

Department of Psychiatry
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Finland

**A PSYCHIATRIC INVESTIGATION OF
OBESE RETIRED INDIVIDUALS
A CASE-CONTROL STUDY**

**PSYKIATRINEN TUTKIMUS
LIICALIHAVUUDEN VUOKSI
ELÄKKEELLE JÄÄNEISTÄ
TAPPAUS-KONTROLLI TUTKIMUS**

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ABSTRACT

AIMS

The present study aims to expand upon knowledge about severe obesity.

METHODS

The subject group consisted of 112 individuals (81 females and 31 males) receiving a permanent disability pension primarily for obesity. The participants of this study lived in Uusimaa in southern Finland. The subjects and the controls were selected by random sampling of data from the Social Insurance Institution of Finland. We tried to have three controls for every female subject and five controls for every male subject. The control subjects were randomly selected from the same area and were receiving a disability pension for a different primary illness. The controls were matched with the subjects by place of residence, sex, age, time since the pension was granted and occupation. Among the women, 71% (n=53) of the subjects and 66% (n=112) of the controls agreed to participate in the study; among the men, 71% (n=22) of the subjects and 72% (n=67) of the controls agreed to participate, yielding a total of 254 participants.

Psychiatric interviews were conducted with all participants. During the interviews, the interviewer did not know to which group the interviewee belonged. The subjects and controls were interviewed individually by the author. A psychologist assessed all individuals using relevant tests. The results were analysed using the chi-squared test (χ^2 -test) and the percent distribution and using the t-test for paired variables. Conditional logistic regression analysis was also conducted. Male and female controls were selected separately.

RESULTS

The psychiatric interviews showed that in the case group, more stress factors were connected to the origin of obesity. Getting married was a statistically significant stress factor ($p=0.0027$). In childhood, separation from parents ($p=0.022$) was a stress factor that increased the risk of obesity in adulthood. In the psychological tests, the results of the questionnaire on coping mechanisms suggested that the subjects performed more active problem solving than the controls ($p=0.037$). The subjects had a slightly stronger feeling that external factors determined the course of their life.

The emotional state of eating was significantly associated with quarrels ($p=0.007$) and feelings of loneliness ($p=0.023$) in the study group. The subjects suffered from night eating syndrome, which was associated with an increased risk of early retirement. The subjects reported feeling increased hunger ($p=0.008$) compared with that of the controls. We found no differences in the preference for sweets between the subject and control groups. The eating habits were the same between the two groups.

Depression was diagnosed more often in the subject group than in the control group according to the psychiatric interviews. Based on the conditional logistic linear model, individuals with severe obesity had a higher risk of depression than those in the control group. The most common disturbance in both groups was chronic depression, which affected 28% of individuals in the subject group and 14% in the control group. Depression was also measured by using Beck Depression Inventory (BDI). Some of the subjects (7%) had masked depression, while this proportion was 5% in the control group. The questions on the BDI that measure irritability ($p=0.0283$), body image ($p=0.0273$) and ability to work ($p=0.0394$) were close to significance.

In total, 31% of the subjects and 50% of the controls said they were fully satisfied with their present weight. Some degree of body image distortion was found among the subjects in the Draw-a-Person test. The Machover index was lower in the subject group than in the control group. Obesity had become a problem for some of the subjects in childhood ($p=0.111$) and for some in adulthood. A large part of the study group described experiencing scorn and contempt from others for being overweight. The subjects' partners did not have negative comments about obesity.

CONCLUSIONS

This study indicates that it is important to conduct research with individuals with severe obesity using psychiatric and psychological methods before they start receiving their pensions. The role of stress factors should be noted when obesity manifests. This study provides information on the relationship between emotions and eating habits in obesity. The occurrence of depression in individuals with obesity should be examined. All types of stigma, discrimination and scorn that are linked to obesity should be reduced.

Society should pay increasing attention to the impact of the environment and external stimuli on individuals' eating behaviour.

Keywords: Body dissatisfaction, body image, coping mechanism, severe obesity, stress, weight gain/loss, weight in depression, eating habits, emotions, body mass index

ABSTRACT IN FINNISH, TIIVISTELMÄ

TAVOITTEET

Tutkimuksen tavoitteena on lisätä tietoisuutta vaikeasta ja sairaalloisesta lihavuudesta.

MENETELMÄT

Tapausryhmä sisälsi 112 henkilöä (81 oli naisia ja 31 miehiä), jotka ovat saaneet pysyvän päätöksen eläkkeelle siirtymisestä vaikean ylipainon tai sairaalloisen lihavuuden takia. Tutkimukseen osallistujat asuivat Etelä-Suomessa Uudenmaan alueella. Tutkittavat ja verrokkit valittiin satunnaisesti Kansaneläkelaitoksen tiedostoista. Mies- ja naisverrokkit valittiin erikseen. Tutkimuksessa pyrittiin saamaan kolme verrokkia jokaiselle naistutkittavalle ja viisi verrokkia jokaiselle miestutkittavalle. Verrokkiryhmän henkilöt valittiin satunnaisesti samalta alueelta siten, että he saivat eläkettä jonkin muun sairauden kuin vaikean lihavuuden tai sairaalloisen lihavuuden takia. Verrokkien kaltaistuksessa otettiin huomioon tutkittavien asuinpaikkakunta, sukupuoli, ikä, eläkkeen alkamisajankohta ja ammatti. Naisista 71% (n=53) tutkittavista ja 66% (n=112) verrokeista halusi osallistua tutkimukseen. Miehistä 71% (n=22) tutkittavista ja 72% (n=67) verrokeista halusi osallistua tutkimukseen. Kaikkiaan tutkimukseen osallistui 254 henkilöä.

Psykiatriset haastattelut suoritti sama tutkija kaikille osallistujille. Haastattelija ei tiennyt haastattelun aikana mihin ryhmään tutkittava kuului. Sama psykologi tutki henkilöt psykologisia menetelmiä käyttäen. Tulokset analysoitiin käyttämällä χ^2 -testiä (χ^2 -testi), prosenttijakaumaa ja t-testiä. Ryhmien välillä suoritettiin myös ehdollinen logistinen regressioanalyysi.

TULOKSET

Psykiatriset haastattelut osoittivat, että tapausryhmässä oli enemmän stressitekijöitä vaikean tai sairaalloisen lihavuuden alkuvaiheessa. Avioliiton solmiminen oli tilastollisesti merkittävä tekijä ($p=0.0027$). Lapsuudessa ero vanhemmista ($p=0.022$) oli stressitekijä, joka lisäsi vaikean tai sairaalloisen lihavuuden riskiä aikuisiällä. Psykologisissa testeissä todettiin, että copingmekanismeissa tutkittavat käyttivät enemmän aktiivista ongelmanratkaisume-

netelmää ($p=0.037$). Tutkittavilla oli vahvempi tunne siitä, että ulkoiset tekijät määräävät heidän elämänsä kulkua.

Tutkimusryhmässä tunnetason syöminen oli selvästi yhteydessä riidan ($p=0.007$) ja yksinäisyyden tunteeseen ($p=0.023$). Tutkittavilta löytyi enemmän yösyömis-oireyhtymää, joka oli riskitekijä aikaistettuun eläköitymiseen. Tutkittavilla esiintyi nälän tunnetta enemmän ($p=0.008$) verrokkeihin verrattuna. Makeanhimossa ei ollut eroa ryhmien välillä. Syömistavat olivat samanlaiset ryhmien välillä.

Masennus diagnosoitiin psykiatrin haastattelujen perusteella useammin tutkittavien ryhmässä kuin verrokkiryhmissä. Ehdollisen logistisen lineaarisen mallin perusteella, tapauksilla oli suurempi riski masennukseen kuin verrokkiryhmällä. Krooninen depressio oli yleisin depressiomuoto 28 prosentilla tapauksista ja 14 prosentilla verrokeista. Masennusta mitattiin myös Beck Depression Inventory (BDI) -menetelmällä. Osalla tutkittavista (7%) oli naamiotuneen masennuksen taudinkuva, verrokeilla vastaava luku oli 5%. Tässä BDI-tutkimuksessa todettiin merkittävä ero kohdissa, jotka mittasivat ärtyisyyttä ($p=0.0283$), kehonkuva ($p=0.0273$) ja työkykyä ($p=0.0394$) ryhmien välillä.

31% tutkittavista ja 50% verrokeista olivat täysin tyytyväisiä nykyiseen painoonsa. Jonkin asteista kehon kuvan vääristymistä havaittiin Draw-a-Person – testin avulla. Tutkittavien ryhmässä Machover-indeksi oli alhaisempi kuin verrokkien ryhmässä. Ylipaino on ollut ongelma joillakin tutkittavilla lapsuudessa ($p=0.111$) ja osalla vasta aikuisiässä. Suuri osa tutkittavista oli kohdannut pilkkaa ja ivaa, joka oli kohdistunut heidän ylipainoonsa. Tutkimukseen osallistujien puolisoilla ei ollut negatiivista sanottavaa ylipainosta.

JOHTOPÄÄTÖKSET

Tämä tutkimus osoittaa, että vaikeaa tai sairaalloista lihavuutta potevat henkilöt tulee tutkia käyttämällä psykiatrisia ja psykologisia menetelmiä ennen eläkkeelle siirtymistä. Stressitekijöiden merkitys tulee huomioida, kun vaikea tai sairaaloinen lihavuus todetaan. Tämä tutkimus lisää tietoutta tunteiden ja syömistapojen yhteydestä painon nousuun, joka on vähän tutkittu aihe. Masennuksen esiintyminen henkilöillä, joilla on vaikea tai sairaaloinen lihavuus, tulisi selvittää. Kaikenlainen stigma, syrjintä ja pilkka, joka kohdistuu vaikeaan tai sairaalaiseen lihavuuteen, tulisi huomioida ja ne pitäisi pyrkiä poistamaan.

Yhteiskunnan tulisi kiinnittää enenevässä määrin huomiota ympäristön ja ulkoisten ylläkkeiden vaikutukseen yksilöiden syömiskäyttäytymisessä.

Avainsanoja: Tyytymättömyys kehoon, kehonkuva, selviytymismekanismi, sairaaloinen ylipaino, stressi, painon nousu/lasku, paino masennuksen aikana, syömistavat, tunteet, painoindeksi

LIST OF ORIGINAL PUBLICATIONS

STUDY I Koski, M. & Naukkarinen, H. The Relationship between stress and severe obesity: A case-control study

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STUDY II Koski, M. & Naukkarinen, H. Severe obesity, emotions and eating habits: a case-control study

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STUDY III Koski, M. & Naukkarinen, H. The Relationship between Depression and Severe Obesity: A Case-Control Study

Open Journal of Psychiatry, DOI: 10.4236/ojpsych.2017.74024, 17.8.2018

STUDY IV Koski, M. & Naukkarinen, H. Body image disturbance and dissatisfaction, scorn and stigma on severely obese individuals, a case-control study

Open Journal of Psychiatry, DOI: 10.4236/ojpsych.2018.83028, July 31, 2018

None of those articles have been used in other dissertations. The articles have been reprinted with the permissions of their copyright holders. The studies are referred to in the text of dissertation as Studies I, II, III, and IV, respectively.

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ABBREVIATIONS

BDI	Beck Depression Inventory
BED	Binge Eating Disorder
BMI	Body Mass Index
CCK	Cholecystokinin
CHD	Coronary Heart Disease
DSM-III	The Diagnostic and Statistical Manual of Mental Disorders version III
FA	Food Addiction
GAS	Global Assessment Scale
GDS	Geriatric depression scale
ICD	International Classification of Disease
ISDB	Indirect Self-Destructive Behaviour
MDD	Major Depressive Disorder
N	Number
NES	Night Eating Syndrome
NHANES	National Health and Nutrition Examination Survey
NPY	Neuropeptide Y
PYY	Peptide Tyrosine-Tyrosine
RR	Risk Ratio
SPSS	Statistical Package for the Social Sciences
UK	United Kingdom
USA/US	The United States of America
WBI	Weight Bias Internalization
WHO	World Health Organization
χ^2 -test	Chi-Squared Test

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1 INTRODUCTION

Obesity has a multifaceted aetiology that involves genetic, biological and behavioural factors, body growth, eating habits, energy expenditure and the function of adipose tissue.

The latest projections of the World Health Organization (WHO) indicate that globally in 2016, approximately 1.9 billion adults (age 18+) were overweight; of these, more than 650 million men and women were obese. Nearly 41 million children under the age of 5 years were overweight globally in 2016. Once considered a problem only in high-income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings. According the latest Finterveys report, there are 2.5 million overweight adults in Finland. Every fourth adult is obese, with a body mass index of at least 30 kg/m² (1).

