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A Smartphone App Platform for Treatment of Obesity Using the Addiction Model

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BACKGROUND

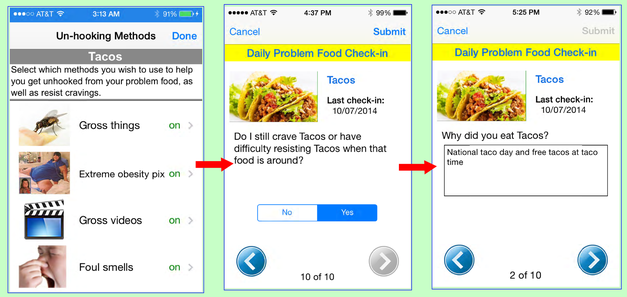
Obesity is a substantially frustrating and intractable health condition for nearly one billion people worldwide, and few effective treatments are available.[1] New intervention strategies are urgently needed. A decade of experience with a popular interactive, open-access website for overweight young people revealed addictive patterns of eating in their bulletin board posts.[2] These qualitative reports are complemented by emerging biological evidence that food and drugs of abuse exploit similar pathways (the dopamine and opiate systems) in the brain.[3,4]

This poster describes a server-connected smartphone app platform used to evaluate an addiction-based obesity intervention.

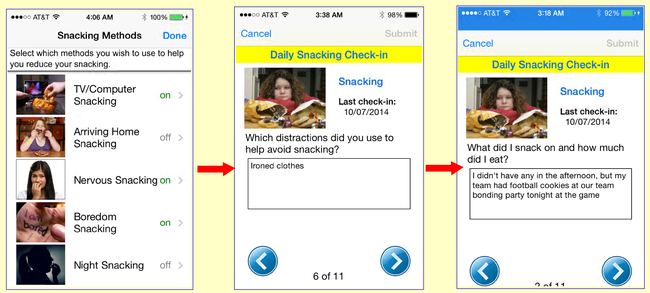
METHODS

This intervention focused on staged withdrawal from problem foods, snacking, and excessive amounts at meals. Problem foods were defined as specific foods associated with cravings or difficulty resisting the food when immediately available. Participants withdrew from each problem food, one-by-one, by abstinence from the food until cravings or difficulty resisting resolved. Withdrawal from snacking (non-specific foods) was accomplished by progressive snacking abstinence time intervals - morning, afternoon, evening, and night time - with the aim of zero snacking during the entire day. Methods used included distractions (e.g. going outside), avoidance of triggers (e.g. boredom, the kitchen), alternative behaviors (squeezing hands), distress tolerance, relaxation techniques, stress management, and keeping hands busy while watching TV. Lastly, participants decreased home meal food amounts by avoiding triggers (e.g. additional food available) and by weighing and recording their typical serving sizes of a maximum of 25 different foods served at meals with progressive, incremental amount reductions computed by the app of all recorded mealtime foods. Wireless food scales and body scales were interfaced to the app.

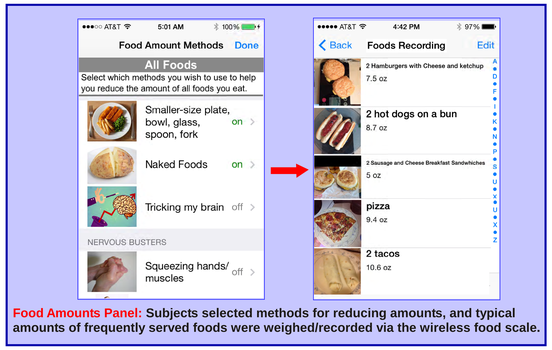
The app was piloted with two cohorts (80 participants, ages 10-21, nearly all obese, 1/3 severely):
Cohort 1, (n=43), 20 weeks: investigated acceptance and effectiveness of the addiction treatment approach
Cohort 2, (n=37), 16 weeks: investigated resistance and ways to overcome it.
Primary outcome was standardized %overBMI
Secondary outcomes were self-ratings of self-esteem, control over food, and degree participants turned to food when stressed.



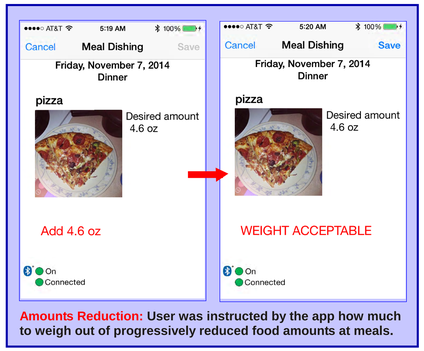
Problem Foods Panel: Subjects withdrew (Un-hooked) from each self-identified problem food, one-by-one, using aversion methods, until cravings for the food or difficulty resisting it resolved.



