Food Addiction and Self-Efficacy for Physical Activity in obesity treatment

Henrik Johansson Rehn and Albin Lundmark

Spring 2016
Master thesis in psychology, 30 ECTS
The program for Master of Science in Psychology oriented toward Sports, Program for Master of Science in Psychology, 300 ECTS
Supervisor: Ulrich Olofsson
Food Addiction and Self-Efficacy in first-line obesity treatment

Henrik Johansson Rehn and Albin Lundmark

Obesity is an increasing public health issue in many parts of the world. Lifestyle treatment is the recommended first-line treatment although the weight reduction over time is limited. Food addiction (FA) is an upcoming perspective viewing some individual’s eating behaviors as similar to substance abuse described in DSM-IV-TR. What impact FA might have in lifestyle treatment is unclear. Self-efficacy for physical activity (SEPA) is a well-known predictor for physical activity and a variable in lifestyle treatment. The purpose of this explorative cross-sectional study was to investigate how FA and SEPA separately and together relate to days in lifestyle treatment for obesity. The study had 41 participants in different stages of lifestyle treatment. Instruments used to measure FA and SEPA were Yale Food Addiction Scale – Swedish (YFAS-S) and Exercise Self-Efficacy Scale – Swedish (ESES-S). FA and SEPA did not relate to each other or to number of days in treatment, indicating that the two factors are unaffected by lifestyle treatment. Future studies investigating if FA affects weight regain after treatment are suggested.

Overweight and obesity is a public health issue in many parts of the world, including Sweden (HU, 2008). In 2015, half of the Swedish population was categorized as obese or overweight with a Body Mass Index (BMI) > 25. Since 2004, the obese population (BMI > 30) in Sweden has increased from 11% to 14% (Folkhälsomyndigheten, 2015). Globally the tendency is similar. In 2014, 600 million people were obese, an increase of 100% during the past 25 years (World Health Organization [WHO], 2015). The issue is so problematic that it is categorized as a chronic illness (National Institutes of Health, 2013; Middleton, Patidar & Perri, 2011). The link between obesity and life threatening conditions like cardiovascular disease and diabetes is well established (Flegal, Orpana & Graubard, 2013; Kopelman, 2000).

Obesity is caused by several factors both genetic and environmental. The general mechanism is a too high energy intake and/or a too low energy output (Naukkarin, Rissanen, Kaprio & Pietiläinen, 2011). To treat obesity it is necessary to address this imbalance of energy and create a permanent state of lower energy intake and/or increased energy output (Kushner, 2014). Clinically there are three main evidence based approaches for treatment of obesity. These are lifestyle treatment, pharmacotherapy, and bariatric surgery (Kushner, 2014). All three are meant to reduce the intake of energy. Lifestyle treatment also affects the energy output through exercise and change of non-exercise habits (Thomson, 2007). Lifestyle treatment can include many different components, but a change in diet and some kind of behavioral change (e.g. increased daily physical activity) is always part of this concept of treatment. The combination of low calorie diet, exercise and behavioral change has been proven the most effective and recommended lifestyle treatment (U.S. Department of Health and Human Services, National Institutes of Health [NIH], 2013; Kushner, 2014; Glenny, O’Meara, Melville, Sheldon & Wilson, 1997). The effectiveness of lifestyle treatment differs,
but some studies have shown substantial weight loss. Barte et al. (2010) showed in their review that the mean weight loss after treatment was 9.5% and Middleton, Patidar and Perri (2011) showed an effect of 8-10% weight loss at end of treatment. Though, maintaining the reduction is difficult for many patients. Middleton et al. (2011) showed that 3-5 years after treatment mean weight was back to pre-treatment weight and Barte et al. (2010) showed that after two years, only 44% maintained the weight reduction. In the Look AHEAD study (2014) there was a group of 7.2% that did not respond to treatment and increased in weight after one year of lifestyle treatment. In the same study, 24.8% of the participants had a weight reduction between baseline and 5%.

