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Obesity and associated clinical and demographical characteristics among Swedish outpatients with psychotic disorders

Degree project in Medicine

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Abstract

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Background: Body mass index (BMI) is a clinical instrument to classify body weight and obesity among individuals and thus, often used to predict obesity-associated diseases. Studies indicate a higher prevalence of obesity among patients with psychotic disorders than in the general population. Hence, examining the background factors associated with obesity among outpatients with psychotic disorders could be used to inform interventions for patients at increased risk for obesity and related co-morbidities.

Aim: To assess the prevalence, clinical correlates and background characteristics of obesity among Swedish outpatients with psychotic disorders.

Methods: This study is an observational, cross-sectional study with register-based data from Sahlgrenska University Hospital outpatient clinics, collected between 2016–2019. The sample (n=1289) is heterogeneous in terms of age, sex and background characteristics. SPSS (IBM) v. 27 was used for data analysis, p-values defined with a 2-tailed significance level at 0.05.

Results: Descriptive statistics confirm common clinical characteristics among obese outpatients. Diabetes, cardiovascular disease and elevated blood pressure were significantly more common among obese outpatients (all $p<0.001$). Logistic regression analysis revealed three significant independent predictive variables for obesity; a longer diagnosis duration of psychotic disorder reduced odds for obesity (OR=0.618), while current treatment with antipsychotic medication (OR=1.896), and birthplace outside of Sweden (OR=1.578) increased odds for obesity after controlling for background factors (e.g. age, sex).

Conclusions: Our results suggest a risk profile for obesity and associated co-morbidity among our patient sample, namely outpatients born outside Sweden and currently treated with antipsychotic medication. The findings also highlight the need for early diagnosis and, subsequently, routine health monitoring and interventions with special attention directed towards patients with higher risk for obesity and associated health problems.

Keywords: BMI, demographic factors, obesity, psychotic disorder, schizophrenia

Background

Psychotic disorders

Psychotic disorders are a group of severe mental disorders that cause an altered sense of reality, abnormal thinking and perception of oneself, others and the world, as well as changes in one's personality and behavior. The main symptoms of psychotic disorders include delusions (e.g., false beliefs that conflict with reality) and hallucinations (e.g., false sensory perceptions). The most common diagnosis among psychotic disorders is schizophrenia, affecting over 20 million individuals worldwide, with a lifetime prevalence of near 1% globally. [1] Schizophrenia commonly manifests during late adolescence or young adulthood, usually debuting earlier among males, however being equally common among both women and men later in life. According to WHO, schizophrenia is considered as the eighth most disabling medical condition, measured in disability-adjusted life years (DALYs), among both males and females between 15-44 years [1] [2].

According to the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5), published in 2013, psychotic disorders are characterized by typical symptoms (such as delusions, hallucinations, diminished emotional expression, disorganized speech and/or behavior) present for more than six months, leading to social and/or occupational dysfunction. The primary psychotic diagnoses under the DSM-5 psychotic disorder classification include schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder and brief psychotic disorder. In addition to the primary psychotic disorders, one can also experience secondary, transient psychotic symptoms. These short-term symptoms can be triggered by other medical conditions and substance abuse and, therefore, are not classified as primary psychotic disorders in the DSM-5 diagnosis criteria [3].

WHODAS 2.0

After introduction of the DSM-5 in 2013, The World Health Organization Disability Assessment Schedule 2.0 (WHODAS-2.0), was introduced as a subjective tool to measure disability and functional impairment among adults. It is a generic assessment instrument and can be used to evaluate function level in patients with various diagnoses, including mental, neurological and addictive disorders. According to previous studies, the self-administered WHODAS2.0-questionnaire has good

psychometric qualities as it thoroughly and reliably covers key life activities among patients of different ages and across cultures. [4] It consists of six main domains: (a) cognition; (b) household; (c) mobility; (d) self-care (e.g. personal hygiene, dressing); (d) social and (e) society (engagement in community and recreational activities). Every question considers the patient's self-experienced function level for each of the domains within the last 30 days with a five-point scale, ranging from ”no difficulty” to ”extreme difficulty/can not do”. [4]. This study includes the short 12-item Swedish version of WHODAS-2.0 questionnaire, with a total of 12 questions; two questions corresponding to each function domain. The 12-item WHODAS-2.0 has previously been psychometrically validated in this patient population, indicating its validity and clinical significance in assessing function level among outpatients with psychotic disorders [5].

Body mass index (BMI)

The body mass index (BMI) is a statistical index calculated from the bodyweight and height of the person. It is defined as a numerical value and expressed in kg/m2. Globally, BMI is widely used as a clinical tool to classify weight and estimate the amount of body fat among individuals and thus, used a to evaluate the individual level of healthy weight. The commonly accepted BMI ranges, used by both National Health Institute (NIH) and World Health Organization (WHO) are classified as following: underweight (< 18.5 kg/m2), normal weight (18.5-25 kg/m2), overweight (>25-30 kg/m2) and obese (>30 kg/m2). Obesity can further be classified into 3 classes: class I (BMI 30.0-34.9 kg/m2), class II (35.0-39.9 kg/m2) and class III (BMI > 40kg/m2). It is to be noted that the BMI classifications and cut-off values presented above and used in this research paper are applicable for White, Hispanic and Black populations, whereas Southeast Asian populations show slight alterations regarding BMI in comparison to other ethnicities. It should also be mentioned that the BMI cut-offs presented in this study are not directly applicable to pediatric patients as the healthy weight level among children and adolescents is estimated according to percentiles instead of fixed cut-off values [6].

