MSc in Clinical Psychology

The Effect of Appetite Awareness Training on Mental Health and Eating Habits Among Participants in Obesity Treatment

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Foreword

This article is part of a research project for a Master’s degree in Clinical Psychology at Reykjavík University. The research project was divided into the last three semesters of four, and assignments were submitted in each semester.

During the second semester, a research proposal was submitted. This included a short introduction, research goals, hypothesis or research questions, and a general description of the research method. A detailed research plan was also submitted along with a literature review of the theoretical basis, the status of knowledge in the field, and the background of the research. Permission for the study was obtained from the National Bioethics Committee and the medical director of Reykjalandur, Magnús Ólason. The third semester involved data processing at Reykjalandur, i.e., calculating and entering results from the self-measurement scales. The method chapter was submitted to supervisors for review. In the fourth semester the emphasis was on data analysis and writing the research article. All chapters were submitted to supervisors for review, and then the final versions of the article were submitted to Reykjavík University, a printed copy and a digital copy. A digital copy was also submitted to Skemman, the digital repository for all universities in Iceland, which contains both students’ final theses as well as scholarly research by the universities’ academic staff.
Acknowledgment

I would first like to thank my supervisors Helma Rut Einarsdóttir, psychologist of the Obesity Treatment Team at Reykjalundur Rehabilitation Centre, and Þorlákur Karlsson, Associate Professor in Psychology at Reykjavik University, for their approachability, quick feedback, good advice, and suggestions about my research and writing.

Finally, I want to express my gratitude to my husband and four children for supporting me unconditionally and encouraging me throughout my years of study and the process of researching and writing this M.Sc. research article. This achievement would never have been possible without their support. Thank you.
Abstract
Appetite Awareness Training (AAT) is an intervention intended to increase ability to rely on internal appetite cues to regulate eating behavior rather than responding to environmental, cognitive, or affective cues. It has been shown that AAT reduces binge eating and overeating as well as decreasing the sense of control loss concerning eating behavior and associated psychological distress. The study’s aim was to assess AATs effectiveness by comparing the scores on self-measurement scales (Binge Eating Scale; BES, Beck Anxiety Scale; BAI, Beck Depression Scale; BDI-II, Depression Anxiety Stress Scale; DASS and Appetite Awareness Scale; AAS) before and after a six session AAT course at the outset of obesity treatment. Data came from 38 groups (N = 375, 288 females, 87 males, age 18-73) at Reykjalandur Rehabilitation Centre. Significant differences occurred for AAS, BAI, BDI-II and DASS anxiety symptoms, but neither for DASS depression nor stress symptoms thought the mean score decreased for both. The overall findings indicate that AAT decreases symptoms of binge eating, depression, anxiety, and increases appetite awareness.

Key words: Appetite Awareness Training, obesity treatment, mental health, eating habits
The Effect of Appetite Awareness Training on Mental Health and Eating habits Among Participants in Obesity Treatment

Obesity is defined by the World Health Organization (WHO, 2015) as abnormal or excess fat accumulation that could prove harmful to a person’s health. Individuals with obesity also deal with various mental health challenges. Research has shown that people with obesity often experience symptoms of depression, anxiety disorders, bipolar disorder, schizophrenia, stress, food addiction, behavioral disorders, emotional eating, distorted body image, and reduced quality of life (Abilés et al., 2008; Gough, Seymour-Smith, & Matthews, 2016; Jagielski, Brown, Hosseini-Araghi, Thomas, & Taheri, 2014; Lopresti & Drummond, 2013; Midlarsky & Nitzburg, 2008; Schneider, Appelhans, Whited, Oleski, & Pagoto, 2010) in addition to various physical characteristics and risk factors such as heart disease, diabetes 2, musculoskeletal diseases, certain types of cancer, and other health issues that many people with obesity face (Kopelman, 2007).

