants enrolled simply to amuse themselves with an iPhone and were removed within the first 2 weeks. One other withdrew. Disciplining of some participants by the mentors was necessary. Engaging participants with the app initially was a problem, improved by weekly 10-15 minute phone meetings and frequent mentor interaction via eRoom messages. An "assign and verify" task approach helped to maintain engagement, for which the secure online verification of participant responses by mentors was essential.

All participants identified their problem foods (range 2 to 18 foods, mean 6.3). The most prevalent problem foods were: soda (59%), chips (57%), ice cream (38%), pizza, (35%), and candy (24%). Successful withdrawal, defined as manageable cravings (minimum 10 days or more of withdrawal) was accomplished by 89% of participants, involving 1-12 problem foods. Certain foods were more difficult: soda (mean 22.5 days), chips (18.5 days), ice cream (15 days), and pizza (11 days). After successful withdrawal, 21% of participants ate a problem food again. Forty-nine percent did not achieve withdrawal from 1-5 problem foods, due to time and motivation issues.

Withdrawal from problem foods resulted in weight loss for 86% of participants. Mean weight change at 10 weeks for all was -8.05 lb. (range -32 to +9 lb.), -3.5% of initial body weight, mean BMI change: -1.7. No age-related difference in intervention response was noted. There was no correlation with number of problem foods listed or withdrawn from and BMI or change in BMI.

All participants reported that the accountability of the app was an important factor helping them lose weight. The weight loss buddy feature of the app was under-utilized due to "not knowing what to say" and "not being friends." Assigning discussion topics and promoting a teammate approach improved buddy utilization. The social networking feature likewise was under-utilized.

Participants initially were resistant to curbing food amounts, but once problem food control was accomplished, participants were much more receptive.

DISCUSSION

The self-directive ability of this population was significantly overestimated. Most participants initially would not engage the addiction-based intervention due to apparent paradigm paralysis of anticipating a conventional diet & exercise approach. Mentor education and coaching ameliorated this resistance. Age was not a factor with regard to engaging the intervention. Breaking addiction to problem foods did result in weight loss, thus validating the study hypothesis. The "divide-and-conquer" approach of one food at a time minimized withdrawal symptoms. Day to day mentor management via the app to maintain engagement is an advantage over face-to-face interventions.

CONCLUSIONS

Phase 1 data suggests that the addiction model is efficacious as an obesity intervention. This approach would be expected to have sustainability superior to diet and exercise interventions, as it addresses the apparent root cause of obesity. Furthermore, the app could be used indefinitely to prevent relapse. Subjects with BMI in the overweight rather than obese category would likely have better results. A comparison study of subjects with lower BMI's is warranted. The Phase 2, displacement activity eating intervention, is expected to result in further weight loss, likely greater than in Phase 1.

Problem food control may constitute a gateway to controlling food amounts.

References
1. Pretlow, R., *Eating Disorders.* 2011;19(4):295-307.
2. Gearhardt *et al.*, *Archives Gen. Psychiatry*. 2011;23(3):39-5.
3. Pretlow, R., *Overweight: What Kids Say*, Createspace, 2010.