

Happiness Factors in Weight Loss Maintenance

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Abstract

Maintaining weight loss long-term is a difficult challenge for most people. Weight loss is often temporary and results in progressive weight regain. Previous research has focused on extension of weight loss methods and behavioral changes through the weight loss maintenance period without specific attention to skills specific to the maintenance phase. Further, emotional health has largely gone untested for how positive psychology influences successful long-term weight loss. We employed quantitative methodologies with a descriptive design, using individuals who self-attested to losing over 5% of their highest body weight and the Adult Hope Scale to measure participants' perceptions of their positive motivational state in weight loss maintenance. Calculations of frequencies and percentages, including median and interquartile range where appropriate, were conducted and figures and tables were used to compare demographic statistics. The findings showed that participants scored high on levels of agency (i.e., goal-setting skills) and pathway (i.e., implementation skills) scores with high overall hope scores in relation to their successful long-term weight loss. The findings indicate potential key skills to weight loss maintenance, with positive emotional health skills being indicated as potential healthy markers for positive weight regulation long-term.

Keywords: Behavioral counseling, obesity treatment, positive psychology, weight loss, weight loss maintenance

Maintaining weight loss is a difficult challenge for most people, with reports of 95% of individuals who successfully lose weight being ultimately unsuccessful at keeping the weight off long-term (Church et al., 2018; Foright et al., 2018). Less than one-fifth of individuals who achieve a 10% reduction in body weight successfully maintain it after one year (Church et al., 2018; Foright et al., 2018). Research has shown that short-term weight loss can be achieved, yet 80% of individuals will regain weight after one year and 95% after three years (Spreckley et al., 2021). Paixão et al. (2020) stated that a significant challenge in obesity treatment is the maintenance of successful weight loss, despite maintaining weight loss is essential for health benefits. Despite research on the physiological aspects of weight loss, research has offered mixed rationales for why successful long-term weight loss is difficult for most people. The process of weight loss maintenance is poorly understood, with the impact of behavioral, psychological, and physical factors incomplete for a successful determination of guideline recommendations (Paixão et al., 2020). There have been a wide variety of recommendations for people to implement for long-term, successful weight loss maintenance that do not appear to be effective (Paixão et al., 2020; Spreckley et al., 2021).

Successful weight loss maintenance does not have an agreed upon definition within the research, because there are several different metrics being used to discuss the maintenance period of weight loss. The different metrics include: the amount of weight that needs to be initially lost varies from 5 to 10% or more, various starting weights and body mass indexes (BMI), varying weight loss interventions, and different weight loss maintenance time frames, all of which spoil literature comparison (Foright et al., 2018; Ramage et al., 2014). Successful weight loss itself has no agreed upon definition, as some demand no weight regain after weight loss interventions, while others define maintenance as successful, as long as the amount of weight regained is less than the control group, or less than the highest weight the individual has ever weighed (Voils et al., 2017). The variances in weight loss maintenance

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definitions create challenges for clinicians and providers to determine what clinical considerations to advise their patients, with little consensus within the literature about standards and expectations for maintenance.

The importance of maintaining a healthy body weight is well supported in scientific research. There are multiple factors that play key parts in rising obesity rates, including insulin resistance, epigenetics, and environmental lifestyle drivers (Caballero, 2019). Obesity increases the risks of developing cardiovascular diseases and diminishes quality of life, while increasing early mortality (Frank et al., 2019). The importance of psychological interventions, such as implementing cognitive behavioral therapy (CBT) techniques to address food cravings and subjective power over food, is supported in the research, leading to positive weight loss results, including long-term weight loss maintenance (Beck, 2008). CBT breaks down human decision-making skills into three parts: cognitive processes, behaviors, and emotions. Many weight loss programs and research only focus on cognitive and behavioral interventions (Beck, 2008). How does emotional health play into successful long-term weight loss? There may be potentially important missing links in traditional weight loss programs by addressing emotional health (Church et al., 2018).

Literature Review

While behavioral training and psychological modifications are key components to long-term successful weight loss maintenance, it is lesser known how elements of positive psychology (i.e., the science of human flourishing and happiness) affect maintaining weight loss (Ramage et al., 2014; Varkevisser et al., 2019). Research in positive psychology found self-efficacy, an individual's belief in their abilities to modify behaviors to achieve desired goals, was a strongly supported positive predictive indicator for successful long-term weight loss maintenance (Kasila et al., 2020; Ross et al., 2019; Spreckley et al., 2021; Varkevisser et al., 2019). Individuals who value having an internal locus of control over their weight loss maintenance plan and/or intervention found having a sense of self-efficacy and autonomy made long-term weight loss feel possible and within their control, even during difficult external circumstances (Ross et al., 2019; VanderWeele, 2017).

