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Weight Change, Psychological Well-Being, and Vitality in Adults Participating in a Cognitive-Behavioral Weight Loss Program

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Abstract

Objective—Excess weight has been associated with numerous psychological problems, including depression and anxiety. This study examined the impact of intentional weight loss on the psychological well-being of adults participating in three clinical weight loss interventions.

Methods—This population consisted of 588 overweight or obese individuals randomized into one of three weight loss interventions of incremental intensity for twelve months. Psychological well-being was measured at baseline, six, and twelve months using the Psychological Well-Being Index.

Results—Mean weight loss was 5.0 pounds at twelve months. Weight change at twelve months was associated with higher overall psychological well-being ($r = -.20, p < .001$), lower levels of anxiety ($r = -.16, p = .001$) and depression ($r = -.13, p = .004$), and higher positive well being ($r = -.19, p < .001$), self control ($r = -.13, p = .004$), and vitality ($r = -.22, p < .001$). Vitality was found to be the best predictor of weight change at twelve months ($p < .001$).

Conclusions—Weight loss was associated with positive changes in psychological well-being. Increased vitality contributed the largest percentage of variance to this change.

Keywords

psychological well-being; weight loss; vitality; obesity

Obesity poses one of the greatest threats to the future of our public health, with over 400 million people worldwide estimated to be obese and 1.6 billion estimated to be overweight (World Health Organization, 2006). Weight loss, while strongly encouraged by health care

professionals, remains challenging to achieve and maintain for many living with excess weight. Though the multiple potential benefits of weight loss for obese individuals span medical, social and psychological domains, barriers to losing weight and maintaining reductions in weight remain for much of this population. Furthermore, many individuals living with significant excess weight encounter more health and psychosocial problems, as well as prejudice and discrimination, all of which can lower quality of life (Gregg & Williamson, 2002; Rand & Macgregor, 1990; Wadden, Womble, Stunkard, & Anderson, 2002).

The relationship between excess weight and dimensions of both quality of life (QoL) and health-related quality of life (HRQL) has been extensively examined (deZwann, et al, 2009; Han, Tjuijs, Lean, & Seidell, 1998). QoL and HRQL assessments typically measure multiple aspects of well being and functioning, including vitality, perceptions of general health, pain, social and physical functioning, impairment or disability, and mental health. Individuals with larger waist circumferences and higher Body Mass Indices (BMI) report lower quality of life and more impairment in completing tasks of everyday living (Han, Tjuijs, Lean, & Seidell, 1998). Middle-aged overweight and obese women (BMI > 25 kg/m²) describe lower levels of social functioning and vitality, as well as worse overall mental health, compared to women in the normal weight range (Brown, Dobson, & Mishra, 1998). Additionally, women who perceive themselves as overweight report lower levels of general health, vitality and physical functioning, and women with a history of frequent weight loss displayed notable reductions in scores on the mental health and emotional functioning areas of quality of life measures (Burns, Tjuijs, & Seidell, 2001). Obese individuals may also experience significant levels of chronic pain, particularly back and knee pain, which may reduce perceptions of quality of life (Barofsky, Fontaine, & Cheskin, 1997). As with other serious medical conditions, obesity has been associated with the presence of mental health problems, including depression and anxiety, in women (Carpenter, Hasin, Allison, & Faith, 2000; Jorm, et al., 2007). However, a recent study by de Zwann and colleagues (2009) found BMI to be a significant predictor of negative outcomes regarding the physical dimensions of HRQL (i.e., physical functioning and limitations, physical pain, general health) but not a predictor of negative psychological HRQL outcomes (i.e., social functioning, role limitations due to emotional problems).