There are, since 2012, two new anti-obesity drugs approved by the U.S. Food and Drug Administration (FDA) and several studies of their effectiveness are ongoing. Drug treatment for obesity has a history of safety problems. No drug has yet survived as a treatment alternative over time. The recommendation is that drug treatment should be combined with physical activity and better eating habits (Kim, Lin, Blomain & Waldman, 2013). The drugs that has been approved by FDA for treatment since 2012 has so far shown significant weight loss at a level of about 5-10% (Kim, Lin, Blomain & Waldman, 2013; Yanovski & Yanovski, 2014).

Bariatric surgery has a substantial effect on weight reduction with a sustained effect for most treated patients (Chang et al., 2014). Compared to the other two treatment approaches bariatric surgery has proven a greater effect on weight loss, between 20-30% (Kushner, 2014; Hofso et al., 2010). All kind of surgery is associated with complications. With bariatric surgery the complication rates range from 10-17% but mortality associated with surgery is low, less than 0.5% (Chang, et al., 2014). A few commonly described post-surgical consequences are deficiencies of vitamins and minerals, revision of the initial surgery and dumping syndrome (Glenny et al., 1997).

Although bariatric surgery gives the best results in weight loss, the risks associated with surgery and the complications that follow are drawbacks. Furthermore, losing weight does not automatically lead to an increase in physical activity (Levine et al., 2005). A majority of post bariatric surgery patients does not reach the recommended daily physical activity (Coen & Goodpaster, 2015). Since the benefits of physical activity on health are clearly proven (Warburton, Nicol & Bredin, 2006) this aspect is to be taken into consideration in all sorts of treatment of obesity. First-line treatment for obesity is lifestyle treatment, followed by pharmacological treatment and bariatric surgery (NIH, 2013; Kushner, 2014). Lifestyle treatment has shown problems with sustaining initial weight loss. Therefore the importance of understanding the mechanisms causing obesity and what affects the outcome of lifestyle treatment is highly relevant.

One upcoming perspective is Food Addiction (FA). The term has occurred in scientific literature since the 1950’s, but it is during the past 15 years the increasing interest to study food intake as similar to substance abuse has appeared (Meule & Gearhardt, 2014). No universal definition of food addiction is established yet (Pursey, Stanwell, Gearhardt, Collins & Burrows, 2014) and what role, if any, FA plays in the global obesity epidemic is still unclear (Ziauddeen & Fletcher, 2012). The current phenomenological discussion about FA can be divided into whether it is a substance abuse or a behavioral addiction (Ziauddeen, Farooqi &
Support for the view of FA as a substance abuse is found in several rodent studies where behavioral, neurological and physiological effects of nutrition’s like fat, sugar, salt and diets based on several of the three, has found similarities to rodent studies of drug addiction (Avena & Hoebel, 2003; Kendig, 2014; Kenny, 2011). Brain imaging studies on humans have shown that obese individuals and those with a substance abuse have structural similarities in the brains reward system (Wang, Volkow, Thanos & Fowler, 2008; Volkow, Wang, Tomasi & Baler, 2013). Significant differences in neural response were found when a group of obese individuals were compared to a lean counterpart in consumption and anticipation of consumption of food (Stice, Spoor, Bohon, Veldhuizen & Small, 2008). Also, differences in neural activation were seen in a group with high scores on FA symptoms compared to a group with low scores during food intake (Gearhardt, 2011).

The critics of FA as a substance abuse object to the conclusion that the result of rodent studies can be generalized to humans since the experimental environment, where addiction to sugar and ‘cafeteria diet’ (high in fat and sugar) has been studied, are widely different from circumstances in daily human life (Ziauddeen et al., 2012). Still, no nutrient, combination of nutrition or concentration of nutrition has been found to be the cause of FA (Ziauddeen & Fletcher, 2012), even though palatable food high in fat, sugar and salt, and highly processed food are commonly mentioned as having addictive potential (Davis & Carter, 2009; Lerma-Cabrera, Carvajal & Lopez-Legarrea, 2015). Hebebrand et al. (2014) has criticized the term “food addiction” for its connotations to a substance-related food. They argue that the studies on rodents and humans investigating FA rather support the existence of an addictive eating behavior and propose “eating addiction” as a better term with connotation to the addictive-like behavior. Hebebrand et al. (2014) focus on the experience of the behavior itself when eating palatable food as the cause of the addiction. They suggest that the behavior of eating cause the similar response in the brain’s reward system, and the overlapping symptoms, as found in individuals with substance abuse.

