

Addiction to Highly Pleasurable Food as a Cause of the Childhood Obesity Epidemic: A Qualitative Internet Study

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An interactive, open-access website was launched as an overweight intervention for teens and preteens, and was generally unsuccessful. An understanding was needed of the reasons for weight loss failures versus successes in youth using the site. Bulletin board posts, chat room transcripts, and poll responses were prospectively gathered and qualitatively and quantitatively analyzed over a ten-year period. Many respondents, ages 8 to 21, exhibited DSM-IV substance dependence (addiction) criteria when describing their relationship with highly pleasurable foods. Further research is needed on possible addiction to highly pleasurable foods in youth. Incorporating substance dependence methods may improve the success rate in combating the childhood obesity epidemic.

In December 1999, an interactive, open-access website was launched as an overweight intervention for teens and preteens. It was assumed that providing information on healthy eating, portion control, and exercise, in conjunction with online peer support, would enable those using the site to attain and maintain healthy weights. Despite demonstrating knowledge of healthy eating and exercise, most youth using the site reported little or no weight loss and some even continued weight gain.

In order to determine the true root factors undermining their efforts, a prospective qualitative analysis was conducted of the anonymous interactions of youth using the website from June 2000 to September 2010.

The website of this study, www.weigh2rock.com, is owned by eHealth International, Dr. Pretlow's company.

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Overweight youth typically are embarrassed to talk face-to-face about their weight. It was hypothesized that anonymous Internet data would reveal information not collectable by conventional face-to-face means.

METHODS

Information was collected by two principal means: a) bulletin board postings and chat room transcripts, and b) multiple-choice polls, that also allowed participants to type comments on the poll's topic. Bulletin board and chat room users were required to enter age, sex, height, and weight. Software, which utilized growth chart files for the year 2000 of the U.S. Centers for Disease Control (2009), allowed only those with a Body Mass Index (BMI) greater than or equal to the 85th percentile to post messages and use the chat rooms. Polls also required users to enter age, sex, height, and weight. However, the poll software did not exclude any users.

Ninety-six monthly online polls were conducted. A "cookie" was logged on a user's computer for each poll to which he or she responded. Detection of a poll's cookie blocked duplicate responses. Acceptance of cookies by the user's computer was required to enable the polls. Further, a user's IP address was recorded, and duplicate responses with identical IP addresses were deleted.

Bulletin board postings, chat room transcripts, and poll comments were qualitatively analyzed for common denominators in weight loss failures and successes, while poll multiple-choice options were quantitatively analyzed. The prevalence and ratio of certain word choices also were calculated via the bulletin boards' database and chat rooms transcripts.

RESULTS

Based on a combination of IP address, first name, and starting weight, it was determined that 29,406 unique users, ages 8 to 21, anonymously posted 41,535 bulletin board messages and 93,787 replies from June 2000 to September 2010. Ninety-four percent of the posters were female, 5% male, and 1% sex unknown. Mean age was 14.2 ($SD = 2.0$) years, mean BMI of self-reported weight was 33.7 ($SD = 7.4$), and mean BMI percentile was 96.1 ($SD = 3.4$). Twelve hundred fifty-two days of chat room conversations were recorded.

Internet anonymity fostered stunning honesty as, for example, this chat room comment shows: "u kno what u guys . . . im never this open with ne one about my weight not even my family" (female, age 15, 5'2", 250 lbs).

The level of human misery expressed in the messages of these youth was appalling. The major trends were as follows:

- a. The majority hated their appearance: "I ruined my body and stretched out my skin . . . i hate to look in the mirror" (female, age 17, 5'4", 245 lbs);

- b. They endured teasing: “someone is always making fun of me or mocking me or calling me names! I laugh along but on the inside im dying!” (female, age 12, 5’9”, 235 lbs);
- c. They suffered physical limitations: “I am unable to ride the rides at the amusement park” (female, age 19, 5’9”, 350 lbs);
- d. Their thighs rubbed together and chafed: “i really really want a gap between my thighs so they dont rub” (female, age 15, 5’4”, 164 lbs);
- e. Clothing was hard to find: “Nothing ‘cool’ fits me, it sucks!!!! ☹” (female, age 15, 5’8”, 240 lbs); and
- f. Dating was difficult: “i’ve got a new boyfriend . . . i think he will break up with me because of my flab” (female, age 17, 5’2”, 200 lbs).