Stunkard (2) found that the development of obesity depends not only on the social class of the individual but also on that of the individual's parents. It has also been found that the manifestation of obesity in adults is related to family history, e.g., to conflicts within the family. The effect of family dynamics is particularly apparent in families with obese children (3). The significance of a disturbed mother-child relationship in the aetiology of obesity has also been emphasized (3). Overeating has been characterized as a defence mechanism against the helplessness and despair caused by loss (3). Some researchers believe that only two of the problems encountered in obese people are specifically associated with obesity, namely, overeating and a disturbed body image (2).

Chronic stress can act as a risk factor that triggers, exacerbates or causes weight gain, dyslipoproteinemia or coronary artery disease (4). Blood pressure and heart rate measurements have been used to examine the effects of brief stresses (5). The peripheral hormone ghrelin has an essential role in stress, emotions and the eating process (6). Hamburger studied the role of stress in obesity in 1951 (7). Prentice (8) suggested that eating after stress can worsen health status, particularly in individuals with dysfunctional eating patterns. The role of stress in the onset of obesity has increasingly become an interest of researchers. Among other researchers, Geiker et al. (9) addressed this research topic.

Recently, there has been growing research interest in obesity. Studies have explored the psychological significance of food among individuals who struggle with their weight. Furthermore, the possibility of an emotional disorder secondary to obesity should always be evaluated. Many peripheral hormones control appetite and food intake. Lenard et al. (10) and Lutter et al. (11) found

that hunger and satiety hormonal signals are released from adipose tissue, the pancreas and the gastrointestinal tract and travel to the brain. Furthermore, Yannakoulia et al. (12) found that dietary patterns differ between anxious men and women after adjusting for potential confounders. Masheb and Grilo (13) examined emotional overeating in overweight patients with binge eating disorder (BED) and found significant correlations of emotional overeating item scores and the total score with binge frequency, eating disorder features and depressive symptomatology. Recently, attention has been paid to food intake and supply, as well as the nutritional content of food. All of these factors have effects on the development of obesity (14).

Depression is common mental illness, with a prevalence from 10-15%. For several decades, researchers have sought to fully understand the connection between depression and weight (15). Chen et al. found that (16) the prevalence of depression is higher in adulthood among women. Depression is observed more often in individuals with abnormal body weight. Mauri et al. (17) found in their research on morbid obesity that mood disorders were the most common diagnoses in obese individuals.

In Western culture, slenderness is glorified, which makes obese individuals have trouble for accepting their bodies. According to Bruch (3), body image is a fluid concept based on all the sensory and mental perceptions that are integrated in the central nervous system. The development of a disturbed body image in an obese child depends on his or her parents' attitudes towards obesity (3). According to Powers (18), the emotional aspect of body image is the sum of all the attitudes one has about his or her body. Dissatisfaction with one's own weight is very common. The rate of obesity is rising. The stigma of obesity seems to be increasing and spreading globally (19). The experience of being fat-shamed leads to chronic pressure, which affects millions of individuals (20). Overwhelmingly, individuals who are obese start to believe, internalize and project the stigma of obesity as others do (21).

The target population of this study is severely obese individuals receiving a pension in Finland. This kind of case-control study has not conducted previously. The aim of this case-control study is to use psychiatric and psychological methods to examine the relationship between stress and obesity and between depression and obesity in individuals with severe obesity receiving a disability pension. The main objective of this study is also to examine emotions and eating habits in the group of severely obese individuals. It also documents body image disturbance and dissatisfaction and the experience of scorn and stigma in severely obese individuals.

2 REVIEW OF THE LITERATURE

Several aetiological factors of obesity have been identified. Obesity naturally has a multifaceted biological basis that includes genetics, biological factors related to normal body growth, eating habits, energy expenditures, and adipose tissue function. The development of obesity can be considered from a psychosocial perspective. This study aims to expand upon knowledge about severe obesity with psychiatric and psychological methods.

2.1 OBESITY IN ADULTHOOD

The prevalence of obesity among adults changes from one country to another and varies with age and sex. The prevalence of obesity depends crucially on the definition of obesity and the methods of evaluation. WHO reports have indicated that in 2016 globally, approximately 1.9 billion adults (aged 18+ years) were overweight. Among this group, more than 650 million were obese. Globally, 41 million children under the age of 5 years were overweight or obese in 2016.

During the years 1980–2000, the prevalence of obesity rose considerably among adult men and women in the USA. Especially among men, but not among women, the rise was considerable from 2003–2004.

Isaman and Rothberg (22) studied obesity numbers in the USA. They reported that the prevalence of obesity has risen over 30% in the last 30 years in the USA and 37% globally. In particular, they examined the incidence of obesity. They highlighted that individuals under 25 years old should be examined for obesity (22).

The Finnish research Finrisk showed that overweight and obesity increased during the years 1982–1997 (23). The strongest upward trend in BMI was found in the oldest age group men, the youngest age group in both sexes, and, in particular, in men who were outside the labour force. Education is still a strong determinant of obesity, especially among women, although the social gradient in BMI was not extended during the 1990s (24). Fogelholm et al. (25) used a questionnaire in their 10-year prospective study. The results emphasized the complexity of weight change. Some factors associated with weight change are apparently negatively associated with health, while some are positively associated, which might explain the equivocal findings on weight change and mortality in the literature. In 2017, the latest Finterveys research showed that almost $\frac{3}{4}$ of males and $\frac{2}{3}$ of females were overweight (BMI at least 25 kg/m²). Obesity became more common among working-age individuals between 2011

and 2017. On the basis of BMI, the prevalence of obesity at age 65 remained the same; every fourth male and every third female were obese (1).

Additionally, the place of residence impacts the development of obesity. In 2016, Lundeen et al. (26) performed research on metropolitan and nonmetropolitan countries, and the prevalence of obesity among adults was higher in nonmetropolitan areas than in metropolitan areas. There were also differences between the North and South (27).

According to Casey et al. (28), eating out frequently, specifically at buffets, cafeterias, and fast-food restaurants, was associated with higher rates of obesity. Perceiving the community as unpleasant for physical activity was also associated with obesity. Adults in rural communities were less likely to be obese when perceived food and physical activity environments supported healthier behaviours.

The food environment is everything that is food related in individuals' living environments: food availability, price, advertisement, etc. Mustajoki (14) stated that access to densely energetic food is currently increasing. Additionally, the consumption of sugary drinks, which leads to weight gain, has become more common. External cues greatly affect the initiation of eating and determine the amount of eating.

2.2 OBESITY IN CHILDHOOD

Childhood obesity is associated with a higher chance of premature death and disabilities in adulthood (29). In developed countries, the prevalence of childhood overweight and obesity was 24.8% among boys and 22.6% among girls in 2013 (30).

According to Geserick et al. (31), obese adults experience remarkable weight gain in early childhood between ages 2–6. Weight gain continues slowly, leading to higher obesity in youth. Most obese adolescents gained weight at the age of 3–6. In particular, high-risk children had high birth weights.

In a longitudinal study of the northern Finland birth cohort of 1966, with measurements obtained at birth, 14 and 31 years, it was found that abdominal obesity developed more easily in children who had small gestational age. It was also stated that adolescents who were obese at 14 years old had obvious risks for abdominal obesity in adulthood (32).

In their study based on registry information on childhood obesity, Mäki et al. (33) found that every fourth Finnish youth was obese. Among children and youth, 10% were obese in this study.

2.3 BIOLOGICAL ASPECTS OF EATING HABITS

2.3.1 PERIPHERAL FACTORS AND BRAIN MECHANISMS CONTRIBUTING TO OBESITY

Many peripheral hormones control appetite and food intake. Hormonal signals of hunger and satiety are released from adipose tissue, the pancreas and the gastrointestinal tract and are transported to the brain (10), (11). Leptin is synthesized by adipose tissue and decreases the impact of appetite-stimulating neuropeptides (34). Insulin is a pancreatic hormone that maintains glucose homeostasis. Like leptin, insulin is capable of modifying the dopaminergic pathway and can influence eating behaviours (35),(36). Ghrelin is produced by the stomach and increases food intake (37). Peptide tyrosine-tyrosine (PYY) decreases appetite and increases satiety (38) (39). Glucagon-like peptide decreases food intake (40). Cholecystokinin (CCK) helps to control appetite, ingestive behaviour and gastric emptying (41).

Neuroimaging studies, which have assessed appetite and body weight regulation, have found modifications in dopaminergic function in response to eating or food cues. The different areas of the hypothalamus are not independent nuclei; there are many synapses and neural pathways for ingestion. Recently, it has been shown that columns of the hypothalamus are connected in different ways to the brain cortex during eating (42).

The role of psychosocial chronic stressors in determining poor mental and physical health is well documented. Among the neuroendocrine dysfunctions related to chronic stress and the nature of the shared biologic mechanisms in the pathophysiology of both clinical entities, depression and obesity (43).

2.3.2 GENETICS

Genetic background contributes to the development of obesity. Inheritance affects many ways that, in the current abundant food environment, too much energy is derived from food. Due to genetic differences, there are large differences in people's ability to regulate energy intake (44).

Twin research can be used to elucidate the interaction between genes and the environment. By comparing twin pairs of different weights, the effect of many confounding factors can be standardized. This reveals the changes in metabolism that are specifically caused by acquired obesity (45).

2.4 SOCIAL CLASS AND SOCIOECONOMIC STATUS

Galobarders et al. (46) investigated BMI and overweight in a sample of working people of the general population in Geneva. The prevalence of overweight was 52.1% among men and 28.7% among women. Overweight men were more likely to have low education, while overweight women had lower education and lower occupation status. Education and occupation were inversely related to BMI for both genders and had a synergistic effect among women. Education and occupation had independent and, for women, synergistic effects on BMI. These two indicators may express disparate mechanisms through which low social class is related to high body mass.

Roskam et al. (47) conducted large-scale research in 19 European countries. In most European countries, people with lower educational attainment are now most likely to be overweight or obese. An increasing level of socioeconomic development was found to be associated with an emergence of inequalities among men and a persistence of these inequalities among women.

2.5 SOMATIC MORBIDITIES OF OBESITY

Obesity is associated with a high incidence of other diseases. Hamdy (48) and Iori et al. (49) have studied this topic.

Associations between short sleep duration and obesity, diabetes and hypertension have been shown in cross-sectional and longitudinal epidemiological studies (46). In a study by Algul et al (50) in an internal medicine setting, there were many people with sleep apnoea syndrome. Gangwisch (51) studied associations between short sleep duration and obesity, diabetes and hypertension.

Guh et al. (52) performed a systematic review and meta-analysis and examined the association of other diseases with obesity and overweight. They

found that both overweight and obesity had multiple comorbidities, such as type 2 diabetes, cancer and cardiovascular diseases. Additionally, asthma, osteoarthritis and chronic back pain were shown to be connected to obesity.

According to Pietiläinen et al. (53), obesity is associated with adverse effects on the body and almost all organs. Obesity affects the individual because lifestyles and heredity influence the development and manifestation of the harms and diseases caused by obesity. Obesity has negative consequences on metabolic factors related to metabolism, such as diabetes, high blood pressure, and cancers; mechanical factors, e.g., osteoarthritis, low back pain, skin problems, sleep apnoea; and mental factors, such as depression, anxiety, forgetfulness, stress, binge eating disorders, memory disorders. Asthma is also considered a consequence of obesity and is a combination of metabolic and mechanical factors.

2.6 CONNECTION BETWEEN STRESS AND OBESITY

Stress reflects an individual's response to environmental conditions. Organisms respond to stress via parasympathetic and sympathetic networks. Stress can be categorized into acute and chronic stress.

In 1939, Bruch (54) discussed obesity in childhood resulting from stress inflicted by a child's parents. In addition, Bruch described the phenomenon known as "reactive obesity" in adults. In 1951, obesity was considered a disease related to stress (7). Obesity, chronic diseases and psychosocial factors have been linked to stress eating (55). Researchers have found clear connections among stress, obesity and psychosocial factors (56) (57).

Chronic stress can act as a risk factor that triggers, exacerbates or causes weight gain, dyslipoproteinemia or coronary artery disease (4). According to Björntorp (58), it is important to examine whether the repeated activation of stress centres is involved in the pathogenesis of abdominal obesity and its comorbidities. One consequence of hormonal imbalance may be "stress eating", which is a poorly defined behaviour. Researchers have studied the association between adiposity and the magnitude of cardiovascular reactions to acute psychological stress (59). The peripheral hormone ghrelin has an essential role in stress, emotions and the eating process (6). Ghrelin and leptin concentrations have been associated with interpersonal stress factors associated with weight gain and obesity (60). Aschbacher et al. (61) indicated that peripheral neuropeptide Y (NPY) plays a major mechanistic role in obesity. Chronic stress is related to metabolic problems during dieting.

