Facilitators and barriers for eating behavior change in individuals with obstructive sleep apnea and obesity.

Author:
Søren Spörndly-Nees

Supervisor:
Pernilla Åsenlöf
Associate Professor, Department of Neuroscience, Physiotherapy

Examiner:
Inger Holmström
Associate Professor, Department of Public Health and Caring Sciences, Health Service Research

Thesis, Advanced Level, 30c
Spring 2010
Abstract

**Background:** Obstructive Sleep Apnea Syndrome (OSAS) is prevalent and the syndrome is associated with increased risk of health related problems. A positive effect of behavioral change programs to reduce weight is expected. More research is needed to identify barriers and facilitators to behavior change.

**Aim:** To identify prerequisites for eating behavior change in obese patients with OSAS.

**Method:** Semi-structured interviews were conducted on 15 obese patients living with OSAS. Data were analyzed using qualitative content analysis.

**Result:** The categories identified as barriers to change in eating behavior in the analysis were desire and craving, influenced by mental state, low self-confidence, insufficient support, social acceptance, complexity of coping with new eating behaviors in daily routines, costs, lack of knowledge, perceived helplessness and low susceptibility. Categories that were identified as facilitators to change in eating behavior were high value of outcome expectations, support and control, external premises, applicable behavior change strategies, self-worth and being triggered by weight increase.

**Conclusion:** To motivate patients living with OSAS to change their eating behavior it is necessary to address both barriers and facilitators. The categories low susceptibility as a barrier and high value of outcome expectations as a facilitator appears to be important for this patient group.

**Keywords:** Obstructive sleep apnea syndrome, content analysis, obesity, eating behavior, behavior change.
Sammanfattning


Syfte: Att identifiera förutsättningar för att ändra matvanor hos feta patienter med OSAS.

Metod: Semistrukturerade intervjuer utfördes på 15 feta patienter med OSAS och kategorier identifierades med hjälp av en innehållsanalys.

Resultat: Följande kategorier identifierades de som hinder till förändrade matvanor i analysen; begär och sug, påverkan av sinnestillstånd, lågt självförtroende, otillräcklig stöd, social acceptans, komplexiteten i att klara av nya beteenden i dagliga rutiner, kostnader, brist på kunskap, upplevd hjälplöshet och låg mottaglighet. De kategorier som underlättade ändrade matvanor i studien var följande: högt värde av förväntningar, stöd och kontroll, externa faktorer, användbara strategier för ändringar i beteende, självkänsla och viktökning som utlösare.

Slutsats: För att framgångsrikt motivera patienter med OSAS att ändra sina matvanor måste hänsyn tas både till hinder och till faktorer som underlättar ett förändrat beteende. Kategorierna ”låg mottaglighet” som ett hinder och ”högt värde av förväntningar” som underlättande faktor tycks vara viktiga för denna patientgrupp.

Nyckel ord: obstruktivt sömnapné-syndrom, innehållsanalys, ät beteende, beteende förändring
Introduction
Patients with obstructive sleep apnea syndrome (OSAS) are candidates for behavioral change treatment as overweight and obesity are associated with the syndrome (Young, Peppard, & Taheri, 2005). The intention of this study was to examine factors of importance with regard to obtaining a change in the eating behavior of patients with OSAS.

Background
Definition
Obstructive sleep apnea syndrome (OSAS) is characterized by loud snoring, repeated episodes of obstruction in the upper airway during sleep and causes a partial (hypopnea) or total stop in the airflow (apnea). The duration of the episodes are more than ten seconds and five times per hour of sleep accompanied with a drop in oxygen saturation of five percentages (Schroeder, Schulze, Hilsted, & Aldershvile, 2004; Franklin, Rehnqvist, & Axelsson, 2007). This may lead to lack of sleep continuity and daytime sleepiness which as well as loss of memory and concentration problems are reported in this patient group (Broström, Johansson, Strömberg, Albers, Mårtensen, & Svanborg, 2007; Veale, Poussin, Benes, & Bazire, 2002).

To diagnose patients with OASA criterion 1 plus 2 or 3 must be fulfilled.

1. Five or more obstructive breathing events per sleeping hour
2. Excessive daytime sleepiness that cannot be explained by anything else
3. Two or more of the following that are not explained by other factors
   - Choking or gasping during sleep
   - Frequent awaking from sleep
   - Unrefreshing sleep
   - Daytime fatigue
   - Impaired concentration (Franklin, Rehnqvist, & Axelsson, 2007).

The severity of the OSAS is determined by two components; the severity of overnight monitoring of obstructive breathing events and the daytime sleepiness.

Overnight respiration is monitored along with pulse oximetry, electrocardiogram (ECG) and measures of sleep stages with an electroencephalogram (EEG). The apnoea-hypopnoea index (AHI) is the mean number of apnoeas and hypopnoeas per hour of sleep and AHI above 5 is
considered pathological. The outcome is classified into mild 5 to 15, moderate 15 to 30 and severe > 30 obstructive breathing events per hour.

Sleepiness is in the same way classified into three categories mild, moderate or severe. Mild; unwanted sleepiness or sleep episodes occurring during activities requiring little attention, moderate; unwanted sleepiness or sleep episodes occurring during episodes requiring some attention and severe; unwanted sleepiness or sleep episodes occurring during episodes requiring active attention (Franklin, Rehnqvist, & Axelsson, 2007).

Loss of activity in the muscles controlling dilatation in the upper airway, increased activity in inspiratory chest muscles and an initially small size of the upper airway are possible mechanisms suggested as explanation for the syndrome (Shneerson & Wright, 2001). Obesity is reported as a common cause for small size upper airways and the superficial fat tissue located in the neck area is thought to compress the pharynx leading to nighttime collapse of the pharynx. The neck circumference is reported to be an important predictor for OSAS (Strandling & H, 1991; Davies, Ali, & Strandling, 1992).

Prevalence
The prevalence of OSAS in middle-aged adults who has combined apnea-hypopnea score of 5 or above and self-reported hypersomnolence is estimated on data from the United States to be 2 percent among women and 4 percent among men (Young, Palta, Demosey, Skatrud, Weber, & Badr, 1993). In the United Kingdom similar prevalence of 1.5 percent in woman and 3.5 percent in men is reported (Ohayon, Guilleminault, Priest, & Cautel, 1997). In Korea the prevalence in women is 3.2 and 4.5 percent in men (Kim, et al., 2004) and an Indian study reports a prevalence of 7.5 percent in a study only assessing men. The high prevalence makes OSAS a syndrome of interest seen from a public health perspective. (Udwadia, Doshi, Lonkar, & Singh, 2004). No studies reporting the prevalence in the Scandinavian population has been identified prior to this study.

Consequences
The consequences of having OSAS are numerous. OSAS is associated with hypertension (Peppard P. E., Young, Plata, & Skatrud, 2000; Nieto, et al., 2000), and an increased risk of cardiovascular diseases and mortality (Young, et al., 2008; Marin, Carrizo, Vicente, & Agusti, 2005; Punjabi, et al., 2009; Yaggi, Concato, Kerman, Lichtman, Brass, & Mohsenin, 2005). Recent studies have reported significantly increased all-cause mortality in OSAS patients (Marshall, Wong, Y., Cullen, Knuiman, & Grunstein, 2008; Punjabi, et al., 2009; Young, et
al., 2008; Yaggi, Concate, Kerman, Lichtman, Brass, & Mohsenin, 2005) and an increased risk of road traffic accidents. (Terán-Santos, Jiménez-Gómez, & Cordero-Guevara, 1999).