The degree to which these youth struggled to lose weight was staggering (<http://www.weigh2rock.com/struggles/>). The higher the BMI percentile, the greater the struggle. Example posts of such struggles are as follows:

it’s like i couldn’t stop eating . . . i don’t understand why i get this feeling.
(female, age 17, 5’2”, 240 lbs)

i’ve tried so hard to say no to food . . . but i just cant for some reason.
(female, age 15, 5’4”, 200 lbs)

Out of control eating was common:

god i can’t stop eating . . . this is so retarded. (female, age 16, 5’4”, 216 lbs)

i eat too dam much i don’t know how to control it. (female, age 17, 5’2”, 240 lbs)

Users of the website struggled to resist urges to eat highly pleasurable foods, in spite of full awareness of the effects of weight gain:

Sweets, pop, anything junk food. I seem to get drawn to it like a fly to a light . . . It’s really hurting my self esteem. (female, age 15, 5’0”, 155 lbs)

I am a sucker for candy, ice cream, pop and cookies . . . i’m tired of being the ‘fat girl out.’ (female, age 18, 5’7”, 320 lbs)

Comfort Eating

Thirty-two percent of those who shared their struggle on the website, explicitly described turning to food when sad, depressed, stressed, nervous,

lonely, tired, or bored (<http://www.weigh2rock.com/comfort-eating/>). For example:

vertime i think about my dead grandma i go to food for comfort.
(female, age 13, 5'7", 223 lbs)

My mum and dad are divorced so I comfort eat. (male, age 12, 5'1",
165 lbs)

They used the pleasure of food to numb unpleasant feelings:

I want/need to lose weight . . . yet ill just keep eating those choc bars
to numb whatever feelings i have at that moment. (female, age 17, 5'4",
184 lbs)

Many of the youth, who posted about their comfort eating, were actually averse to it:

I hate when I comfort eat . . . I DONT KNOW HOW TO STOP ITS
KILLING ME. (female, age 13, 5'6", 177 lbs)

Stress Eating

Participants related overeating to stress in their lives:

i eat when i am stressed out or depressed . . . its soo hard for me. (female,
age 14, 5'4", 189 lbs)

i was stressing out big time about my exams . . . i had the biggest binge
ever. (female, age 16, 5'8", 171 lbs)

Eating when stressed out, as described by these youth, may have been partly comfort eating. But the major portion of this stress eating appeared to be displacement activity, similar to nail biting, hang-nail picking, and nervous tics, as this post shows, "I bite my nails when I am nervous or stress. I also overeat then too" (female, age 13, 5'2", 158 lbs).

Boredom Eating

Eating out of boredom was the most common reason the children gave for their overeating. Self-expressed boredom was extremely prevalent in youth using the site. In 1,252 days of chat room transcripts the letters b, o, r, e, d

occurred nearly as often as the letters w, e, i, g, h (0.623:1 ratio). Example messages included:

i eat junk whenever I'm bored. (female, age 14, 5'4", 153 lbs)

i eat when im bored to and im not even hungry. (female, age 17, 5'3", 225 lbs)

Boredom, as articulated by these youth, actually may have been an incorrect label for other, less socially acceptable, emotions, such as depression or anxiety. Posts frequently described being bored and another emotion in the same sentence, for instance:

I eat cause I am depressed and bored most of the time. (female, age 16, 5'2", 215 lbs)

i get bored. or sad and then BANG there i am gettin food again. (female, age 15, 5'8", 183 lbs)

Comfort eating and displacement activity eating evidently overrode the feeling of being full that normally curbs overeating, as evidenced by this example: "when i am bored i eat even thou i feel full i still eat more and more and i don't know why" (male, age 16, 6'3", 300 lbs).