One instrument used for measuring the prevalence of FA, and that stands independent from the discussion about FA as a substance abuse or behavioral addiction, is the Yale Food Addiction Scale (YFAS) questionnaire. The 25 questions are based on the DSM-IV-TR criteria for substance dependence (Gearhardt, Corbin & Brownell, 2009). FA is not an official diagnose and is not represented in the DSM-V, even though the phenomenon has many familiar features seen in substance abuse of for example tobacco and alcohol, as well as the new DSM-V behavioral addiction diagnose - gambling. Further research is required to give solid scientific support of the empirical evidence that already exist for most of the criteria in the DSM-V (Meule & Gearhardt, 2014). However, the prevalence of FA measured with YFAS is approximately 25% in an obese/overweight population (Pursey et al., 2014; Davis et al., 2011) and about 11% in normal weight population (Pursey et al., 2014). It is a common opinion that losing weight is difficult (Wing & Phelan, 2005) and lifestyle treatment for obesity has shown that about one out of six have gained weight after eight years of treatment (Look AHEAD Research Group, 2014). The question if FA has a crucial negative effect on the treatment of overweight and obesity has been discussed (Stice et al., 2008) and is still highly relevant.
It is possible that for some individuals FA plays an important role to their difficulties in reducing energy intake, but as aforementioned, obesity and overweight also is a result of too low energy consumption. Predictors of physical activity are several. In a review by Bauman et al. (2012) it was found that reported health, intention to exercise, male sex, previous physical activity and self-efficacy are predictors to physical activity in all ages. Self-efficacy is also a predictor for short-term and long-term physical activity in life-style obesity treatment (Teixiera et al., 2015). Self-efficacy can be defined as: “the conviction that one can successfully execute the behavior required to produce the outcomes” (Bandura, 1977). The term is an important part of a social-cognitive theory explaining human behavior. According to the theory, self-efficacy is constructed mainly through four sources of information:

- Enactive mastery experiences that serve as indicators of capability; vicarious experiences that alter efficacy beliefs through transmission of competencies and comparison with the attainments of others; verbal persuasion and allied types of social influences that one possesses certain capabilities; and psychological and affective states from which people partly judge their capableness, strength, and vulnerability to dysfunction. Any given influence, depending on its form, may operate through one or more of these sources of efficacy information (Bandura, 1997, p. 79).

Even though more research is needed to test Banduras theory of sources to self-efficacy for physical activity (SEPA), mastery experience, self-persuasion and reduction of negative affective state seem to be important to develop self-efficacy in the context of physical activity (Warner et al., 2014).

Beside the increased energy consumption and general health benefits, physical activity seems to have neuromechanical effects that reduce cravings for individuals with substance abuse (Linke & Ussher, 2015). Interestingly, it might be that physical activity also reduces cravings in behavioral addictions since this has been found in an exploratory study on gamblers (Angelo, Tavares & Zilberman, 2012). The results are partially supported by former research showing a relationship in severity of problem gambling and poorer mental and physical health (Morasco, Eigen & Petry, 2006). If physical activity can reduce cravings for both substance abuse and behavioral addictions, it is of clinical importance for lifestyle treatment of obesity patients with FA. Not only to increase energy consumption, but to decrease energy intake and help the patient manage the FA, irrespective of the FAs underlying etiological mechanisms.