The accumulation of fat in visceral adipose tissue around the waist has been regarded as a sign of maladaptation to chronic environmental stress

exposure (62). Stress can drive dysregulation of homeostasis and obesity (59) (63). “Sickness behaviour” refers to a coordinated set of behavioural changes that develop in sick individuals over the course of an infection (64). Under certain conditions, obesity facilitates the maintenance of homeostasis, likely by increasing the levels of hormones involved in the regulation of energy balance. Under such conditions, obesity is perceived by the physiologist as a necessary biological adaptation rather than a disease (65). Some researchers believe that passive and active stresses have different influences on a given cardiovascular, immune or endocrine disease between individuals with obesity and those with normal weight (66). Newly discovered neural mechanisms related to stress behaviours have been identified. These mechanisms suggest new possibilities to prevent and cure psychopathologies associated with stress. Studies on psychological stress have focused on stress-related psychopathologies (67).

Huh et al. (68) studied when hunger and stress are greatest during the day. These researchers found that high levels of hunger and stress were somewhat associated with the afternoon and evening hours. Torres et al. (69) found no associations of cardiovascular or psychological stress with obesity in a group of male subjects. Prentice (8) suggested that eating after stress can worsen health status, particularly in individuals with dysfunctional eating patterns. McInnis et al. (70) explained obesity in terms of cellular disturbances. Maladaptive stress triggers a compensatory mechanism that could explain obesity and overweight. Stress remains poorly understood in obesity.

According to Geiker et al. (9), stress affects sleep quality, food intake, weight gain, abdominal obesity, and food quality. Several events in life can cause mental stress. Inadequate sleep and poor nutrition can increase the risk of developing mental illness.

2.7 OBESITY AND EATING HABITS

Appetite is important research area. Both normal and disturbed eating are poorly understood. Only a few affective care strategies have been effective in the treatment of disturbed eating, even if there is psychiatric disease or obesity.

Hamburger (71) found that hyperphagia may involve eating to relieve emotional tension, such as that caused by unspecified anxiety or feelings of rejection. Masheb and Grilo (13) examined emotional overeating in overweight patients with BED and found significant correlations between emotional overeating and binge frequency, eating disorder features and depressive symptomatology. Furthermore, Yannakoulia et al. (12) found that dietary patterns differed between anxious men and women after adjusting for potential confounders.

According to Nedeltcheva et al. (72), recurrent bedtime restriction can modify the amount, composition and distribution of human food intake. Sleeping short hours in an obesity-promoting environment may facilitate the excessive consumption of energy from snacks but not from actual meals.

Ostrovsky et al. (73) found that obesity in males and females is associated with binge eating, social anxiety and emotional eating. The findings of Dalton et al. (74) provided additional support that the trait of binge eating represents a hedonic subgroup of obesity. The authors emphasized the importance of food composition and determined that gluttons fail to recognize when they are full. Dalle Grave et al. (75) investigated personality features that influence eating habits, the development of obesity and the likelihood of treatment success for obesity and identified particular personality traits (binge eating and night eating) that are associated with obesity in women.

Geary and Moran (42) discussed learning and the process of being hungry. In terms of appetite, the desire to continue eating requires food aromas to stimulate the brain through nerves. Variability is a strong influencing factor in pleasure eating. When many similar foods that have satisfying aromas are available, this leads people to eat more than one dish. This explains many cultural differences in popular foods, social connections and eating times. For example, children accept foods more quickly when their parents also like that food. This learning overcomes the innate ability to avoid new scents, which is very strong among young children. Writer also observed that human and animal tests showed differences between genders, with women liking sweets more than men. One conclusion based on this finding is that women prefer sweets as their favourite food, while men like more salty and savoury food (42).

Puder and Munsch (76) asserted that childhood obesity requires early intervention because psychological factors influence the development of the child's treatment. In childhood development, behaviour, cognition, and emotional regulation are very closely related to each other. Disorders are found specifically in families seeking treatment for obesity. In the case of children, it is important to include in the treatment the views of both parents and children on psychological distress as a preventive measure against parents denying behavioural problems. In many cases, parents are also unaware of their children's health issues, and they tend to underestimate both their children's weight and the associated psychological disorders. An obese child may have a variety of behavioural problems, including depression, anxiety, somatoform problems, and sociological withdrawal. Obesity also causes important developmental disorders that limit interaction and integration with peers. Numerous studies have shown a link between obesity and social problems, and children can even be subjected to social stigma and thus develop

a worse self-perception. This can lead to serious disturbances for the child during development (76).

Walton et al. (77) emphasized the importance of family dinners and the relationship between food intake and adolescent and young adult development. Food prepared for family dinners is usually made at home, so young people have the opportunity to participate in the preparation of the food, and male individuals have the opportunity to learn to eat healthily during these dinners. At home, regular meals strengthen family cohesion. In addition, attending frequent family meals lowers opportunities to eat outside the home. Food eaten at home is often healthier than food eaten outside the home (77).

Hudson and Williams (78) found that compared with that in normal-weight individuals, eating in obese individuals was more frequently associated with the emotions of anger, boredom and depression. Eating alone was also much more common among obese individuals, and they often tried to conceal their eating (78).

Vittrup and McClure (79) studied eating and exercise hobbies in families with young children, their knowledge of health and the risks of obesity and their attitude towards preventing and intervening in the development of obesity. The research showed that many adults and children were overweight but that most parents wrongly estimated their children's weight, believing that obese children had a healthy weight. They also found that parents were not acquainted with healthy eating habits and that they had insufficient knowledge about eating, food amounts, exercise and trends of obesity and health risks. Barriers to healthy weight were costs of food, lack of time and knowledge. In the future, medical staff need to know these kinds of barriers when they try to reduce the prevalence of obesity.

Higgs et al. (80) studied how cognitive processes (learning and memory) affect eating habits. Researchers have considered how learning and memory processes interact with satiation processes and how cognitive systems change reactions to food. They suggested that interventions promoting precise eating could help in controlling appetite.

Many researchers have critically compared overweight with addiction diseases. It has been suggested that some foods, such as sugar, fat and bread should be handled like medicines (81).

Income uncertainty also causes food uncertainty. This causes overeating among individuals, especially among females, when they have sufficient income (82).

Cardi et al. (83) studied the influence of negative and positive mood influence on eating behaviour (meta-analysis) under laboratory conditions. The researchers found that negative mood was connected to large portion sizes, especially among binge eating individuals. In addition, positive mood

was connected to consumption of calorie-dense foods among all study groups (83). In addition to mood, eating was also affected by the quality and quantity of food offered.

2.8 OBESITY AND DEPRESSION

In adulthood, depression is higher among women (19). Depression is found more often in individuals with abnormal body weight. Mauri et al. (17) found in their research on morbid obesity that mood disorders were the most common psychiatric diagnoses in obese individuals. Obesity has been significantly associated with mood disorders, but its association with anxiety disorders has been controversial (84).

Obesity can also be understood as an indirect form of self-destruction. Typical forms of indirect self-destructive behaviour (ISDB) include excessive smoking, alcohol and drug abuse, excessive self-induced stress and strain, and difficulty accepting the restrictions imposed by long-term illnesses (85). ISDB usually lasts for years, and the individual is not aware of his or her behaviour, especially its suicidal nature (85). In some cases, ISDB appears to protect the individual from underlying depression or anxiety. Occasionally, the individual acts very impulsively without thinking of the long-term consequences of his or her behaviour (86). Sometimes, this type of depression is also termed masked depression, such as by Kielholz (87) and Akiskal (88).

Ma and Xiao (89) examined a population-based sample of people from the US. The degree of obesity was an independent risk factor for depression in women in obesity class 3. The risk for depression was homogeneous within the obese population. According to Zimmermann (90), obese individuals have the same symptoms as patients with major depressive disorder (MDD). In the study, increased appetite, increased weight and tiredness were lower in obese patients than in the nonobese population. Fowler-Brown et al. (91) assumed that obesity is not associated with risk for depression in the general population, although it is associated with an increased risk of having depressive problems in higher social classes; therefore, sociodemographic characteristics are important when determining the association between depression and obesity. According to Wild et al. (92), the appearance of symptoms in people with obesity and depression varied widely between those in different BMI classes. They reported that women with BMIs in the second and third classes of obesity experienced more depression, whereas obesity seemed to be associated with a lower risk of depression in older men. Zhao et al. (93) stated that the prevalence of depression and anxiety appeared to depend on various BMI levels regardless of the population's disease status and other psychosocial and lifestyle factors.

Zhang et al. (94) researched the pathophysiology of obesity as well as interventions targeting it. They focused on not only the factors influencing the development of obesity but also the role of hormones and intestinal peptides. They also conducted neuroimaging studies, and their findings provided insight into the portion of the brain involved in the development of obesity. In their studies, brain circuits were considered to be related to obesity. According to Milaneschi et al. (95), leptin levels are higher in men, especially men with abdominal obesity.

Luppino et al. (96) aimed to determine the bidirectional connections among depression, overweight and obesity in their meta-analysis. They found bidirectional associations between depression and obesity: obese individuals had a 55% increased risk of developing depression over time, while depressed persons had a 58% increased risk of becoming obese. Obesity was observed to activate inflammation. Other biological mechanisms and psychological factors also affect this situation. Being obese and knowing that one is obese increase psychological stress. Being thin is viewed as ideal in both the USA and Europe. This leads to increased dissatisfaction with one's body and lower self-confidence, which are risk factors for depression for obese individuals. Disturbed eating habits, eating disorders and experience of physical pain increase the risk of depression among obese individuals (96).

In their research, Pereira-Miranda et al. (97) found that consistent results that depression is associated with obesity and overweight, especially among females. Researchers observed that negative self-image and the stigma associated with obesity result in unhealthy eating habits (97).

2.9 OBESITY AND BODY IMAGE, DISSATISFACTION, SCORN AND STIGMA

According to Bruch (3), *body image* is a fluid concept based on all the sensory and mental perceptions that are integrated in the central nervous system. Bruch considered feelings of the control and possession of one's body to be essential elements of body image. In obesity, disturbances in body image occur, especially among individuals who become obese during childhood and adolescence. The development of a disturbed body image in an obese child depends on his or her parents' attitudes towards obesity (3). According to Powers, the emotional aspect of body image is the sum of all the attitudes one has about his or her body (18).

According to Stunkard (98), only two factors are involved in obesity. The first of these factors is hyperphagia (overeating); at least once in his or her life, each obese individual has consumed far more calories than he or she has

expended. The other main finding among obese individuals is the presence of a disturbed body image. This is a more common finding among individuals who have been obese since adolescence.

Stunkard and Mendelson (99) showed that the development of body image disturbance depends on three factors: the age at the onset of obesity, the presence of emotional disturbance, and negative attitudes expressed by others towards obesity during childhood and adolescence. Stunkard and Mendelson (99) also proposed that a disturbed body image of this type requires intensive psychotherapy; the individual cannot be cured otherwise. Stunkard and Burt (100) observed that a disturbed body image was most common among individuals who had been obese in childhood. Stunkard and Wadden (101) found that body image disturbance rarely remits spontaneously. They examined several overweight persons before and after antiobesity surgery. Disturbance was most commonly found in individuals with childhood-onset obesity. According to Adami et al. (102), among individuals who had undergone surgical methods and were no longer obese, those with adult-onset obesity had body image perceptions that were very similar to those of controls, while those with early-onset obesity had abnormal body image perceptions. Rand and Stunkard (103) (104) found that the body image disturbances of obese individuals lessened over four years of psychoanalytic therapy.

Wardle et al. (105) found that early-onset obesity has an adverse effect on body image, which is independent of current BMI. Moreover, early-onset obesity increases the risk of body dissatisfaction, which in turn impairs self-esteem (102).

Dissatisfaction According to Crawford and Campbell (106), the average BMI at which women considered themselves to be overweight was significantly lower than that for men and was well within the acceptable BMI range. The results of the study by Pingitore et al. (107) indicated that satisfaction with body weight and shape decreased as BMI increased in both genders. Women, however, showed significantly greater body and weight dissatisfaction than men in most weight categories. Leonhard and Barry (108) demonstrated that the discrepant scores were significantly different among the groups of females. Subjects agreed on judgements of hypothetical normal male and female figure sizes; men in different BMI groups agreed upon a figure representing their size and felt that their desired size was attainable. Obese and very obese females underestimated their size and felt that their desired size was unattainable.

Interpersonal relations in childhood and adolescence are important for consistent body dissatisfaction. The influence of family and peers is important for reducing body dissatisfaction without depending on the media (109) (110).

Alipour et al. found that female university students value their own ideal body weight as being lower than their real body weight. Most of the female

students showed body image disturbances and dissatisfaction with their own weight (111).

Scorn and stigma The rate of obesity is rising. A stigma of obesity seems to be developing and spreading globally (19). The experience of being fat-shamed results in chronic pressure, which affects millions of individuals (20). Overwhelmingly, individuals who are obese start to believe, internalize and project the stigma of obesity as others do (21). Prospective research has found that adults who have experienced discrimination due to their weight have a 2.5 times greater risk of becoming obese. Individuals who have gained weight experience great difficulty losing weight (112).