Mindless Eating

The comfort eating of these youth appeared to be typically unconscious or mindless. In a 3-choice poll asking about mindless eating, 54% of respondents ($n = 52$) chose, "I mindlessly eat, and I realize afterwards that I do this when I'm sad, stressed, or bored."

Vicious Cycle

Many of those who posted were trapped in a vicious cycle, where they ate to ease the pain and stress of being obese itself:

I am unhappy because I eat I eat cause I am unhappy. (female, age 12, 5'3", 145 lbs)

Every time I'm stressed I eat and my weight is making me stressed. (female, age 14, 5'6", 171 lbs)

Gender Disparity

The marked gender disparity of posters (only 5% males) was explored in a 3-choice poll, that asked, “Why do you think more girls want to lose weight than guys?” Fifty-seven percent of respondents ($n = 114$) felt it was because “Girls care less if guys are overweight than guys care if girls are overweight.” An example poll comment was: “boys like fit girls, but girls dont mind too much” (female, age 12, 5’3”, 176 lbs). Males who did post on the boards were not as concerned about their weight as females, however, they exhibited comparable difficulty losing weight.

DSM-IV Substance Dependence Criteria

The way these youth described their relationship with highly pleasurable food came close to satisfying nearly all of the *DSM-IV* substance dependence (addiction) criteria (American Psychiatric Association, 1994). These criteria are: a) large amounts of substance consumed over a long period, b) unsuccessful efforts to cut down, c) continued use despite adverse consequences, d) tolerance, e) withdrawal, and f) neglecting aspects of life in pursuit of the substance. Three or more criteria are required for establishment of an addiction. The majority of posts exhibited at least three criteria, particularly: a) large amounts of substance consumed over a long period, b) unsuccessful efforts to cut down, and c) continued use despite adverse consequences.

Tolerance was a fourth criterion observed. Eating progressively more and more over time may represent tolerance. In a 2-choice poll, 77% of respondents ($n = 92$) indicated they ate more now than when they first became overweight. An example comment was: “before when i went out to eat i’d eat only a plate or two at a buffet and get stuffed. now i eat 3 and still feel hungry” (female, age 18, 5’2, 275 lbs). Progressively eating more over time might well have resulted from linear growth with age, stretching of stomach capacity, or a vicious cycle of comfort eating. Still, to a 4-choice question, “Why do you think you eat more now?”, 15% of respondents indicated that food satisfied them less, which is consistent with tolerance. A 14-year-old girl described this tolerance:

It’s like a drug. What used to satisfy you before now has no effect. I feel like i’ve become immune to the foods that used to comfort me. And like drugs you keep moving on to bigger, worse things in order to get the same feeling as when you started out. (female, age 14, 5’2”, 201 lbs)

Withdrawal was a fifth criterion observed in this study. Of the posts that related to struggling when trying to lose weight, 56% specifically described incessant urges or cravings for certain foods. Such urges were consistent with

withdrawal. Examples are: “I am having an extreme craving. . . . UGH!!!!!! i hate urges!” (female, age 17, 5’4”, 174 lbs) and “WHY is it SO hard to resist CRAVEings??? I’m SUFFERing with all this WEIGHT but I still HAVE to eat what I’m craveing!” (female, age 14, 5’0”, 304 lbs).

In a poll that asked, “When you try to eat less, how do you feel?”, 46% of respondents ($n = 134$) indicated that they experienced “intense cravings,” again suggesting withdrawal symptoms.

A poll stated, “The definition of ‘addiction’ is feeling driven to a behavior even though the person knows that it will damage her/his health or social life.” The poll then asked, “Do you think that you are addicted to food?” Twenty-nine percent ($n = 63$) chose, “I think I’m addicted to most foods,” 37% chose, “I’m addicted, but only to certain foods,” and 34% chose, “I don’t think I’m addicted to any foods.”