The benefits of routine BMI measurement in health care are its practicality, as it is an easily accessible and non-invasive method, not requiring medical knowledge or further diagnostic expertise or data analysis. Although BMI is not a direct measure of body fat, it is shown in studies that BMI levels have a significant correlation with obesity-associated disease outcomes, making it a feasible instrument in large-scale health monitoring, showing ability to distinguish obesity-associated illness

among patients of different age, sex and ethnical background. [7]. However, on an individual level, the body mass index cannot solely be used to classify physical health status and weight-related health risks as BMI measurement does not take into consideration the distribution of fat in the body, level of visceral adiposity or the ratio of muscle mass to fat mass. According to previous studies, metabolic illness is also prevalent in populations with normal BMI, and, therefore, it has been suggested that other supplementary diagnostic tools for obesity-related risk profile assessment should be introduced in screening protocols. [8, 9] These, more direct measures of body fat and distribution of fat mass include methods such as measurement of waist circumference, skinfold calipers, visceral adiposity index and measurement of total body fat percentage by using DXA-scans (dual-energy x-ray absorptiometry) or bioelectrical impedance analysis. The advantages these methods and their predictive value for obesity-associated health risks, along with future clinical implementations, need further investigation as studies have shown dissenting results in the accuracy of different methods among different patient groups. [8, 9,10, 11, 12]

Obesity and associated morbidity and mortality among patients with psychotic disorders

Several studies have reported that patients with schizophrenia have a higher BMI and thus, also a higher prevalence of obesity than the general population. [13, 14]. According to previous studies, it is estimated that patients with psychotic disorders have approximately 10-15 years shorter life expectancy than the general population with the leading cause of death being ischemic heart disease and cancer. [15]. In addition, among all deaths due to ischemic heart diseases, patients with schizophrenia were 17.4% less likely than other patients to have been previously diagnosed with the condition, indicating inadequate somatic diagnostics and/or diagnosis delay among the schizophrenic patient population. [15].

Another common manifestation of co-morbidity among psychiatric outpatients is metabolic syndrome. Metabolic syndrome is a cluster of clinical manifestations that commonly occur in combination, including increased blood pressure, high blood sugar/insulin resistance, abdominal obesity and dyslipidemia (low levels of high-density lipoproteins and/or high levels of low-density lipoproteins) [16]. It is known that manifest metabolic syndrome significantly increases the risk for developing type 2 diabetes mellitus as well as cardiovascular disease and can be considered as a preclinical state for these diseases. [16]. Previous studies indicate that in comparison to general population,

having schizophrenia is associated with an increased risk for diabetes after controlling for age, sex and ethnicity and the risk remains increased even after controlling for obesity. [14]. According to a Swedish study, 10% of outpatients with psychotic disorder have diabetes, indicating a 2.7-fold prevalence in comparison with general population. In addition, 45% of the same patient population show clinical manifestations of metabolic syndrome. [17]. The high prevalence of metabolic disturbances and diabetes among this patient population can, to some extent, be explained by antipsychotic medication. Evidence from case studies and clinical trials suggests that second-generation (”atypical”) antipsychotics, such as Olanzapine and Clozapine, are associated with weight gain along with metabolic dysregulation, affecting both blood lipids and glucose levels. [18, 19].

As mentioned above, the high prevalence of metabolic and cardiovascular comorbidity among patients with psychotic disorders can partly be explained by the metabolic adverse effects of antipsychotic medication, but also by lifestyle factors such as increased cigarette smoking, alcohol and/or substance abuse, poor diet and low grade of physical activity, known to be common among patients with psychotic disorders. [20]. It is also shown in studies that patients with psychotic disorders are less likely to seek and receive treatment for somatic health problems in comparison to the healthy population, which can lead to diagnosis delay and insufficient interventions and treatment and generally, a poorer physical health status. [20]. It is also known that psychotic patients show a poorer cognitive function and a lower health literacy compared with the general population, which should be taken into account when planning accessible and functional health care services for this specific patient population. [21]. It can be discussed, that the multifactorial and complex psychopathology behind the gap in mortality rates between healthy population and patients with psychotic disorders demonstrates a need for safe and successful treatment plans. The planning requires the cooperation of the patient and their social network, along with various healthcare and social service professionals. In addition, it requires usually combination of both pharmacological treatment with psychosocial interventions, along with continuous risk assessment, to help minimize the burden of somatic co-morbidity. [22]

Aim

To assess the prevalence and clinical correlates, as well as clinical and demographical characteristics of obesity among Swedish outpatients with psychotic disorders. Two specific research questions were generated:

1. What is the prevalence of obesity and obesity-associated co-morbidity among Swedish outpatients with psychotic disorders?

2. What associations can be identified between characteristics, both clinical and demographic, and obesity in this patient population?

Methods

Procedure for data collection

In the Västra Götaland Region, Sweden, all patients diagnosed with a psychotic disorder are annually offered a health interview and physical examination. The primary aim of this intervention, first implemented 2016, is to prevent and provide screening for the risk of developing metabolic diseases, such as diabetes, thyroid disease, hyperlipidemia and hypertension, as well as cancer among outpatients with psychotic disorders. The health interview includes a review of the patient's background, lifestyle and eventual risk factors (e.g. smoking, diet, level of physical activity, alcohol consumption). The physical examination includes control of weight and height (i.e. BMI), measuring blood pressure, analysis of blood samples and eventual other diagnostic measures according to the patient risk profile and background (electrocardiogram, spirometry, cancer diagnostics). All outpatients with psychotic disorders within Västra Götaland Region are given a Case Manager who is responsible for initiating and coordinating this health check-up, including both health interview and physical examination every year. See Appendix for the medical guidelines for the annual health check-up in the Västra Götaland Region used as the background for this research paper. (A2; Swedish: Årligt hälsosamtal och somatisk kontroll av patienter med långvarig psykisk sjukdom; Systematisk kontroll av somatisk hälsa).

From the patient records, annual data recorded between January 2016 and December 2019 from outpatient clinics was collected and analyzed. The obtained data included patient background information from the health interview, including both demographic and clinical characteristics, along with clinical data as results from the annual physical examination (weight, height, blood pressure).

The total number of patients enrolled in the outpatient clinics during the study period January 2016-December 2019 had a yearly average of 2789 patients. Of these patients, the primary indicator in our study was patients that had completed an annual health check-up recorded in the local quality register during this period, which resulted in a total of 2179 patients. Of this patient group, 1289 patients had a complete BMI and blood pressure recorded within the same seven-day period as the annual health check-up. The seven-day period was chosen due to earlier clinical experience, as many of the outpatients are not, due to their psychiatric condition, able to undergo the entire health check-up during the same visit. The patients were therefore given the opportunity to complete the physical examination and health interview during multiple visits over the seven-day period to ensure complete and up-to-date data for all patients included in the study. See Figure 1 for an illustration of the sampling procedure.