Developing self-efficacy is consistent with self-regulation theory, rooted in the ability to manage impulse control to change cognitive patterns from instant gratification to delayed satisfaction (Lisle & Goldhamer, 2003; Ross et al., 2019; Teixeira & Marques, 2018). Weight loss maintenance is a long-term intervention, thus the need to develop delayed satisfaction is an essential element for success. The belief that individuals can change their thoughts and feelings results in the development of positive regard, autonomy, self-efficacy, and resilience, of which lead effective and successful long-term weight loss (Beck, 2008; Kasila et al., 2020; Ross et al., 2019). Without the ability to be able to self-monitor and make necessary changes, there is consensus within the research that weight loss maintenance is unlikely (Ross et al., 2019; Spreckley et al. 2021).

Self-monitoring emerges as an essential factor in self-efficacy in the research on successful weight loss maintenance. People's ability to be able to monitor their progress, such as through weekly weigh-ins, daily food tracking, exercise/activity logs, were critical to long-term weight loss (Beck, 2008; Ramage et al., 2014; Voils et al. 2017). Cognitive and affect modifications can lead to individual's developing self-efficacy, developing resistance to unhealthy behaviors, taking credit for successes, and healthy distraction techniques for building resiliency (Beck, 2008; Ross et al., 2019). Similarly, behaviors are considered autonomous when they are generated intrinsically within an individual and self-regulated (Cosme & Berkman, 2020; VanderWeele, 2017). Control of circumstances or external events is not necessary for autonomy. Rather, developing an internal locus of control is necessary to an individual's autonomy (Cosme & Berkman, 2020; VanderWeele, 2017).

Positive psychology research has found that happiness appears to be a significant trait in goal achievement, trumping intellectual ability and competence (Celano et al., 2020; Trudel-Fitzgerald et al., 2019). Researchers (Dhal et al., 2020; Lisle & Goldhamer, 2003) found a positive correlation between intrinsic motivation, having the self-perception of being in control of one's pursuits, as a necessary component of both behavioral change and happiness. However, research has not yet linked them together as values essential to weight loss maintenance. The use of various methodologies, assumptions, and instrumentation tools within the existing literature leave challenges in data analysis comparison and gaps within the research, because metrics do not address the connection between weight loss maintenance and happiness. Depression versus happiness is more frequently documented in research, due to the existence of valid and reliable depression measurement scales, whereas similar happiness scales are present with

far fewer frequency in the research (Church et al., 2018; Dragun et al., 2020; Payne et al., 2019; VanderWeele, 2017). There is a limited understanding of emotional well-being and successful weight loss maintenance, resulting in a need for further investigation.

While CBT has been important over the past 60 years in helping people learn the benefits of cognitive reframing, looking specifically at emotional health is relatively new in the field of weight loss maintenance, resulting in a delay in research that connects successful weight loss maintenance with emotional well-being (Beck, 2008; Church et al., 2018). Moreover, positive psychology is a newer field that has yet to connect the two variables of interest, happiness, and weight loss maintenance, in the research (Herlambang et al., 2021; Whillans et al., 2019). Happiness is a notoriously subjective and nebulous variable to study, leading to difficulties in defining it within the research and participant's abilities to communicate their own internal feelings of what they believe happiness to be (Węziak-Białowska et al., 2019).

Subsequently, happiness has then been broken down into more tangible components, such as self-efficacy, resilience, autonomy, and intrinsic motivation (Herlambang et al., 2021; VanderWeele, 2017; Whillans et al., 2019). Health is a noticeably absent value on the list of aspects of human happiness and flourishing (VanderWeele, 2017). In order to establish this connection between happiness and health, research needs to be completed on the relationship between these two variables. Further, of the many aspects of human flourishing that lead to overall life satisfaction and well-being, which ones directly relate to health and weight loss maintenance? The ability of an individual to choose these values in order to develop their own sense of happiness and flourishing has been shown to be effective in weight loss maintenance studies, but the cognitive processes are unknown on how individuals undertake making these selections.

Without a better understanding of the principles of emotional well-being tied to weight loss maintenance, patients are at risk for weight regain, which research shows has a high rate of occurrence (Church et al., 2018; Foright et al., 2018). While psychological changes have been researched in weight loss interventions, the maintenance phase is typically seen as a continuance of the changes learned during the intervention phase (Beck, 2008; Church et al., 2018; Voils et al., 2017). Rather, if specific interventions were applied during the weight loss maintenance phase, such as happiness-informed interventions, individuals could have higher rates of successfully maintaining weight loss versus care as usual (Church et al., 2018; Voils et al., 2017). Relapse prevention skills, including self-monitoring and self-efficacy to implement learned behavioral skills, were essential in achieving long-term weight loss goals (Church et al., 2018; Voils et al., 2017). A key component to human happiness is self-efficacy, so happiness appears to be an essential part of weight loss maintenance, but to the knowledge of the researchers, no study has been done to specifically study these variables of interest.