Research conducted by Goldschmidt et al. (2014) found that the body mass of individuals with obesity with chronic depression was higher than that of individuals with obesity who do not experience chronic depression. Obesity has been shown to increase the risk of severe depression by 25%, and one in four people with obesity show signs of affective or anxiety disorders (Simon et al., 2006). The relationship between anxiety disorders and obesity has been shown to be gender neutral (Brumpton, Langhammer, Romundstad, Chen, & Mai, 2013; Simon et al., 2006). In a study comparing results from two large surveys conducted 1995-1997 and 2006-2007 (N = 25,668), greater weight gain was observed in those with anxiety or depression (Brumpton et al., 2013). There was no gender difference with regard to the weight gains relations to anxiety and depression, and the frequency of obesity in both genders increased with anxiety and depression. Ongoing depression has been shown to have a connection with reduced physical and social activity, which increases the risk of obesity (de Wit et al., 2010). Depressive symptoms have also been shown to increase
the likelihood that an individual will attempt to reduce stress by eating, and thus increasing the risk of obesity (Goldschmidt et al., 2014). This kind of emotional eating, along with binge eating, has also been shown to be more common in individuals with obesity and depression than in those without depression. At the same time, people with obesity and anxiety have been shown to be more likely to engage in emotional eating than people with anxiety who are not obese (Schneider et al., 2010).

A study by Grilo, White, and Masheb (2009) found that 74% of people with binge eating disorder (BED) had a history of other mental disorders, and 43% currently had a mental disorder. A person with BED experiences loss of control while eating followed by negative emotions, shame, guilt, self-disgust, etc. (American Psychiatric Association, 2013). After eating they do not take action to counteract the food (induce vomiting, fasting, laxative, or excessive exercise), as people with anorexia and bulimia do. People who binge eat are therefore likely to become overweight or obese and are at greater risk of developing various health complications (National Institute of Mental Health, 2014). A risk factor that most seemed to promote obesity in people with BES was previous history of other mental disorder or current mental disorders (Grilo et al., 2009). A study by Lin et al. (2013) showed that a group who intended to have gastric bypass surgery had more severe symptoms of eating disorders, adaptive disorders, and sleep disorders than the non-operative group. In Grilo et al.’s (2009) study, a comparison was made between people with BED and a current mental disorder, and people with BED and no other mental disorder. The people with BED and another mental disorder were younger when they first dieted, had a higher weight index over time, more severe eating disorder symptoms, and experienced more negative feelings and lower overall well-being than individuals with BED and no history of other mental disorders. The cause of BED is unclear (American Psychiatric Association, 2013), but it has been argued that the disorder often begins with a strict diet or after a strict diet (U.S. Department
of Health & Human Services, 2016). According to Kessler et al. (2013) a low proportion of people with BED get treatment. Physicians may fail to assess or recognize eating disorders, and people with BED more often get treatment for emotional related problems associated with BED instead of the BED itself. Therefore, it is important to ask people specifically about eating problems though it may not be among their complaints.

Lifestyle, dietary, physical, and behavioral therapy have proven to be successful in weight loss but were not as successful at reducing binge eating (Grilo, Masheb, Wilson, Gueorguieva, & White, 2011). A comparative study by Gade, Hjelmesæth, Rosenvinge and Friborg (2014) of a conventional obesity treatment for gastric bypass surgery and a conventional obesity treatment with additional cognitive behavioral therapy (CBT) showed a decrease in eating behavior, emotional distress, and more weight loss in participants when CBT was added to the conventional treatment. However, in another study (Cooper et al., 2010) where participants received CBT, which was designed specifically to prevent weight gain after treatment, the majority of participants (24% of them with BED) regained almost all lost weight. CBT proved to be no better than behavioral therapy in maintaining weight loss. A year later, Grilo et al. (2011) came to the conclusion that CBT proved to be better for people with BED than behavioral weight loss (BWL) to reduce binge eating. However, CBT was not as effective at promoting weight loss as BWL.