Research has shown that social rejection and isolation cause psychosocial stress (113). This situation can lead to obese individuals having individuals with similar situations within their social networks (114) (115). This situation begins to develop during childhood. Researchers (116) (117) (118) found that negative weight bias influences choices and that this bias occurs in everyday life. In working environments, females become objects of discrimination (119). Additionally, Brewis et al. (following other researchers) found that low income is involved in many aspects of quality of life (19) (120) (121) (122). They also researched the relationship among self-esteem, guilt and shame, which were found to be connected to body and weight status. The researchers above found that women had statistically high levels of shame and guilt regarding their own weight.

Psychosocial stress can occur in childhood because of school bullying. Social relations could also be causes of stigma. What peers eat and take an interest in can result in obese individuals having small social networks. This relates to the fact that individuals with obesity are also very lonely (122) (123). Palad et al. (124) found that weight stigma can lead individuals to assimilate this scorn, which leads to low quality of life.

Pont et al. (125) focused on stigma experience among children and young people with obesity. According to the researchers, stigma causes negative behavioural changes, such as binge eating problems, social isolation, avoidance of health services, decreased physical activities and weight gain, which deteriorate obesity and introduce more barriers to changes for a healthier lifestyle (125).

2.10 FRAMEWORK OF THIS STUDY

Studying obesity is important from the perspective of the national economy. At the individual level, the problems of diseases are emphasized.

The aim of this case-control study is to use psychiatric and psychological methods to examine the relationship between stress and obesity and between depression and obesity in individuals with severe obesity receiving a disability pension. The main objective of this study is also to examine emotions and eating habits in a group of severely obese individuals. It also tracks body image disturbance and dissatisfaction and scorn and stigma in severely obese individuals.

The biological and psychosocial backgrounds of obesity have been studied extensively. However, few studies have been conducted on psychiatric problems related to obesity, such as disturbances in body image, dissatisfaction, and the scorn and stigma due to obesity.

3 AIMS OF THE STUDY

Obesity poses an increasing threat to public health in Finland, where obesity has become more common among men than among women. In international comparisons, Finland is ranked among the top countries for obesity, although fortunately, it is not number one.

STUDY I The relationship between stress and severe obesity:

A case-control study

In this study, psychiatric interviews and surveys of coping mechanisms were used to identify stressful events among individuals with obesity.

STUDY II Severe obesity, emotions and eating habits: A case-control study

This study provides information on the relationship between emotions and eating habits in severely obese individuals.

STUDY III The relationship between depression and severe obesity:

A case-control study

The study investigated the relationship between depression and severe obesity by using a case-control method.

STUDY IV Body image disturbance and dissatisfaction, scorn and stigma in severely obese individuals

The study aimed to elucidate the connection among body image disturbance and dissatisfaction, scorn and stigma in severely obese individuals by using a case-control design.

4 MATERIALS AND METHODS

4.1 MATERIALS

The subjects consisted of all the people living in the province of Uusimaa (population 1,127,022) and receiving a permanent disability pension primarily because of obesity on 31 December 1983. The number of people meeting these criteria was 152. Nineteen had been granted a temporary pension and were excluded from the sample. Those who had died or who no longer received a pension were also excluded from the sample. The subject group finally consisted of 112 patients, including 81 women and 31 men. The controls were selected from among those living in the province of Uusimaa and receiving a disability pension because of some other primary illness. In Uusimaa, the number of such individuals was 39,039 on 31 Dec 1983. The controls were matched with the subject group by place of residence and sex. As far as possible, the matching also took the control person's age, time when the pension was granted, and occupation into account. The occupation of the controls was either the same as that of the subjects or unknown. The controls were selected by means of random sampling. Since the men constituted a small group, many controls were selected to ensure statistically reliable analysis.

The male and female controls were selected separately. Three controls for each female subject and five for each male subject were selected from the potential controls. For the interviews, an attempt was made to have at least two controls for each female subject and three for each male subject. In all, the study thus included 510 persons, of whom 112 were subjects and 398 were controls. During this research, the numbers of cases and controls were changed because we wanted to find the potential controls.

Three letters of invitation to participate in the study were sent to each subject and control, with the first letter sent in early summer 1984. Those who did not respond to the first letter received a second letter towards the end of that summer, and those who did not answer even the second letter received a third letter in April 1985. The letters were discreetly worded and emphasized the confidentiality of the study. The letter sent to the study subjects is provided as supplementary material. Most of those not taking part in the research indicated their reasons for refusing in writing. The letters are available to the researcher.

4.1.1 THE TOTAL SAMPLE

Of the women, 71% (n=53) of the subjects and 66% (n=112) of the controls agreed to participate in the study; among the men, 71% (n=22) of the subjects and 72% (n=67) of the controls agreed to participate, yielding a total of 254 participants. One of the male subjects could not be contacted for follow-up, and one female subject withdrew from the study before the psychological test. In addition, one of the female controls refused to continue the interview after the first few questions.

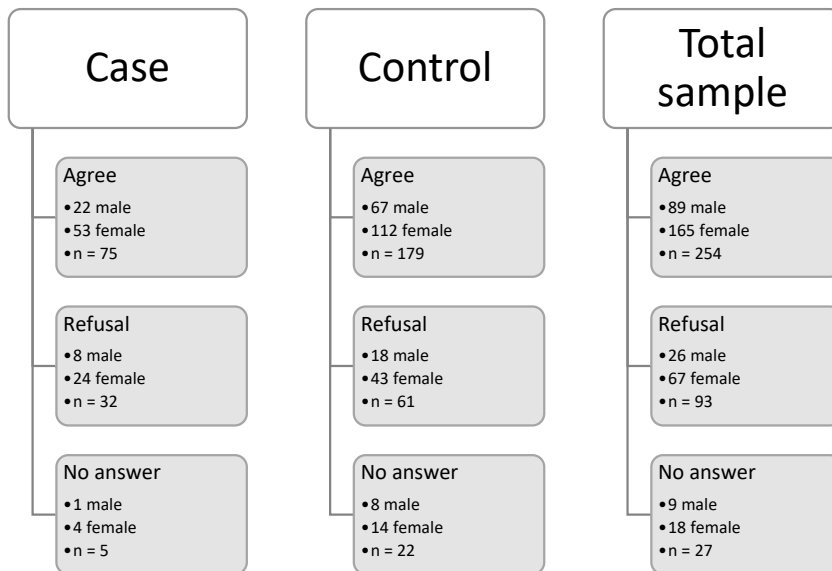


Figure 1 The total sample of this study

4.1.2 AGE DISTRIBUTION OF THE SAMPLE

Figure 2 shows the participants' age in the matched sample.

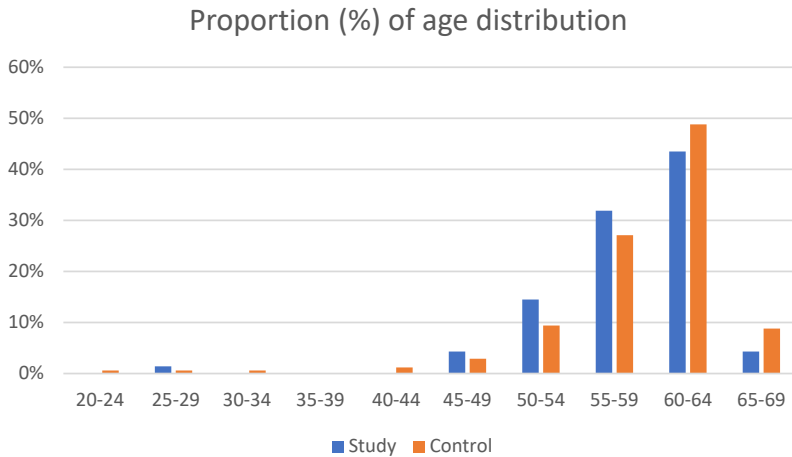


Figure 2 Age of the participants in this research

4.1.3 BODY MASS INDEX

Body mass index (BMI) was calculated using the following formula: body weight (kg) divided by the square of body height (cm). Weight and height were reported by patients. According to the WHO guidelines, BMI was classified as follows: overweight, BMI 25–29.9; obese, BMI 30–34.9; severely obese, BMI 35–39.9; and morbidly obese, BMI ≥ 40 .

4.1.4 OCCUPATIONS

The standard occupational classifications of the Social Insurance Institution (1982) were used. Table 1 shows the occupational distributions of males and females. Because both the study and control groups were matched, there were no statistically significant differences in occupation distribution between cases and controls.

Table 1 Occupational category of the research participants

	Study group n = 112	Control group n=262	Significance (χ^2-test)
Occupational category	n=22 (male), n=53 (female)	n=66 (male), n=112 (female)	fp=0.593 mp=0.901
Technical, scientific, sociological, and artistic work	m= 0%, f= 0% total= 0%	m= 0%, f= 4.5% total= 2.2%	
Accounting and clerical work	m= 4.5%, f= 5.7% total= 5.1%	m= 1.5%, f= 2.7% total= 2.1%	
Commercial work	m= 4.5%, f= 17.0% total= 10.8%	m= 4.5%, f= 10.7% total= 7.6%	
Agricultural, forestry, fishing	m=0%, f = 7.5% total= 3.7%	m=3.0%, f =7.1% total= 5.1%	
Transport, communication work	m= 27.3%, f= 7.5% total= 17.4%	m= 24.2%, f= 4.5% total= 14.3%	
Industrial work	m= 50.1%, f= 17.0% total= 33.5%	m= 48.6%, f= 21.4% total= 35.0%	
Service work	m= 13.6%, f= 45.3% total= 29.5%	m=18.2%, f =49.1% total= 33.7%	
Total	m= 100%, f= 100% total= 100%	m= 100%, f= 100% total= 100%	

f= female, m= male

4.1.5 REFUSAL TO PARTICIPATE

The results of the individuals who refused to participate in personal interviews were removed from the register. Thirty-seven individuals refused to participate, namely, nine men and 28 women in the case group and 26 men and 83 women in the control group. The mean age of the men who did participate in the study was 59 years, and the mean age of the women was 61 years. Thirty-one individuals in the refusal group had a primary school education, whereas 34 had no vocational education of any kind. The individuals who refused to participate in the study were as poorly educated as those who did participate; the age distribution and gender distribution were also identical.

4.2 METHODS

An interview form was used, parts of which the author filled out during the interview and the rest after it. The author herself interviewed all the participants. The participants were interviewed using a semistructured psychiatric interview developed for this study, with 90 minutes being allotted to each person.

The author herself developed the interview form by using a clinical psychiatric examination and previous literature. This schedule consisted of 147 questions. The main focuses were obesity, eating habits, morbidity and personality. The examinees reported their own weight and height. A pilot study (n = 30) was conducted in the neurological ward of the Hesperia Hospital in Helsinki, with the sample consisting of patients of the hospital.

Diagnoses were specified by the ICD and DSM disease classifications. The researcher of this study interviewed all examinees, blinded to their assignment to the study or control group. The DSM-III recommends the use of a multiaxial system for evaluation to ensure that valuable information for planning treatment and predicting the outcome for each individual is recorded on each of five axes, the first three of which constitute an official diagnostic evaluation. Axes I and II include all mental disorders, personality disorders and specific developmental disorders assigned to Axis II, and all other mental disorders are assigned to Axis I. Diagnoses were asked during the interview, and some diagnoses were checked based on the patient's papers.

Axis III is for physical disorders and conditions. The separation of this axis from the mental disorders axes is based on the tradition of separating the disorders that manifest themselves primarily at the behavioural or psychological level (i.e., mental disorders) from those that do not. It is necessary to have a term that can be applied to all disorders that are not considered "mental disorders". The term "organic disorder" would incorrectly imply the absence of physical factors in "mental" disorders. Hence, the DSM-III uses the term "physical disorder", recognizing that the boundaries for these two classes of disorder ("mental" and "physical" disorders) change as our understanding of the path physiology of these disorders increases (126).

Axis IV, Severity of Psychosocial Stressors and Axis V, Highest Level of Adaptive Functioning in the Past Year, are for use in special clinical or research settings and provide information additional to official DSM-III diagnoses (Axes I, II and III), which is of value for treatment planning and predicting outcome (126).

The social skills of the subjects were measured using the Global Assessment Scale (GAS), with responses rated on a scale from 0-9 (127).

4.3 STUDY I THE RELATIONSHIP BETWEEN STRESS AND SEVERE OBESITY: A CASE-CONTROL STUDY

A psychiatric interview form was used in this study. The author of this research interviewed all of the participants. During the interview, the interviewer examined stress factors that were connected to obesity. The total number of

participants was 254 (study group n =75 and control group n=179). In this study, we used Axis IV (Severity of Psychosocial Stressors) of the DSM-III classification. The GAS (127) was used to measure social, occupational, and psychological functioning. In addition, the standard occupational classifications of the Social Insurance Institution (1982) were used. In this research, Axis V of the DSM-III was also used to define differences between the study and control groups.