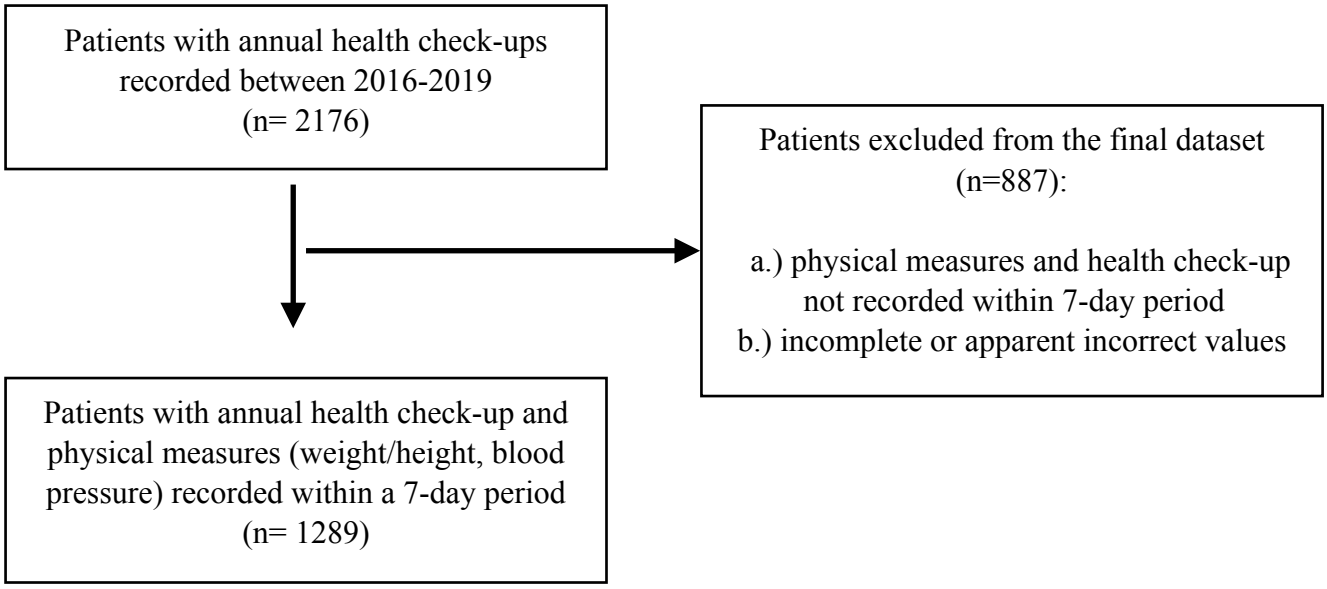

Figure 1. Sampling procedure

Measures and variables

Patient background information collected during the annual health check-up included both demographic and clinical characteristics, among which the following characteristics were used in this study to create a complete dataset:

Demographic characteristics: Age (in years); sex (according to patient ID-number, female/male); duration of psychosis diagnosis (diagnosis before/after year 2010), current treatment with antipsychotic medication (registered in patient data, yes/no); level of education (five ordinal categories from 'not completed primary education' to 'completed university degree of >3 years'); current living situation (independently in regular housing conditions, regular housing conditions with assistance, permanent special housing with health care staff, social housing, or homeless); occupation/type of regular income (employment, sick leave, sickness benefits or compensation, welfare benefits or financial aid, or other type of income); geographic area of birth (Sweden, Nordic countries or other continent). The demographical variables were dichotomized as follows, in order to maintain the statistical integrity of the subgroups for relevant sample size, as some demographic subgroups (e.g. homeless) had only a few or no observations.

Age (in years), Sex (male/female), duration of psychosis diagnosis (2009 or earlier/2010 or later), antipsychotic medication (yes/no), education level (completed senior high school or university/not completed senior high school), current living condition (assisted living/independently), occupation (on benefits/own income), and birthplace (outside Sweden/ in Sweden).

Clinical characteristics included in the patient background information included co-morbidity in diabetes, cardiovascular disease and/or thyroid disease (registered diagnosis; yes/no) and current smoking status (yes/no). As parts of the annual physical examination, blood pressure (systolic and diastolic in mmHg), weight and height (BMI, in kg/m2), was included for all outpatients in the final dataset. Background information included also data on whether the patient had conducted a health interview and/or physical examination within the previous year (yes/no).

For a subgroup of patients, information was available for patients' function impairment assessed using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS-2.0). Patients with the 12-item self-administered WHODAS-2.0 questionnaire (n=343) recorded within the same

7-day period described above were included in the study. The questionnaire includes a total of 12 items, divided into six different function domains (sub-scales). The WHODAS 2.0 sum score (including all six domains) constitutes a statistic that is sufficient to describe the degree of overall functional limitation, whereas the sub-scales provide information on specific domains of functional impairment. [4,5].

For logistic regression models, obesity (BMI in kg/m2, non-obese: BMI ≤29.9 and obese BMI ≥30) was used as the dependent binary outcome variable. See Appendix (A1; Swedish: Årsuppföljning) for the full document used for the collection of patient data.

Statistical methods

Demographic and clinical characteristics were compared using descriptive statistics. Comparison of these characteristics was done by generating two independent patient groups, patients without obesity (BMI ≤29.9), and with obesity (BMI ≥30). These cut-off values were defined by using the standard BMI-classification values for adults accepted by the World Health Organization [9].

To meet the assumptions for the parametric statistical tests, normality for the continuous variables (age, BMI and blood pressure) in the total sample (n=1289) was assessed using normality plots, a method chosen due to the large sample size. The Q-Q plot is supplemented by both skewness and kurtosis values. For the sample size (n >300), reference values for skewness < 2 and kurtosis < 4 were set, indicating a normal distribution of the continuous variables, and therefore enabling analysis by the chosen descriptive statistical tests. [23] See Appendix for the Q-Q plots (A3) and descriptive statistics including kurtosis and skewness values (A4).

Differences between patients in the two groups (obese/not obese) were tested by contingency tables, using independent samples t-test for continuous variables and chi-square tests for categorical variables. Due to the dichotomized categorical variables and large sample size, no near-zero cell counts were observed, indicating no numerical instability in the contingency tables.