AAT is a treatment approach that Linda W. Craighead, and her colleagues developed from research and clinical treatment to improve people’s eating habits and well-being regarding their eating habits (Craighead, 2012). The treatment approach is based on CBT. In their work with individuals with obesity Craighead and colleagues found that it was difficult for some people to keep a food diary, or that some people got too dependent on such registration. They, therefore, developed a new guideline for food intake, AAT, were the focus is on increasing the attention on internal cues of hunger or satiety to regulate food intake.
In a study by Craighead and Allen (1995), three women with BED were taught to identify three circles (diet, negative feelings, and ignoring satiety) that maintained overeating and binge eating. Problem solving methods, relapse prevention, and cognitive reconstruction were used to interpret the circles. The goal of the treatment was not to contribute to weight loss but to get a grip on binge eating. If the goal were to lose weight, then after getting a hold on the binge eating the individual would need to be advised on appropriate methods that do not include rigid diet. A strict diet can potentially cause binge eating (U.S. Department of Health & Human Services, 2016). The results of the study revealed that the three women did not meet the diagnostic criteria for binge eating six months later (Craighead & Allen, 1995).

In another study, Allen and Craighead (1999) reviewed the effect of an 8-week therapy, built on appetite awareness and CBT, for 29 women with BED. It emerged that binge eating decreased substantially, the feeling of hunger did not increase, there was no weight gain, less emotional eating was observed in certain circumstances, and both depression and social anxiety decreased. Another study conducted by Dicker and Craighead (2004) revealed that AAT was effective at monitoring appetite awareness and that it could be a desirable asset to use with CBT instead of focusing on food intake.

The AAT course at Reykjalundur is the first course participants take part in during obesity treatment (Reykjalundur, n.d.). The length of the total obesity treatment is up to 1½ year. It is important to evaluate the effect of the AAT course at Reykjalundur to provide the best available treatment based on scientific research. This study’s hypothesis is that AAT will decrease symptoms of depression, anxiety, stress, and binge eating and increase appetite awareness.

**Method**

**Participants**

The sample in the study consisted of participants ($N = 375$) enrolled in an obesity treatment program at Reykjalundur from March 2012 to September 2015. They all
participated in appetite awareness group therapy as the first intervention in their obesity treatment. There were 288 female participants (77%), with ages ranging from 21 to 70 years ($M = 41.3, SD = 11.0$). There were 87 male participants (23%), with ages ranging from 18 to 73 years ($M = 45.1, SD = 11.7$). All participants had received a referral from a doctor for obesity treatment because of their obesity (body mass index (BMI) ≥ 35 as well as complications or BMI ≥ 40). Exclusion criteria from the obesity treatment were if they had a BMI ≤ 35 or BMI ≤ 40 and younger than age 18.

**Measures**

**Appetite Awareness Scale (AAS).** The scale, used to measure appetite awareness, is an unpublished piece of work by Linda Craighead, one of the authors of the AAT treatment approach. It has neither been tested nor standardized. The self-report measure was translated to Icelandic by psychologist Helma Rut Einarsdóttir and has also neither been tested nor standardized. The AAS is based on six statements designed to assess people’s appetite awareness, whether they eat when not hungry, and whether they continue eating when they are no longer hungry. Answers should be based on last month’s experience. Total scores are from 6 to 36 points. The score options are on a six-point ordinal scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = usually, and 6 = always, except for in questions 4 and 5 where it is reversed: 6 = never, 5 = rarely, 4 = sometimes, 3 = often, 2 = usually, and 1 = always).

**Beck Anxiety Inventory.** A self-measurement scale, Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988), that evaluates 21 mental and physical symptoms of anxiety during the past week on a six-point ordinal scale (0-3). Possible scores are between 0 and 63 points, with higher scores indicating more severe symptoms of anxiety. Psychometric properties of the Icelandic translation of the BAI have been shown to be very good, $\alpha = .96$ for a student sample and $\alpha = .92$ for a clinical sample (Sæmundsson et al., 2011).
**Beck Depression Inventory.** A self-measurement scale, Beck Depression Inventory (BDI-II; Beck, Steer, Ball, & Ranieri, 1996), that evaluates 21 mental and physical symptoms of depression on a four-point ordinal scale (0-3), for the past 2 weeks. Possible scores are between 0 and 63 points, with higher scores indicating more severe symptoms of depression. Psychometric properties of the Icelandic translation of the BDI-II have been shown to be very good, $\alpha = .91$ for a student sample and $\alpha = .93$ for a clinical sample (Arnarson, Ólason, Smári, & Sigurðsson, 2008).