During the interview, the psychologist filled out the questionnaire. The questionnaire used in this study examined coping mechanisms. This assessment was originally developed by Saari (128) and was modified by Keltikangas-Järvinen, who changed the wording and added one alternative to the questionnaire (alternative 9). The form has ten alternatives describing various behavioural possibilities in stressful and problematic situations. The respondent ranks the alternatives on a scale from 1 to 10 according to how well they describe him or her. Alternative 1 best describes the personality of the respondent. Alternative 2 represents the second-best description, alternative 3 the third best, and so on. When the respondent considers an alternative to be completely unsuitable, they can draw a line through this alternative. According to Saari's definition (128), alternatives 4, 7, 8, and 10 represent active methods of problem solving, whereas alternatives 5, 6, and 9 are examples of giving up on trying to solve a problem.

4.4 STUDY II SEVERE OBESITY, EMOTIONS AND EATING HABITS: A CASE-CONTROL STUDY

The researcher of this study interviewed all cases (n=75) and controls (n=179) using a semistructured psychiatric questionnaire. The main foci of this interview were eating and feeling hunger. Additionally, childhood eating habits were examined. The questionnaire was developed based on some other questionnaires that the Social Insurance Institution of Finland uses. The participants were interviewed by the author of this manuscript using an interview form that was partially filled out during the interview and then completed afterward.

4.5 STUDY III THE RELATIONSHIP BETWEEN DEPRESSION AND SEVERE OBESITY: A CASE-CONTROL STUDY

The author (a psychiatrist) interviewed all participants and designed the interview form according to clinical psychiatric examinations and previous

literature. The form consisted of 147 questions. The ICD and DSM classifications were used.

After the interview, the participants completed the BDI developed by Beck et al. (129), which was used as a measure of conscious depression. The different alternative answers of each category were read aloud to the interviewee, who then selected the best alternative for his or her situation. The inventory consisted of 21 questions, and each question had four to six alternative answers. The total score ranges from 0–63. An additional factor, weight gain (19b), was added to the original BDI by Raitasalo (130) because the BDI only addressed losing weight (19a). Patients who had gained weight had difficulty answering the original questions only about losing weight. The questions measured the quantitative aspects of depression and the severity of the depressive symptoms regarding the most common characteristics of patients with depression observed in clinical practice. In this research, we divided the patients into five groups according to the level of depression.

4.6 STUDY IV BODY IMAGE DISTURBANCE AND DISSATISFACTION, SCORN AND STIGMA IN SEVERELY OBESE INDIVIDUALS

Body image includes individuals' physical, emotional and interpersonal (relationship, perception between individuals) perceptions of themselves.

All subjects (n=75) and controls (n=179) were interviewed using structured psychiatric forms. During each interview, attention was drawn to the development of obesity, in addition to how much the individual would like to weigh and how satisfied he or she was with his or her weight. Specifically, we paid attention to the kinds of memories and recollections the respondents had about scorn and contempt directed at them because of their weight.

We also used some psychological tests in this research. In the Draw-a-Person test, separate variables were used for various features of the drawings, such as type, size, sex, and general impression of the developmental degree of the perception of the body. There are five points in the Machover index, which is used to estimate the results of the Draw-a-Person test. The maximum number of points on this test is 19. The Machover index (131) measures distortions pertaining to perceptions of the human body. The higher the index value is, the more distorted the perception. In regard to the integrity of the perception of the human body, this index is based on the Kalliopuska and Siimes index (132), which measures the integrity of an individual's perception of the human body. In this index, there are nine questions, and the maximum number of points is 25. The higher the index value is, the more integrated the perception.

Separate variables were also used for various features of the drawings, such as type, size, gender, and general impression of the developmental degree of the perception of the body.

The Rorschach test is a projective diagnostic personality test consisting of ten cards with inkblot designs. Klopfer's scoring methods and other scoring systems were applied (133). The method applied by Keto (134) was used. The variable that was used on the Rorschach record forms was the barrier penetration index, which measures body image boundaries. The mean number of barrier responses on one test record presented by Fischer and Cleveland (135) was four, and the mean number of penetration responses was two. A large number of barrier responses indicates that an individual has an established picture of his or her own body and that he or she is able to cooperate with others based on this well-integrated self-esteem. A low number of barrier responses indicates that an individual's bodily boundaries are poor and that he or she works as other individuals say. A large number of penetration responses also indicates penetration of the body.

4.7 STATISTICAL METHODS

The statistical methods used in this study included t-tests and conditional logistic linear models. Because the subjects were matched, we analysed the data with figures and percentages and by calculating the means for the subjects and controls using the matched control approach. The two classes were then compared using a t-test for paired variables. Variables for which significant results were detected were analysed further using the logistic linear model. The risk ratios and upper and lower confidence limits were calculated for parameters that remained significant following the logistic linear analysis. The statistical parameters were calculated with the Statistical Package for the Social Sciences (SPSS) for Windows 18/Windows, Chicago, IL, USA). The conditional logistic analyses were performed with the Glim program. Generalized linear interactive modelling (GLIM) is straightforward when the data are arranged in the convenient individual-by-individual format, which commonly corresponds to the method of compilation. A major advantage of this technique is that it is easy to use and has inherent flexibility.

In each set, one case was included for every 0–5 controls. Because these observations were considered counts, a Poisson error distribution was used, and the logarithmic function was used as the link function. The model was a special form of the log-linear model. The linear predictor in the systematic part of the model for each observation was a (linear) function of the observed exposure variables for each individual plus a constant (set) term, which could

vary from matched set to matched set. According to the literature regarding case-control data, this model is termed “conditional logistic regression” (which is a misleading description for data analysts who are familiar with generalized linear model terminology).

Although the group of subjects would have remained very small with this method, the missing controls were replaced by the nearest control. The matched control approach meant that some of the subjects who had agreed to participate were excluded from the study during the statistical analysis because a control was not available. In some cases, specific variables were lacking, and the number of observations available for comparisons was further diminished (136) (137).

Differences between groups were considered highly significant when the probability (p) of error in rejecting the null hypothesis was $p < 0.001$ (***), significant when $p < 0.01$ (**), and nearly significant when $p < 0.05$ (*).

4.8 ETHICAL CONSIDERATIONS AND PRIVACY PROTECTION

The study protocol was approved by the Ethics Committee of Hesperia/Aurora Hospital (a community psychiatric hospital in Helsinki) and Lapinlahti Hospital (a psychiatric clinic at Helsinki University)/Psychiatric Centrum of Helsinki University. Informed consent was obtained from the participants, and the ethical principles of the Declaration of Helsinki were followed throughout the study.

The Sickness Insurance Act and the National Pensions Act provide insurance against disability for all residents of Finland. The National Pensions Scheme offers basic pension insurance to all Finnish citizens. Age, professional skills, and other factors are also important for evaluating disability. Individual differences in working capacity should be recognized, with consideration of the applicants’

In this research, subjects were sent a letter signed by the director of a social security research institute and asked if they wanted to participate in the study. A copy of the letter is available from the author.

Three letters inviting individuals to participate in the study were sent to each subject and control. The letters were discreetly worded and emphasized the confidentiality of the research. Most individuals who did not participate in the study indicated their reasons for refusal in writing. These letters are available upon request.

5 RESULTS

5.1 BODY MASS INDEX

The mean weight of the subjects (n=75) was 106.2 kg (SD=18 kg) and that of the controls (n=179) was 72.3 kg (SD=14.3 kg). At the time of the personal interviews, 40% of the female subjects and none of the female controls had a BMI of over 40, and 33% of the female subjects had a BMI of 35–39.9. Among the men, 36% of the subjects and none of the controls had a BMI exceeding ≥ 40 , and 41% of the subjects and 2% of the controls had a BMI of 35–39.9. In addition, 6% of the female subjects and none of the male subjects had a BMI of 25–29.9 (Fig. 3 and Fig. 4).

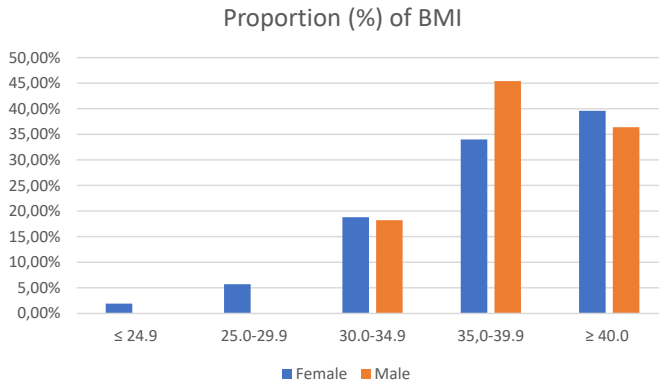


Figure 3 Proportions of individuals in different BMI categories in the study group by sex

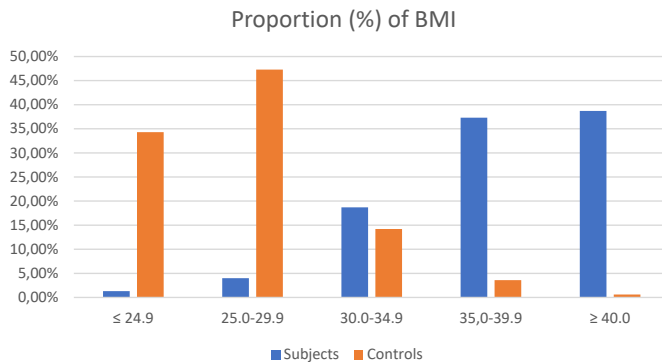


Figure 4 Proportions of subjects and controls in different BMI categories

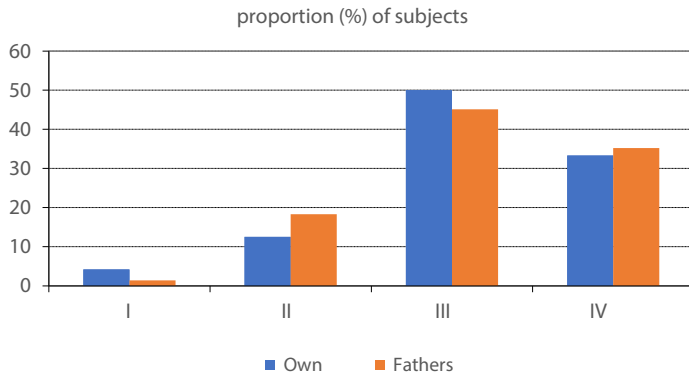
5.2 SOCIAL CLASSIFICATION

Table 2 shows the findings of this research that used Bruun's social classification (138). We found clear significant differences between the subjects and the controls. The highest proportion of the male subjects (43%) was in the fourth social class, whereas the highest proportion of the male controls (58%) was in the third social class. Thirty-eight percent of the male subjects belonged to the third social class, while 18% of the controls belonged to the fourth social class. Fifty-five percent of the female subjects and 58% of the female controls were in the third social class, and 29% of the female subjects and 25% of the controls were in the fourth social class.

Table 2 Social classification according Bruun's social classification

Social classification			
	Study group n=112	Control group n=262	Significance (χ^2 -test) P=0.0560 (m) P=0.963 (f)
I=First social class	4.2%	2.3%	
II=Second social class	12.5%	17.7%	
III=Third social class	50.0%	57.7%	
IV=Fourth social class	33.3%	22.3%	

The highest proportions of the fathers of the male subjects (47%) and controls (69%) belonged to the fourth social class. A large number of the male subjects had thus become caught in the fourth social class like their fathers, while only 18% of the controls remained in this class. The highest proportions of the fathers of the female subjects (48%) and controls (50%) belonged to the third social class. None of the female subjects' fathers belonged to the first social class (Fig. 5 and Fig. 6).



I = First social class
 II = Second social class
 III = Third social class
 IV = Fourth social class

Figure 5 Own and father's social class according to Bruun in the study group

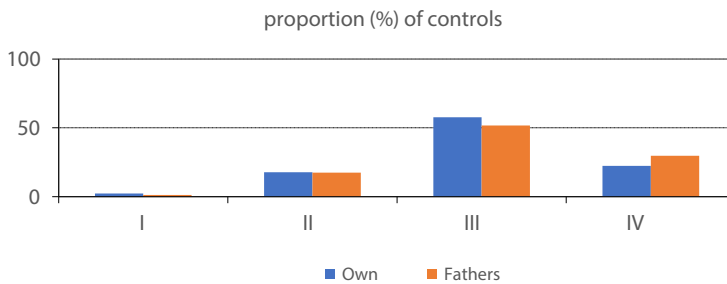


Figure 6 Own and father's social class according to Bruun in the control group

5.3 MARITAL STATUS

Table 3 shows the marital status of the cases and controls. The majority of the study subjects were married (62.7%). In the control group, the corresponding figure was 59.6%. In the sample, 10.7% of the study subjects and 15.7% of the control subjects were unmarried. Marital status did not affect enrolment in this study.