Physically, weight change impacts multiple facets of health-related quality of life. A large prospective study found that women who gained weight over a four-year period demonstrated decreases in physical functioning and levels of vitality, and reported increased bodily pain (Fine et al., 1999). Conversely, weight loss can result in improvements in quality of life. Women from the same study who lost weight over the four-year period showed improvements in physical functioning and vitality, and decreases in amounts of bodily pain. Additionally, Fontaine and colleagues (1999) found significant increases in health-related quality of life scores following a 13-week weight loss treatment program, including gains in physical functioning, general health, vitality, and mental health. Smoller, Wadden and Stunkard (1987) reviewed the literature on the effects of dieting on mood and found that patients in behaviorally or medically-oriented treatments reported improvements in mood, while obese patients in psychiatric care reliably reported negative changes in mood. Weight

loss in individuals living with morbid obesity is associated with reductions in levels of depression (Dixon, Dixon & O'Brien, 2003).

HRQL and well-being instruments assess a wide range of quality of life traits, including daily functioning, general health, mental health and notably, vitality, which is defined as, "the specific psychological experience of possessing enthusiasm and spirit" (Ryan & Frederick, 1997, p. 530). Peterson and Seligman (2004) found vitality to have principal components of zest, enthusiasm, vigor, and energy. Structural equation modeling found vitality to measure the subjective feeling of being alive and alert (Bostic, Rubio, & Hood, 2000). Self-determination theory predicts that autonomous motivation would enhance subjective vitality relative to motivation by external control (Nix, Ryan, Manly, & Deci, 1999; Ryan & Deci, 2008). While increases in overall scores on HRQL measures are documented frequently in the literature following weight loss, it is unclear which aspect or aspects of HRQL are responsible for this overall change (i.e., mental health, general health, vitality).

In this study, we sought to examine the efficacy of a weight loss intervention on BMI, behavioral change (i.e., calorie intake, exercise levels), cardiovascular risk factors, perceived obstacles to behavior change, and mental health. In this paper, we examined the impact of these interventions on psychological well-being in a cohort of overweight and obese participants. We examined which aspect or aspects of well-being drove improvements in well-being scores in accordance with weight change. Specifically, we hypothesized that reductions in weight would be associated with increases in overall psychological well-being, vitality and general health. Furthermore, in accordance with previous research, we hypothesized that reductions in weight would be associated with lower levels of depression. Finally, we sought to determine if weight change would be associated with changes in levels of anxiety and perceptions of self-control.

Method

Participants

One thousand five hundred and sixty individuals were recruited from a freestanding Health Maintenance Organization (HMO) located on the campus of a major medical center and from the general population. Study inclusion criteria included a Body Mass Index (BMI) over 25 kg/mg² or a BMI of 24 or more with at least one cardiovascular risk factor, and an understanding and desire to comply with study protocol. Individuals with BMI of 24 with other health issues were included because of the potential benefits of weight loss on various cardiovascular risk factors. These risk factors were assessed as part of this study, though not included in the present analysis. A refundable deposit of \$100 was required and was intended to aid in participant engagement. Study exclusion criteria included medical conditions that could interfere with participation, intention to move in the next twelve months, and/or not agreeing to follow study protocol. Following group orientation sessions, individuals who agreed to participate (n=919) provided informed consent and were further scheduled for computer orientation sessions. Seven hundred and twenty-two participants completed baseline computerized questionnaires and 588 participants were randomized into one of three intervention groups. Final data were collected in 1998 and spanned a 12-month

period as several waves were completed. This study is not a basic presentation of the clinical trial, but we present a CONSORT-like diagram of enrollment and patient flow (Figure 1).

The Albert Einstein Committee on Clinical Investigations approved the study methodology and access to the study database for the current analysis (#2008-833). Additionally, all participants signed an informed consent approved by the Committee prior to inclusion in this study.

Materials and Procedure

Participants were randomly assigned to one of three intervention groups of different intensities for twelve months. Using a cognitive behavioral approach for tailoring lifestyle modification goals, the incremental levels of intervention included a workbook alone ($n=116$), the addition of computerized tailoring using computer kiosks ($n=236$), and the addition of both computers and staff counseling ($n=236$). The workbook intervention was created for use in this study as an individual program consisting of self-help sheets and guided participants to sections most relevant to their weight-loss goals. The computer intervention consisted of touch screen computer kiosks at the study site that provided nutritional, physical activity and behavioral information based on each participant's tailored weight-loss goals, readiness to change, knowledge, and behaviors.