**Binge Eating Scale.** A self-measurement scale, Binge Eating Scale (BES; Gormally et al., 1982), that evaluates the severity of binge eating among people who are overweight or obese. The scale contains 16 items with three to four statements each representing the severity of cognitive and behavioral functions associated with binge eating (Grupski et al., 2013). Possible scores range from 0 to 46, where a higher score indicates more severe binge eating symptoms (Gormally et al., 1982). A score of 18 to 26 points suggests mild to moderate binge eating symptoms and a score of 27 or higher suggests serious binge eating symptoms (Grupski et al., 2013). Psychometric properties of the Icelandic translation showed that internal consistency reliability was good, both for the general population ($\alpha = .88$) and clinical population ($\alpha = .85$) (Vigfúsdóttir, 2015).

**Depression Anxiety Stress Scale.** A self-measurement scale, Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995), with 42 statements on a four-point ordinal scale, divided equally among three sub-components: depression, anxiety, and stress. Results of each subscale is in the range of 0-42 points, higher scores indicating more severe symptoms. In the general Icelandic population (Ingimarsson, 2010) DASS had the Cronbach’s alpha .92 for depression, .85 for anxiety, and .90 for stress. In a clinical population reliability was .97 for depression, .92 for anxiety, and .95 for stress.
The goal of the group therapy in AAT is for participants to relearn to respond to internal cues of hunger or satiety. This is done by 1) educating participants about maladaptive cycles they can get stuck in if they respond to environmental, cognitive, or affective cues instead of internal cues, 2) using self monitoring to increase awareness about internal cues of hunger/satiety and act according to them, 3) teaching constructive methods for dealing with overeating and binge eating, e.g., problem solving (instead of maladaptive and negative self evaluation) and relapse prevention skills (knowing high risk situations) and 4) teach how to avoid or deal with high risk situations by using problem solving and relapse intervention.

The course is based on the book: *The Appetite Awareness Workbook – How to listen to your body & overcome bingeing, overeating and obsession with food* by Linda W. Craighead and translated to Icelandic by Helma Rut Einarsdóttir (Craighead, 2012). Helma also developed and translated the course material. Duration of the course is six sessions, once per week, for 90 minutes per session.

**First session.** The first session began with a short introduction of the AAT group therapy. Then the self-measurement scales were administered. Then participants briefly introduce themselves. A brief introduction of what appetite awareness is and reason one and two on the appetite awareness model were explained: “Being to hungry/satiety” and “Ignoring satiety”. Next the appetite monitoring scale was explained as well as the five basics of healthy eating habits (eating regularly, slowly, with attention, pleasure and sitting down). Diaphragmatic breathing was taught and homework submitted.

Homework: Read three documents (Sitting Down While Eating, Eating Slowly with Awareness and Pleasure, and Diaphragmatic Breathing), monitor with a checklist if they were eating by the five basic healthy eating habits, write down the reasons why you want to
change your lifestyle, and read chapter two of *The Appetite Awareness Workbook* (Craighead, 2012).

**Second session.** The homework was reviewed. Then the appetite awareness model (four ways to eat) was introduced and the third reason on the appetite awareness model: “Eating because food is available” and the use of a motivation card taught.

Homework: Fill out an appetite awareness monitoring scale for each meal or snack, fill out checklist for healthy eating habits each day, fill out motivation card (the reasons from first session: Why I want to loss weight) and read chapter four in *The Appetite Awareness Workbook*.

**Third session.** The homework was reviewed. In this session the fundamental principles of CBT were explained and a written CBT assignment done.

Homework: Continue filling out checklists, appetite awareness monitoring scale and complete the CBT written assignment: Circumstances, thoughts, and feelings.