Snacking Panel: Subjects withdrew from snacking during progressive time intervals with a goal of zero snacking for the entire day



Food Amounts Panel: Subjects selected methods for reducing amounts, and typical amounts of frequently served foods were weighed/recorded via the wireless food scale.



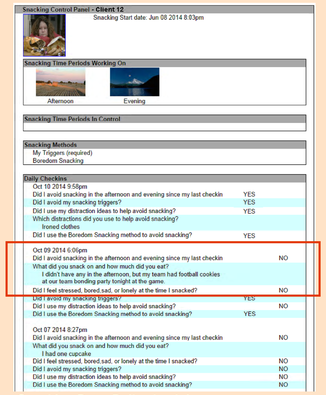
Amounts Reduction: User was instructed by the app how much to weigh out of progressively reduced food amounts at meals.

Starting pizza amount 9.4 oz.

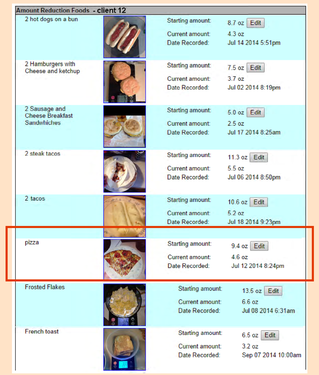
Ending pizza amount 4.6 oz.

Computer Server Data Display

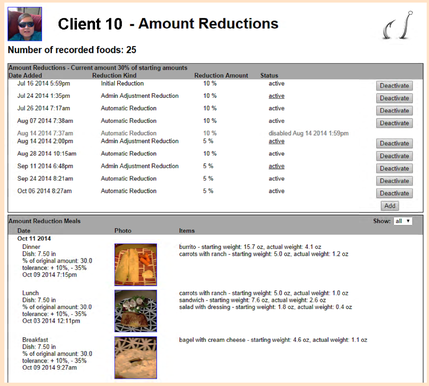
Problem Foods Data: Daily check-in responses



Snacking Data: Daily check-in responses



Food Amounts Data: Weighed/recorded foods



Food Amounts Data: Incremental reductions with weighed meals

RESULTS

Nearly all subjects (89% cohort 1, 100% cohort 2) were able to identify one or more specific problem foods and successfully withdraw (cravings resolved) from one or more foods. The majority (70%, 72%) of subjects completely eliminated snacking (non-specific foods), while the remainder reduced snacking frequency. Nearly all (92%, 96%) reduced weighed amounts of foods consumed at home meals.

Cohort 1 (20 weeks): %overBMI decreased by 7.1 ($p<.01$) and weighed amounts of foods at home meals were reduced to 51.1% of starting amounts

Cohort 2 (16 weeks): %overBMI decreased by 5.25 ($p<.01$), and weighed amounts of foods at home meals were reduced to 58.4% of starting amounts.

Resistance was due to withdrawal symptoms, including urges, agitation, and anger, but rarely true hunger (e.g. stomach growling or emptiness). Yet, participants interpreted withdrawal symptoms as "hunger." Those participants, who resisted the intervention, exhibited classic, addict-like behaviors of obfuscation, rationalization, deflection, lying, cheating, and denial of their struggles.

Secondary outcomes: self-esteem, control over food, and the degree of turning to food when stressed all showed statistically significant improvements.

DISCUSSION

This app evaluated a new obesity intervention using methods derived from classic addiction medicine and behavioral addiction treatments. Although the addiction basis for obesity remains a debate, addiction treatment methods may still be evaluated. This app's platform offers real time data monitoring for trials with quick dissemination of addiction treatment methods for the pressing public health problem of obesity.

CONCLUSIONS

A smartphone app / server platform proved useful as:

1) A packaged treatment for obesity, based on the addiction model.

2) A research tool for investigating further addiction treatment methods and ways to overcome resistance.

References

1. Ng, M, et al., *Lancet 2014*; 384(9945): 766–781.
2. Pretlow, R., *Eating Disorders.* 2011;19(4):295-307.
3. Murray, S. et al., *Nat Rev Endocrinol* 2014;10(9):540-52.
4. Wang, G. et al., J Addict Dis 2004;23(3):39-53.