Table 3 Marital status in this research

Marital status		
Status	Study group N=75	Control group N=179
Unmarried	10.7%	15.7%
Married	62.7%	59.6%
Widowed	14.7%	13.5%
Divorced	6.7%	10.7%
Common-law marriage	5.3%	0.6%

χ^2 -test; $p=0.0894$

5.4 SOMATIC MORBIDITIES

In this research, 68 study group participants had a first additional disease, and 27 also had a second additional disease. When we looked at both disease groups, we noted that a large number of participants had diseases of the circulatory system (study group 28.4% and control group 28.6%) and rheumatoid arthritis/osteoarthritis and similar diseases (study group 34.7% and control group 21.2%).

In the control group, the most common disease group was diseases of the circulatory system (26.6%). The second most common disease group was rheumatoid arthritis/osteoarthritis and similar diseases (21.2%). In both groups (study and control), diseases of the musculoskeletal system and connective tissue were present (control group 10.8% and study group 6.3%).

Diabetes was an additional risk factor contributing to retirement; $RR=7.3$ and 95% confidence limit 5.1–10.4. This is a result of GLIM analysis, for which the university's computer centre calculated the results of the logistical linear model.

5.5 STUDY I THE RELATIONSHIP BETWEEN STRESS AND SEVERE OBESITY: A CASE-CONTROL STUDY

During the psychiatric interview, the researcher asked about the point in life when the weight gain started. In this study, more stress factors were identified in the study group than in the control group. "Getting married" was a statistically significantly stressful life event ($p=0.0027$). Pregnancy, abortion and delivery were also stressful situations. Additionally, the prevalence of "family problems" was more common in the study group.

Figure 7 shows only the percentages of the study and control groups with yes answers. In this figure, we can see that in the study group, the highest

percentages reported the following stressful live events: getting married (16.25%), pregnancy (13.75%), giving birth (12.0%) and family problems (8,75%). In the control group, the highest percentage reported a severe or long-term illness (13.58%), followed by getting married and pregnancy (both 11.11%). In addition, the percentage of individuals reporting type of work or changes in working conditions was considerably higher in the control group (9.88%) than in the study group (2.50%).

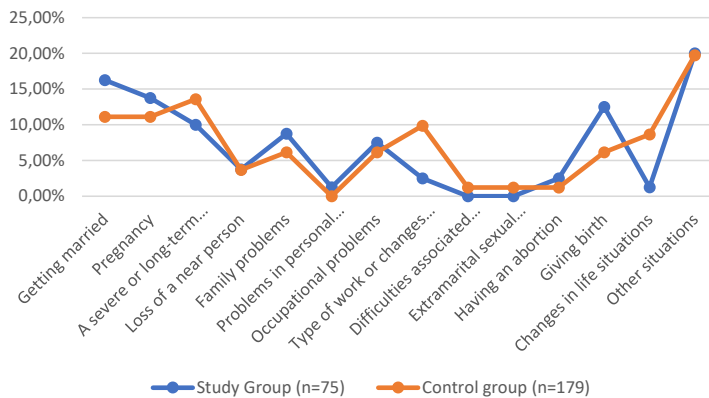


Figure 7 The point in life when obesity began

Separation from parents was more frequent among the participants in the study group (n=75) than among those in the control group (n=179), and this difference was nearly statistically significant. This difference was nearly statistically significant according to the paired t-test ($p = 0.022$) and the logistic linear model (risk ratio = 2.9; confidence limits: 1.6–5.1).

Regarding DSM-III Axis IV, more stress factors were diagnosed in the study group. This was found during the interviews. Regarding Axis IV, over two-thirds of the participants were diagnosed with some level of stress, but a higher proportion of participants in the study group were assigned to level 4 (the second-highest stress level). The mean stress levels for the study and control groups were calculated according to the DSM-III Axis IV. The mean stress levels for the study group (n=75) were 4.44, with a standard deviation of 0.5831. The mean stress levels for the control group (n=179) were 4.119, with a standard deviation of 1.1519. There were no differences between groups based on data analysis using the conditional logistic linear model. The GAS scores were higher in the control group than in the study group. The study group had a mean GAS score of 4.6, with a standard deviation of 0.6779. The

control group had a mean GAS score of 4.8343, with a standard deviation of 0.7588 ($p = 0.022$).

According to the results for coping mechanisms, the participants in the study group ($n=75$) solved their problems more actively than the participants in the control group ($n=179$). According to Saari's definition (128), alternatives 4, 7, 8, and 10 represent active methods of problem solving, whereas alternatives 5, 6, and 9 are examples of giving up on trying to solve a problem. The mean total rankings of all alternatives representing active coping mechanisms were 22.8 for the case subjects and 21.5 for the control subjects ($p = 0.306$). The mean total rankings of all alternatives representing giving up on problem solving were 6.6 for the case subjects and 8.7 for the control subjects. This difference was statistically significant ($p = 0.037$).

5.6 STUDY II SEVERE OBESITY, EMOTIONS AND EATING HABITS: A CASE-CONTROL STUDY

A total of 14% of the subjects ($n=75$) and 23% of the controls ($n=179$) reported eating associated with quarrels. A paired t-test showed $p=0.007$. In all, 11% of the subjects reported eating when feeling lonely; the corresponding figure among the controls was 3% ($p=0.023$). The logistic linear model showed that there was a statistically significant difference between the subjects and the controls with regard to eating habits in that, compared with that of the controls, the eating of the subjects was statistically significantly more often associated with an undefined emotional state.

The results of this study demonstrated that the emotional state was significantly connected to eating in association with quarrels and loneliness. In addition, pleasure ($p=0.073$) and other states of mind (**) were also related to eating habits.

Eight percent of the subjects and two percent of the controls had periods of binge eating ($p=0.060$). The logistic linear model showed that the subjects did not run a statistically significant risk for premature retirement. Thirty-six percent of the subjects and as many as 11% of the controls had night-eating syndrome, (RR 4.5, confidence limit 2.5–8.1 and $p=0.000$).

Sixty-four percent of the subjects ($n=61$) and 68% of the controls ($n=143$) said that they were not often hungry. Fifteen percent of the subjects and 3% of the controls said that they were continually hungry, while 20% of the subjects and 24% of the controls said that they were often hungry. A total of 4.5% of the control group and 1.3% of the study group could not answer this question. However, the paired t-test yielded $p=0.039$, which was an almost statistically

significant finding. The X^2 test showed a significant difference between the groups ($p=0.008$).

We found minor differences between the subject and control groups in their responses to questions about foods that they liked or disliked. Surprisingly, there was no significant difference in the preference for sweets between the subject and control groups.

In this study, we also investigated eating habits during the formative years of childhood. In our study, we found that in the study group, 2.7% reported that while eating a meal, they had to clean the plate; among the controls, the number was 1.7%. In the study group, 5.3% of individuals reported only eating meals, and in the control group, this number was 5.1%. A statistically significant difference was not found between groups in the chi-square test ($\chi^2=0.85$).

Ninety-six percent of both the subjects and controls reported eating mostly at home. The majority of both the subjects and the controls said that they prepared their own food (75% and 72%). These findings were similar between the subject and control groups.

When the participants were asked about their own perceptions of their obesity status, the study group ($n=75$) thought that gaining weight had nothing to do with food. However, 41.7% of the same group reported eating too much. This finding was statistically significant in the chi-square test ($X^2 = 0.0007$).

5.7 STUDY III THE RELATIONSHIP BETWEEN DEPRESSION AND SEVERE OBESITY: A CASE-CONTROL STUDY

Depression was diagnosed more often in the subject group than in the control group during the psychiatric interview. In the DSM-III, depression was divided into four subclasses (Table 5). A total of 28% of the subjects had chronic depression (dysthymia disorder). The corresponding figure for the controls was 14%. Of those diagnosed as having a mental disorder, 21 were women, and 6 were men. Based on the logistic linear model, the difference between the subjects and the controls was almost statistically significant (Table 4).

Table 4 Occurrence of mood disturbances among the subjects and the controls. Relative (%) frequencies. Statistical significance between the subjects and the controls (RR is a 95% confidence limit)

	Subjects n =75 %	Controls n =178 %	p-value	RR (*)	95% confidence limit
Chronic depression	28	14	***	2.1	1.3-3.5
Other mood disturbance	7	2	***	6.6	2.6-16.5
Serious mood disturbance	4	1	***	6.0	1.4-14.3
None	61	83			
Total	100	100			

(***) = p < 0.001, statistically highly significant
 (**) = p < 0.01, statistically significant
 (*) = p < 0.05, statistically almost significant

5.7.1 THE BECK DEPRESSION INVENTORY

According to the BDI, 11% of the study group and 11% of the control group had severe depression. Eleven percent of the study group and 9% of the control group had moderate depression, and 56% of the study group had no depression. The corresponding figure among the control group was 58%. In both groups, the percentages were fairly similar to each other. Masked depression was found in 7% of the study group and 5% of the control group.

Based on the logistic linear model, no statistically significant difference was found between the subjects and the controls, nor was there any statistically significant difference when men and women were considered separately.

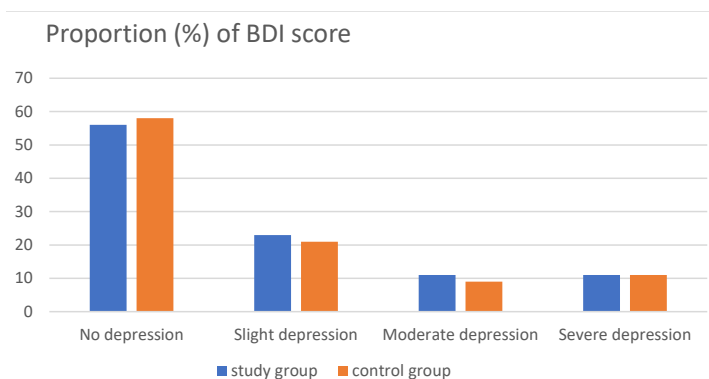


Figure 8 The occurrence of depression using Beck’s Depression Inventory

Using the BDI (study group 75 and control group 179), a total of 21 questions were asked. These questions were also studied separately. The finding for item 11 of the BDI, which measures irritability, was close to statistical significance ($p=0.0283$) in the control group. The finding for item 14, for which the person in question judges his or her body image, was also close to statistical significance ($p=0.0274$), was item 15, which measures ability to work ($p=0.0394$), this item was lower in the study group. Item 18, which addresses the person's appetite, yielded the following result: ($p=0.0365$) in the study group. This denotes a finding close to statistical significance. Item 19, which asks about changes in weight gain, yielded a statistically significant finding: $p=0.0139$.

We paid special attention to the weight changes reported on question 19 in the BDI. The weight had not changed in 44.2% of all participants, including those in both the study and the control group. Among individuals in the study group, 37.9% with BMI >40 had gained more weight, and only 6.9% had lost weight.

5.8 STUDY IV BODY IMAGE DISTURBANCE AND DISSATISFACTION, SCORN AND STIGMA IN SEVERELY OBESE INDIVIDUALS

At the time of the psychiatric examination, the mean weight of the subjects was 106.6 kg. Most commonly, the BMIs of women were ≥ 40 . In the male group, the BMIs were most commonly 35.0–39.9. In childhood, 20% of the study group females had been obese. A total of 42.1% of the males in the study group had been obese in childhood.

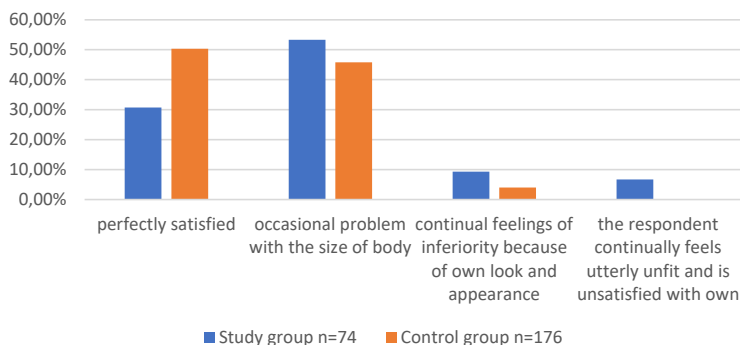


Figure 9 Individuals' feelings regarding weight and self-existence

Figure 9 shows that 31% of the subjects and 50% of the controls said they were fully satisfied with their present weight, but 53% of the subjects and 46% of the controls reported having occasional problems with their body size. When asked whether being overweight constrained their human relationships, 30% of subjects gave affirmative responses.

A total of 61.4% of the study group described scorn and contempt directed at them for being overweight. In the control group, this percentage was 12%. The participants' partners did not have any negative comments to say about obesity.