Another poll asked, “Do you have a problem with mainly one food?” and “If yes, type the food here.” Sixty-one percent of respondents ($n = 80$) voted “yes” and indicated that they had a problem with mainly one food; chocolate, fast food, chips, and candy were the most problematic foods (http://www.blubberbuster.com/poll/abused_foods_87.htm).

Pleasurable Sensations

The immediate pleasure of food sensations in the mouth—taste, texture, chewing, and swallowing—appeared to be the process by which the youth in the current study were hooked, rather than a delayed chemical response analogous to a drug. For example, bulimic posts described immediately purging foods eaten, yet still obtaining comfort from the foods and exhibiting dependence on the comfort eating behavior. Weight gain was ameliorated by purging. For instance:

when im in the house bored all day . . . and what do i end up doing?
BINGEING!! Honestly i must have consumed at least 5000 calories today
and i purged which im really mad about cos im in recovery for bulimia.
(female, age 17, 5’8”, 163 lbs)

Success Stories

Success stories characteristically depicted tolerating withdrawal-type symptoms (e.g., cravings and irritability) in order to lose weight. Typically, withdrawal symptoms subsided within two weeks, similar to withdrawal when coming off cigarettes or drugs, as noted in this comment: “if u can have enough self control and stay off the sugar for two weeks you stop craving sugar completely” (female, age 15, 5’10”, 209 lbs).

De-conditioning also was productive, as one teen related:

Eat a Big Mac while staring at a picture of a dirty toilet or having fried chicken while looking at cockroaches. I ended up having to do something similar to break my addiction. (And I'm down 30 pounds). (female, age 17, 5'8", 190 lbs)

Although qualitative, the sample messages of these results illustrate the anguish of these youth and the reasons for their weight loss failures and successes. Further, in a 3-choice poll asking, "Do you think that information on healthy eating helps you to lose weight?", 67% of respondents ($n = 96$) selected "No, I am overdosed on healthy eating information—I need info on how to resist cravings."

DISCUSSION

The teens and preteens in this study used food to cope with life. The pleasure of food soothed their unpleasant feelings, and the displacement activity of eating relieved their stress. However, they were unable to stop this comfort and stress eating, even when painfully overweight or obese because of it and even though aware of the results. Their posts expressed a loathing of being fat and an immense effort to resist urges to eat highly pleasurable foods, especially junk food and fast food, knowing that eating those foods would result in further weight gain. And, many noted that their eating was out of control. The following post typified this struggle: "does anybody have any info on how to resis the urge 2 eat, knowing that later on you'll regret . . . i need help bad!" (male, age 16, 5'6", 230 lbs).

What these children say points to a serious dependence on the pleasure and action of eating, comparable to dependencies on tobacco, alcohol, and even drugs, although less severe. This may comprise a significant component of the childhood obesity epidemic. In addition to the data satisfying *DSM-IV* addiction criteria, two examples further support this rationale:

I think I'm ADDICTED to FOOD . . . I TRY to eat RIGHT but I go CRAZY until I eat stuff that TASTES GOOD! I know I NEED to stop OVEReating, but I TRY my BEST to diet and CAN'T! . . . I try to TALK myself OUT of OVEReating but it DOESN'T work! (female, age 14, 5'0", 304 lbs)

I won't be hungry, but I will be, like, "Hmmm, I want chocolate," and I will eat it and then feel bad, but when I'm eating it, it's like I don't care. It's weird. (female, age 21, 5'7", 170 lbs)