Patients describe snoring, frequent awakening, dyspnoea, frustration over nocturia, fear of dying during sleep and the partners’ anxiety about the condition as negative effects of the OSAS affecting daily life (Broström, Johansson, Strömberg, Albers, Mårtensen, & Svanborg, 2007). Furthermore health related quality of life measured through the Medical Outcome Survey Short Form 36 (SF36) is found lower in patients with OSAS than in the general population (Pichel, Zamarrón, Megán, del Campo, Alvarez-Sala, & Suarez, 2004). Decrease in health related quality of life is in a recent study seen throughout all of the eight parameters measured in the SF36 questionnaire (physical function, role limitations due to physical health problems, body pain, general health perception, vitality, social functioning, role limitations due to emotional health problems and mental health). A relation between high quality of life and low severity of OSAS exists (Lopes, Esteves, Bittencourt, Tufik, & Mello, 2008). As such OSAS is a condition affecting both physical as well as mental health.

Risk factors
Contributing factors for OSAS are increasing age (Ip, et al., 2001; Ip, Lam, Tang, Lauder, Ip, & Lam, 2004), habitual snoring (Young, Peppard, & Gottlieb, 2002) and male sex increases the risk in a male to female ratio on approximately 3:1 (Young, Palta, Demosey, Skatrud, Weber, & Badr, 1993). Alcohol and sleeping in supine position also makes the apneas more prevalent (Franklin, Rehnqvist, & Axelsson, 2007).

Obesity is known to be associated with OSAS (Young, Palta, Demosey, Skatrud, Weber, & Badr, 1993; Lopes, Esteves, Bittencourt, Tufik, & Mello, 2008). Among patients with OSAS 90 percent has been shown to have a body mass index (BMI) > 25 (Anttalainen, Saaresranta, Kalleinen, Aittokallio, Vahlberg, & Polo, 2007) and a strong causal role of excessive body weight is suggested to be likely on this syndrome (Young, Peppard, & Taheri, 2005). According to a population based prospective cohort study a moderate decrease in body weight of 10 percent may lead to a decrease in the AHI on 26 percent and 10 percent weight gain predict 32 percent increase in the AHI (Peppard P. E., Young, Palta, Dempsey, & Skatrud, 2000).

Exercise may be important to improve the condition and is in a recent randomized controlled study found to improve the AHI, health related quality of life and quality of sleep in patients
with OSAS (Sengul, Ozalevli, Oztura, Itil, & Baklan, 2009) but the overall evidence for exercise and physical activity is not sufficient (Shneerson & Wright, 2001).

**Treatment**

A variety of treatments for the OSAS exists including continuous positive airway pressure (CPAP), oral appliances, surgery, pharmacology and weight reduction through lifestyle changes. The CPAP treatment is constant positive air pressure through a mask covering the nose or both nose and mouth. The patient wears the mask during sleep and the positive air pressure prevents the tongue and soft palate from collapsing (Franklin, Rehnqvist, & Axelsson, 2007). CPAP is currently regarded as the most effective treatment for the syndrome (Giles, Lasserson, Smith, White, Wright, & Cates, 2006). The oral appliances widen the upper airway by displacing the tongue, soft palate and epiglottis anterior. These are shown less effective compared to CPAP treatment (Giles, Lasserson, Smith, White, Wright, & Cates, 2006). Surgery involves removing tissue obstructing the airway or bypassing the upper airway. No evidence supports the use of surgery and post operative complications are reported (Franklin, Rehnqvist, & Axelsson, 2007). Treatment is often combined with recommendations of lifestyle modifications, even though the evidence is lacking for the latter (Shneerson & Wright, 2001). In a recent randomized controlled study the effect on weight loss induced by a very low energy diet on obese men with moderate and severe OSAS was examined. The treatment improved the AHI status with 67 percent and 17 percent were disease free after 9 weeks (Johansson, et al., 2009). Lifestyle interventions are in recent published controlled randomized intervention studies suggested as an effective treatment in mild and severe OSAS. The studies examined the effect of an initial very low calorie diet followed by a lifestyle change intervention for weight reduction and gives promising support for the recommendations of lifestyle modifications as treatment in mild (Tuomilehto, et al., 2009) moderate and severe OSAS (Foster, et al., 2009).

**Behavior change theory**

In planning and executing lifestyle modifications aiming at a persistent behavioral change it may be important to understand and take individuals decision making on health related behaviors into account (Glanz, Rimer, & Lewis, 2002). The theoretical understanding along with knowledge on what influences motivation engaging in healthy behavior in a certain group of individuals could be helpful in tailoring health behavior changes.
The Transtheoretical Model of Stage of Change (TTM) provides a theoretical framework for understanding the process of behavioral change and form a basis for tailoring interventions. It describes behavior change as occurring in five stages. Precontemplation stage is characterized by individuals not intending to take action towards behavioral change within the next 6 months. The following contemplation stage, consists of individuals intending to take action within the next 6 months. In the preparation face some steps towards behavioral change has been made and intention to take action within 30 days exist. Specific modifications in lifestyle behaviors have occurred for less than 6 months in the action stage. The maintenance stage is present when a behavioral change has lasted for more than 6 months, in this stage individuals seek to prevent relapse (Prochaska, Redding, & Evers, 2002).

Ten processes of change used by the individual to facilitate progression through the stages are described within the theory. Self-efficacy and perceived pros and cons for a behavioral change, the decisional balance are other important constructs of the TTM (Spencer, Wharton, Moyle, & Adams, 2007). In an intervention study by Johnson et al. interventions based on the TTM, is shown to improve healthy eating, exercise, managing emotional stress and weight in a population of overweight and obese adults (Johnson, et al., 2008). The TTM shows promising results in weight loss and may give a sufficient base for designing behavioral change interventions.

**Qualitative research on behavioral change**

Identifying and understanding barriers and factors facilitating change may be essential for the successful tailoring of interventions to initiate a persistent behavioral change. Qualitative research on the perception of diet, motivators and barriers in a low-income community in the United States was conducted through a survey involving in total 796 subjects. The results shows time, costs, laziness, taste, lack of discipline and being picky as the top five barriers for healthful eating. The top five motivators for healthful eating were; for health, to feel good/better, to live long, to maintain health and to treat diseases. Family was the number one to enable healthful eating (Eikenberry & Schmidt, 2004). Focus groups on 27 participants divided on five groups and eight interviews was conducted in a low-income community in the United Kingdom. Findings show costs, availability and education as barriers in healthful eating. Furthermore this study report perceived helplessness as a barrier, meaning a number of issues the participants felt impacted their weight status but were unable to change such as metabolism, genetics and family shape, lack of time, childcare and time management. Social and family network along with education and awareness were also influencing healthful
eating (Withall, Jago, & Cross, 2009). Motivators and barriers to healthful eating were examined in low-income mothers with overweight and obesity. Information was collected through eight focus group interview with Non-Hispanic black and non-Hispanic total 80 participants. Outcome expectancies were identified as a motivating factor. Personal appearance, a desire to fit into favorite clothes and to participate in their children activity was important to motivate the mothers. Physical discomfort and diseases related to overweight would also motivate them to weight loss. Social support was reported to facilitate more long-term weight loss. Barriers to healthy lifestyle behaviors were outcome expectancies as a history of unsuccessful weight loss attempts made the mothers give up searching for appropriate help for weight loss. Self-efficacy was related to more factors e.g. giving up due to repeated experiences of regaining lost weight. Emotional coping response was identified as a theme and deals with participants using large portions and high calorie food to cope with stress, negative emotions, loneliness and boredom. Physical environment, lack of social support and a stressful lifestyle caused skipped meals or snacking throughout the day. The situation was also reported as a barrier both economical and not being in control of their weight due to genetic, low metabolism or side effects of birth control (Chang, Nitzke, Guilford, Adair, & Hazard, 2008).

The motivation and perceived barriers towards weight loss in overweight men wanting to lose weight were explored in four focus groups of total 22 men. Appearance and health hazards of being overweight were mentioned as motivation factors similar to the results of Eikenberry & Schmidt 2004. The strongest motivator identified was the desire to be effective at the work and attractive for the job marked. The most frequent mentioned barrier for weight loss was lack of motivation. The perception of slim diet was also considered as a barrier (Sabinsky, Toft, Raben, & Holm, 2007).