To identify the possible predictors of obesity, the binary outcome variable, out of the background characteristics as predictor variables, a binary logistic regression model was created. The regression model was constituted using stepwise backward elimination, starting with all predictor variables of interest (”full model”) and testing the model by deleting least significant variables until all remain-

ing variables in the model fulfill the p-value threshold of $p > 0.1$ (”stopping rule”), indicating inclusion in the final regression model. [24]. Assumptions for logistic regression were met as all variables had independence for observations and the categories of the dependent variables were mutually exclusive and exhaustive (0=BMI ≤29.9 or 1=BMI ≥30). No significant outliers were excluded due to the large sample size. The number of outcomes per predictive variable was also taken into consideration, using a ”rule of thumb” of 10-20 outcome events per predictive variable to avoid overfitting the regression model. [25, 26]. For logistic regression models, odds ratios (OR) were used to determine the predictive effect of background characteristics (”exposures”) in increasing odds for obesity (”outcome”) and using odds ratios, compare the effect of different exposures on the outcome. The odds ratios are defined as OR > 1 if the exposure is associated with higher odds of the outcome and OR < 1 if the exposure is associated with lower odds of the outcome. If the OR=1, the exposure does not affect the odds of the outcome. [27]

To prevent incorrect results due to intercorrelations between predictive variables, a multicollinearity analysis was performed for all predictive variables included in the full model, using VIF (variance inflation factor) < 5 and tolerance < 0.2 as threshold values. [28] The predictive variables included in the regression analysis included age, sex, treatment with antipsychotic medication, diagnosis duration, birthplace, occupation, living condition, level of education and smoking status. Clinical characteristics, such as previous diagnosis of diabetes or cardiovascular disease, were not included in the set for predictive variables for obesity as it is likely these conditions are explained by obesity rather than play a predictive role or explain development of obesity.

SPSS (IBM) v. 27 was used for all statistical analyses. All p-values, if not otherwise mentioned, were defined with a 2-tailed significance level at 0.05.

Ethical considerations

This project has been ethically approved by the Swedish Ethical Review Authority (# 2020-03010) with the title ”Utveckling av kroppslig hälsa hos öppenvårdspatienter inom verksamhetsområde Psykos, Sahlgrenska universitetssjukhuset”. All data analyzed in this study were extracted using a central system. Thus, the dataset was anonymous as patients were marked by subject numbers. The risk for altered patient integrity was therefore low as the data could not be connected to identifiable personal data of the study subjects.

Results

Descriptive statistics of the patient sample

Following data was obtained of the total dataset (n=1289), indicating a heterogenous sample; Age (range: 19- 92, SD=14.3, md=53. $\bar{x}$ = 52.2) and BMI (range: 15.7 - 62.5, SD=6.2, md=28, $\bar{x}$ = 28.9)

Total prevalence of obesity (BMI ≥30) in the sample was 37% (n=480), of which 233 (48.5%) were females and 247 males (51.5%). When comparing mean BMI between sexes, the mean BMI for females (n=592) was 29.2 (SD=6.6) respective for males (n=697) 28.6 (SD=5.9), indicating that in our study sample, females had generally a higher body mass index compared with the males in the same patient population. The difference in the BMI means between sexes was confirmed statistically significant using one-way ANOVA analysis (p=0.05).

Of the total patient sample, 191 (14.8%) outpatients were diagnosed with diabetes with no statistically significant difference between males and females (p=0.965). Among outpatients diagnosed with diabetes, 111 outpatients (58.1%) were obese. In addition, 193 outpatients (15%) of the study sample were diagnosed with cardiovascular disease, not showing statistical significance between males and females (p=0.569). Of these patients, 100 outpatients (51.8%) were obese. Among both males and females, diagnosis of diabetes and/or cardiovascular disease was significantly more prevalent among obese outpatients. (all p<0.001). Additionally, 270 outpatients of the total sample (21%) were current smokers.

Prevalence of obesity based on demographic and clinical characteristics

Table 2 summarizes the demographic and clinical characteristics included in patient background information, whilst comparing the prevalence of these factors among non-obese and obese patients respectively.

Table 2. Clinical and demographic characteristics of the patient sample (n=1289) without obesity (BMI ≤29.9, n= 809) and outpatients with obesity (BMI, ≥30 n=480)

	N	**Non-obese (n=809)**	**Obese (n=480)**	**P-value**
Age (mean, SD)	1289	52.4, 15.3	51.8, 12.6	0.467[a]
Sex (Female/Male)	1289	359/450	233/247	0.147[b]
Duration of diagnosis	1239			0.015 [b] *
2009 or earlier, n (%)	927 (75.0%)	561 (72.7%)	366 (78.9%)	
2010 or later, n (%)	309 (25.0%)	211 (27.3%)	98 (21.1%)	
Antipsychotic medication	1199			0.006 [b] *
Yes, n(%)	1091 (91.0%)	671 (89.2%)	420 (94.0%)	
No, n (%)	108 (9.0%)	81 (10.8%)	27 (6.0%)	
Education level	1098			0.834 [b]
Not completed senior high school, n (%)	322 (29.3%)	203 (29.5%)	119 (29.0%)	
Completed senior high school/university, n(%)	776 (70.7%)	484 (70.5%)	292 (71.0%)	
Living condition	1186			0.263 [b]
Independently, n (%)	610 (51.4%)	393 (52.7%)	217 (49.3%)	
Assisted living, n (%)	576 (48.6%)	353 (47.3%)	223 (50.7%)	
Occupation	1172			0.093 [b]
Own income, n (%)	340 (29.0%)	223 (30.8%)	117 (26.2%)	
Benefits, n (%)	832 (71.0%)	502 (69.2%)	330 (73.8%)	
Birthplace	1246			0.009 [b] *
Sweden, n (%)	844 (67.7%)	550 (70.4%)	294 (63.2%)	
Outside Sweden, n (%)	402 (32.3%)	231 (29.6%)	171 (36.8%)	
Systolic blood pressure (mean, SD)	1289	126.9 (17.49)	130.3 (15.16)	< 0.001 [a] ***
Diastolic blood pressure (mean, SD)	1289	79.1 (10.94)	82.1 (10.71)	< 0.001 [a] ***
Diabetes, n (%)	1289	80 (9.9%)	111 (23.1%)	< 0.001 [a] ***
CVD, n (%)	1289	93 (11.5%)	100 (20.8%)	< 0.001 [a] ***
Thyroid disease, n (%)	1289	58 (7.2%)	45 (9.4%)	0.158 [b]
Smoking	1289			0.616 [b]

Yes, n (%)	270 (20.9%)	173 (21.4%)	97 (20.2%)	
No, n (%)	1019 (79.1%)	636 (78.6%)	383 (79.8%)	
Health interview	1289			0.499 [b]
Conducted within the last year, n (%)	820 (63.6%)	509 (62.9%)	311 (64.8%)	
Not conducted within the last year, n (%)	469 (36.4%)	300 (37.1%)	169 (35.2%)	
Physical examination	1289			0.003 [b] *
Conducted within the last year, n (%)	788 (61.1%)	469 (58.0%)	319 (66.5%)	
Not conducted within the last year, n (%)	501 (38.9%)	340 (42.0%)	161 (33.5%)	
WHODAS 2.0 function assessment	1289			0.281 [b]
Conducted within the last year, n (%)	343 (26.6%)	207 (25.6%)	136 (23.3%)	
Not conducted within the last year, n (%)	946 (73.4%)	602 (74.4%)	344 (71.7%)	

*p<0.05; **p<0.01; ***p<0.001 a=Independent sample t-test, b=Chi-square test

When comparing obesity and mean age in our patient sample, no significant differences were found, indicating that obesity is somewhat equally prevalent among outpatients of all ages (p=0.467). Although the mean BMI level was slightly higher among female outpatients as previously mentioned, sex showed no significant differences in prevalence of obesity (p=0.147) in statistical analysis between non-obese and obese patient groups.