Maintaining a healthy weight long-term has many advantages. Obesity prevalence in the United States was 41.9% through 2017 – 2020, increasing from 30.5% in 1990 (Centers for Disease Control and Prevention [CDC], 2022). Obesity increases the risks of developing cardiovascular diseases and diminishes quality of life, while increasing early mortality (Frank et al., 2019). The estimated annual cost of obesity-related disease treatment in the United States was \$173 billion in 2019 (CDC, 2022). Overweight and obese people have increased rates of heart disease, high blood pressure, atherosclerosis, diabetes, high cholesterol, and cancer (National Heart, Lung, and Blood Institute, n.d.). Obesity increases cardiovascular mortality rates by four-fold and cancer-related mortality rates by two-fold, making obesity the greatest preventable health-related cause for mortality, only second to tobacco use (Osama, 2021, June 9). Globally, more than two billion people are overweight or obese, with rates projected to increase, not lessen, in the foreseeable future (Caballero, 2019).

To establish the connection between obesity, weight loss maintenance, and positive psychology, research needs to be completed on the relationship between happiness and health. Of those many aspects of human flourishing that lead to overall life satisfaction and well-being, which ones directly relate to health and weight loss maintenance? The ability of an individual to choose these values in order to develop their own sense of happiness and flourishing has been shown to be effective in weight loss maintenance studies (VanderWeele, 2017). The purpose of this descriptive quantitative study is to explore the perception of happiness in previously overweight or obese adults who have successfully maintained their weight loss. The proposed research question we sought to answer is, how do adults with a previous history of excessive weight (classified as overweight or obese) perceive their happiness while successfully maintaining their weight loss?

Method

This research study was a quantitative methodology with a descriptive design. A descriptive design was chosen to allow for the description of distribution of two variables, without regard to any other causative hypotheses. The data was used to discover patterns, connections, and trends between the two variables. Study participants were individuals currently enrolled in a weight loss program (Weight Watchers) and completed an online, anonymous survey. Study participants were found using an online survey to gain access to the target population on the social media site “WW Connect,” an active social media site only for Weight Watchers members, both current and “lifetime,” a term used by Weight Watchers members who have achieved their desired weight loss and are successfully maintaining (Gudzune et al., 2015). WW Connect was used to find potential participants for this study to access the target population.

Inclusion criteria. Participants must be (a) adults aged 18 years and older; (b) self-attest to previously losing over 5% of their highest body weight; and (c) self-attest to previously being overweight or obese sometime in their lifetime, as measured by standard body mass index (BMI).

Exclusion criteria. People excluded will be (a) those who fall outside of the inclusion criteria.

Sampling Methodology. This study used a non-probability sampling methodology with a convenience sampling method. Weight Watchers was selected due to availability of the target population, as they have a large number of active participants on WW Connect (a social media site) who have achieved and maintained weight loss. Convenience sampling was used based on the availability of the participants, which was necessary due to the constraints and parameters of the project. Due to the inclusion criteria being set for the specific population for one of the variables of interest being studied (weight loss maintenance in adults who were previously categories as overweight or obese), the results should be generalizable with minimal risk of threat to external validity.

Institutional Review Board approval. The A. T. Still University Institutional Review Board approved this study (protocol number #2022-069). The survey instrument to measure happiness was the (a) Adult Hope Scale (AHS), a scale developed by Snyder et al. (1991) that uses positive psychology and hope theory to measure participants' perception of their positive motivational state, and (b) key demographic information. DiGasbarro et al. (2020) found the AHS demonstrated good to excellent reliability with good internal consistency, as well as concurrent validity of the AHS to measure hope as a motivational construct. The survey collected demographic data collection included age, sex, race, height, and weight to determine inclusion criteria for weight loss maintenance. Participants self-attested to previously losing over 5% of their highest body weight and reported how long they have successfully been maintaining their weight loss in months. The investigator deployed the survey using the Qualtrics platform.

Data Collection

Survey participants were asked through post requests on WW Connect (Weight Watcher's social media site) to participate in the online survey. The request included a brief explanation of the study, listed the variables of interest (happiness and weight loss maintenance), and indicated its purpose (a research study). The link to the survey was included in the request, leading potential participants directly to the online survey. The survey included 19 questions and took on average 10-15 minutes to complete. Data collection was capped at six weeks, with reminders posted on the social media site at two-week intervals. In total, sixty-one adults completed the AHS within the six-week data collection timeframe. Data collected was downloaded through the Qualtrics software and stored in an IBM SPSS database. Collected survey data were anonymous, immediately deidentified, and answers were confidential. Data were kept private within full scope of confidentiality.