Physical activity is, together with an improved diet and stress management, one of the three pillars that the lifestyle treatment in the present study is built on. The program is based on the NIH (2013) review of effective interventions in treatment of obesity. The operative phase is during the first year, including 21 days of treatment. Follow-up sessions occur once every year for three years after the treatment has ended. The mean effect in weight reduction is 4.3% during the four years. During the operative phase, a pattern is seen where the participants reduce weight during the first six month and then stabilize their weight for the rest of the year (Hjalmarsson et al., 2014). For this study, BMI at treatment start has been available. A small number of the participants that had undergone treatment longer than 4-6 month had a second BMI measure point. In all, there were too few BMI measure points for the whole group to qualify weight reduction as a variable of outcome. Since the effect of treatment usually occurs
during the first half of the program, the time spent in treatment is to be considered an applicable factor to understand the impact of treatment.

The purpose of this explorative cross-sectional study is to investigate how FA and SEPA separately and together relate to days in lifestyle treatment for obesity during first year of treatment.

Method

Participants

The participants were all undergoing a lifestyle treatment program for obesity at the Center for behavioral medicine in Umeå and Sorsele. The treatment is for people with BMI ≥ 28 combined with complications linked to overweight (e.g. diabetes and/or cardiovascular disease) and for people with BMI > 30. The patients were accepted for lifestyle treatment by referral from doctors, nurses and dieticians mainly in primary health care. To be accepted for treatment, the participants also needed to manage participation in light physical activity and group treatment sessions. These criteria for treatment were applied as inclusion criteria for this study together with the patient’s voluntary commitment to participate in the study.

Of 46 participants four were excluded due to invalid answers, where three or more adjacent questions were left unanswered. The four participants excluded were similarly distributed in age, gender and BMI as the included participants. Of the 42 participants left, 54.8% were women and 45.2% men. The age span ranged between 31-73 years with a mean age of 52 years. The participants were divided into three groups based on the number of days in treatment (see Table 1).

Table 1. Number of participants, number of days in treatment, gender, age and BMI.

<table>
<thead>
<tr>
<th>Group</th>
<th>N (male/female)</th>
<th>Days in treatment mean</th>
<th>Days in treatment min - max</th>
<th>Age mean (SD)</th>
<th>BMI at treatment start mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>19 (9/10)</td>
<td>48</td>
<td>7 - 64</td>
<td>55(10)</td>
<td>37(6.2)</td>
</tr>
<tr>
<td>Group 2</td>
<td>16 (7/11)</td>
<td>134</td>
<td>110 - 173</td>
<td>51(8)</td>
<td>36(5.5)</td>
</tr>
<tr>
<td>Group 3</td>
<td>7 (3/4)</td>
<td>351</td>
<td>328 - 372</td>
<td>47(15)</td>
<td>40(6.1)</td>
</tr>
</tbody>
</table>

Procedure

All patients visiting Center for behavioral medicine during the month that data collection was ongoing were asked to participate in the study. For a description and overview of the treatment program, go to Appendix 1. Information about the purpose of the study was given along with instructions telling the participant to answer the questionnaires in the given order. As part of the treatment program, all patients registered information about their background (e.g. sex and age) and physical health (e.g. weight, waist-measurements and blood values) at day one of treatment. Some of these measures recur (e.g. weight and waist-measures)
with a given interval during the treatment program. Information about the participants’ background and weight has been accessible for this study.

**Measurements**

YFAS - S – The Yale Food Addiction Scale – Swedish is a translated version of YFAS, but no study of its validity has been done yet (personal communication Berginström, 2016, February 18). The instrument was used to measure FA. The English version has good validity in detecting individuals with FA (Davis et al., 2011) with demonstrated convergent, discriminant and incremental validity when compared to other instruments for addictions and eating disorders. The internal reliability for YFAS is good, Kuder–Richardson α = 0.86 (Gearhardt, Corbin & Brownell, 2009). YFAS has been translated to several other languages including French, German, Italian, Turkish and Chinese (Brunault, Ballon, Gaillard, Reveillere & Courtois, 2014; Chen, Tang, Guo, Liu & Xiao, 2015; Innamorati et al., 2014; Meule, Vögele & Kübler, 2012; Sevincer, Konuk, Bozkurt, Saracli & Coskun, 2014). The 24 statements refer to eating behavior and perception during the previous 12 months. Statement 1 to 16 follows by a Likert-scale of five alternatives to choose from: 0 = Never, 1 = once a month, 2 = 2-4 times a month, 3 = 2-3 times a week, 4 = 4 or more times a week. Statement 17 to 24 follows by two alternatives to choose from: No = 0 and Yes = 1. The questionnaire ends with a question about how many times during the past year the respondent has tried to stop eating certain foods altogether, followed by five alternatives: Once or less = 1, 2 times = 2, 3 times = 3, 4 = times, 5 or more times = 5. When scoring YFAS-S, the items are grouped into eight symptom categories (criteria) in conformity with the symptoms of substance dependence in DSM-IV-TR. For each symptom category, there is a cut off value. If the item score for the specific category reaches the cut off value, the criteria is met. To meet a FA diagnose, three or more criteria need to be met together with a reached cut off value for one or both of the two items measuring clinical significant impairment.