Factors from patient background information that showed significant differences in prevalence of obesity were duration of psychotic disorder diagnosis and current treatment status. Compared with non-obese patients, patients with obesity had been diagnosed with psychotic disorders for a longer time (diagnosis year 2009 or earlier, p=0.015). Also, current treatment with antipsychotic medication was more prevalent in the obese patient population. (p=0.006).

When looking at demographic factors,, the only characteristic showing significant differences in prevalence of obesity was the birthplace of the patient, as obesity was more prevalent among patients born outside Sweden. (p=0.009). Interestingly, no statistically significant differences were found in prevalence of obesity based on the other socioeconomic factors such as education level (p=0.834) living condition (p=0.263) or occupation (p=0.093) of outpatients.

Significant differences in the clinical characteristics included differences in mean blood pressure levels and somatic co-morbidity. Obese outpatients had higher mean systolic and diastolic blood

pressure ($p< 0.001$). The mean blood pressure for non-obese outpatients was 127/79 mmHg, while the mean blood pressure among obese outpatients was 130/82 mmHg. This indicates 3 mmHg higher systolic and diastolic blood pressure among obese outpatients. Outpatients with obesity had also a higher prevalence of both diabetes and cardiovascular disease (both $p<0.001$), but no statistical significance between obesity and thyroid disease was found in our sample ($p=0.158$). Current smoking, although generally high in prevalence in the patient population, showed no significance when compared to the prevalence of obesity ($p=0.616$) in the patient population in this study.

A higher percentage of patients with obesity had conducted a physical examination within the last year compared with patients without obesity ($p=0.003$). However, no statistical differences were found between prevalence of obesity and conducting a health interview within the last year. There were no significant differences in prevalence of obesity and conduction of the WHODAS 2.0 function assessment ($p = 0.281$).

Prevalence of obesity, level of function and self-assessed disability

For a subgroup of patients, a separate data-analysis was conducted to compare the self-assessed function level in daily life between obese and non-obese outpatients. The mean values of the six function domains and sum scores for both non-obese and obese outpatients are presented in Table 3. The mean values are supplemented with IQR (interquartile range) to account for the variability of the median value.

The patients with recorded WHODAS-2.0 ($n= 346$) were comparable to the total patient population sample in terms of age (mean 51.7 vs. 52.4, $t=-0.779$, $p=0.436$) and sex composition ($\chi2 = 0.037$, $p=0.847$). We can therefore assume that this subgroup analysis is representative of the total patient sample in terms of their age and sex.

Table 3. Self-assessed function comparing patients with obesity (BMI= ≥30) and without obesity (BMI= ≤29.9).

	Non-obese (n=207)	**Obese (n=136)**	**P-value**
Age, mean (SD)	52.2 (15.0)	51.0 (13.1)	0.431[a]
Sex (female/male)	88/119	68/68	0.173[b]
Function dimensions (6 sub-scales)			
1. Cognition, mean (SD), IQR	1.66 (0.84), 1.0	1.88 (0.98), 1.5	0.047 [a] *
2. Household, mean (SD), IQR	1.95 (1.03), 1.5	2.10 (1.13), 2.0	0.358 [a]
3. Mobility, mean (SD), IQR	1.75 (1.09), 1.0	1.90 (1.16), 1.5	0.200 [a]
4. Self-care, mean (SD), IQR	1.23 (0.61), 0.0	1.35 (0.78), 0.0	0.153 [a]
5. Social, mean (SD), IQR	1.74 (0.87), 1.5	1.86 (0.95), 1.5	0.255 [a]
6. Society, mean (SD), IQR	2.27 (1.05), 1.5	2.37 (1.06), 1.5	0.432 [a]
WHODAS-2.0 sum score, mean (SD), IQR	21.2 (8.3), 12	22.9 (9.3), 11	0.107 [a]

*p<0.05; **p<0.01; ***p<0.001 a=Independent sample t-test, b=Chi-square test

Generally, patients with obesity rated higher mean level of function impairment in all sub-scales, representing the different dimensions of functioning. Furthermore, the mean of the total WHODAS 2.0- sum score was higher for obese patients, indicating a trend for decreasing level of daily function with increasing level of obesity. However, the only function domain with statistically significant differences was the domain for cognition (p=0.047), which included questions regarding learning new tasks and ability to concentrate. This indicates that obese outpatients experience a significantly decreased function in cognitive processes, such as tasks requiring comprehension and observance.

Demographic and clinical characteristics as independent predictors of obesity

To identify independent variables for obesity, binary logistic regression analyses with backward stepwise election method (n=998) were used, using obesity as the dependent variable.
Starting with a full model, including all chosen background characteristics as predictive variables for obesity among the patient sample (age, sex, diagnosis duration, current treatment with antipsychotics, birthplace, occupation, living condition, education level, smoking), only significant variables

were included in the final model after elimination. The confidence interval was defined at 95% C.I. for all variables. The final model included four statistically significant predictive variables for obesity, including age, duration of diagnosis, treatment status with antipsychotic medication and birthplace.

Higher age showed slightly reduced odds for obesity (OR=0.998, 95% CI: 0.977-0.998) while having a longer diagnosis duration of psychotic disorder (OR=0.618, 95% CI: 0.434-0.880) reduced the odds for obesity by almost 40%. On the other hand, remarkably increased odds for obesity was found among patients with current treatment with antipsychotic medication (OR=1.896, 95% CI: 1.174-3.061), and birthplace outside of Sweden (OR=1.578, 95% CI: 1.190-2.094).

Background characteristic removed from the final model, indicating a lower predictive value for obesity and fulfilling the elimination criteria of p-value >0.1 included living condition, education level, occupation and current smoking status.