Data Analysis

Once the data collection period ended, researchers imported the data from Qualtrics into IBM SPSS version 28.0 (Armonk, NY: IBM Corp.) for analysis. The data collected were at the nominal, interval, and ordinal level. Calculations of frequencies and percentages, including median and interquartile range where appropriate, were conducted and figures and tables were used to compare demographic statistics. Demographic data were analyzed first. Age was intentionally asked as an open-ended question and collected using a nominal level of measurement, with the mean age (i.e., measure of central tendency) calculated and indicated in the research study. Sex and race

were collected using a nominal scale, with percentages of each being indicated in the research, using measures of dispersion.

Table 1. Descriptive statistics for demographic and background characteristics

Characteristic	N	%	Mode(s)	Mdn	IQR
Age, y	56	100	50	55 ^a	18.5 ^a
Sex					
Male	2	3.6			
Female	54	96.4	Female		
Race					
White	51	91.1*	White		
Black/African American	4	7.1*			
Height, in	55	98.2*	64	64 ^a	5.0 ^a
Weight, lbs	56	100	136, 173	165 ^a	34.8 ^a
Contest to losing over 5% of overall highest body weight					
Yes	59	96.7	Yes		
No	2	3.3			
Weight classified as overweight or obese at any time in lifetime					
Yes	58	95.1	Yes		
No	3	4.9			
Length time (in months) of maintained weight loss					
Below 3 months	9	16.1			
3-5 months	6	10.7			
6-11 months	8	14.3			
12-23 months	9	16.1			
24-35 months	11	19.6			
36 months and above	13	23.2	36 and above		

Note. Mdn = median. IQR = interquartile range.

*Value does not equal 100% due to missing values.

^aThe Kolmogorov-Smirnov test was used to test normality. The variable does not reflect normality ($p < .05$).

Normality testing was performed to determine if there is a goodness of fit in the sample data as drawn from a normally distributed population (Ghasemi & Zahediasi, 2012). The Shapiro-Wilks normality test was used to determine if the data falls within the standard distribution, with a criterion alpha level (p-value) of less than or equal to 0.05 (Ghasemi & Zahediasi, 2012). Current BMI was collected on an interval scale, used to determine if study participants were able to achieve a healthy weight after self-attesting to previously being overweight or obese. These demographic data were essential to the study, as this variable of interest (i.e., weight loss maintenance) was examined against the other variable of interest, factors of happiness. Data collected from the AHS were analyzed using the total scores from the scale, the subscale scores from both the pathways and agency items, and the total overall hope score (on a scale of 8-64) (Snyder et al., 1991). Specific AHS questions and scores were analyzed that indicate different parts of the study's definition of happiness, including self-efficacy and autonomy (Herlambang et al., 2021; VanderWeele, 2017; Whillans et al., 2019).

Table 2. Descriptive statistics for adult hope scale sub-scores

Agency Sub-score					Pathway Sub-score				
AHS Question	N	%	Mode	Mdn	AHS Question	N	%	Mode	Mdn
Q2: I energetically pursue my goals.					Q1: I can think of many ways to get out of a jam.				
Somewhat False	1	1.8			Slightly False	1	1.8		
Slightly False	3	5.4			Slightly True	5	8.9		
Slightly True	4	7.1			Somewhat True	9	16.1		
Somewhat True	9	16.1			Mostly True	27	48.2	Mostly True	7.0
Mostly True	25	44.6	Mostly True	7.0	Definitely True	14	25.0		
Definitely True	14	25.0							
Q9: My past experiences have prepared me well for my future.					Q4: There are lots of ways around any problem.				
Somewhat False	1	1.8			Slightly False	1	1.8		
Slightly False	1	1.8			Slightly True	5	8.9		
Slightly True	1	1.8			Somewhat True	9	16.1		
Somewhat True	10	17.9			Mostly True	21	37.5	Mostly True	7.0
Mostly True	19	33.9		7.0	Definitely True	20	35.7		
Definitely True	24	42.9	Definitely True						
Q10: I've been pretty successful in life.					Q6: I can think of many ways to get the things in life that are important to me.				
Somewhat False	1	1.8			Somewhat False	1	1.8		
Slightly True	3	5.4			Slightly False	2	3.6		
Somewhat True	11	19.6			Slightly True	5	8.9		
Mostly True	21	37.5	Mostly True	7.0	Somewhat True	12	21.4		
Definitely True	20	35.7			Mostly True	24	42.9	Mostly True	7.0
					Definitely True	12	21.4		
Q12: I meet the goals that I set for myself.					Q8: Even when others get discouraged, I know I can find a way to solve the problem.				
Definitely False	1	1.8			Mostly False	1	1.8		
Somewhat False	2	3.6			Slightly False	1	1.8		
Slightly False	3	5.4			Slightly True	3	5.4		
Slightly True	5	8.9			Somewhat True	13	23.2		
Somewhat True	13	23.2			Mostly True	26	46.4	Mostly True	7.0
Mostly True	23	41.1	Mostly True	7.0	Definitely True	12	21.4		
Definitely True	9	16.1							