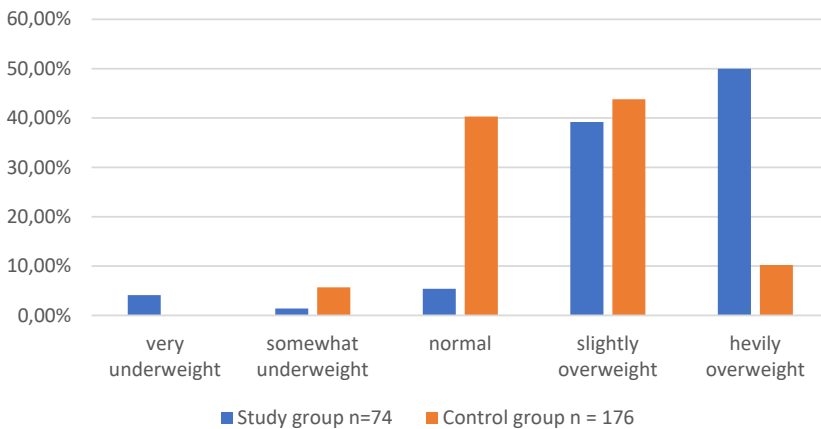


Figure 10 Present weight described by the individual

Figure 10 shows that 50% of the study group reported being heavily overweight, while 10.2% of the control group did; 5.4% of study group and 40.3% of control group reported being normal weight.

The level of body image disturbance was measured by the Machover index. The mean of the Machover index measuring disturbance ($n = 64$) was 3.98 for the subjects and 4.31 for the controls. Statistically significant results were found in the Machover index for the point position ($p=0.0300$, $RR=3.3$, confidence limit 1.9–5.7) and the missing division ($p=0.0447$, $RR 0.3$, confidence limit 0.1–0.8). The mean wholeness index ($n = 65$) was 17.35 for the subjects and 18.02 for the controls. The wholeness index showed some differentiation between groups ($p=0.0571$). There was also a trend in the differences in the drawing of lines ($p=0.0839$). The wholeness index differentiated between the subjects and the controls to some extent. This topic requires further research.

The drawings were classified into six groups (Table 5). The distribution into groups revealed no statistically significant differences. The results were tested using a logistic linear model.

However, examination of the drawings revealed substantial differences between the subjects and the controls. The subjects did not want to draw a drawing more often than the controls. The subjects also drew stick figures and grotesque figures (ghosts, dolls, etc.) more often than the controls. Notably, only one subject drew just a head, whereas in the control group, there were 12 such drawings (Table 5).

Table 5 Distribution of the types of drawings among the subjects and the controls. Relative (%) frequencies

	Subjects (n=75)	Controls (n=179)
No drawing	11.4%	5.6%
Stick figure	8.5%	5.6%
Snowman, ghost, Santa Claus	5.6%	5.1%
Just a head	1.4%	6.8%
No abnormality	73.6%	67.0%
A baby	0.0%	1.1%
	$p=0.642$	

There was no major difference in the sizes of the drawings (large drawings, small drawings) between the subjects and the controls (Table 6). A small human figure was drawn by 24% of the subjects and 22% of the controls.

Table 6 Distributions of the human figures among the subjects and the controls. Relative (%) frequencies.

	Subjects (n=70)	Controls (n=157)
Small	24.3%	22.3%
Large	5.7%	8.9%
Normal	70.0%	68.8%

Regarding the sex of the figure drawn, 36% of the subjects drew a human figure the sex of which could not be determined. The corresponding percentage among the controls was 29. The opposite sex was drawn by 12% of the subjects and 9 % of the controls.

Among the subjects, 47% drew a figure the age of which could not be determined; the corresponding percentage among the controls was 33. Children were drawn by 14% of the subjects and 12% of the controls.

The values of the firmness and permeability of the boundaries of the body based on the barrier and penetration indices revealed no significant differences between the subjects and the controls. The mean number of barrier responses was 1.92 among the subjects and 1.75 among the controls. The mean number of penetration responses was 1.38 among the subjects and 1.72 among the controls.

Figure 11 shows the extent to which (%) scorn and stigma were noticed at different ages in the study and control groups. In the study group, overweight was problem before school age for 7% of the individuals and at school age for 10% of the individuals. During youth, overweight was a problem for 14% of the study group.

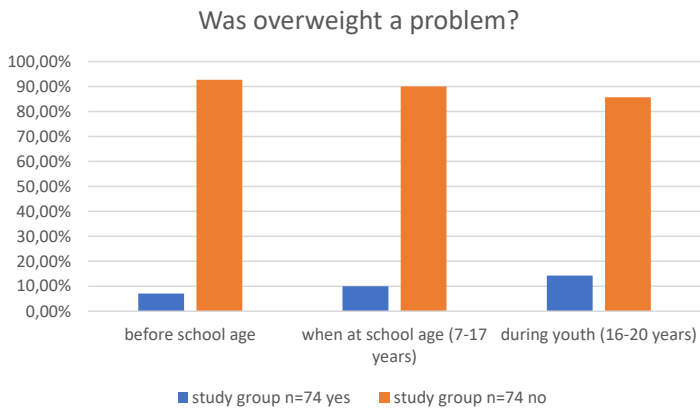


Figure 11 Perceptions of whether overweight was a problem at different ages in the study group

In control group, overweight was problem before school age for 0.6%, at the school age for 1.10% and during youth for 2.30% of individuals.

Figure 12 shows data on memories and recollections of being overweight.

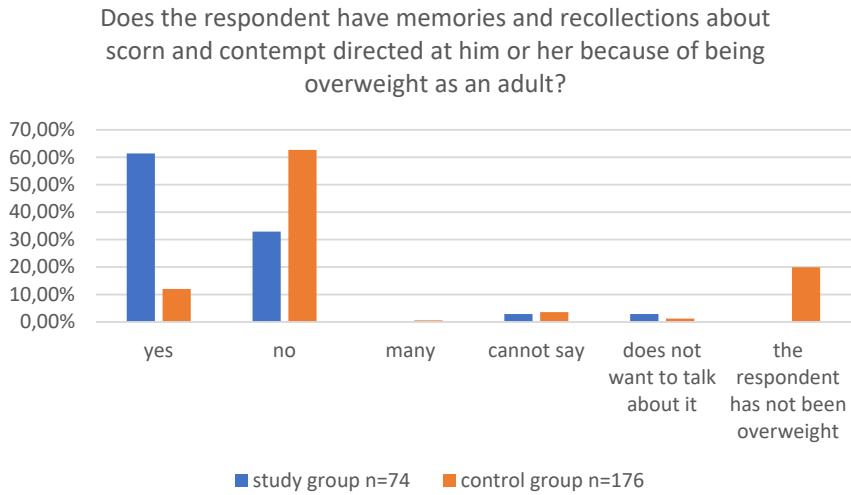


Figure 12 Respondents’ memories and recollections about scorn and contempt directed at him or her because of being overweight as an adult

Some statistical findings of this study between the study (n=75) and control groups (n=179)				
	Significance χ^2 - test	Paired t-test	RR	Confidence limits 95%
The point in life when obesity began				
Marriage	0.0027			
Family problems	0.0057	*	3.3	
More active in problem solving		0.037		
Separation from parents		0.022	2.9	1.6-5.1
Influence of emotional state of eating				
Eating associated with quarrelling	p=0.001	p=0.007		
Eating associated with loneliness	0.023			
Night eating		***	4.5	2.1-8.1
Feelings of hunger	p=0.008		1.2	0.6-2.3
Occurrence of mood disturbances				
Chronic depression		***	2.1	1.3-3.5
Other mood disturbance		***	6.6	2.6-16.5
Serious mood disturbance		***	6.0	1.4-14.3
Beck Depression Inventory				
Irritability	0.0283			
Body image	0.0274			
Work inhibition	0.0394			
The point in life when obesity was acknowledged in the study group and the control group				
How does the respondent describe his or her own present weight?	<0.0001			
How does the respondent feel about his or her own weight and self-existence?	<0.0001			
Does the respondent have memories and recollections about scorn and contempt directed at him or her because of being overweight as an adult?	<0.0001			
Has being overweight ever been a problem?				
Before school age		p=0.0111		
When at school age (7-17)		p=0.0033		
During youth (16-20)		p=0.0008		
The risk of diabetes				
			7.30	5.1-10.4

Table 7 Some statistical findings of this study between the study (n=75) and control groups (n=179)

6 DISCUSSION

6.1 STATEMENT OF PRINCIPAL FINDINGS

The first aim of this study was to examine the impacts of stress on the onset and development of obesity. In the psychiatric interview, more stress factors were identified in the study group than in the control group. Getting married and feeling lonely were the most important factors. Separation from parents was identified more frequently among participants in the study group than among those in the control group, and this difference was nearly statistically significant. According to the results for coping mechanisms, the participants in the study group solved their problems more actively than the participants in the control group.

The second aim was to examine severe obesity, emotions and eating habits. The results of this study demonstrated that emotional state was significantly connected to the association of eating with quarrels and loneliness in the study group. A significant difference was observed between the subject and control groups in the feeling of hunger, with the subject group experiencing greater hunger. Surprisingly, there was no significant difference in the preference for sweets between the subject and control groups. We did not find any differences in eating habits between the groups.

The third aim was to assess the relationship between depression and severe obesity. Depression was diagnosed more frequently in the subject group than in the control group based on the psychiatric interview. In the conditional logistic linear model, individuals with severe obesity had a higher risk of depression than persons in the control group. The findings from the BDI questions measuring irritability, body image and ability to work were significantly higher. With regard to the question about the change in weight on the BDI, individuals whose BMI was ≥ 40 gained weight, and only a small percentage lost weight.

The fourth aim was to examine body image disturbance and dissatisfaction, scorn and stigma on severe obesity. A large part of the study group described scorn and contempt directed at them for being overweight. We found some differences in the Draw-a-Person test, with some degree of body image disturbance found among the subjects. Additionally, the Rorschach variables provided some findings. With regard to the age at which obesity became a problem, a clear difference was observed between the control and study groups.

6.2 DISCUSSION OF STUDY II AND STUDY III

Bruch (3) reported that the feeling of hunger is not innate and that it is somewhat acquired by learning. In overeating disorders, the feeling of hunger is abnormally enhanced, prompting the urge to eat. The feeling of hunger becomes mixed with other signals of discomfort and emotional tension. Individuals eat when they are disappointed, and they use their love of eating to compensate for these feelings. Bruch has also discussed “reactive obesity”, which affects individuals who eat when they feel tension, anxiety or loneliness. According to Hamburger (7), overeating tends to be associated with very strong emotional feelings; individuals eat when they are emotionally disturbed.

In our study, we found that eating was associated with quarreling and loneliness. Obesity is associated with uncontrolled hunger, anger, anxiety, boredom and fatigue. Vaidya et al. (139) have also demonstrated that obese individuals have poor control of eating; they eat when they have stress, anxiety and boredom. Hudson and Williams (78) reported similar findings. According to Rosenthal and Wehr (140), who studied seasonal affective disorder, vegetative symptoms increase hunger and weight gain. Brownell and Wadden (15) found that many individuals use food to escape and that they may use food as a substitute for relationships. Many obese individuals report that food is their best friend and that they look forward to times when they can be alone with food.

The number of binge eaters (eight %) in the present study was lower than that in previous studies (141) (142) (143). Gearhardt et al. (144) studied the eating habits of patients with BED and found that nearly half of the patients had food addiction. In addition, they detected significant associations between negative affect and emotional dysregulation, eating disorders, psychopathology and low self-esteem in BED patients. In addition, the prevalence of NES (36%) in the present study was higher than that reported by Stunkard et al. (145), i.e., 8.9%-15%. According to Napolitano et al. (146), NES is a subcategory of obesity that overlaps with binge eating. In addition, Pawlow et al. (147) found that stress and anxiety play roles in NES and suggested that practising relaxation techniques may be an important component of treatment of this condition.

The present study shows that the obese individuals in the subject group experienced and reported feeling hunger more often than the individuals in the control group; this difference approached statistical significance. The findings contrast those of Vaidya et al. (139), who found that obese patients reported having very large appetites and that they were able to consume a large amount of food before they felt full. Furthermore, they found that individuals with obesity rarely reported feelings of hunger (139). In our study, the same number of subjects and controls reported liking to eat sweets. The consumption of fruits and vegetables between the groups was similar.

In this study, there were only minor differences in childhood eating habits between the study and control groups. Eating habits are culturally dependent and are learned as a child. In addition to the quality of nutrition, more attention should be given to the emotional reasons for eating, as suggested by Brownell and Wadden (15). In their study, Puder and Munch (76) highlighted the role of psychological disorders in childhood obesity and preventive actions to prevent obesity. In addition, Walton et al. (77) investigated family dinners of families with children and highlighted the importance of these dinners because they strengthen families and because homemade food is healthy

In addition to emotions, many other factors influence a person's eating behaviour, although mood plays an important role. What and how much one eats also depends in part on the quality and quantity of food available. The next section looks at the role of depression in this case-control study. Cardi et al. (83) examined the impact of mood on eating.