Discussion

The results of our study show that obesity is highly prevalent among patients with psychotic disorders and accordingly, a matter of both public and individual health concern. The total prevalence of obesity among this heterogenous sample of outpatients with psychotic disorders in our study was 37%, which is high in comparison to the data from Public Health Agency in Sweden, showing a 15% prevalence of obesity in the general adult population in Sweden, in 2016. [29]. The unhealthy weight patterns among outpatients with psychotic disorders is further emphasized by the fact that the mean BMI in our patient sample for both sexes was in the overweight-category (BMI between 25-30 kg/m2) according to the standard BMI-classification by WHO [9]. The prevalence of overweight and obesity among the general Swedish population also indicates an increasing trend, and according to WHO's Adulthood Obesity Prevalence Forecast, it is estimated that 26% of men and 22% of women will be obese by 2030 [30]. As obesity is an increasing problem on the general population level, special attention needs to be directed towards the vulnerable patient groups, such as patients with psychotic disorders, known to be in higher risk for obesity and associated illnesses. [29, 30] Our study also confirms the high level of co-morbidity in diabetes among patients with psychotic disorders as the prevalence of diabetes among our outpatient sample was relatively high at 14,8%. In comparison, the prevalence of diagnosed diabetes among the general population in

Sweden in 2020, according to the Swedish National Diabetes Register (Nationella Diabetesregistret, NDR), is estimated at 5,5%. [31]

The high prevalence of somatic co-morbidity among this patient group is concerning, as previous studies indicate that patients with psychotic disorders tend to receive treatment for somatic illnesses to a lesser extent than the general population. [32] According to a report by Swedish National Board of Health and Welfare, diabetics with psychiatric diagnosis have a higher risk for preventable hospital admissions due to their diabetes and in addition, receive significantly lower extent of treatment with antihypertensive medication when compared to diabetics without psychiatric diagnoses. [32]. Similar observations can be made in the light of cardiovascular disease, as patients with psychiatric illness receive lower degree of secondary pharmacological prevention after a cardiovascular event, such as myocardial infarction or stroke. Accordingly, psychiatric patients have a higher mortality rate after hospital admission for cardiovascular disease, indicating inadequate secondary preventive treatment among this patient group. [32, 33]. These findings, along with the high prevalence of cardiovascular and metabolic co-morbidity confirmed in our study, is concerning.

One possible topic for discussion, explaining the reduced access to somatic treatment and associated mortality among psychiatric outpatients can be the various hindrances this patient group experiences when seeking health care. A qualitative study from Sweden, comprising of semi-structured interviews of patients with a diagnosed chronic psychiatric disorder and simultaneous somatic disease, including interviews with patients' family members and healthcare professionals, shows a gap between the healthcare needs of psychiatric patients and the organization of healthcare services [34]. According to the study, some of the obstacles experienced by the patients include experiences of not being taken seriously and fragmentation of healthcare services within the region, leading to experiences of inadequate psychosomatic support. The somatic disease burden among psychotic patients is further complicated by the complex symptom panorama of psychotic disorders (such as cognitive impairment, depressive symptoms, delusions) which can contribute to the difficulty of understanding and interpreting somatic symptoms and accordingly, seeking timely treatment. According to the interviews conducted in the study, also healthcare professionals experienced obstacles regarding lack of specialist expertise within psychiatry, inadequate teamwork between healthcare providers and lack in the continuity of healthcare staff. A possible solution for these problems, according to all interviewed parties, would be individual contact/support persons or liaison physicians, who could function as a link between the patient and various health care services. The study

suggests that all outpatients within psychiatry should have a coordinated individual health care plan to ensure customized care and easy access for patients who need for more complex, continuous and inter-professional healthcare and support. [34] This study, along with the results of our research, highlight the need for well-designed national guidelines in order to take care of outpatients with psychotic disorders. By offering screening and early interventions, we can try to tackle the burden of obesity and related health issues, such as cardiovascular and metabolic disease among this specific patient population.

When examining the background factors among outpatients with psychotic disorders, patients born outside Sweden showed significantly higher prevalence of obesity compared with outpatients born in Sweden. It is likely that the high prevalence of more complex mental and physical health issues among patients with migrant backgrounds can be attributed to multiple factors, such as exposure to trauma and/or stressors before and after resettlement, lack of goods, poverty and limited socioeconomic support. Additional challenges when seeking health care might also include cultural and/or linguistic barriers and a greater variation in healthcare literacy and knowledge. According to previous research, migrant background and associated sociodemographic and cultural factors among psychotic patients increases the risk for compulsory admission to mental health care units, indicating a possible delay in intervention and treatment among this patient group. [35]. Similar patterns can be thought to affect also the implementation of physical health examination routines among migrant outpatients, resulting in higher prevalence of obesity due to inadequate accessibility, which can lead to delayed health check-ups. However, previous studies also indicate that the patient's region-of-origin is more accurate in predicting compulsory admission than migrant status itself, indicating that specific cultural and structural barriers affect mental health status and seeking treatment more than general socioeconomic factors among migrant patients. [35] Similar findings in the light of obesity among psychiatric outpatients can be drawn from our study results, as the birthplace of the patient was the only demographic factor of statistical significance, whilst education, type of income and living condition showed no statistical significance for the prevalence of obesity, even after controlling for other factors, including birthplace. In addition, current smoking status showed no significant relationship with obesity, a finding also confirmed in previous research. [36]

In addition to the cultural and structural barriers, the higher prevalence of obesity among migrants might also be associated to adaptational lifestyle challenges regarding attitudes towards local nutrition and health culture. This can lead to neglecting physical activity and a lack of healthy nutrition

habits and successively, promote a sedentary lifestyle with a higher risk to develop obesity. To overcome the problem of obesity and associated health issues among psychiatric outpatients with foreign backgrounds, attention needs to be directed towards ensuring equal accessibility for both health interviews and physical examination regardless of language and/or cultural background. Important actions towards equal accessibility are, for example, using professional interpreters in order to achieve full understanding between the patient and health care professionals (e.g. Case Manager) when conducting the health interview. [37] By ensuring full comprehension between the patient and Case Manager, a better understanding of the patients physical health status, contributing lifestyle factors and eventual interventions can be achieved, resulting in more efficient health monitoring and disease prevention. However, resolving the language barrier does not always secure understanding of the cultural and social contexts of health behavior among migrant patients. To approach this problem, new tools, such as the Cultural Formulation Interview of DSM-5, are introduced for the clinicians to use to better understand patients from different backgrounds and how to access possible health issues in appropriate cultural context. [37]