**Fourth session.** The homework was reviewed. Two other reasons on the appetite awareness model explained: “Bending a rule” and “What the heck”, and then the appetite monitoring scale with additions.

Homework: Continue filling out checklists, appetite awareness monitoring scale, and read chapters five and six of *The Appetite Awareness Workbook*.

**Fifth session.** The homework was reviewed. Last two reasons on the appetite awareness model explained: “Emotional eating” and “Planning a binge”. Mindful eating exercise: “Eating a raisin with awareness”.

Homework: Continue filling out checklists, the appetite awareness monitoring scale, read chapter seven in *The Appetite Awareness Workbook*.

**Sixth session.** The homework was reviewed. Chapter eight and nine covered about becoming your own coach and reducing reliance on written AAT scales while increasing
internal monitoring on hunger and satiety. A summary of the previous sessions and then self-measurement scales were administered.

**Procedure**

The obesity treatment, from March 2012 to September 2015, started with all participants being invited to a pre-medical examination with a doctor (physical check up and background information) and a nurse (evaluation on well-being and condition). The next step was going to the outpatient clinic, where treatment plans were made for everyone, including AAT for 6 weeks. Group therapy in AAT is the first intervention in obesity treatment at Reykjalundur. The duration of the whole obesity treatment is 1½ year. The AAT course was six sessions, once a week, for 90 minutes per session. The instructor of each group was either a psychologist or a social worker. Self-measurement scales (AAS, BES, BAI, BDI-II and DASS) were administered by instructors in the beginning of the first session of AAT and again at the end of the last session. The first 29 groups were administrated BAI and BDI-II, while the remaining groups 30-38, were administered DASS instead of BAI and BDI-II.

**Data analysis**

All identifiers were removed before statistical processing of the data began and there is no analysis or encryption key. Permission for the study was obtained from the National Bioethics Committee (dated 2016-07-05, license number VSN-16-109) and the medical director of Reykjalundur, Magnús Ólason (Reykjalundur dated 2016-06-09).

Statistical procedures where conducted in IBM SPSS Statistics version 24. Descriptive analysis was conducted and paired samples t-tests were performed to compare mean scores for each self-measurement scale before and after the AAT intervention. A repeated measure ANOVA was conducted to calculate significant difference between mean scores before and after AAT on all self-measurement scales. Effect sizes were calculated by converting the $F$-values to $r$. Significance levels were at $p < .001$ and $p < .05$. 
Results

There was a different number of participants answering all the self-measurement scales (table 1). Out of 375 participants, most answered the AAS, both before \((n = 325)\) and after \((n = 238)\) completing AAT. The fewest participants answered DASS as instructors switched from BDI-II and BAI to DASS for groups 30 to 38, for the sake of convenience.

Table 1

<table>
<thead>
<tr>
<th>Range of Scores, Number of Participants and Missing on all the Self-Measurement Scales Before and After AAT</th>
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<tbody>
<tr>
<td>Before</td>
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<td>Min.</td>
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<td>AAS</td>
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<td>BES</td>
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<td>BAI</td>
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<td>BDI-II</td>
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<td>DASS</td>
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<tr>
<td>Depression</td>
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<tr>
<td>Anxiety</td>
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<td>Stress</td>
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</table>

Note. AAT = Appetite Awareness Training, AAS = Appetite Awareness Scale (score range 6-36), BES = Binge Eating Scale (score range 0-46), BAI = Beck Anxiety Inventory (score range 0-63), BDI-II = Beck Depression Inventory (score range 0-63), and DASS = Depression Anxiety Stress Scale (score range on each subscale 0-42).

Scores on AAS decreased 6 points after AAT. A lower score on AAS indicates better appetite awareness (figure 1).

Figure 1. Mean scores on Appetite Awareness Scale (AAS) before and after Appetite Awareness Training (AAT). The scores on AAS range from 6 to 36. Lower scores indicate better appetite awareness.
Participants’ mean scores decreased on all the self-measurement scales after AAT compared to their scores before AAT (figure 2). Participants’ mean scores decreased the most on BES, or 6 points. See significance test scores for the total in the next section.