Views regarding dietetic service, outcomes of dietary treatment and impact on attending dietitian on obese patients’ lives were examined in 24 obese patients. Accessibility and costs for dietary treatment were emphasized as important in affecting the choice of treatment. Facilitators towards change included support from family, friends and professionals. Furthermore behavioral strategies such as self-monitoring and motivational issues such as feeling fitter, happier more energetic as well as losing weight were identified. Fear as a trigger and education on diet and health risks of obesity were also reported as important facilitators towards change. Barriers were beliefs that it was difficult to eat healthy and that they already had healthy eating habits. Psychological factors such as depression, negative emotions, stress,
feeling sad, lack of motivation and hating to feel committed were other reported barriers. Environmental factors, physical factors, and unrealistic expectations were also mentioned as barriers to change (Jones, Furlanetto, Jackson, & Kinn, 2007). For brief overview of the presented articles see table 1.

Table 1. Main barriers and facilitators of identified are summarized and presented with description of sample and authors. Barriers and facilitators similar but labeled different are presented together

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Sample</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td></td>
<td>Low income communities (n=27)</td>
<td>Withall, Jago &amp; Cross, 2009</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td></td>
<td>Overweight men (n=13)</td>
<td>Sabinsky, toft, Raben &amp; Holm, 2007</td>
</tr>
<tr>
<td>Availability /Environmental factors</td>
<td>Low income communities (n=27)</td>
<td>Withall, Jago &amp; Cross, 2009</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Perceived helplessness</td>
<td>Low income communities (n=27)</td>
<td>Withall, Jago &amp; Cross, 2009</td>
</tr>
<tr>
<td>Emotional status</td>
<td>Low income communities (n=27)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td></td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Eikenberry &amp; Smith, 2004.</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>Overweight men (n=13)</td>
<td>Sabinsky, toft, Raben &amp; Holm, 2007</td>
</tr>
<tr>
<td>Beliefs</td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Physical factors</td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Unrealistic expectations</td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Outcome expectancies</td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td>Physical environment</td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td>Social support</td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td>Situation</td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>For health /Motivational issues</td>
<td>Low income communities (n=796)</td>
<td>Eikenberry &amp; Smith, 2004.</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>To feel good/better</td>
<td>Low income communities (n=796)</td>
<td>Eikenberry &amp; Smith, 2004.</td>
</tr>
<tr>
<td>To live long</td>
<td>Low income communities (n=796)</td>
<td>Eikenberry &amp; Smith, 2004.</td>
</tr>
<tr>
<td>To maintain health /Motivational issues</td>
<td>Low income communities (n=796)</td>
<td>Eikenberry &amp; Smith, 2004.</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>To treat diseases</td>
<td>Low income communities (n=796)</td>
<td>Eikenberry &amp; Smith, 2004.</td>
</tr>
<tr>
<td>Social and family network /</td>
<td>Low income communities (n=27)</td>
<td>Withall, Jago &amp; Cross, 2009</td>
</tr>
<tr>
<td>Support</td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Education and awareness</td>
<td>Low income communities (n=27)</td>
<td>Withall, Jago &amp; Cross, 2009</td>
</tr>
<tr>
<td></td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Desire to be effective at the</td>
<td>Overweight men (n=13)</td>
<td>Sabinsky, toft, Raben &amp; Holm, 2007</td>
</tr>
<tr>
<td>work and attractive for the job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>marked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance and health hazards of</td>
<td>Overweight men (n=13)</td>
<td>Sabinsky, toft, Raben &amp; Holm, 2007</td>
</tr>
<tr>
<td>being overweight /</td>
<td>Low income overweight and obese mothers (n=80)</td>
<td>Chang, Nitzke, Guilford, Adair &amp; Hazard, 2008</td>
</tr>
<tr>
<td>Outcome expectancies</td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Behavioral strategies</td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
<tr>
<td>Fear</td>
<td>Obese adults (n=24)</td>
<td>Jones, Furlanetto, Jackson &amp; Kinn, 2007</td>
</tr>
</tbody>
</table>
Summary
The prevalence of OSAS in middle-aged adults is high 1.5-3.2 and 3.5-7.5 percent for women and men respectively (Young, Palta, Demosey, Skatrud, Weber, & Badr, 1993; Ohayon, Guilleminault, Priest, & Caulet, 1997; Kim, et al., 2004; Udwadia, Doshi, Lonkar, & Singh, 2004) and risk factors of having OSAS are numerous. OSAS is associated with hypertension (Peppard P. E., Young, Plata, & Skatrud, 2000; Nieto, et al., 2000), increased risk of cardiovascular diseases and mortality (Young, et al., 2008; Marin, Carrizo, Vicente, & Agusti, 2005; Punjabi, et al., 2009), increased risk of road traffic accidents (Terán-Santos, Jiménez-Gómez, & Cordero-Guevara, 1999), increased all-cause mortality (Marshall, Wong, Y., Cullen, Knuiman, & Grunstein, 2008; Punjabi, et al., 2009; Young, et al., 2008) and health related quality of life (Pichel, Zamarrón, Megán, del Campo, Alvarez-Sala, & Suarez, 2004; Lopes, Esteves, Bittencourt, Tufik, & Mello, 2008).

Weight loss may be an important treatment for OSAS (Peppard P. E., Young, Palta, Dempsey, & Skatrud, 2000) and to obtain behavioral changes in healthy eating interventions based on the TTM has shown promising results (Johnson, et al., 2008). Evidence for lifestyle interventions as a treatment of OSAS is lacking (Shneerson & Wright, 2001) but a recent publication show good results (Tuomilehto, et al., 2009). Eating behavior is important in interventions aiming at reducing body weight however it is unknown how patients with OSAS view dietary behaviors. It could be of great importance for tailoring behavioral interventions to bear the experiences of patients living with OSAS in mind. Identification of barriers is considered important in order to know whether certain factors are limiting progress and result of behavioral treatment (Garaulet & Pérez de Heredia, 2009). Studies examining facilitators and barriers towards diet change, weight change and dietary treatment exist but no studies have been done on obese patients living with OSAS’ perception on facilitators and barriers. To provide effective purposeful treatment affecting the eating behaviors and eventually resulting in persistent weight loss knowledge is needed on what is perceived as motivators and barriers towards the behavior change.
Aim
The overall aim of this study is to identify prerequisites for eating behavior change in obese patients with OSAS.

Research question
1. What are the perceived facilitators and barriers for engagement in healthy eating behaviors in obese patients with OSAS?

Method
Design
This study is a part of a larger descriptive qualitative study aiming to describe what characterize expectancies, experiences and behaviors related to physical activity, eating habits and CPAP adherence in individuals with OSAS combined with obesity.

To provide information for use in tailoring future behavioral interventions, experiences from this patient group on diet and sound eating habits were explored in a semi-structured interview on 15 obese patients (BMI> 30) living with OSAS.

Qualitative research is suggested to develop an understanding of a phenomenon as it is present in the real world (Polit & Beck, 2008). One technique within the qualitative research tradition is the content analysis which aims to make a replicable and valid inference from a text to the context of their use (Krippendorff, 2004). The content analysis has been used in health care research to process transcribed interviews (Söderberg & Lundman, 2001). The content analysis was found suitable for the aim and the descriptive nature of this study, as it focuses on both differences and similarities with in the data collected and allows various depth of interpretation (Graneheim & Lundman, 2004). In order to describe the process and understand the experiences and behaviors related to nutrition habits of this population a descriptive qualitative semi structured interview study was conducted. Content of importance for eating behavioral change appearing in interviews was extract by performing a content analysis on the data (Graneheim & Lundman, 2004).
Selection of participants

Purposeful sampling was made to ensure experiences from a wide variety of patients with OSAS concerning age, gender, education, civil status, severity and duration of established OSAS, level of obesity (BMI) and self-identified stage of change.

Inclusion: patients with moderate or severe OSAS, defined as apnoea-hyponea-index (AHI) and desaturation index (DI) > 15 in combination with obesity (BMI > 30), who control the Swedish language.

Exclusion: Patients with cardio-vascular diseases including myocardial infarctions and stroke.