Three paths of the computer intervention covered fitness, nutritional and psychobehavioral aspects of weight loss. The five computer kiosks were fitted with touch screens and were located in the medical subspecialty waiting room of the HMO. Participants were quizzed about knowledge and behavior in nutrition, activity, and psychobehavioral realms and prescribed three activities to work on in the next week. When participants next visited, they were first asked how they had done on their homework and then proceeded with further evaluation and prescription for the following week. Each path was comprised of guidance in regards to weight loss, in various forms, including text, animation, graphics, interactive quizzes and video clips. During the first three months of the intervention, participants were instructed to use kiosks weekly to help identify problem areas and set goals. After three months, participants were asked to utilize kiosks monthly. Average kiosk sessions lasted between 20 and 30 minutes, though participants were free to use the kiosk for as long as desired. Staff consultation consisted of six group weight-related treatment sessions lead by a registered dietician and/or a cognitive-behavioral therapist, as well as up to 18 telephone or face-to-face consultations. Group treatment sessions focused on completing activities and assignments from the workbook, as well as encouraging participants to use the computer kiosks to overcome obstacles and help solve any weight-loss related problems. Detailed information regarding these interventions was previously reported (Wylie-Rosett, et al., 2001).

Weight-loss goals for all groups were based on the Transtheoretical Model of Change and included 289 possible goals (Prochaska, 1994). This model determines an individual's readiness to implement a novel health-related behavior and provides strategies to guide the individual through various stages of change to action (overt changes from a less adaptive behavior to a healthier behavior) and maintenance (actions taken to prevent relapse to the maladaptive behavior). Each participant selected goals related to their stage of readiness

(pre-action, action, or maintenance) and behavioral interventions were then selected based on each participant's stage and intervention level. Behavioral interventions and targets included fitness, nutrition, and psycho-behavioral options. Goals were regularly revisited and tailored by the participants throughout the twelve months.

Weight and Physical Activity—Body weight and height were measured at baseline and weight was measured again every three months. Weights were obtained with participants wearing clothing but no shoes on a balance beam scale. Waist and hip circumference were also obtained using a tape measure. Body Mass Index (BMI) was calculated using weight and height. Weight changes were calculated as current weight at six and twelve months minus baseline. Possible covariates such as education level or baseline weight were not removed.

Physical activity was measured at baseline and one year using the Paffenbarger Physical Activity Questionnaire, an eight-item measure assessing daily stairs climbed, distance walked in blocks, and sports and recreational activities (Paffenbarger, Wing & Hyde, 1978). From this data, intensity of weekly energy expenditure was calculated in Metabolic Equivalent Tasks (METs) using a scoring system created by measure developers.

Psychological Well-being—Psychological well-being was measured at baseline, six months and twelve months using the Psychological Well-Being Index, a 22-item, health-related quality of life self-reported questionnaire with ratings of 0–5 for each item (Dupuy, 1984). The Psychological Well-Being Index provides an overall well-being score (highest score is 110 representing maximum well-being), as well as subscales measuring levels of anxiety, depression, self-control, general health, positive well-being, self-control, and vitality. The Index measures self-representations of affective and emotional states that reflect a spectrum of well-being to subjective levels of distress. The depressed mood scale measures feeling “blue,” hopeless or downhearted. The anxiety subscale assesses feelings of nervousness, tension and heavy pressure, and the positive well-being scale assesses the state of an individual's spirits, happiness in daily living and cheerfulness. The self-control scale measures emotional stability and fears of losing control of one's behaviors, thoughts and emotions. The general health scale assesses concerns regarding illness and functioning in regards to health. Finally, the vitality scale asks four questions about the past month: “How much energy, pep, or vitality did you have or feel,” “I woke up feeling fresh and rested,” “Did you feel active, vigorous, or dull, sluggish,” and “I felt tired, worn out, used up, or exhausted.” The Psychological-Well Being Index has been utilized in a variety of populations and shows adequate validity and reliability (Dupuy, 1984; Rose, et al., 2006).