Current Literature

To date, there is minimal clinical evidence for food addiction: a preliminary validation of a food addiction scale in 353 adults (Gearhart, Corbin, & Brownell, 2009) and a preliminary investigation of food addiction in 50 children (Merlo, Klingman, Malasanos, & Silverstein, 2009). The main evidence for food addiction comes from animal models, where sugary, fatty food consumption has been linked with behavioral signs of dependence (Avena & Hoebel, 2003; Colantuoni et al., 2002; Johnson & Kenny, 2010) and positron emission tomographic (PET) imaging studies in humans, which revealed reduced levels of dopamine receptors in the brains of obese individuals, similar to levels in the brains of drug-addicted individuals (Wang, Volkow, Thanos, & Fowler, 2004). Further, the reward value of both highly pleasurable foods and drugs of abuse is reduced by pharmacological blockage of dopamine receptors or by lesions of the dopaminergic system (Avena & Hoebel, 2003; Colantuoni et al., 2002). The opiate system of the brain is likewise involved in both drugs of abuse and pleasurable food reward, as opiate inhibitors, such as naloxone, which is used for treating heroin abuse, also reduce fondness for and consumption of sweet, high fat foods in both normal weight and obese binge eaters (Drewnowski, Krahn, Demitrack, Nairn, & Gosnell, 1995).

Although clinical evidence of food addiction is sparse, there are similarities between substance dependence and overeating, such as a loss of control and an inability to stop or cut down on consumption despite an expressed intention to do so (Gold, Frost-Pineda, & Jacobs, 2003). Moreover, similar to individuals with substance dependence, some obese individuals continue to eat unhealthy foods even in the face of severe negative consequences, such as diabetes, heart disease, and stigmatization (Volkow & O'Brien, 2007).

The observation that children in this study appear hooked on immediate food sensations is consistent with that of Volkow and Wang (2005). In contrast to drugs, which activate the reward system through direct pharmacological effects, pleasurable food activates the system through fast sensory signals, as well as slow processes, such as rising brain glucose.

Speculation Per Results of This Study

Initially, children overeat because “the food is there”—it simply tastes good. But once their brains realize that pain, stress, and boredom are eased by the pleasure of the food, this comfort eating behavior will be repeated, typically mindlessly. As children continue to eat to ease emotional distress, changes in their dopamine receptors insidiously take place in their brains. Once significant dopamine receptor changes have taken place, the children are unable to cease the comfort eating—they are addicted. Actual addictive tolerance may develop (e.g., “I feel like I’ve become immune to the foods that used

to comfort me.”). Thus, they eat larger amounts and higher pleasure-level foods to obtain the same degree of comfort.

The observation that the children in this study struggled to lose weight proportional to their BMI percentile suggests that dependence on the pleasure of food may be on a continuum: overweight children may be only partially dependent (addicted); obese children may be fully dependent (addicted); and morbidly obese children may be in addictive tolerance mode. Aversion to withdrawal symptoms (cravings, irritability, depression), along with continued comfort eating needs and the vicious cycle set up by this, maintains the addiction, manifested by weight loss failure and relapse.

In *The End of Overeating*, Kessler documents, “Foods today are much more hedonic than in the past . . . layered with sugar, salt, fat, and high-tech flavorings . . . hyperpalatable foods are much more the norm today” (Kessler, 2009). Foods today are thus much more comforting and much more addicting. High-tech, massive industrialization has rendered such hyperpalatable, addicting foods cheap and widely available (Snack Food Tech, 2007). Children have difficulty obtaining tobacco, alcohol, or drugs, but they have ready access to hyperpalatable foods. When bored, stressed, or depressed they may use such foods as a “drug of comfort,” which is more acceptable than tobacco, alcohol, and drugs of abuse.

Dependence on highly pleasurable foods exhibited by the children in this study appeared to develop from the pleasure of food easing stress and emotional pain (i.e., comfort eating). This observation contradicts Kessler’s claim that dependence develops from simple exposure to hyperpalatable foods. Further, “Studies in humans and animal models indicate that stress can lead to both vulnerability to develop addiction, and increased drug taking and relapse in addicted individuals” (Briand & Blendy, 2010, p. 219). Dopamine receptor changes would thus seem to constitute a neuro-behavioral callus to shield against further psychological pain and would not be expected to occur in the absence of pain. Food companies even market to this pain relief (e.g., “Comfort in Every Bar” is a candy bar slogan [Mars Corporation, 2006]).