Table 2. Informant characteristic

<table>
<thead>
<tr>
<th>Informants (n) Total</th>
<th>N=15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8 (53%)</td>
</tr>
<tr>
<td>Female</td>
<td>7 (47%)</td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
</tr>
<tr>
<td>Mean (Range ± SD)</td>
<td>56.8 (41-71 ± 10.15)</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
</tr>
<tr>
<td>Mean (Range ± SD)</td>
<td>38.47 (31.7-52.3 ± 5,75)</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
</tr>
<tr>
<td>Compulsory school</td>
<td>4 (26.7%)</td>
</tr>
<tr>
<td>High school</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Collage/University</td>
<td>8 (53.2%)</td>
</tr>
<tr>
<td>Working status</td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td>9 (60%)</td>
</tr>
<tr>
<td>Pension</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Of work sick</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Smoking status</td>
<td></td>
</tr>
<tr>
<td>Non</td>
<td>8 (53.3%)</td>
</tr>
<tr>
<td>Stopped</td>
<td>5 (33.3%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Duration of established OSAS in years</td>
<td></td>
</tr>
<tr>
<td>Mean (Range ± SD)</td>
<td>3.2 (0.5-10 ± 2,87)</td>
</tr>
<tr>
<td>Civil status</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>6 (40 %)</td>
</tr>
<tr>
<td>Cohabiting/married</td>
<td>9 (60%)</td>
</tr>
</tbody>
</table>

Procedure

Patients visiting the CPAP-unit at Uppsala Academic Hospital who fulfilled the inclusion criteria were asked by a physician or nurse to participate in the study, selected to fulfill the
purposeful sampling. The researcher provided written and oral information on the study and the participants gave their written consent. Appointment for the interview was made by telephone and took place at Uppsala Academic Hospital in the physiotherapy department. A senior researcher conducted all interviews in accordance with an interview guide. An assistant researcher or doctoral student managed technical equipment on all occasions but one.

Data collection
Participants personal data; year of birth, gender, weight, height, civil status, education level, job situation, smoking status along with questions concerning diseases, medicine and time since diagnosed sleep apnea and time using the CPAP device were collected. The participants were asked to evaluate their eating behavior by choosing one of six statements best describing their current eating habits. Each statement was representing a stage from the TTM (Appendix 1). To ensure confidentiality each informant was given a number as future reference.

Semi structured interviews with open ended questions were conducted. The interview guide (Appendix 2) was prior to the interviews tested in a pilot interview on a participant matching the inclusion criteria, for the relevance and comprehensibility. Initial questions were followed by clarifying questions when needed. The interview guide was created to support the interviewer in structuring the interview to assure all three content areas of importance for the aim of the study was covered (CPAP adherence, physical activity and diet behavior). The interviews were all recorded on an Olympus DS-40 Dictaphone and the duration was between 25 – 60 minutes.

Methods for analysis
All interviews were transcribed verbatim and a content analysis (Graneheim & Lundman, 2004) was conducted on the whole written interview, the unit of analysis.

All interviews were read and content concerning nutrition and eating behavior was identified.

From this meaning units were extracted. The meaning units were separated from the transcribed text and presented in a table after content area roughly divided into three content areas; barriers, facilitators and other. The later representing text not directly qualified as either barrier or facilitator but in need of further examination from the original context.

The table was read again and condensation was performed as spoken language was removed to shorten the amount of text forming the basis for the result.
Meaning units from the content area, other was divided into either barriers or facilitators and each of content areas were reorganized in temporary categories and further condensation was made.

The meaning units was coded, arranged in sub-categories and categories. Eight categories occurred in the content area of barriers, nine in facilitators and two in others. After rearranging the results and research triangulation the content areas were limited to barriers and facilitators.

Reviewing the categories was done to capture more details in the main categories and avoid losing information due to high level of abstraction. After the review 14 categories appeared as barriers and 18 as facilitators. On the basis of these in order to capture the essence of the categories the final 10 and 6 categories arose with 14 and 18 sub-categories for barriers and facilitators respectively.

Trustworthiness was sought by including participants representing a broad variety of experiences identified in the purposeful sampling and by triangulating with another researcher. The results are presented in categories and sub-categories and documented with quotations in order to make the process from transcribed text to categories and sub-categories transparent to the reader.

**Ethical considerations**

The study participants received written and oral informed about the procedure and gave their written consent to participate. The informants were informed that they could withdraw at any time and confidentiality was insured by de-identifying data. No side effect was suspected of participating in the study, but informants are likely to be touched when reflecting over questions concerning their situation. Finally the study was approved by the Regional Ethic Committee, Uppsala (EPN D-nr 2008-030).
Results

In this section the two content areas barriers and facilitators are presented. Within each content area categories are explained and documented with central quotations aiming to exemplify statements representative for the specific category. The result is summarizes in table 3 showing categories and sub-categories for the barriers and facilitators identified.

Table 3. Results. Barriers and facilitators presented in category and sub-categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Barriers</strong></td>
<td></td>
</tr>
<tr>
<td>Desire and craving</td>
<td>Need of fulfilling the liking of and satisfying the craving/lust for food</td>
</tr>
<tr>
<td></td>
<td>Compensating the desire for tobacco</td>
</tr>
<tr>
<td>Influenced by mental state</td>
<td>Controlling feelings</td>
</tr>
<tr>
<td></td>
<td>Mental state effecting eating habits and motivation</td>
</tr>
<tr>
<td>Low self-confidence</td>
<td>Not feeling able to cope with the problem</td>
</tr>
<tr>
<td>Insufficient support</td>
<td>Harping about – opposite effect</td>
</tr>
<tr>
<td></td>
<td>Personal chemistry</td>
</tr>
<tr>
<td></td>
<td>Wanting support</td>
</tr>
<tr>
<td>Social acceptance</td>
<td>Afraid of disrespecting host by eating/drinking very little</td>
</tr>
<tr>
<td>Complexity of coping with new eating behavior in daily routines</td>
<td>Troublesome to carry through healthy eating</td>
</tr>
<tr>
<td>Costs</td>
<td>Too expensive</td>
</tr>
<tr>
<td>Lack of knowledge</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Perceived helplessness</td>
<td>Not feeling able to effect one’s own situation</td>
</tr>
<tr>
<td>Low susceptibility</td>
<td>Perceived low susceptibility</td>
</tr>
<tr>
<td><strong>Facilitators</strong></td>
<td></td>
</tr>
<tr>
<td>High value of outcome expectations</td>
<td>Consequence expectation</td>
</tr>
<tr>
<td></td>
<td>Results and expectations motivates</td>
</tr>
<tr>
<td>Support and control</td>
<td>Support from peer or professional</td>
</tr>
<tr>
<td></td>
<td>Group support</td>
</tr>
<tr>
<td></td>
<td>Control as support</td>
</tr>
<tr>
<td></td>
<td>Family support</td>
</tr>
<tr>
<td></td>
<td>Individual support</td>
</tr>
<tr>
<td>External premises</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td>Easy accessible</td>
</tr>
<tr>
<td>Applicable behavior change strategies</td>
<td>Applicable knowledge on healthy food</td>
</tr>
<tr>
<td></td>
<td>Strategy for routine change and stimulus control</td>
</tr>
<tr>
<td></td>
<td>Holistic treatment approach</td>
</tr>
<tr>
<td></td>
<td>Need for energy impute/output measures</td>
</tr>
<tr>
<td></td>
<td>Strategy</td>
</tr>
<tr>
<td></td>
<td>Insight and knowledge</td>
</tr>
<tr>
<td>Self-worth</td>
<td>Good self-confidence</td>
</tr>
<tr>
<td></td>
<td>Wanting to be in control</td>
</tr>
<tr>
<td>Triggered by weight increase</td>
<td>Not recognizing one self</td>
</tr>
</tbody>
</table>
Barriers
Ten categories and 14 sub-categories were identified as barriers throughout the analysis of the interviews representing a variety of experiences concerning behavioral change towards healthy eating from obese patients living with OSAS.