Surprisingly, as previously mentioned, educational level showed no significant differences regarding prevalence of obesity among outpatients with psychotic disorders. This indicates a different risk profile for obesity among our patient sample and the general population, as overweight and obesity in the general population is more prevalent among individuals with lower degree of education. These findings are confirmed in various studies, both in Sweden and internationally [29, 38]. Previous studies suggest several explanations that might determine the relationship between lower prevalence of obesity among individuals with higher education level, such as better access to health information as well as comprehension of this information and also, increased knowledge of risk behavior and lifestyle choices associated with obesity. [38] When discussing these education-related factors related to obesity among psychiatric outpatients, it is evident that similar conclusions can not be drawn in the patient population, as the psychotic disorder itself can reduce the individual cognitive capacity. This might lead to situations where education level is of lesser influence, as the individual capacity to seek, understand and apply health-related information is limited due to the psychotic disorder itself and decreased level of function; not necessarily level of education. Similar conclusions regarding decreased function level can be drawn from our study results as obese outpatients had generally a higher level of self-experienced disability and lower level of daily function (WHODAS 2.0-questionnaire) in comparison with non-obese outpatients (See Table 2). The trend for decreasing function level alongside increasing obesity was present for all function domains as

well as the WHODAS 2.0-sum score. However, the difference was statistically significant only for the function domain regarding cognition, which further emphasizes the significance of examining cognitive function level, rather than educational level, among outpatients with psychotic disorders.

In line with previous research, current treatment with antipsychotic medication showed a statistically significant increased risk for obesity (OR=1.896). Most antipsychotic medications include weight gain and metabolic dysregulation as a common adverse effect and thus, an increased risk for developing obesity. [18, 19]. These adverse effects, however, show remarkable differences between different types of antipsychotic medications and patient groups. [39, 40] When observing mortality among patients with schizophrenia, treated with antipsychotics, previous research data suggests a dose-dependent relationship between antipsychotic medication and cardiovascular mortality. According to research, both overall and cardiovascular mortality is highest among psychotic patients with no antipsychotic medication, followed by the patients with high exposure for antipsychotic medication. This U-shaped curve between mortality rate and dose of antipsychotic medication indicates that mortality rates are lower when the medication is used in conservative doses. [41] These findings support the need for individual treatment plan, considering the patient risk profile and choice of medication type and dosage carefully. [39, 40]. In our study, significant differences were also found when using independent samples t-test to compare prevalence of obesity and duration of psychotic disorder diagnosis (p=0.015), which suggested that obesity is more prevalent among patients with longer diagnosis duration. However, after controlling for age, sex and other background factors (including antipsychotic medication), the binary logistic regression model shows that longer diagnosis duration is in fact associated with a lower risk for obesity, suggesting that a longer treatment period is a protective factor for developing obesity. Therefore it can be discussed that the significance of longer diagnosis duration among obese outpatients in the independent samples t-test, not controlling for other factors, can in fact be explained solely by longer exposure and/or cumulative dose of antipsychotic medication. The findings regarding diagnosis duration and obesity in the logistic regression model, however, suggest that patients who are detected and diagnosed early with their psychiatric condition are at lower risk to develop obesity, possibly due to earlier health interventions through the annual health check-ups offered at the outpatient clinics. This highlights the need for early diagnosis and interventions and emphasizes their significance in promoting physical health status among psychiatric outpatients. In addition to the regular health check-ups, these findings accentuate the need for individual treatment plans, including routine monitoring of dose and medication type to ensure optimal psychosomatic health among outpatients.

The WHODAS 2-0 self-administered questionnaire was used to evaluate the level of disability and self-experienced function in daily life among outpatients. The hypothesis of our study was that patients with obesity would experience more disability in their daily lives, as indicated by previous research among other patient populations: It is known from previous studies, regarding general population with obesity, that higher BMI is associated with higher level of disability and reduction of health-related quality of life (HRQoL), and the association is also present after controlling for somatic co-morbidities such as diabetes. [42] Cohort studies on this topic area suggest that co-occurrence of both obesity and psychological problems amplifies the risk for disability. [43] However, studies among patients with other psychiatric diagnoses suggest that instead of obesity, the severity of the mental illness is a stronger independent predictor for higher level of disability. [44] The trend of increasing level of disability associated with higher prevalence of obesity was observed in our study results, as the WHODAS 2-0 mean score for every function domain, as well as sum score, was higher among obese outpatients. Surprisingly, however, cognition was the only domain with significant differences between obese and non-obese outpatients. The relationship between obesity and cognitive dysfunction, especially regarding executive functions, is supported by previous research findings, suggesting that obesity is associated with both morphological and physiological changes in the brain tissue. [45] However, the association between obesity and changes in brain function is not yet fully understood and remains under discussion. There is both evidence suggesting that brain lesions among obese individuals are due to metabolic dysregulation (e.g. insulin resistance, pre-diabetes), inflammatory response of the adipose tissue and/or cardiovascular dysfunction, but also evidence that obesity-related lifestyle and behavior patterns play a role in this complex phenomenon. [45, 46, 47]. The contribution of other, harmful lifestyle patterns among outpatients with psychotic disorders is further emphasized in our study results, as 21% of the patient sample were current smokers (not including other tobacco or nicotine products). The number of smokers is high in comparison with the latest data from the Public Health Agency in Sweden, indicating that only 6% of the Swedish general population consume cigarette products daily. [48] Although the prevalence cigarette smoking showed no significant differences between obese and non-obese patient groups, the overall health effects of smoking and related health issues should be adressed among outpatients with psychotic disorders, because smoking can likely contribute to lower level of daily functioning and cardiovascular morbidity.

A higher percentage of patients with obesity had a conducted a physical examination within the last year compared with patients without obesity (p=0.003). This might indicate that obese outpatients receive more intensive health care monitoring through routinized check-ups due to their obesity-associated increased risk for other co-morbidities. The physicians conducting the physical examination might also highlight the importance of annual health examination to patients with obesity and accordingly, increased health risks which leads to more efficient monitoring. It might also be due to the fact that outpatients with obesity are more concerned of their own health status and and are more motivated to seek timely somatic health care in comparison to non-obese patients.