In our research, we found connection between obesity and depression. Depression has also been investigated in previous clinical studies by other researchers (148) (149) (150). We found that the most common diagnosis was chronic depression. Similar findings were found by Beydoun and Wang (151). According to Murphy et al. (152), depression was much more severe in obese individuals than in nonobese individuals. Degirmenci (153) found that depression and anxiety levels were high among individuals who had obesity. In studies by Krukowski et al. (154), slight or moderate depression was observed in some individuals, and in this group, a clear risk of psychopathology was found

In addition, Konttinen et al. found that emotional eating and depressive symptoms were correlated with increased weight in both males and females. Furthermore, emotional eating has been shown to be related to eating sweets in both genders, and depressive symptoms and non-emotional eating have been demonstrated to be related to reduced consumption of fruits and vegetables (155).

During the psychiatric interview, we identified the same characteristics of masked depression as in the Achte study (86). In addition, Kielholz (87) had the same opinions of depression.

In our study, we did not estimate the correlation of depression with different body mass categories. Istvan et al. (156) observed that depression was only weakly correlated with BMI among women but not among men. According to Ma and Xiao (89), obesity is an especially important risk factor for depression in obese female individuals with BMI class 3 obesity.

Weight gain in obese individuals is an important marker of depression severity, as reported by Murphy et al. (152). In our study, we found connections between weight gain and depression based on the BDI scores.

In the present study, we found only few MDD patients because of the special sample. Sarwer et al. (157) found that two-thirds of morbidly obese individuals

had a psychiatric diagnosis, often MDD. Stunkard et al. (158) identified an association between obesity and MDD. In Kaplan et al.'s (159) research, some forms of depression, particularly mood disorders with a seasonal pattern (seasonal affective disorder), were associated with weight gain. Mannan et al. performed a meta-analysis and found a bidirectional link between obesity and depression. The pathway from depression to obesity was stronger than the pathway in the reverse direction (160).

Riepe et al. (161) used forms to measure depression and working ability and found that there are different syndromes that clinical psychiatrists have difficulty identifying. In our study, we found a connection between the BDI score and ability to work.

6.3 DISCUSSION OF STUDY I AND STUDY IV

Stress causes changes in human cell actions, especially among depressive patients. Acute psychological stress leads to an increase in inflammatory factors. Long-term stress and changes are similar depending on lifestyle and personality. The effect of disturbed sleep is the same as the effects of depression and alcoholism at the cellular level (162).

In this study, we found many connections between stress and severe obesity. We found a clear connection between weight gain and marriage and family problems.

In the present case, the researchers also identified clear stressors in childhood. The subjects were separated from their parents more often than the controls. The findings were statistically significant.

The findings in our study are consistent with the concept of reactive obesity, which was reported by Bruch (54). According to Udo et al. (163), stressful life events cause greater weight gain in women. However, there wasn't clear difference in amount of notified stressful life events between women and men in group, which reported those situations.

Liu and Umberson (164) found that children who experience more stress subsequently experience more weight gain as adults. Phillips et al. (165) studied weight during pregnancy and the postpartum period. Weight gain was detected extremely early in pregnancy. Udo et al. (163) observed a stronger connection between weight and stress among females than among males. The subjects in the present study suffered from stress more often than the control subjects, a finding that is in agreement with previous results (166-168). Acute stress causes central obesity (169), and chronic stress also causes obesity (170). George et al. (171) researched eating behaviour and reported the same findings as Pervanidou and Chrousos (170). Low tolerance to stress, eating habits and food addiction are

critical drivers of obesity development (172). Rolls et al. (173) found differences in factors related to obesity between sexes. Women have more stress and are more dissatisfied with their weight.

A study in Canada produced identical results to our study, showing that obesity and comorbid psychological problems are risk factors for unemployment (174). Czeglédi (175) highlighted psychological factors associated with lifestyle. In the present study, we identified the same findings as in previous research.

Severe obesity is a problematic disease caused by many factors. This chapter examined stress factors causing obesity and body image disturbances, including stress factors caused by scorn and the stigma of obesity. Experiences of scorn and stigma usually are caused by the environment. Pereira-Miranda et al. (97) found in their study that poor self-esteem negatively impacts eating.

In our study, 31% of the subjects and 50% of the controls said they were fully satisfied with their present weight, but 53% of the subjects and 46% of the controls reported having occasional weight problems. In total, 50% of the study group reported being heavily overweight, while in the control group, the same percentage was 10.2%. A total of 5.4% of study group and 40.3% of control group reported being normal weight. Stunkard and Wadden (101) found that obese individuals have body image disturbances. Adami et al. (102), Hill and Williams (176) and Buddeberg-Fischer et al. (177) reported similar findings. According to Sarwer et al. (178), the vast majority of obese women in their study demonstrated body image dissatisfaction related to their obesity, with almost half reporting the greatest dissatisfaction with their waist or abdomen compared to other body regions. On average, these subjects reported significantly more body image dissatisfaction than controls. The results of the present study do not lend support to the theory that disturbed body image is more common among individuals who were obese in their youth (100). Rand and Resnick (179) produced different results, with a large majority (87%) of their subjects considering their actual weight to be socially acceptable.

Draw-a-Person and Rorschach tests did not show clear differences between groups. They showed only some indication that severely obese individuals are a very heterogeneous group of individuals,

Heijens et al. (180) found that a high percentage of overweight children experience teasing because of their weight. A history of teasing and social norms affects body dissatisfaction, although BMI appears to have no effect. Moreover, self-efficacy has an influence on beginning to eat healthily, and self-confidence should be increased.

This study did not find differences between males and females. According to Demarest and Langer (181), body shape dissatisfaction was greatest for overweight women and was approximately the same for average weight women as it was for overweight men. Men of average weight and underweight women

were fairly satisfied with their current shape. Both men and women had distorted views of the shape that the opposite gender found most attractive. Friedman et al. (182) and Linde et al. (183) reported more stigmatization in association with obesity than Brownell (184) and Chen et al. (185), who reported that females pressured themselves to be thin and experienced greater body dissatisfaction, which is linked with depression.

According to Carels et al. (186), weight bias among individuals who are attending weight-loss groups is associated with psychological maladjustment and a disturbance in their ability to achieve optimal health and well-being. Docteur et al. (187) found that severely obese individuals perceived themselves as being more corpulent than obese individuals.

According to Brewis et al. (19), mainstream U.S. society has negative views towards the overweight and obese. Mocking obese individuals is common in both institutional and interpersonal relationships. In particular, the way that women perceive themselves to be judged by their weight and the opinions of people in their social networks affect them.

The staff of health centres and family members have been found to mock individuals about obesity (188). In the study group, 61.4% had experienced scorn and stigma because of obesity in adulthood. In this study, scorn and stigma are partly treated as the same thing. Stigma refers to interaction between individuals in this research.

Pearl and Waddens (189) suggested that the stigma of obesity and eating disorders seems to be lacking among certain groups of men. Himmelstein et al. (190) showed that 40% of men reported experiences of weight stigma. Additionally, verbal insult was very common among men. Men who reported weight stigma were younger, had a higher BMI and were usually unmarried.

According to Hayward et al. (191), most individuals who were overweight and obese suffered weight stigma and assimilated weight illusion. They used inoperative coping mechanisms that were strongly connected to worse psychological well-being. Those who suffered more stigma were more vulnerable to psychological stress. According to Araiza and Lobel (192), high stress, overweight and obesity have increased in modern society. This phenomenon has led to many questions about the connections among these changes. Researchers have found a link between stress and eating, which is connected to both biological and behavioural processes. The combination of long-term stress and eating may influence weight gain, stigma and health.

Causal factors linking obesity and depression should be studied more in this field. Stigma and social preconceptions against obesity can underlie this connection, with evidence showing the role of antifat attitudes (193) (194) (195) (196).

Functional inability, which is higher among obese individuals, also impact weight and depression. Obese individuals have difficulties moving and thus also have worse quality of life than healthier individuals.

6.4 STRENGTHS AND LIMITATIONS OF THIS RESEARCH

6.4.1 STRENGTHS

The study comprised a detailed comparison of a sample of the target population with closely matched controls. The subjects and controls were interviewed individually face to face by the author (a psychiatrist), which may have improved the reliability of the results. The study was conducted in such a way that the interviewer was blinded as to whether the interviewee was a subject or a control. Because the control group was carefully selected by matching each case subject with a control subject according to place of residence, age, sex, occupation and date that the pension was granted, disability represented a unifying factor between the two groups, which strengthens the reliability of the conclusions. The controls were selected by random sampling of data from the Social Insurance Institution of Finland. The difference in age between the groups was not examined given the research setting. The same psychologist examined all individuals in the study and control groups.

Participation in the study was high. Among the recruited women, 71% (n=53) of the subjects and 66% (n=112) of the controls agreed to participate in the study; among the men, 71% (n=22) of the subjects and 72% (n=67) of the controls agreed to participate, yielding a total of 254 participants. One of the male subjects could not be contacted. dropout rate was the same in both groups. All the subjects were interviewed individually, which tends to improve the reliability of the study. Given that international studies suggest that a participation rate of 70% is very high, the participation rate in this study increases the value of the study itself and the findings obtained. The present group represented unique characteristics, as all subjects had retired early because of obesity.

6.4.2 LIMITATIONS

The researcher who performed the interviews was not aware of the BMI of the individuals until the statistical analysis. It was not possible to take the participants' weight because clinical experience shows that most individuals in the present study would have refused. It should be noted that the individuals who took part in this study had participated in health research many times and had been diagnosed with obesity. The individuals had been diagnosed with obesity from the beginning, which means that the bias was very low. According to Rothman (197), the relation between bones and muscles changes with age according to the research setting, but the bias is similar between age groups. Rothman also found that especially among morbidly obese individuals, error estimation occurs when individuals estimate their weight to be too low.

The nutrition questions were similar to those used by the Social Insurance Institution in its own research. Additional insight would have been provided if a nutritionist had been involved in the study. Additional benefits would also have been achieved by including an internist on the study team.

Obese individuals are widely studied. The results cannot be generalized to all people with obesity. The study findings provide more information about the psychopathology of obesity and its origin.

The register of the Social Insurance Institution of Finland can be considered a good comparison group because the sample of this study is unique. With the help of the methods used, we obtained a good case-control sample. The individuals in the study group could not be compared to those who were of the same weight and were working. If the controls had been from the general population, the findings could have been slightly different.

6.5 FUTURE DIRECTIONS

In the future, it is important that all severely obese individuals undergo a psychiatric examination before being placed on earlier retirement. Further somatic investigations need to be conducted among people who retire early because of obesity. There is a growing need for a comparative study of obese persons who work and obese persons who retire early due to their condition. Men and women should be researched separately. Obese subjects should be divided into smaller groups: those who have been obese since childhood, those who have been obese since adolescence and those who have become obese as adults. In addition, groups with a BMI over 40 need to be studied further.

Future studies should focus on men, especially young men's obesity. Research shows that they suffer from scorn and stigma, which decreases psychological wellness.

Many low- and middle-income countries are now facing a “double burden” of disease: while they continue to deal with the problems of infectious disease and undernutrition, at the same time, they are experiencing a rapid upsurge in chronic disease risk factors such as obesity and overweight, particularly in urban settings. It is not uncommon to find undernutrition and obesity existing side-by-side within the same country, the same community and even the same household (29).

Some studies have assessed pathological changes with rather vaguely defined variables, and there have been few theoretical or empirical attempts to improve the concept of “body image” or to develop more suitable alternatives. It has become increasingly clear that a distinction must be made between measures of body size perception and measures of body attitude or body satisfaction (198) (199). Weight bias and obesity stigma have become global problems during recent years (200).

6.6 CONCLUSIONS AND CLINICAL IMPLICATIONS

It was very important to conduct this study because there are few case-control studies of obesity that have been conducted in this way. It should be kept in mind that in this study, there were many controls for each case. This research provides essential information on groups that have not been previously examined. The findings from this study can be utilized to improve the care and understanding of individuals with severe obesity.

This study shows how heterogeneous this group of severely obese individuals is. It has been observed that psychiatric examination is necessary in severely obese individuals before they are pensioned.

In municipal health care, it is very important to identify individuals who are at risk of developing obesity. Children of obese mothers are a particular risk group. Obese mothers must receive nutritional guidance during pregnancy, and such guidance should be extended to their children.

This study was also important because severe obesity is associated with many other disabling illnesses (e.g., musculoskeletal disorders). Costs resulting from disability caused by obesity and from lost working days are significant with regard to the national economy. Some costs of obesity are easy to identify, but some of them are indirect. People who have been obese since childhood develop early cardiovascular disorders and other somatic diseases should be documented. In particular, it should be noted that stigma is associated with obesity and low self-esteem. Efforts should be made to eliminate the stigma and mocking of obese individuals for the sake of clarity.

The food environment is everything food related in individuals' living environment: food availability, price, advertisement, etc. Access to densely energetic food is currently increasing. Additionally, the consumption of sugary drinks, which leads to weight gain, has become more common. External cues greatly affect the initiation of eating and determine the amount of eating.

Although it is the responsibility of each individual to take care of his or her own well-being and monitor his or her eating habits, society should attempt to contribute to improving people's living conditions and making their eating habits healthier.

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