Data Analysis

Statistical analyses were performed using SPSS 17.0 for Mac. One-way analysis of variance was employed to compare weight loss between intervention groups at six months and twelve months. Comparisons of demographic factors on weight and well-being outcomes were examined using ANOVA, chi-square and t-test analyses. One sample *t*-tests were employed to examine baseline psychological well-being data with published norms. Regression analyses and correlations were used to analyze the relationship between weight change and

psychological well-being. Multiple regression analyses were performed to further explore the relationship between psychological well-being and weight change. Significance levels were set at $p = .01$ to account for multiple tests.

Results

Demographics—Baseline demographic information and weights of the 588 randomized participants who met study criteria are listed in Table 1. Baseline weights and BMI did not differ significantly across treatment groups, $F(2, 585) = 2.27, p = .10$ and $F(2, 585) = 2.39, p = .09$, respectively. The majority of study participants were female (82.3%) and Caucasian (83.0%). The mean age of participants was 52.2 years ($SD=11.7$) and one-third of participants reported obtaining graduate-level degrees (33.8%).

Of the 588 participants, approximately 80 percent completed the study, with dropout rates of 16 percent in the workbook group, 22 percent in the computer/workbook group, and 17 percent in the computer/workbook/staff counseling group. Participants who dropped out of the study did not have significantly different baseline BMI compared to those who completed the study $t(586) = -.90, p = .37$ nor did they differ in baseline weight $t(586) = -1.1, p = .27$. Completers did not differ in gender $X^2(1, N = 588) = .00, p = .99$, marital status $X^2(3, N = 588) = 2.8, p = .42$, education level $X^2(4, N = 588) = 5.6, p = .23$, or race/ethnicity $X^2(4, N = 580) = 7.23, p = .12$, compared to those who did not complete the study, but were older $t(586) = 6.0, p < .001$. Completers did not differ in baseline psychological well-being variables compared to non-completers (anxiety $p = .09$, depression $p = .09$, positive well-being $p = .26$, self-control $p = .16$, general health $p = .54$, vitality $p = .69$, or total well-being $p = .22$).

Total psychological well-being scores, as well as subscale scores at baseline, six and twelve months, are provided in Table 2. Our sample exhibited lower vitality scores at baseline compared to Swedish population data of vitality subscale scores of psychological well-being index (Swedish $M = 17.2$, adjusted scale $M = 13.2, t[586] = -9.13, p < .001$), but similar levels of depression (Swedish $M = 15.5$, adjusted scale $M = 12.5, t[586] = -1.07, p = .29$)ⁱ (Dimenas, Carlsson, Glise, Israelsson & Wiklund, 1996). Mean overall well-being, anxiety, depression, and positive well-being did not differ from baseline at one year (overall $t[462] = 1.45, p = .15$, anxiety $t[461] = 2.23, p = .03$, depression $t[461] = .57, p = .57$, positive well-being $t[462] = .27, p = .79$). Self-control and general health were significantly lower at one year from baseline ($t[461] = 2.78, p = .006$ and $t[462] = 3.70, p < .001$, respectively). Vitality significantly increased from baseline to one year, $t(461) = -2.95, p = .003$.

Mean Body Mass Index (BMI) at baseline was 35.6 kg/mg^2 ($SD=6.54$). At baseline, BMI was inversely associated with overall psychological well-being ($r = -.16, p < .001$). BMI at baseline negatively correlated with baseline vitality ($r = -.26, p < .001$) and general health ($r = -.32, p < .001$). BMI was not associated with baseline depression ($p = -.06$), anxiety ($p = -.03$), self-control ($p = -.02$) or positive well-being ($p = -.07$).