Desire and craving
The category is characterized by strong feelings towards eating, from mere enjoyment of food to having problems controlling dietary in a healthy direction. A need of fulfilling the liking of and satisfying the craving for food along with using food as compensation for the desire towards tobacco was experienced by the informants.

“It is a genuine pleasure, I love all types of foods… and then you have to reward yourself and it was very difficult not having a good cheese or something as a reward” [Informant 9]

The eating behavior was by a few informants regarded as an actual addiction towards food and eating. They described it as feeling like an alcoholic or comparable to a smokers need for a cigarette.

“I feel like an alcoholic… I use the food to lower anxiety you know” [Informant 9]

One person increased chocolate intake after smoking cessation as a substitute to cigarettes.

”When I stopped smoking I eat chocolate…I eat so much chocolate it wasn’t sane you know” [Informant 13]

Influenced by mental state
Food was used in controlling feelings and the mental state was affecting eating habits and motivation towards behavior change. Food was by one informant identified as an important tool to control feelings and eating was described as a way to enhance or reduce the present state of mind.

“… all my feelings I handle through food” [Informant 9]

Feeling bad and having psychical problems were described to effect choice of food in a negative direction.
“…when you don’t feel good that’s the problem. When you don’t feel good we
don’t give a damn about what we eat” [Informant 4]

Low self-confidence
Earlier negative experiences from gaining weight after a successful weight loss and
difficulties of losing weight in current attempts was reported as a barrier to commence in new
attempts.

“…the thing is I don’t think I can manage anything… I’m not losing… nothing
happens I have put on four kilos on the contrary” [Informant 14]

Insufficient support
Harping about had the opposite effect of the intended, poor personal chemistry and lacking
support had a demotivating effect. Too much attention towards changes in eating behavior
was also to stated produce irritation and in some cases behavior opposite to the intended.

“… have some difficulties in someone telling me what to do … it gets too much
moralizing in that case it more likely has the opposite effect” [Informant 12]

One person described how poor personal chemistry towards professionals may cause an
individual intending to participate in a behavioral change programs to stop.

“Well I did register…but he and I didn’t click. Unfortunately“ [Informant 2]

Experiences from both lacking support and being supported led to emphasizing the
importance of and the wish to be supported.

“Well my wife perhaps a little more that she had supported me more”
[Informant 7]

Social acceptance
An informant described concerns about social reactions on the fact that the informant only
will able to eat small portions as well as being easy affected by alcohol due to a gastric bypass
operation. The informant was afraid of disrespecting the host by eating and drinking very
little.

“Something I have thought about that will be I mean after the operation when I
go to a restaurant or is invited somewhere… you order a portion. I will not be
able to eat the portion… I am only allowed to eat a little part of it but… I guess
that is the way it is… it looks like you don’t appreciate the food I mean” [Informant 5]

"If you are invited on a glass of wine or similar, you will be very tipsy … and it will seem as if you have been drinking ahead” [Informant 5]

Another informant was being afraid of disrespecting host by eating and drinking very little.

“…the disadvantages are probably if you go out…to eat… that’s a little tiresome…you can forget about liquor and beer…that’s probably the only disadvantage when you go out you have to consider what you eat and order ” [Informant 8]

**Complexity of coping with new eating behavior in daily routines**

It was believed to be troublesome to carry through healthy eating; difficulties to succeed in changing eating behavior were emphasized as it was found complicated and more time consuming to follow a healthy diet. Having continuity in diet habits were found difficult, skipping lunch and choosing the easiest alternative was often mentioned as a reason for not eating healthy.

“I’m having trouble keeping regularity … skipping lunch now and then … I’m hungry in the mornings, eat a little too much then because it’s so very good” [Informant 1]

“… in order to make something low calorie you know it takes a little effort and when you come home it’s the easiest possible in principle” [Informant 2]

**Costs**

Healthy food was by two informants experienced too expensive and food prices were a factor affecting choice of diet.

“…it may contain odd ingredients as well but not too much…it will be too expensive …. I cannot afford to pay just any price” [Informant 3]

**Lack of knowledge**

Skills in cooking and knowledge about what to eat and how much a normal portion is were identified as barriers to engaging in healthy eating behaviors.
“…and what is a normal portion I still do not know what a normal portion is, what is people eating or what am I supposed to eat, maybe I am not to eat as normal people maybe I am to eat less” [Informant 9]

**Perceived helplessness**
The feeling of external locus of control was present in informants experiencing helplessness due to the perception of external factors not under their control influencing the health, diet and weight situation.

“I use to say if most people eat as I do no one could be fat…surely on certain occasions I want a little chocolate…everybody wants that I guess … but not in those amounts causing me to weigh as much as I do” [Informant 10]

“But all I have to do is to look at a cake then I put on 400 g so to say” [Informant 4]

**Low susceptibility**
Perceived low susceptibility was identified as the risk of being obese and having OSAS was known but disregarded by some informants.

“Diabetes is a great risk factor and blood pressure… and all that comes with it. Stroke an all…but as well as you when you walk the streets and you do not expect anything to happen” [Informant 1]

**Facilitators**
Six categories and 18 sub-categories appeared in the analysis of the interviews, as facilitators to behavior change in engaging in healthy eating in this group of obese living with OSAS.

**High value of outcome expectation**
Both consequence expectations and the motivation rising when seeing results and expecting future results were reported. Several informants mentioned if the perceived risk of their behavior was concrete and likely to occur within a few years or if they were forced due to life threatening conditions or physical limitations from gastro-bypass operation they would be capable to change behavior.
“I mean surely if it is a diagnose – this counts for you, you have got two years left to live if you do not do something drastically now…you would react quiet serious on that. At least I would” [Informant 6]

Getting started and seeing the results on the scale is emphasized as a great motivation. Along with seeing results of diet change the expectation on improvement of general health or a specific disease is by several informants reported as important motivators.

"I should probably lose weight …I might be more mobile you know my pelvis is my big problem when I walk… I think I might be able to, you know my goal is, I am thinking dear god if 30 minutes a day if I could walk 30 minutes a day… get out and feel this is wonderful” [Informant 9]

“…as I said it is easy when you see the pace on the scale that it is going well” [Informant 12]

Support and control
Receiving support from peer or professional, by family, in a group or as an individual as well as being in a control situation as support and an overall need for support were among the many thoughts and wishes for support highlighted by the informants. Many of the informants emphasized the importance of support from a person in the same situation as them self to be able to exchange experience. Professionals to give educational advice, support and coaching were also requested.

“…I think the most important though is to have a contact to a person who is a support and kind of is there and talk to you about these problems” [Informant 6]

The effectiveness of team feeling was mentioned as a potential source of motivation. The possibility of discussing with others and feeling part of a team was underlined as important for success.

“It would be excellent if diet reduction could be a part of this or some kind of exercise group… that would be excellent… in that case I would have participated in that semester if it was say 10 occasions” [Informant 1]

Creating a feeling of strict control and follow-up is mentioned as elements of importance in the process of changing eating behavior and losing weight.
“…being a part of some program and having some kind of supervision you know a control situation you know visiting someone once a moth… and talking it through. How has it been and what can you do to handle this… I think it would be very helpful” [Informant 6]

Support from the family as motivational talk and practical support when shopping and cooking food was viewed positively.

“Nothing disgusting they say and then no mum if we are in the store, put it back… like a child you know… they really support me” [Informant 9]

One informant had a wish for individual support.

“I want it individual” [Informant 5]

**External premises**

Time available and easy accessible food was emphasized as facilitating external premises. Increased time available when one informant was to be retired was expected to make diet changes possible.

“But now I will soon be employed by the government and then I will have as much time as ever” [Informant 2]

Food being easy to prepare as well as food appreciated to the whole family as well as having easy access encourages healthy food choices.

“…preferably you can eat the same food as the rest of the family” [Informant 7]

**Applicable behavior change strategies**

Applicable knowledge on healthy food providing strategies for routine change and stimulus control was wanted in a holistic treatment approach where need for energy input/output measures, overall strategy, insight and knowledge were important factors.