Note. Mdn = median.

Data collected from the AHS were analyzed using the total scores from the scale, the subscale scores from both the pathways and agency items, and the total overall hope score (on a scale of 8-64) (Snyder et al., 1991). Snyder et al. (1991) states that a higher number on the total scale score indicates higher hope levels. Further, specific items were analyzed to indicate different parts of the study's definition of happiness, including self-efficacy, resilience, autonomy, and intrinsic motivation (Herlambang et al., 2021; VanderWeele, 2017; Whillans et al., 2019). Using descriptive statistics, measures of central tendency were used to determine the mean responses to each question (ranked from definitely false to definitely true) in order to further analyze factors of happiness within specific questions (Snyder et al., 1991).

Results

Sixty-one adults completed the AHS (Snyder et al., 1991). Two participants did not self-attest to losing over 5% of their overall body weight in their lifetime and three did not classify their weight as overweight or obese at any time in their lifetime; therefore, data from five participants were excluded from analyses. Of the remaining participants ($N = 56$), the majority were female (96.4%) and ranged in age from 30 to 78 years ($Mdn = 55$; $IQR = 18.5$). Participants' height ranged from 61 to 70 inches and participants' weight ranged from 113 to 372 pounds. All demographic and background data information is summarized in Table 1.

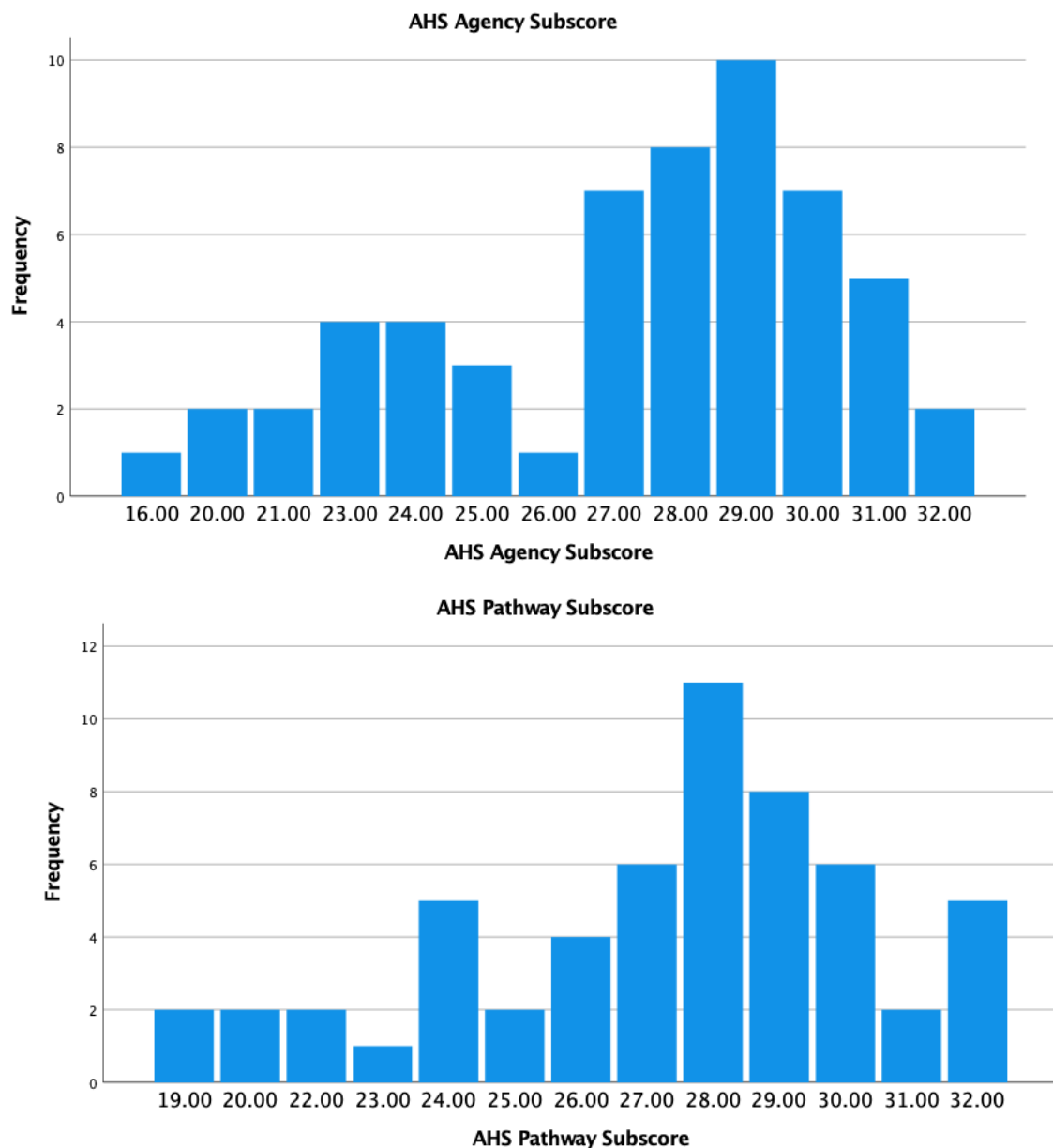


Figure 1. AHS Agency and Pathway sub-scores

Descriptive statistics for AHS sub-score findings are summarized in Table 2. As shown in Figure 1, participants ($N=56$) responded with an AHS agency (i.e., goal-setting capabilities) sub-score range of 16 to 32 points ($Mdn=28.0$; $IQR= 4.8$). Figure 2 shows participants ($N=56$) responded with an AHS pathway (i.e., implementation skills) sub-score range of 19 to 32 points ($Mdn=28.0$; $IQR= 3.8$). Figure 3 shows participants ($N=56$) responded with an overall total AHS score (agency plus pathway sub-scores) range of 40 to 63 points ($Mdn= 55.5$; $IQR= 8.0$).