![Figure 2. Mean scores on Binge Eating Scale (BES), Beck Depression Inventory (BDI-II), Beck Anxiety Inventory (BAI), and Depression Anxiety Stress Scale (DASS) before and after Appetite Awareness Training (AAT).](image)

Means scores post AAT all decreased from the scores prior to AAT on all the self-measurement scales as shown in Table 2 which shows results divided by gender and age. The largest decrease in scores was 7 points on BES and the lowest decrease was on DASS depression symptoms or 0.4 points. The difference was statistically significant on all scales except two DASS subscales. There were mean score differences on DASS for symptoms of depression and stress, though these were not statistically significant. Fewer participants answered the DASS ($n = 56$ of $N = 375$) than other scales. Only the total difference between measurements pre and post AAT was considered, but not for all measurements such as between pre and post AAT measurements for each age group by gender. The decrease in test scores following AAT was not significantly different between genders or between age...
groups. Though there was greater variability among male participants, they were fewer than the female participants.

Table 2

Means and Standard Deviations for Pre- and Post-AAT Self-Measurement Scales by Gender and Age Groups

<table>
<thead>
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<th></th>
<th>Female</th>
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<th>Male</th>
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<td>Before  M (SD)</td>
<td>n</td>
<td>Before  M (SD)</td>
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<td>AAS by age groups</td>
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<td>Before  After</td>
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<td>Before  After</td>
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<td>Before  After</td>
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<tr>
<td>18 - 36</td>
<td>60</td>
<td>21.2 (4.9) 15.1 (4.1)</td>
<td>11</td>
<td>22.6 (6.2) 16.2 (5.2)</td>
<td>71</td>
<td>21.4 (5.1) 15.2 (4.3)</td>
</tr>
<tr>
<td>37 - 46</td>
<td>55</td>
<td>20.8 (4.9) 15.1 (3.8)</td>
<td>20</td>
<td>21.8 (3.4) 14.1 (3.7)</td>
<td>75</td>
<td>21.1 (4.5) 14.8 (3.7)</td>
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<tr>
<td>47 - 73</td>
<td>55</td>
<td>21.4 (4.1) 15.5 (3.5)</td>
<td>29</td>
<td>21.0 (4.0) 16.5 (4.1)</td>
<td>84</td>
<td>21.2 (4.1) 15.8 (3.7)</td>
</tr>
<tr>
<td>Total</td>
<td>170</td>
<td>21.1 (4.6) 15.2 (3.8)</td>
<td>60</td>
<td>21.6 (4.3) 15.6 (4.3)</td>
<td>230</td>
<td>21.2 (4.5)* 15.3 (4.0)*</td>
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<tr>
<td>BES by age groups</td>
<td>(N = 198)</td>
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<tr>
<td>18 - 36</td>
<td>51</td>
<td>22.2 (8.7) 14.3 (8.6)</td>
<td>9</td>
<td>21.4 (8.8) 16.4 (9.2)</td>
<td>60</td>
<td>22.1 (8.6) 14.7 (8.6)</td>
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<tr>
<td>37 - 46</td>
<td>44</td>
<td>21.3 (8.5) 14.4 (7.7)</td>
<td>18</td>
<td>17.7 (5.1) 9.7 (7.9)</td>
<td>62</td>
<td>20.3 (7.8) 13.0 (8.0)</td>
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<tr>
<td>47 - 73</td>
<td>55</td>
<td>19.1 (7.6) 12.2 (7.3)</td>
<td>21</td>
<td>17.5 (6.7) 10.7 (5.6)</td>
<td>76</td>
<td>18.7 (7.4) 11.8 (6.8)</td>