ⁱNormative data was collected using an alternate Likert scale for index items, so subscale means have been adjusted to reflect current Likert scale recommendations for this measure.

Weight Change—Mean weight loss overall across groups at six months was 5.1 lbs ($SD = 11.4$) and 5.0 lbs ($SD = 15.1$) at twelve months. Mean weight loss at twelve months for each group in increasing order of intensity of intervention level was approximately two, four and seven pounds, and was previously reported (Wylie-Rosett, et al., 2001). The project was conceived as a public health intervention. An expert computer-only intervention could be administered to hundreds of thousands of participants at minimal cost. Weight loss of five pounds in 100,000 overweight and obese people would have more impact on population health than weight loss of 20 pounds in 100 people. All of the intervention groups lost a significant amount of weight from baseline. No significant differences in weight change at six or twelve months were found between individuals of different races/ethnicities (six months $F[4, 461] = .345, p = .85$, twelve months $F[4, 462] = .80, p = .52$), or between male and female participants (six months $t[471] = .50, p = .62$, twelve months $t[473] = -.48, p = .63$).

Psychological Well-Being and Weight Change Across Groups—Weight change across groups was associated with higher psychological well-being scores and correlations are listed in Table 3. Weight loss across intervention groups at six months was not correlated with higher overall psychological well-being ($r = -.12, p > .01$). Weight loss at six months was not significantly associated with anxiety or depression, or with positive well-being, general health, vitality, or self-control as measured by the subscales of the Psychological Well-Being Index ($p > .01$).

One-way ANOVA found no significant differences between the three intervention groups on psychological well-being outcomes at six months (anxiety $p = .62$, depression $p = .61$, positive well-being $p = .67$, self-control $p = .73$, general health $p = .91$, vitality $p = .73$, total well-being $p = .81$). Additionally, no significant differences in well-being were found between intervention groups at twelve months (anxiety $p = .53$, depression $p = .32$, positive well-being $p = .39$, self-control $p = .11$, general health $p = .83$, vitality $p = .35$, total well-being $p = .29$). No differences between participants of different races/ethnicities or by gender in mean psychological well-being outcome scores (total and subscales) following the weight loss intervention at six or twelve months were observed ($p > .01$).

Weight change across treatment groups at twelve months was associated with higher overall psychological well-being ($r = -.20, p < .001$). Weight change at twelve months was correlated with lower levels of anxiety ($r = -.16, p = .001$) and depression ($r = -.13, p = .004$), and higher positive well-being ($r = -.19, p < .001$), self control ($r = -.13, p < .004$), and vitality ($r = -.22, p < .001$). General health was not correlated with weight change at one year ($r = -.10, p = .03$). Baseline overall psychological well-being, as well as baseline anxiety, depression, positive well-being, self-control, and vitality, did not correlate with weight change at six or twelve months ($p > .01$). Baseline general health was associated with weight change at six months ($r = .12, p = .007$) but not at twelve months ($r = .07, p = .15$).

Multiple regression analyses were performed to determine which of the psychological well-being components was best predicted by weight change in these groups (Table 4). Multicollinearity and autocorrelation ($d = 2.1$) were tested and acceptable. Vitality was found to be the best predictor of weight change at twelve months. Furthermore, vitality

scores at six months into the weight change interventions predicted weight at twelve months ($b = -.21$, $t(301) = -3.75$, $p < .001$) and also explained a significant proportion of the variance in weight at twelve months ($R^2 = .045$, $F(1, 301) = 14.1$, $p < .001$). Weight change at six months correlated with change in vitality at six months ($r = -.20$, $p < .001$) and weight change at one year correlated with change in vitality at one year ($r = -.25$, $p < .001$).