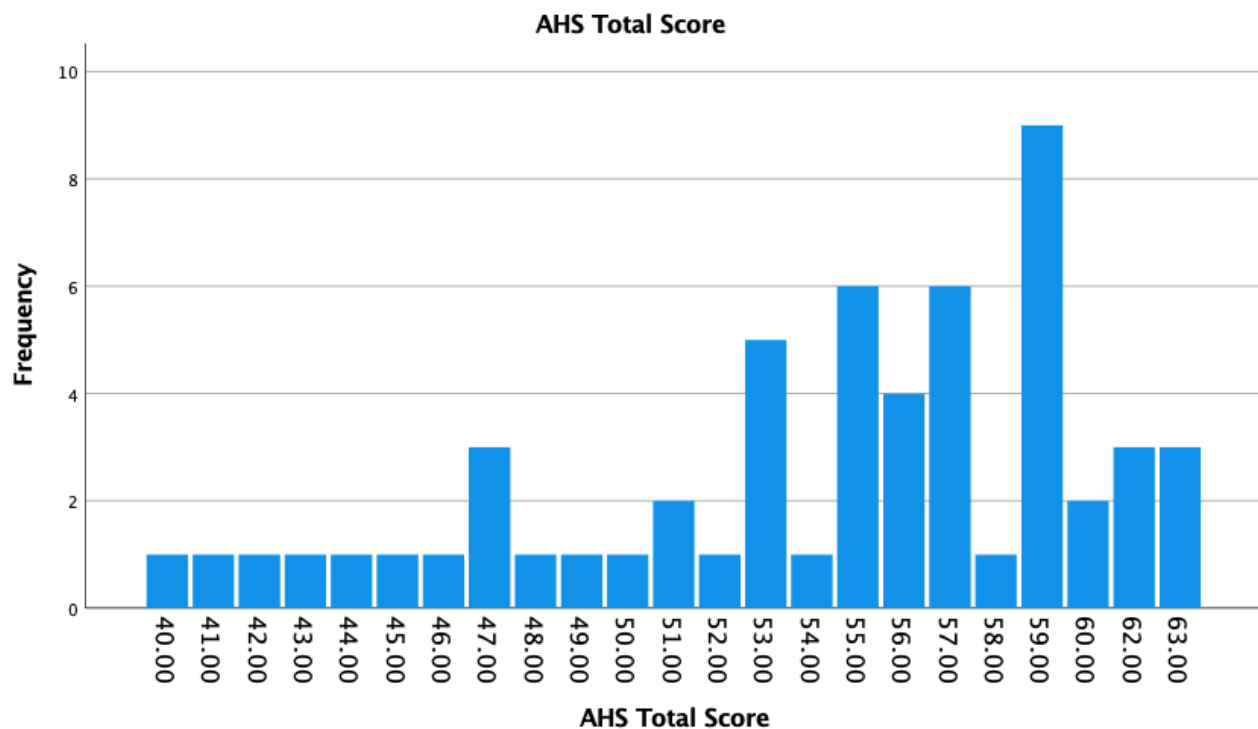


Figure 2. AHS total score

Discussion

Adults with a previous history of excessive weight perceive higher levels of happiness as successful indicators for their weight loss maintenance, with high hope, agency, and pathway scores in the AHS being factors of efficacy in long-term weight management. Autonomy and self-efficacy are key parts of human happiness and both are supported in this study as essential elements (VanderWeele, 2017; Varkevisser et al., 2019). The AHS was broken down into two sub-scores, agency (i.e., goal-setting capabilities) and pathway (i.e., implementation skills), with both sub-scores being examined individually as well as summed for a total hope score (Snyder et al., 1991). The AHS measures a positive motivational state derived to achieve success, with higher scores indicating higher degrees of hope (Snyder et al., 1991). Participants scored high for both agency and pathway, indicating that higher capabilities in these two areas were important factors for long-term weight loss maintenance.

As shown in Figure 2, participants recorded high agency scores when instructed to think about the answers to the questions in relation to their weight loss maintenance abilities. The agency subscore for participants indicated a mode of "mostly true" for all four AHS questions, indicating a high agency score for participants. For example, 69.6% of participants chose "mostly or definitely true" for AHS Question 2, "I energetically pursue my goals," indicating a high degree of goal setting skills. Goal-setting capabilities were found to be positively predictive of weight loss maintenance. VanderWeele (2017) established that the ability to set goals was a key part of an individual's happiness factors in health. Participant's pathway sub-scores reflected similar results. Participant's pathway sub-scores indicated a mode of "mostly true" for all four AHS questions, leading to higher pathway scores for participants who reflected on their happiness factors in weight loss maintenance. For AHS Question 4, "there are lots of ways around any problem," 73.2% of participants reported this to be "mostly or definitely true" for them in relation to their weight loss maintenance. Participant's individual abilities to create a pathway for behavioral changes in the weight loss maintenance phase appears to be a potential indicator for successful long-term weight loss.

As shown in Figure 3, participants indicated high agency and pathway scores, that, added together, provide the total overall hope score. Participants (N=56) responded with an overall total AHS score of a median of 55.5 points out of 63, indicating a high degree of hope was part of their weight loss maintenance success. With 58.9% of participants being successful at maintaining their weight loss for over 12 months, the results indicate a correlation between a high degree of goal setting and implementation skills are potentially needed to achieve weight loss maintenance successfully.