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<tr>
<td>Total</td>
<td>150</td>
<td>20.9 (8.3) 13.6 (7.9)</td>
<td>48</td>
<td>18.3 (6.6) 11.4 (7.5)</td>
<td>198</td>
<td>20.2 (8.0)* 13.1 (7.8)*</td>
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<td>BDI-II by age groups</td>
<td>(N = 201)</td>
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<td>18 - 36</td>
<td>52</td>
<td>19.2 (12.6) 13.6 (12.6)</td>
<td>9</td>
<td>20.6 (10.7) 13.8 (9.5)</td>
<td>61</td>
<td>19.4 (12.3) 13.7 (12.1)</td>
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<tr>
<td>37 - 46</td>
<td>44</td>
<td>16.6 (11.7) 10.3 (9.6)</td>
<td>17</td>
<td>16.1 (9.8) 8.3 (7.7)</td>
<td>61</td>
<td>16.5 (11.2) 9.7 (9.1)</td>
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<tr>
<td>47 - 73</td>
<td>55</td>
<td>17.2 (10.8) 11.3 (10.2)</td>
<td>24</td>
<td>11.1 (9.1) 8.2 (7.7)</td>
<td>79</td>
<td>15.3 (10.6) 10.4 (9.6)</td>
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<td>Total</td>
<td>151</td>
<td>17.7 (11.7) 11.8 (10.9)</td>
<td>50</td>
<td>14.5 (10.1) 9.2 (8.1)</td>
<td>201</td>
<td>16.9 (11.4)* 11.2 (10.4)*</td>
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<td>BAI by age groups</td>
<td>(N = 177)</td>
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<tr>
<td>18 - 36</td>
<td>41</td>
<td>12.4 (10.4) 7.7 (9.4)</td>
<td>9</td>
<td>9.3 (7.5) 7.2 (6.9)</td>
<td>50</td>
<td>11.8 (9.9) 7.6 (8.9)</td>
</tr>
<tr>
<td>37 - 46</td>
<td>36</td>
<td>13.2 (12.3) 10.7 (9.5)</td>
<td>17</td>
<td>9.8 (8.1) 5.7 (6.6)</td>
<td>53</td>
<td>12.1 (11.1) 9.1 (8.9)</td>
</tr>
<tr>
<td>47 - 73</td>
<td>51</td>
<td>12.3 (9.7) 9.9 (9.1)</td>
<td>23</td>
<td>9.2 (10.6) 6.3 (9.3)</td>
<td>74</td>
<td>11.3 (10.0) 8.8 (9.2)</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>12.6 (10.6) 9.4 (9.3)</td>
<td>49</td>
<td>9.4 (9.1) 6.2 (7.9)</td>
<td>177</td>
<td>11.7 (10.3)* 8.5 (9.0)*</td>
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<td>DASS depression</td>
<td>(N = 56)</td>
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<tr>
<td>18 - 36</td>
<td>14</td>
<td>10.1 (9.3) 9.1 (8.1)</td>
<td>2</td>
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<td>7.7 (6.6) 9.1 (9.0)</td>
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<td>9.5 (8.4) 10.2 (10.0)</td>
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<td>DASS anxiety by age groups</td>
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<td>DASS stress by age groups</td>
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Note. AAT = Appetite Awareness Training, AAS = Appetite Awareness Scale, BES = Binge Eating Scale, BDI-II = Beck Depression Inventory, BAI = Beck Anxiety Inventory and DASS = Depression Anxiety Stress Scale. Before = before AAT, After = after AAT. Age range is in years, 18 - 36 = 18 - 36 years, 37 - 46 = 37 - 46 years, 47 - 73 = 47 - 73 years. * p < .001, ** p < .05.

For the self-measurement scales that showed statistical significance the effect sizes were very large for AAS (r = .74) and BES (r = .63), large for BDI-II (r = .54), and good for BAI (r = .37) and DASS anxiety symptoms (r = .33).
Discussion

The results of the research suggest that AAT decreases symptoms of depression, anxiety, and binge eating, and increases appetite awareness among participants and therefore in most parts supports the research hypothesis. Stress symptoms decreased but not significantly.