At baseline, weight did not significantly correlate with physical activity ($r = .02$, $p = .67$). Physical activity was associated with levels of vitality at baseline ($r = .12$, $p = .004$) but not at one year ($r = .05$, $p = .23$). Physical activity at one year was not significantly associated with weight change at one year ($r = -.02$, $p = .71$). Physical activity at baseline was not related to vitality at six or twelve months ($r = .10$, $p = .08$ and $r = .10$, $p = .03$, respectively). Physical activity at baseline was not related to vitality at six or twelve months.

Discussion

Reductions in weight following a cognitive-behavioral weight loss intervention were associated with improvements in overall well-being, depression, anxiety, and ratings of self-control, vitality and positive well-being. These findings are consistent with previous studies on the impact of weight change on various quality of life factors (Fontaine, et al., 1999). Changes in weight were associated with changes in the above mentioned psychological well-being outcomes regardless of weight-loss intervention intensity. Further, lower levels of vitality at six months predicted less weight loss at twelve months. Multiple regression analyses suggested that vitality was the strongest predictor of weight change in our sample. Finally, vitality at six months predicted weight change at twelve months.

Participants either self-identified as overweight or obese, or were told by their physicians that their health would improve if they lost weight. The more weight that participants lost, the better their improvement in psychopathology, vitality, self-control, positive well-being and overall psychological well-being. Self-identification as overweight or obese may be related to negative emotions, which improve as weight is lost. Further, we conclude that the driving factor in this process is feelings of vitality.

The importance of vitality in improvements in psychological well-being and weight change as demonstrated by multiple regression is noteworthy and deserves further exploration. Overweight people who voluntarily lose weight may be exercising self-control, which also was associated with weight loss in our study. Exercising self-control for autonomous reasons led to enhanced feelings of subjective vitality, which may help replenish lost ego-strength, and in turn lead to better self-control performance subsequently (Muraven, Gagne, & Rosman, 2008). The connection between weight loss and self-control seems logical, but has not been developed. Self-control might directly increase vitality, or only operate through observed weight loss, or both.

Numerous experimental and field studies show that vitality is enhanced by activities that satisfy basic psychological needs for relatedness, competence, and autonomy (Ryan & Deci, 2008). Vitality has been related to a decreased risk of coronary heart disease (Kubzansky & Thurston, 2007). Vitality in this study measured levels of energy, vigor and activity, but was

not associated with actual energy expenditure through exercise. Participants who reported higher levels of vitality may have felt more motivated to make behavioral changes, and more able to achieve weight loss goals. Feeling psychologically and emotionally able to change may be related to subjective levels of autonomy, which has been shown to be one of the strongest predictors of weight loss and weight maintenance (Williams, Grow, Freedman, Ryan & Deci, 1996).

All participants, regardless of weight loss intervention received, showed comparable gains in vitality only when associated with weight change. This suggests that participating in a weight loss program of little intensity or high intensity was not associated with gains in well-being in this cohort. Additionally, changes in overall well-being, as well as depression, anxiety, and positive well-being, did not change significantly from baseline as a function of time or trial participation. Therefore, these findings suggest that participation in a weight loss intervention alone did not promote positive changes in these aspects of psychological well-being; rather, improvements in vitality were primarily present when accompanied by weight change. Weight loss from baseline to twelve months was significant, but modest. Just as fairly small reductions in weight can improve physical health (Rose, 2001; Van Gaal, Wauters & De Leeuw, 1997; Wing, et al., 2011), our findings suggest that modest weight change is also associated with improvements in vitality. Even though self control and general health declined slightly over twelve months, they did improve in people who lost weight.

Numerous studies have recently shown that vital exhaustion, the reverse of vitality, is a key component in prognosis and quality of life in coronary heart disease (Appels, et al., 2006; Gulickson, et al., 2007; Skodova, et al., 2008). Our sample showed lower baseline vitality than published norms. It is possible that the decrease in vitality obese people feel with their condition is a precursor to the increase in vital exhaustion patients with coronary heart disease feel. Conversely, the increase in vitality obese people feel with weight loss may be a harbinger of their improved health status on both psychological and physical levels.