Instructions on how to shop and cook healthy food through concrete advices and practical demonstrations to make it work in daily living situations were suggested as a part of the treatment.
“…someone who helped me make a list of what food to buy…who went with me to the store shopping and then together with me cooked…that would be all perfect” [Informant 3]

Avoiding the risk behavior by not buying unhealthy food replacing with healthy food and activating oneself to suppress the craving when it appears.

"Now what I must do is to teach me not to buy home food I cannot eat…it may not exist because I do not rush to the store and buy…then it will last too long and I will manage to stop myself…sometimes you can wait for it to stop…the craving ” [Informant 9]

“…but surely you could probably activate yourself more in the evenings, do stuff outside your home. That is one way to solve the problem I mean if I am invited out it is not like I go to their refrigerator and steel food…and I do not have that craving either” [Informant 6]

A holistic approach for focusing on the individual and realizing the complexity of treating both obesity and OSAS is summarized by more informants.

"…some kind of overall solution like, that you realize it is different mechanisms controlling it all so to say” [Informant 11]

A need to measure energy balance in order to ease the process of controlling the energy intake was wanted.

"The easiest were if you in a very simple way could measure energy in and energy out” [Informant 12]

Structure meals during the day and making them regular were seen as a good way to ensure stable and healthy food.

“What I found good was regular meals and kind of structure the day kind of try to eat maybe five to six times and not that much …” [Informant 11]

Knowing how to solve the problem and realizing what to do promote motivation and action.

”…I have realized all this snacking in the evenings in not good so I have tried to stop” [Informant 6]
Self-worth
Good self-confidence from earlier positive experiences strengthens the belief of succeeding again.

"If I could do it last time it should be equally easy this time" [Informant 12]

Wanting to be in control was described as one informant valued a certain amount of freedom in possible interventions directed towards weight loss and stresses the need to be one’s own master.

"I kind of have to be my own master…I have to create my own guidelines”
[Informant 12]

"…that it is my idea on what and how I guess you might need help with how but anyway” [Informant 12]

Triggered by weight increase
Feeling shocked and not able to recognize one-self when seeing the result of a weight increase on the scale.

"I stepped on the scale and said no that is not me…it did not correspond to me that was kind of what made it tilt and then all there is to do is change it…no I could not identify with the numbers ” [Informant 12]

"I was all shocked you know when I realized how I had increased” [Informant 13]
Discussion

The results show that desire and craving, influenced by mood, low self-confidence, insufficient support, social acceptance, complexity of coping with new eating behaviors in daily routines, costs, lack of knowledge, perceived helplessness and low susceptibility were main categories interpreted as barriers for obtaining a change in eating behavior change. Furthermore, high value of outcome expectations, support and control, external premises, applicable behavior change strategies, self-worth and being triggered by weight increase appeared as categories facilitating a behavioral change in the studied group.

In developing group interventions and tailoring treatment for individuals aiming at a behavioral change, pros and cons are parts of the core construct of the TTM. Knowing what is perceived as facilitators and barriers in patients with obesity and OSAS may help health professionals in guiding patients towards a positive decisional balance and, in accordance, to the TTM progress through stages.

Decisional balance is the perceived benefits and costs of changing referred to as pros and cons. Similar to pros and cons the results in the present study are concentrated on the two areas of content; facilitators and barriers. Pros are suggested to outweigh the cons towards a change when an individual moves from contemplation to the preparation stage. The cons are usually regarded outnumbering the pros in the precontemplation stage (Spencer, Wharton, Moyle, & Adams, 2007). Facilitators and barriers may be an additional factor affecting the decisional balance further. This suggests that it may be of great importance to focus on both minimizing barriers and on identifying facilitators to promote behavioral change. Removing or minimizing the number of barriers may help the individual to identify the benefits of a behavioral change and as such have a facilitating effect.

Result discussion

This is, to our knowledge, the first study to examine barriers and facilitators in patients with OSAS and obesity therefore the results presented are unique and comparisons with studies of similar study population is not possible. However other studies have been identified dealing with barriers and facilitators towards weight loss and diet change (see table 1). The participants in these other studies were not selected due to the specific criteria of being obese combined with a complication of obesity or close related diseases. Their health status, besides being overweight, was not mentioned. Whether this affects the results of these studies
compared to the present analysis is unknown, but it is possible that adding OSAS to the general problems of being obese changes the perception of the situation.

**Barriers**

In the present study low susceptibility was found to be a barrier. This was not found in other studies. The category refers to the low perceived risk of being obese and living with OSAS along with examples of disregarding risks known to the participants. This category may exist in the present study because the informants were recruited as patients. The informants are, as patients, likely to be aware of their situation which might explain why the category occurred in this study, but was not identified as a barrier in other studies (see table 1). The fact that Chang et al. 2008 refers to susceptibility as a motivating factor, rather than a barrier, in their study of overweight and obese low income mothers proves that awareness about risk factors exists in this group (Chang, Nitzke, Guilford, Adair, & Hazard, 2008). Being diagnosed with OSAS and considered a patient is therefore not likely to be the only explanation why the category occurs as a barrier in this group but not is found reported elsewhere as a barrier.

Perceived susceptibility is according the Health Belief Model (HBM) the belief concerning the risk of getting a condition. Combined with the perceived severity of the condition it accounts for the perceived threat. Considerations of the perceived threat and the perceived benefits of taking action are important in deciding what action will be made (Janz, Champion, & Strecher, 2002). The HBM contributes to illustrate the complexity of the low susceptibility by explaining factors possibly affecting an individual’s perceived susceptibility.

The category costs as a barrier towards diet change identified in this study is a common reported barrier. It was reported in four of the five articles identified in the background section and may be of great importance for behavioral change (Eikenberry & Schmidt, 2004; Withall, Jago, & Cross, 2009; Jones, Furlanetto, Jackson, & Kinn, 2007; Chang, Nitzke, Guilford, Adair, & Hazard, 2008). However the populations investigated must be taken into account. The majority of the studies where cost was identified as a barrier were conducted on low-income populations (Eikenberry & Schmidt, 2004; Chang, Nitzke, Guilford, Adair, & Hazard, 2008; Withall, Jago, & Cross, 2009) which make transferability or comparison to people with middle or high income complex. Economics and cost of food may be expected to influence people living on a low-income more than those with higher incomes (Lallukka, Laaksonen, Rahkonen, Roos, & Lahelma, 2007; McLaren, 2007). Furthermore, it is possible
that a majority of people in need of treatment for obesity, with or without OSAS or other obesity related diseases, may be higher prevalent in low-income or socioeconomic groups, as a certain socioeconomic gradient to overweight and obesity has been reported (Dykes, Brunner, Martikainen, & Wardle, 2004; Marques-Vidal, Bovet, Paccaud, & Chiolero, 2010). The circumstance that costs was found an independent category in the present study, even though the population examined was not selected for its socioeconomic characteristics, is an indication of the importance of cost even in groups not classified after income.

Social acceptance as a category was in the present study expressed as a wish of not breaking the social norms. The observation is supported in studies on men describing that men are supposed to eat what is served and usually a lot (Sabinsky, Toft, Raben, & Holm, 2007). Both masculinity and occupation is reported to have effect on eating behavior (Roos, Prättälä, & Koski, 2001) and a general wish to fit in with the social norms to be socially accepted may be the background for these views. Fulfilling the norms is likely to exist as a barrier in different groups but the population studied could be of great importance in regard to the social norms creating the barrier. Comparing the study on Danish men (Sabinsky, Toft, Raben, & Holm, 2007) with a study on Arab women (Habiba, Baynouna, & Bernsen, 2010) shows some contrasts. The expectations of masculine behavior set a barrier for the men, whereas the women were restricted by not being allowed to go outside alone. This observation shows that large cultural differences are likely to appear that can influence or even set barriers specific to certain societies.