ESES - S – Exercise Self-Efficacy Scale - Swedish was used to measure SEPA. The questionnaire is composed by six questions asking for the participant’s confidence in his or her ability to fulfill an exercise program despite common barriers, e.g. “when physically fatigue”. The ratings range from 1-10, where 1 stand for “not confident at all” and 10 stands for “very confident”. When scoring ESES-S, the mean and standard deviation of the six items is used. The English version of ESES has internal consistency with an alpha coefficient > 0.8 and a reliability test-retest correlation > 0.75 (Dzewaltowski, 1989; Yordy & Lent, 1993). ESES-S has moderate test-retest reliability (intraclass correlation coefficient for the total score; .59) and respectable internal consistency (Cronbach alpha, first measure; 87, second measure; 89). Convergent and divergent construct validity is partially supported (Nessen, Demmelmaier, Nordgren & Opava, 2015). Though, the use of International Physical Activity Questionnaire (IPAQ) as an instrument to measure physical activity as done in Nessen et al. (2015) study is questionable (Lee, Macfarlane,Lam & Stewart, 2011).

**Ethical considerations**

The study was approved by the head of Center of behavioral medicine. The participants were informed of the purpose of the study, confidentiality, that participation was voluntary and that they could decline their participation at any time during the completion of the
questionnaires. They were also informed that the data would be part of the continuous
development of Center of behavioral medicines treatment program.

**Results**

The YFAS-S questionnaires had about 2% responses missing. These blanks were
replaced with the median of the respondent’s answers on YFAS-S since this was deemed to be
the best way to replace missing values without compromising the total score. There was one
blank answer in the ESES-S questionnaires, which was replaced with the mean score for that
respondent.

FA did not relate to number of days in treatment, regardless of the scoring option
symptom count or diagnose. Symptom count is the number of criteria met by YFAS-S with a
score ranging from zero to seven and is to be consider lenient compared to the more strict
scoring option diagnose. As shown in Table 2, the YFAS-S symptom score mean is evenly
spread between the groups. Analyzed with a one way ANOVA, number of days in treatment
were compared with symptom score and did not reach statistical significance, $F(2, 39) = 0.33,$
$p > 0.7.$ Number of days in treatment compared with those fulfilling the criteria for diagnose
showed no difference statistically when tested with a $\chi^2$ test; $p > 0.7.$

Table 2 present a similar pattern for ESES-S as for YFAS-S with a mean score evenly
spread between the groups. ESES-S did not relate to number of days in treatment. The
difference between the groups, analyzed with a one way ANOVA, did not reach statistical
significance, $F(2, 39) = 0.12,$ $p > 0.8$ and showed that ESES-S did not relate to number of days
in treatment.