An important limitation of this study is that all measures of well-being were self-reported. Self-reported data are subject to biases and inaccuracies, which may impact study findings. Additionally, the majority of participants in this study were female and Caucasian, and may not be representative of the greater overweight or obese population. Therefore, generalization of these findings should be conducted with caution. Computers utilized in this intervention are likely to be outdated given the pace of technological advancement as well as the long duration between data collection and analysis. However, the application of computers and technology to deliver tailored interventions continues to be an effective and increasingly popular strategy for weight management (Neve, Morgan, Jones & Collins, 2010; Pelligrini, et al., 2012; Reed, et al., 2012; Tate, Jackvony & Wing, 2006). A systematic review of clinical trials and meta-analysis of computer interventions in obesity found 11 randomized trials and 13 comparisons, including ours (Reed, et al., 2012). Techniques included use of a website, computer program, or PDA diary compared to a paper diary for self-monitoring, information delivered via computer compared to that delivered in a classroom, and email counseling. Reed, et al. concluded that adding a computer intervention to a standard weight-loss intervention caused significantly more weight loss

than the standard intervention alone; but substituting a computer intervention for a standard intervention led to no difference or less weight loss than the standard intervention alone. This is what we found (Wylie-Rosett, et al., 2001).

The greatest change in expert computer intervention in weight loss since we collected our data is the advent of web-based programs. Neve, et al., (2010) did a systematic review of web-based interventions with meta-analysis. They found thirteen studies on weight loss and five on weight maintenance. Seven studies were assessed for effectiveness based on percentage weight change, with four found effective. Due to heterogeneity of designs and small number of comparable studies, they found that frequency of use predicted weight change, but that other elements could not be assessed for their effects on beneficial weight change or attrition. It seems likely that if our study were repeated today we would use web delivery techniques, but that other technology would not change the program.

The Vitality Scale consists of four questions with six response choices each, or a possible range from 0 to 24. The change in vitality we see from baseline to twelve months from 11.8 (3.8) to 12.3 (3.4) is in the middle of the range, is about a half response choice change on one item, and represents a z-score of 0.135. This is not of impressive clinical significance on its face, however the evidence that change in vitality is a driving force in weight loss may mean that small change in vitality may have outsize benefits in motivating people to lose weight. Helping clients to pay attention to feelings of energy, pep, waking feeling fresh, rested, feeling active and vigorous versus dull, sluggish, tired, worn-out, and used up may be an element of weight loss motivation that has been ignored.

The findings of this study further support previously reported evidence that weight change is associated with positive changes in psychological well-being. However, the finding that vitality is key to weight change has implications for health care professionals treating individuals for excess weight. The mechanism may be an increased feeling of self-control. We hypothesized that increased feelings of vitality may boost the ability for future self-control, forming a positive feedback loop for purposeful weight loss. The correlations of weight change and improvements in both vitality and self-control support this possible mechanism.

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Figure 1.
Participant Recruitment and Flow through a One-Year Weight Loss Intervention Trial

Table 1

Baseline Demographic Characteristics of a Weight Loss Intervention Cohort (N=588)

	Percentage	n	Mean (SD)
<i>Age (years)</i>			52.2 (SD=11.7)
<i>Gender</i>			
Female	82.3%	484	
Male	17.7%	104	
<i>Race/Ethnicity</i>			
White/Caucasian	83.0%	488	
Black	11.1%	65	
Hispanic/Latino	2.7%	16	
Asian	1.2%	7	
Other	2.0%	12	
<i>Marital Status</i>			
Married	67.5%	397	
Single	15.5%	91	
Divorced	10.9%	64	
Widowed	6.1%	36	
<i>Education (Highest Level Completed)</i>			
Grades 10–11	0.5%	3	
High School Diploma	15.5%	91	
Some College	24.3%	143	
College Degree	25.9%	152	
Graduate Degree	33.8%	199	
<i>Baseline Body Mass Index (BMI kg/mg²)</i>			35.6 (SD=6.54)
BMI < 25 + 1 cardiovascular risk	<1%	9	
BMI 25	99%	579	
BMI 25 – 29.9	19%	111	
BMI 30 – 34.9	33%	192	
BMI 35 – 39.9	25%	145	
BMI 40 – 44.9	12%	68	
BMI 45+	11%	63	
<i>Weight</i>			
Baseline (n=588)			214.1 lbs (SD=44.4)
Six months (n=473)			207.1 lbs (SD=43.7)
Twelve months (n=475)			207.9 lbs (SD=45.1)