The current results have several key implications. While this study investigated agency and pathway sub-scores as measurements for emotional well-being, these results are consistent with similar research linking the importance of self-regulation in behavioral goals such as weight loss maintenance (Ross et al., 2019). By creating a goal and pathway for outcome achievement, an individual's belief in their ability to achieve their desired outcome appears to be a possible key emotional factor necessary for successful weight loss maintenance. Believing they have the capabilities to achieve weight loss maintenance may be a potential emotional indicator for success, which is important, because it supersedes any other psychological beliefs (such as control fallacies) that could potentially be barriers for change (Beck, 2008).

Negative patterns of thinking potentially increase when making behavioral changes (Beck, 2008; Behr et al., 2021). Behr et al. (2021) found negative emotions increased over the course of weight loss programs, indicating a potential for negative emotions to be higher at the end of weight loss programs heading into the maintenance phase. Similarly, Payne et al. (2019) found increased negative emotions lead to blunted weight loss. With participants focusing on their positive emotions and factors within their control, this led to a high capability to maintain weight loss in this study. Nearly 84% of participants had maintained their weight loss for three months or more at the time of the survey. The research shows that hope, autonomy, and self-efficacy are potential factors in successful long-term weight loss maintenance.

Additionally, Dahl et al. (2020) found heightened purpose fosters self-perception, which leads to meaning creation and significance in individual pursuits. Self-perception could possibly be a deterrent for individuals who believe that they do not intrinsically possess agency or autonomy skills. Dahl et al. (2020) found overwhelming evidence that well-being can be learned as a skill(s). These traits are not selected for some while others permanently miss out; rather, they can be learned and obtained over time with self-examination and determination. Ekman et al. (2021) found fostering happiness is not passive nor hopeless, people have tools they can incorporate to increase positive emotions. Hopelessness appears to be a negative belief that sabotages behavioral change, where this study shows that, conversely, hope is a potentially key element of successful weight loss maintenance. Hope is a skill that can be learned and implemented, rather than an unobtainable factor attributed to some individuals and not others.