**Table 2. Incidence of diagnose, YFAS-S symptom score mean and ESES-S score mean.**

<table>
<thead>
<tr>
<th></th>
<th>YFAS diagnos/no diagnos</th>
<th>YFAS-S symptom score mean</th>
<th>YFAS-S SD</th>
<th>ESES-S mean</th>
<th>ESES-S SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>3/19</td>
<td>2.158</td>
<td>1.214</td>
<td>4.142</td>
<td>2.012</td>
</tr>
<tr>
<td>Group 2</td>
<td>4/16</td>
<td>2.563</td>
<td>1.632</td>
<td>4.519</td>
<td>2.228</td>
</tr>
<tr>
<td>Group 3</td>
<td>1/7</td>
<td>2.429</td>
<td>1.813</td>
<td>4.314</td>
<td>2.887</td>
</tr>
</tbody>
</table>

The self-reported ESES-S and YFAS-S symptom score did not show any correlation to
each other, $p > 0.6.$ Together with the outcome of precedent analysis, the question of how FA
together with SEPA relate to number days in treatment were deemed to be redundant. The data
available to measure weight reduction for this group indicated expected outcome. 15 of the
participants that had been in treatment for a longer period than four or six month had a second
measure of BMI. The mean weight reduction in BMI were $-3.7$ with a standard deviation of
3.7.

One statistically significant result was seen in a comparison between YFAS-S symptom
score and age in a correlation matrix, Pearson’s $r -0.60$ $p < .001.$ As shown in Figure 1, a
The purpose of this study was to investigate how FA and SEPA separately and together relate to days in lifestyle treatment for obesity during first year of treatment. FA and SEPA do not relate to each other or to number of days in treatment. Therefore, any difference between the participants in self-reported FA and SEPA can be assumed to be better explained by other factors than number of days in treatment. Nothing indicates that these factors combined relate to number of days in treatment. The results indicate that FA and SEPA are two stable factors independent of lifestyle treatment for obesity. A relationship between age and FA was found, where younger respondents report more symptoms of FA than older respondents. This result implies that FA is influenced by age or factors directly related to age.

The results indicate that FA is a stable construct during lifestyle treatment with clinical relevance. No study comparing FA and number of days in treatment has to our knowledge been done before. Two studies have investigated how FA relate to treatment outcome of BMI in lifestyle treatment, finding individuals with FA at baseline (diagnose or higher level of symptom score) having the same treatment outcome as individuals without FA (Burmeister, Hinman, Koball, Hoffmann & Carels, 2013; Lent, Eichen, Goldbacher, Wadden & Foster, 2014). Together with the results in the current study, it indicates that FA is unaffected by lifestyle treatment and that the outcome in weight reduction is unaffected by FA.

Lent et al. (2014) offers two suggestions when discussing their result of no relation between FA and treatment outcome. First; lifestyle treatment may also treat FA by giving the participants tools like self-monitoring that is useful for FA as well. Second; FA might be of clinical irrelevance to lifestyle treatment for obesity. Findings in the present study give no
support for the possibility that treatment affects FA as discussed by Lent et al. (2014), as our findings would have shown less symptom scores in group 3 than group 1. The second way of reasoning might be true, but is still unresolved and it is possible to view the findings in the present study as an indicator of the longitudinal impact of FA. If FA is a stable factor as the findings in the present study indicates, FA may be part of the explanation why maintaining weight reduction is one of the major challenges in weight loss treatment (Look AHEAD Research Group, 2014; Middleton et al., 2011). It is possible that lifestyle treatment help the participant to reduce negative eating behavior without treating the actual addiction. A longitudinal study of the stability of FA on individuals undergoing lifestyle treatment and how it may relate to weight regain could answer that question.

Of what relevance, if any, the perspective of viewing some individuals eating behavior as similar to an addiction is continuously up for debate. Since no nutrient has been identified as causing addiction, and the scientific support for the presence of all DSM symptoms is weak, the question of whether or not FA exists is still possible to discuss. A third way of making the term relevant is to find it clinically useful. The finding of FA as stable during lifestyle treatment will be of importance if future studies can identify a unique feature for the group of food addicts that is of importance for treatment. As aforementioned, finding FA to be influencing weight regain could be such a feature. Otherwise, as summarized by Long, Blundell and Finlayson (2015) one way is to view FA as a sub-category to binge-eating, which may give the thoughts, feelings and behaviors identified by YFAS a more useful function than to be a term aspiring to explain the global health problem of obesity.