First, the results confirm previous findings by researchers who used AAT to decrease symptoms of binge eating (Allen & Craighead, 1999; Craighead & Allen, 1995; Dicker & Craighead, 2004). That is an important result because research has found that people with BES seldom receive appropriate treatment (Kessler et al., 2013). Bingeing needs to be addressed specifically because dietary, physical, behavioral, and lifestyle-changing therapy do not reduce bingeing despite contributing to weight loss, and CBT was more effective at reducing bingeing (Grilo et al., 2011). However, CBT has not been shown to maintain weight loss (Cooper et al., 2010). AAT offers another option, monitoring internal cues of hunger and satiety, to the traditional food diary in CBT and has proven successful for women with BED (Allen & Craighead, 1999). Therefore, it was interesting to see in this study that there were no significant differences between gender or age groups with regard to significant reduction of BES symptoms.

Second, anxiety symptoms decreased significantly on both BAI and DASS. There were no differences between gender or age groups, suggesting that AAT benefits both genders and all age groups equally. It is important that anxiety symptoms are addressed in obesity treatment because one of every four people with obesity shows signs of anxiety or affective disorder (Simon et al., 2006). Individuals with obesity and anxiety are more likely to engage in emotional eating than other people with anxiety (Schneider et al., 2010).

Third, a difference in depression symptoms occurred on BDI-II and DASS, though the difference was not significant on DASS, possibly due to fewer participants answering
DASS ($n = 56$) in comparison to BDI-II ($n = 201$). Nevertheless, the mean score decreased and this is therefore a reason to investigate this difference between BDI-II and DASS more closely. Reduction of depressive symptoms is very important as depression is thought to have a strong relation to obesity. Increased weight gain and rates of obesity is found in individuals with depression (Brumpton et al., 2013), and in addition depression reduces physical and social activity, which increases the risk of obesity (de Wit et al., 2010). Because AAT is based on CBT, it is not just appetite awareness that is taught but also traditional CBT methods, cognitive restructuring, problem-solving skills, and relapse prevention (Dicker & Craighead, 2004).

Fourth, stress symptoms decreased however not significantly. There was no measure of stress other than DASS. Few participants answered DASS ($n = 56$), and it is therefore advisable to investigate further whether AAT significantly affects stress symptoms. A research by Goldschmidt et al. (2014) showed that persistent depressive symptoms increased the likelihood of trying to reduce stress by eating, and this was more common in individuals with obesity.

Fifth, mean scores on AAS decreased. A lower score on AAS suggest that people have a better appetite awareness. Therefore, the results indicate that people had better appetite awareness after the AAT course. However, AAS is unpublished work and has therefore not been tested or standardized so there are no psychometric properties for it. Future research on the psychometric properties of AAS would be practical for clinical work to observe changes in appetite awareness.

Limitations of the research are a weak research design with no comparison group and only before and after measures. Potential threats to internal validity are history, i.e., that something else might have changed at the same time as AAT, and placebo effect, i.e., that differences occur due to a person’s expectations of feeling better because they started
therapy.

Strengths of the research are that many different self-measurement scales were used and that each had very specific questions. History or placebo is therefore unlikely to have the same effect on all the participants in all the self-measurement scales.

As the first intervention in obesity treatment, AAT decreases symptoms of binge eating, depression, anxiety, and increases appetite awareness among participants. The main purpose of AAT is getting participants to focus more on their internal cues of hunger and satiety, eating habits and help them adopting healthier eating habits. The results of this study that symptoms of BES decrease and appetite awareness increase are important to the obesity treatment in Reykjalundur. They show that the course is effective in implementing those behavior changes in participants and also useful in further development of the obesity treatment in general. These findings are also important because of their relevance for implementing clinical procedures that improve mental well-being in participants in obesity treatment, as symptoms of depression, anxiety, and impaired quality of life often occur in people with obesity (Jagielski et al., 2014). Furthermore, it is significant because people with obesity with mental disorders seem to show greater resistance to treatment than people with obesity with no history of mental disorders (Lopresti & Drummond, 2013).
References


The Effect of Appetite Awareness Training