Being influenced by mental state and using food as an instrument to handle feelings often accompanied by a destructive tendency when the informants surrender to the unhealthy food was reported in this study. Several other studies reported similar findings as a barrier to diet change (Withall, Jago, & Cross, 2009; Jones, Furlanetto, Jackson, & Kinn, 2007; Chang, Nitzke, Guilford, Adair, & Hazard, 2008). Negative emotional state and depression were found associated with poor results in weight loss interventions. It suggests that focusing on mood or emotional state of the patient could be important to succeed in developing strategies for losing weight (Linde, et al., 2004). These findings supports that the category; being influenced by mood may be of importance for tailoring interventions aiming at behavioral change.

Perceived helplessness occurs in the present study as a more or less conscious mechanism helping the individual to explain his situation to himself and to the surroundings. Some
individuals did not feel responsible for their situation and believed they were unable to change. These factors are in accordance with previous findings (Jones, Furlanetto, Jackson, & Kinn, 2007; Chang, Nitzke, Guilford, Adair, & Hazard, 2008; Withall, Jago, & Cross, 2009). These observations may be an expression of high external locus of control. Locus of control refers to the degree individuals believe they can affect events in their lives through their personal actions. High internal locus of control is the belief that your actions to a large degree can affect the course of events in your life. High external locus of control is the opposite belief, that other factors, such as fate or chance, mainly determine future events. In a 20 year follow up cohort study of children, those feeling a high internal locus of control were found to have a reduced risk of several health outcomes when they were grown-ups, including problems such as the risk of developing overweight and obesity (Gale, Batty, & Deary, 2008). The protective effect of the perceived high internal locus of control indicates that the degree of perceived helplessness may be an indicator of the behavioral change outcome prognosis. As discussed by Jones et al. 2007 perceived helplessness may reflect a conflict between patients taking a personal responsibility and the tendency for the patient to avoid responsibility by blaming the problems on the unfair situation which they are in (Jones, Furlanetto, Jackson, & Kinn, 2007).

The category perceived helplessness originated from statements representing avoiding behaviors. In the stage of precontemplation there is a tendency to avoid reading, thinking or talking about risk behavior (Prochaska, Redding, & Evers, 2002) and perceived helplessness may express thoughts and experiences from individuals in this stage.

The present study found that low self-confidence due to earlier experiences or lack of success in ongoing attempts to lose weight resulted in low self-efficacy towards behavior change. Similar results were reported in several studies (Chang, Nitzke, Guilford, Adair, & Hazard, 2008; Jones, Furlanetto, Jackson, & Kinn, 2007). Thus, focusing on low confidence as a barrier may be of importance in affecting the success in behavior changes. The behavioral theories; TTM, The Health Belief Mode and the Social Cognitive Theory all have incorporated the thoughts of self-efficacy in their theory which shows the relevance of the factors self-confidence and self-efficacy for achieving a change in behavior (Glanz, Rimer, & Lewis, 2002). Self-efficacy is in the present study identified as the possible outcome of low-confidence and addressing low-confidence is likely to be an important aspect of the overall barriers.
People in the precontemplation stage (TTM) are suggested to be under informed about the consequences of their behavior or may have low confidence in their ability to change due to lack of success in earlier attempts. In this stage the individual has no intention to take action within the next six month (Prochaska, Redding, & Evers, 2002). The categories low self-confidence and lack of knowledge from this study may represent individuals in this stage. The first referring to earlier experiences of not succeeding and as such to a low self-efficacy that one can actually manage the behavioral change and the second referring to an actual perception of not knowing how to cook and eat in a way that will lead to weight loss.

Lack of knowledge was also identified in low income communities (Eikenberry & Schmidt, 2004) and insufficient support was found as a barrier in low-income mothers (Chang, Nitzke, Guilford, Adair, & Hazard, 2008). The two categories; Desire and craving, and complexity of coping with new eating behaviors in daily routines were found to be important to the informants in this study similar to the result of an earlier study (Jones, Furlanetto, Jackson, & Kinn, 2007). The four above mentioned categories of barriers, i.e. lack of knowledge, insufficient support, desire and craving and complexity of new eating behaviors in daily routines are described in the cited studies and the present study, expressing that these four factors are perhaps of importance to the people experiencing them. Therefore, these barriers should be addressed in contexts where behavior change is desirable.

**Facilitators**

Being triggered by weight increase as a category originated in this study, in descriptions of informants not recognizing themselves and being shocked by their weight. The category gives a new aspect of facilitators towards behavioral change and is not found reported elsewhere. The category could be interpreted as representing a possible turning point and an event giving increased awareness of unhealthy behavior patterns and the consequences they bring. Weight increase acts as the trigger in this context which insinuates a possible need for some informants to keep a certain focus on the objective figures provided by a scale. The category may be likened with parts of the TTM´s process of change. The dramatic relief deals with experiencing negative emotions connected to the risks of the unhealthy behavior. The process of environmental reevaluation focuses on realizing the negative impact of the unhealthy behavior. Both processes occur in the early stages of change in the progress from precontemplation towards the contemplation and the preparation stage (Prochaska, Redding,
Weight may be used as a tool to create consequence expectations and positive expectations of results in order to increase motivation.

The category, high value of expectations, as found in the present study is represented in several studies not as an independent category but as the underlying motivation of both positive and negative expectations (Eikenberry & Schmidt, 2004; Sabinsky, Toft, Raben, & Holm, 2007; Jones, Furlanetto, Jackson, & Kinn, 2007; Chang, Nitzke, Guilford, Adair, & Hazard, 2008). This is the most cited facilitator suggesting that high value of expectations is an important facilitator in many different groups and not only in the studied group of obese OSAS patients. The category stresses the importance of a time perspective and taking this in account in goal setting. In this way it allows the individual to build up important motivating expectations both in a short and long-term perspective.

External premises as a category was also found as a facilitator in one study (Withall, Jago, & Cross, 2009). This finding shows a need of taking external factors such as for instance availability in account when intending to change eating behavior. However, even though external premises may be important, findings from the UK show that the access to fruit and vegetables was not a major barrier to healthy eating. Other more motivational factors represent larger barriers and it is suggested not to blame difficulties in access as a major reason for the occurrence of unhealthy diets among people with low income (Dibsdall, Lambert, Bobbin, & Frewer, 2003).

Most of the categories identified as facilitators in the present study have been identified in earlier studies; support and control (Chang, Nitzke, Guilford, Adair, & Hazard, 2008; Jones, Furlanetto, Jackson, & Kinn, 2007), applicable behavior change strategies (Jones, Furlanetto, Jackson, & Kinn, 2007; Withall, Jago, & Cross, 2009) and self-worth (Chang, Nitzke, Guilford, Adair, & Hazard, 2008). Finding similar categories as earlier reported is an interesting result because it shows agreement of facilitators between groups despite a wide variety of life experiences and present situations. This should be appreciated in conducting and preparing interventions aiming for diet change. Results and experiences from populations not identical but similar may provide important information allowing health professionals to apply a more nuanced approach in treatment. It is however important to also consider the specific profile and problems of the actual group of interest.
**Method discussion**

The semi-structured approach with the use of an interview guide where key questions ensured reflection of contents important for the aim of the study and increased the likeliness of dependability proved to be good. Furthermore utilizing open ended questions in the interview seems to have given a richness of variation on the various experiences as described in literature (Polit & Beck, 2008), allowing the informants to cast light on experiences highest valued or first in mind. The informants described their experiences and beliefs with regard to barriers and facilitators for behavior change towards healthy eating and several categories were identified. The prevalence of specific categories or sub-categories is not reported as the aim was to identify barriers and facilitators towards eating behavioral change and to develop an understanding of the phenomenon. This it is often the main goal of qualitative studies (Polit & Beck, 2008) rather than examining which factors are most prevalent. Each statement and category represents a view from an informant and is considered important as it casts light on an area of importance for a patient experiencing life with obesity and OSAS.