Table 2

Psychological Measures at Baseline, Six Months and Twelve Months as Measured by the Psychological Well-Being Index *

	Baseline (n=587)	Six Months (n=341)	Twelve Months (n=463)
Anxiety	17.4 (4.2)	16.2 (4.9)	17.1 (4.5)
Depression	12.4 (2.5)	12.0 (2.8)	12.4 (2.3)
Positive Well-Being	12.1 (3.6)	11.7 (3.8)	12.2 (3.8)
Self-Control	12.4 (2.4)	11.5 (2.7)	12.1 (2.4) **
General Health	10.6 (2.7)	10.2 (2.8)	10.1 (2.9) **
Vitality	11.8 (3.8)	11.8 (3.9)	12.3 (3.4) **
Total Well Being	76.7 (15.0)	73.2 (17.6)	76.1 (16.1)

* Higher scores indicate positive outcomes

** Indicates significant change from baseline at the $p < .01$ level

Table 3

Correlations of Weight Change and Psychological Well-being as Measured by the Psychological Well-Being Index at Six and Twelve Months (Dupuy, 1984)

	Correlation	Significance
Six Months (n=341)		
Overall Psychological Well-Being	$r = -.12$	$p = .03$
Anxiety	$r = -.09$	$p = .09$
Depression	$r = -.11$	$p = .05$
Positive Well-Being	$r = -.12$	$p = .03$
Self-Control	$r = -.09$	$p = .09$
General Health	$r = -.04$	$p = .45$
Vitality	$r = -.12$	$p = .03$
Twelve Months (n=462)		
Overall Psychological Well-Being	$r = -.20$	$p < .001^*$
Anxiety	$r = -.16$	$p = .001^*$
Depression	$r = -.13$	$p = .004^*$
Positive Well-Being	$r = -.19$	$p < .001^*$
Self-Control	$r = -.13$	$p = .004^*$
General Health	$r = -.10$	$p = .03$
Vitality	$r = -.22$	$p < .001^*$

* Indicates significance at the $p < .01$ level; weight change is scored in a negative direction and psychological health in a positive direction

Table 4

Multiple Regression of Psychological Well-being and Weight Change at One Year in a Randomized Weight Loss Trial Cohort (n=462)

	b	SE b	β	R²
<i>Step 1</i>				.025
Constant	3.90	2.75		
Anxiety	-.53	.16	-.157*	
<i>Step 2</i>				.026
Constant	6.21	3.75		
Anxiety	-.41	.21	-.121	
Depression	-.35	.39	-.055	
<i>Step 3</i>				.039
Constant	4.06	3.83		
Anxiety	-.25	.21	-.074	
Depression	.30	.47	.047	
Positive Well-Being	-.71	.29	-.177	
<i>Step 4</i>				.039
Constant	4.68	4.25		
Anxiety	-.23	.22	-.067	
Depression	.34	.49	.052	
Positive Well-Being	-.69	.30	-.172	
Self-Control	-.14	.40	-.022	
<i>Step 5</i>				.052
Constant	5.37	4.23		
Anxiety	-.14	.22	-.043	
Depression	.46	.48	.071	
Positive Well-Being	-.36	.33	-.089	
Self-Control	-.11	.40	-.017	
Vitality	-.66	.26	-.17*	

* Indicates significance at the $p = .01$ level