SEPA measured with ESES-S seems to be stable during lifestyle treatment. Blanchard et al. (2007) shows that barrier self-efficacy (a similar measure to SEPA) is stable during and after an intensive physical activation counseling intervention for a group of inactive patients in primary health care. Interestingly the control group had a lowered barrier self-efficacy during the time of the study, indicating that a stable level of self-efficacy could be seen as a positive treatment outcome for patients with a sedentary behavior. A discrepancy between the respondents perceived ability to overcome barriers for physical activity and the respondents’ actual ability may be an explanation to this outcome. For the participants in lifestyle treatment the support and experience they are given during treatment program help them match their perception of their ability, something they might have been unable to do if they were not undergoing the treatment program. Disregarding the finding by Blanchard et al. (2007), the outcome of ESES-S as stable during treatment is to be considered unexpected. According to theory (Bandura, 1997) and previous research (Warner et al. 2014), an important source of self-efficacy is the experience of mastering a specific task, which is an expected part of undergoing lifestyle treatment with scheduled physical activity. A possible explanation to the findings in the present study is that the lifestyle treatment do not challenge the participant to a possible and expected extent and since Blanchard et al. (2007) also found SEPA to be stable in an intervention aiming for an increase in physical activity, this might be a general problem for this kind of interventions. Future studies investigating the possibility to increase mastery experience for physical activity in lifestyle treatment is therefore suggested.

The relationship of an inverse correlation between FA, both YFAS-S symptom score and diagnose, and age has previously been found (Eichen, Lent, Goldbacher & Foster, 2013;
Flint et al., 2014). Though, other studies have found the opposite relationship where adults aged > 35 had significantly higher prevalence of FA (22%) than adults aged < 35 (17%) (Pursey et al., 2014). These ambiguous results give an inconclusive answer to the relationship between FA and age. It is possible that there are a higher prevalence of FA in the younger population in Västerbotten compared to the older population. We know that many of the participants were referred to lifestyle treatment after routine health controls offered to 40, 50 and 60 years old citizens in the region. Postulated that there is a higher prevalence of FA in the younger population, and that FA is strongly associated with obesity, it is reasonable that a larger amount of individuals with FA are enrolled into treatment at the 40 year health control compared to the health controls for 50 and 60 years old. Though, given that the prevalence of FA is not higher in the younger population, the outcome of YFAS-S might be caused by a confounding factor linked to the participants’ perceived problems with being obese. The older participants might perceive their overweight as less of a burden but get their problem actualized by the health system. In contrast to the younger participants who seek help more actively and therefore perceive their obesity as more of a problem.

Limitations

Although the study was done on a clinical sample of considerable size there are some limitations. The lack of a validated version of YFAS-S gives the findings in the present study a degree of uncertainty. The risk that the Swedish version of YFAS do not measure the same construct as the English version and that the accuracy is unknown, need to be taken into consideration. Moreover, the YFAS-S asked for the participants’ experiences of the past 12 month which is a formulation that can be interpreted differently by the respondents. Depending on how much importance the participants attribute their thoughts, feelings and behaviors before and after treatment start, their understanding of the items might have differed between each other.

The study investigating the validity of ESES-S was done in a rheumatoid arthritis population (Nessen et al., 2015). To what extent the validity of ESES-S might differ between various clinical populations is uncertain, but need to be taken into consideration.

The participants undergoing lifestyle treatment at the Centre of behavioral medicine are frequently submitted to questionnaires of different sorts possibly leading to fatigue and a routine-like response pattern. Furthermore, some participants might have chosen to decline due to this battery of questionnaires, or other unknown factors, which might have resulted in homogeneity among the patients who chose to participate in the study.

The absence of outcome variables and the cross-sectional design are obstructive circumstances of this study when trying to understand the relation of FA and SEPA in lifestyle treatment for obesity. Thus the conclusions are tentative. To support the indications that has been given, a study investigating outcome variables like BMI together with FA and SEPA is needed.
References


Figure 2: Illustration of the lifestyle treatment program in Umeå and Sorsele done by the authors (Landstingets kommunikationsstabil (CK), 2015; Västerbottens läns landsting, 2015).