As strength to this study trustworthiness was sought to be increased by approaching credibility, dependability, confirmability and transferability as described in literature (Graneheim & Lundman, 2004; Polit & Beck, 2008).

Credibility was sought through purpose full sampling, collecting data until saturation was reached and thorough documentation of the categories. Having the interview guide as a tool increases likeliness of dependability. Triangulation with co-researcher was done to ensure confirmability in the content of condensed meaning units, sub-category and categories that rose throughout the analysis process. Transferability was strengthened by describing the study, in details step by step allowing the reader to follow the process.

In comparing qualitative studies of different groups of overweight and obese individuals with the present group of obese and OSAS diagnosed patients, it was possible to examine if categories appeared in various groups. Categories reappearing may be important in discussing how transferable the results are. The reappearance of categories shows that other obese populations then the one in this study emphasize some of the same factors and may not only be relevant for the group examined. Thus the results of qualitative studies aiming to examine weight loss could be of importance for other populations than the ones they represent. It is however important to keep the design and size of the studies in mind. The studies referred to are qualitative and can be expected to give information of the group studied and the number
of participants included in the studies does not enable the results to be transferred to the general population.

Despite efforts to ensure correct translation of quotations, presenting the results in English may be a limit of the study as verbatim translation would lead to misconceptions and some extent of interpretation has occurred in the process of translating. It is uncertain how this affects the results but bearing in mind the presumption that all approaches to a text involves some degree of interpretation (Graneheim & Lundman, 2004), it may not be of great importance.

Participating in the study may affect the informants on a personal level. Dealing with their status as obese and diagnosed OSAS patients along with potential risk factors of their condition could be difficult to handle. However, the aim was to take part of experiences from the informants and not to reveal unknown information to the participants. Existing feelings may be touched but the negative effects are considered small and the possible gain from the contribution of the study is thought to outweigh the possible downsides.

The researcher, having limited experience in analyzing qualitative data, may be a limit to the study. Using the content analysis as method in the analyzing process is suggested to be a good choice because the method allows the analysis to be performed in various levels of difficulty (Graneheim & Lundman, 2004). The descriptive qualitative nature of this study does not allow for high levels of evidence (Polit & Beck, 2008) but given the aim to explore experiences of a phenomenon not being examined earlier, the design was found suitable.

Conclusion
Changing behavior is a complex process and success is influenced by many factors. Experiences from obese patients with OSAS show that there are a number of factors that need to be taken into consideration when aiming at achieving behavioral change in eating behavior in this patient group.

This study indicates that there is a need to have a broad focus on both barriers and facilitators to motivate patients living with OSAS to change eating behavior. Low susceptibility as a barrier and high value of outcome expectations as a facilitator are categories that appears to be
of specific importance for this group. The remaining results from this study are similarly
described elsewhere, suggesting some agreement in barriers and facilitators throughout
various populations engaging in behavioral change towards healthy eating. Future research or
intervention designs should also take the experiences of other population in account.

**Future perspectives**

The study presented gives valuable knowledge on perceived facilitators and barriers towards
eating behavior change in a group of obese patients with OSAS. Confirmation of the results in
further research aiming at implementing the knowledge in tailoring behavioral intervention
studies should be done in future studies.
References


Appendix 1

Bakgrundsfrågor
Vid flera alternativ - sätt ett kryss i den ruta som stämmer på dig.

Namn: __________________________

Födelseår: __________

Man □
Kvinna □

Vikt: _____ kg Längd: _____ cm

Civilstånd: gift/sambo □
ensamstående □

Utbildning: grundskola □
gymnasiet □
högskola □

Sysselsättning: arbetar □
                   yrke:________________
                   studerar □
                   arbetslös □
                   pensionär □
                   sjukskriven □
                   sjukbidrag □
                   sjukpension □

Rökning: röker □
           slutat röka □
           aldrig rökt □

Sjukdomar: __________________________________________________________

Mediciner: _________________________________________________________

Hur länge har du haft diagnosen sömnapnésyndrom? _____________

Hur länge har du använt CPAP? ___________________________
Frågor om din fysiska aktivitet:
Med fysisk aktivitet menas alla typer av kroppsrörelser som ger en ökad energiförbrukning; exempelvis lek, hobbyverksamhet, promenader, idrott.

Vilket påstående nedan beskriver bäst vad du tycker om din nuvarande nivå av fysisk aktivitet?
Jag är för närvarande…
- Inte särskilt fysiskt aktiv och jag har inte för avsikt att bli mer fysiskt aktiv under de närmaste 6 månaderna
- Inte särskilt fysiskt aktiv, men jag har funderat på att öka min aktivitetsnivå under de närmaste 6 månaderna
- Inte särskilt fysiskt aktiv men jag är fast besluten att öka min aktivitetsnivå under de närmaste 6 månaderna
- Fysiskt aktiv, men jag har bara varit det de senaste 6 månaderna
- Fysiskt aktiv och jag har varit det längre än 6 månader
- Jag brukade vara fysiskt aktiv för ett år sedan men de senaste månaderna har jag varit mindre aktiv

Frågor om dina matvanor:
Med matvanor menas både vad du näringsmässigt får i dig och vilka rutiner/vanor du har kring ditt matintag.

Vilket påstående nedan beskriver bäst vad du tycker om dina nuvarande matvanor?
Jag har för närvarande…
- Inte särskilt bra matvanor och jag har inte för avsikt att förändra mina matvanor under de närmaste 6 månaderna
- Inte särskilt bra matvanor, men jag har funderat på att förändra mina matvanor under de närmaste 6 månaderna
- Inte särskilt bra matvanor, men jag är fast besluten att förändra mina matvanor under de närmaste 6 månaderna
- Bra matvanor, men jag har bara haft det de senaste 6 månaderna
- Bra matvanor och jag har haft det längre än 6 månader
- Jag brukade ha bra matvanor för ett år sedan men de senaste månaderna har jag haft sämre matvanor
Appendix 2
INTERVJUGUIDE

Provintrjfu 2008-04-29

Syftet med denna studie är att studera variationer i erfarenheter och uppfattningar hos individer med sömnapné i kombination med fetma vad gäller egen riskuppfattning och föreställningar om den egna hälsan och förmågan till hälsorelaterad beteendeförändring.

<table>
<thead>
<tr>
<th>Vetenskaplig frågeställning</th>
<th>Tematisk intervjufråga</th>
<th>Ex på uppföljande frågor</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Erfarenheter av sömnapné</td>
<td>På vilket sätt påverkar sömnapnén ditt vardagsliv?</td>
<td>Berätta! Kan Du ge ett exempel!</td>
</tr>
<tr>
<td>- Erfarenheter av övervikt</td>
<td>På vilket sätt påverkar övervikten ditt vardagsliv?</td>
<td>Berätta! Kan Du ge ett exempel!</td>
</tr>
<tr>
<td>- Följsamhet och tilltro till egen förmåga att använda CPAP</td>
<td>I vilken utsträckning använder Du CPAPen? Underlättande resp försvårande faktorer för användning?</td>
<td></td>
</tr>
<tr>
<td>- Self-efficacy för fysisk aktivitet?</td>
<td>Vad tror du om din förmåga att öka din fysiska aktivitetsnivå? Underlättande och försvårande faktorer?</td>
<td></td>
</tr>
<tr>
<td>- Motiv och drivkrafter</td>
<td>Vad skulle kunna få dig att öka din fysiska aktivitetsnivå? Finns det något som skulle få dig att avstå? Hur redo är Du?</td>
<td></td>
</tr>
<tr>
<td>- För- och nackdelar med viktnedgång</td>
<td>+ och –</td>
<td></td>
</tr>
<tr>
<td>- Self-efficacy för att lägga om kosten?</td>
<td>Vad tror du om din förmåga att lägga om kosten?</td>
<td></td>
</tr>
<tr>
<td>Motiv och drivkrafter</td>
<td>Vad skulle kunna få dig att lägga om kosten?</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Finns det något som skulle få dig att avstå?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hur redo är Du?</td>
<td></td>
</tr>
</tbody>
</table>