Keyes (2005) found flourishing adults are also the healthiest. Keyes (2005) findings suggest happiness factors play a key role in long-term weight loss maintenance. While CBT focused on benefits of cognitive reframing, looking specifically at emotional health is relatively new in the field of weight loss maintenance (Beck, 2008; Church et al., 2018). Using CBT skills to cognitively reframe negative emotions has been found to prevent relapse (i.e., weight regain) and lead individuals in weight loss maintenance to feel less burdensome and in control of their abilities to sustain their efforts (Hartmann-Boyce et al., 2018). When changing individual thoughts and behaviors, these feelings always follow, resulting in higher levels of positive emotions, such as autonomy and self-efficacy, both of which are reflected in this study's findings (Beck, 2008; Hartmann-Boyce et al., 2018). Higher levels of positive emotions may be a necessary key element of successful long-term weight loss maintenance.

Limitations

Unfortunately, psychological factors in weight loss maintenance remain limited. Emotional factors are notoriously difficult to measure and often subjective to individual experience, making them difficult to research. Węziak-Białowska et al. (2019) found that individuals who said they were "happy" varied wildly with the specific question about happiness that was asked. Positive psychology offers a pathway for being able to measure and study happiness through quantitative research which could result in more studies being done on the emotional wellness aspects of weight loss maintenance. In this study, the sample size was small (N= 56) and demographically narrow with participants primarily self-identifying as female (96.4%) and white (91.1%), putting potential limitations on generalizability for larger population groups. The use of a specific weight loss program was used to target the

population could result in potential biases. Socioeconomic data was also not gathered for participants, leaving social determinants for health largely unaddressed.

Additionally, there was no pretest for how the participant's perceptions of changes of negative thought processes over time in relation to their weight loss, thus there were no data to show how the participant's autonomy and self-efficacy were different than prior to weight loss interventions. Individual's perception of hope, autonomy, and self-efficacy were reported in relation to their ability to maintain weight loss, but they were not asked to rate how these factors had changed for them over time or in comparison to when they were previously overweight or obese. While our study did not directly address any specific changes participants made in negative thought processes, other studies have found the importance of this ability as an essential skill (Dahl et al., 2020; Ekman et al., 2021; Keyes, 2005). Future studies could include a comparison group for individuals who have experienced weight gain after weight loss, with the comparison of their perceived happiness to those who successfully maintained long-term weight loss. Adopting happiness factors is not ineffectual, useless, or an inert process, people can develop the tools to increase positive emotions in their pursuits.

Recommendations

While our study demonstrated a potential connection between high levels of positive emotions and successful weight loss maintenance, future research is needed to establish a correlation between these two variables. The science of human flourishing synthesizes the importance of increasing positive emotions in behavioral pursuits, but often does not directly address weight loss or successful long-term weight loss maintenance (Dahl et al., 2020; Ekman et al., 2021; Keyes, 2005). More research is needed on the emotional factors necessary to sustain behavioral change long-term, which is essential for maintaining weight loss. Clinical studies are necessary with large and diverse participation of people, showing "real world" outcomes that include varied social determinants of health and well-being.

Conclusion

Maintaining a healthy weight long-term has many advantages, as obesity increases the risks of developing cardiovascular diseases, diminished quality of life, and early mortality. This study showed that behavioral training and psychological modifications are key components to long-term successful weight loss maintenance (Ramage et al., 2014; Varkevisser et al., 2019). Additionally, goal-setting capabilities and creating effective pathways were found to be positively predictive of weight loss maintenance. Participants who responded with an overall total AHS score of a median of 55.5 points out of 63, indicated a high degree of hope was part of their weight loss maintenance success. With 58.9% of participants being successful at maintaining their weight loss for over 12 months, the results indicate a correlation between a high degree of goal setting and implementation skills are potentially needed to achieve weight loss maintenance successfully. Positive psychology can potentially offer necessary solutions to emotional health linked to positive motivational states and successful weight loss maintenance. Self-efficacy and autonomy were aligned with successful behavioral change in this study, as it has been found in other research studying successful weight loss maintenance (Paixão et al., 2020). Perception of happiness appears to be related to effective long-term weight loss, but more research is needed to explore the links between these factors. A deepened understanding of emotional health factors is necessary to explore the possibility that addressing emotional health results in successful physical weight loss in the long-term.

Compliance with Ethical Standards

Ethical Standards

All study procedures involving human participants followed institutional and/or national research committee ethical standards and the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Board of A.T. Still University, protocol number #2022-069.

Declaration of Conflicting Interests

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All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Jamie T. Powers and Jeffrey L. Alexander.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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