In *Stress in America 2010* (American Psychological Association, 2010) findings ($n = 1,136$, ages 8–17) suggest substantial stress levels in children and a relationship between that stress and obesity. Children who are overweight are more likely to report that they worry a lot or a great deal about things in their lives than children who are normal weight (31% vs. 14%). Children who are overweight are more likely than children of normal weight to report eating too much or too little as a symptom of stress (48% vs. 16%) and to report eating to make themselves feel better when they are really worried or stressed about something (27% vs. 14%).

Accordingly, a perfect storm may be contributing to the childhood obesity epidemic: a) cheap, widely available, highly pleasurable foods, b) increased stress in children, and c) comfort eating, leading to dependence (addiction).

Weaknesses of This Study

The participants in this study comprise only a specific group—youth who were self-motivated to find the website and post messages—and, consequently, the results may not be generalized. Still, it would seem counterintuitive that youth who have not posted on the website would have a different cause for their overweight than those who have posted on the site.

The data of this study may be further challenged due to the qualitative nature. Even so, the data are vast, and the anonymity of the web-based data collection method facilitated remarkable, spontaneous candor, in contrast to typically subdued face-to-face quantitative research results.

Opposing View

Opponents contend, “Though the use of a substance abuse model to treat overeating could prove beneficial . . . unlike drugs and alcohol, food is necessary for life . . . and is not a substance from which children can simply abstain” (Pretlow, 2008, p. 476). Nonetheless, poll results in the current study revealed that 61% of respondents had a problem with mainly one food and essentially highly pleasurable foods. Thus, it appears that overweight children may be addicted to only certain foods, primarily highly pleasurable foods. Such foods are not necessary for life. It is feasible for children to abstain from them. Abstaining from any food, even such problem foods, may seem unreasonable. However, if children were allergic to those foods, they would need to avoid them forever. Avoiding addicting foods is comparable.

CONCLUSION

These results demonstrate that comfort eating and the resulting dependence on highly pleasurable foods, or food substances, may be a component of the childhood obesity epidemic. Nevertheless, no conclusions as to the prevalence of comfort eating and food addiction in children are possible from this research. It is hoped that these qualitative findings will stimulate research using quantitative methods, such as the Yale Food Addiction Scale (Gearhart et al., 2009), on the general population. The prevalence of addictive symptoms to certain foods in youth (e.g., eating in spite of anticipated negative consequences) may then be determined.

Given that childhood obesity interventions show marginal success rates with generally poor long-term results (Whitlock, O'Connor, Williams, Beil, & Lutz, 2010), and given that the impact of physical activity is in question (Metcalf et al., 2010), it may be sensible to add in substance dependence methods (addiction medicine) to weight management programs. Further,

the reasons that youth seek comfort in pleasurable foods (i.e., to alleviate sadness, stress, and boredom) and thereby may develop dependency, should be addressed. As one child concluded: “If parents took the time to actually listen to their kids . . . less kids would go to the fridge when they were depressed” (female, age 12, 5’3”, 186 lbs).

Youth in this study appear to be victims of boredom, stress, and depression in an addictive, comfort food environment. Accordingly, it may be prudent to limit exposure and access by children to highly pleasurable foods (e.g., sugar-sweetened beverages, junk food, and fast food). Taxation of sugar-sweetened beverages, and possibly junk food and fast food, and restriction of such outlets to children, would seem warranted and even embraced by some children: “OMG THIS WOULD HELP SO MUCH!! . . . i find myself at the deli buying candy behind my moms back ugh” (female, age 13, 5’0”, 128 lbs).

Acknowledging highly pleasurable food as an addictive substance for a segment of the pediatric population, and incorporating substance dependence methods in overweight intervention and prevention programs, may prove to be an important factor for control of the childhood obesity epidemic.

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