Strengths and limitations

The sample size of the study is extensive (n=1289) and can be seen representative of the heterogenous population of outpatients with diagnosed psychotic disorders. Therefore, the dataset analyzed can be thought as a reliable representation of the broad variation of demographic factors in this patient group. Demographic background information of age and sex was obtained from all patients of the sample as well as clinical characteristics, including BMI, blood pressure, co-morbidity and current smoking status, all n=1289. Due to incomplete data collection during the annual health interview for some patients, additional demographic data (current antipsychotic medication, education, occupation, living condition and birthplace) was available for a smaller subsample of patients, however leading only to a minor information loss, as sample size exceeded 1000 individual observations for each background characteristic included in the main analyses.

The naturalistic patient sample adds to the value of this study as a majority of psychiatric research uses samples with stringent criteria for exclusion and inclusion to accomplish a homogenous dataset. While the homogeneity of the dataset and reduced variation in the sample may yield high internal consistency, it does not fully represent the complex and heterogenous psychiatric patient population in real life as it is not usually obtained in naturalistic samples. Thus, rigid exclusion and inclusion criteria and a creation of controlled dataset can lead to artificial situations, which might lack clinical relevance [49]. For example, the inclusion of older patients in patient sample is important as older adults are often underrepresented in clinical research, possibly due to lower grade of awareness among elderly, lack of resources, physical barriers or distrust in research systems. [50]

The registration of WHODAS 2.0 item as a component of the annual health check-up among patients with psychotic disorders was first implemented in 2016 and there was a delay in establishing the routine among different clinics. This resulted in a limited subset of patients with WHODAS 2.0 items registered in our dataset. Furthermore, the seven-day criterium for the time-interval between health interview and registration of clinical values of main investigation (BMI and blood pressure) narrowed down the inclusion criteria for patients chosen for data analysis in this study. However, most of the patients were able to perform the complete health check-up within the seven-day period, leading to the final sample size of 1289 patients for most characteristics.

An important topic for discussion that might be seen as a possible limitation of the study is the clinical implementations of measuring body mass index and its accuracy to evaluate bodyweight-related health status. Despite BMI's wide clinical applications and being a part of routine physical examination, the accuracy and usefulness of measuring body mass index is under discussion, as BMI functions only as a surrogate measure for excess body fat estimated on excess weight among individuals. BMI does not take into consideration individual body type, distinguish the ratio between fat, muscle and bone mass nor the distribution of adipose tissue in the body, all known to be important factors in developing obesity-associated comorbidity. However, in clinical settings BMI is an established routine to measure obesity among patients, though its feasibility in predicting subsequent metabolic morbidity can be discussed as it does not take into consideration the factors discussed above. A possible indication for further studies could be to include more direct measures of body fat and distribution of fat mass, such as measurement of waist circumference or skinfold calipers, and to compare obesity-associated comorbidity among outpatients using different methods to supplement the BMI-measurements. Some of these methods, such as measurement of waist circumference, are already included in the regional guidelines for the annual health check-up of outpatients with psychotic disorders, (see Appendix A2) but are still poorly implemented by clinicians. This might be due to the fact that measuring waist circumference can be experienced as a more invasive or intrusive procedure by some patients, and therefore its feasibility during the health check-up needs to be individually assessed.

However, the clinical benefits of measuring both BMI and waist circumference is supported by research data. Previous meta-analysis, comparing the accuracy of the two methods in predicting metabolic illness in different patient populations, shows that in a heterogenous population, waist circumference (> 102 cm for men, >88 cm for women) is in fact more accurate predictor for devel-

opment of diabetes than prevalence of obesity (BMI > 30). [50] This data supports the fact that in addition to measuring BMI, the annual health check-up of outpatients should routinely include also measurement of waist circumference in order to better evaluate the metabolic health and risk for diabetes among patients with psychotic disorder.

Another possible indication for eventual further studies can be seen in the variation of BMI in the same patient population in correlation to the type of antipsychotic medication used, as out study included data on only if the patient was currently treated with any type of antipsychotic medication (yes/no). It is known from previous studies that antipsychotics show remarkable differences in adverse effects and risks for metabolic co-morbidities. Therefore, comparison between different types of antipsychotic medications, along with BMI variation and associated co-morbidities, could be a possible research question in further studies.

Comparison of the prevalence of cardiovascular disease between outpatients with psychotic disorder and general population in this research paper was challenging as cardiovascular disease is an umbrella term comprising of different diagnoses, such as coronary heart disease, acute myocardial infarction, cerebrovascular disease, heart failure and cardiac arrhythmias, all differing in etiology, risk factors, treatment strategies and mortality. In addition, most previous studies and national register databases focus on mortality related to cardiovascular disease rather than prevalence of the diagnoses, leading to a limited material to compare morbidity between our patient sample and general population. In our study, the diagnosis of cardiovascular disease was documented as binary alternative (yes/no) during the annual health interview, also being dependent on the documentation done by the Case Manager. A possible indication for further studies could be a more through documentation of cardiovascular morbidity and sub-diagnoses among outpatients, leading to more precise information on this topic area.

When considering the choice of statistical methods for regression models, the data-driven backward selection method, starting with the full model with all predictors, was used due to the large sample size and in comparison to the sample size, relatively few predictive variables. The advantage of backward selection method includes the recognition of the effects of all candidate variables simultaneously. As the sample size was much greater than the number of variables, the logistic regression is able to yield a more generalizable model with higher reproductive value and validity. Stepwise selection also minimizes the risk for biased variable selection as it does not choose the variables

based on previous research or expert knowledge, which might promote variable selection that supports the hypothesis of the study, leading to biased results. Automated variable selection methods, such as backward stepwise elimination, is considered to be a useful statistical method in exploratory studies with a relatively large sample size (> 50 events per variable) where previous data on the topic area and/or knowledge of the relationship between variables is limited. This study can be considered as such as the obtained patient sample is large and characterized by remarkable heterogeneity in terms of age and background characteristics. In addition, previous research on similar, naturalistic outpatient populations, with such varied age and background characteristics of participants, is limited. However, a limitation related to the chosen statistical method includes the possibility of missing out some combinations of potential predictors, as the stepwise selection method can not always ensure selection of the best possible combination of predictor variables. In addition, backward elimination model does not allow re-entering variables if the variable in question has previously been removed from the model as non-significant. It must also be noted that the statistical measures generated in models based on stepwise selection, such as regression coefficients, confidence intervals, p-values and coefficients of determination are somewhat biased and can not directly be interpreted as such. [51, 52]. It is also to be noted that using stepwise elimination in statistical analyses increases the Type I error rate, i.e. incorrectly rejecting the null-hypothesis. This issue, known as multiple testing problem, is most problematic in analyses testing null-hypothesis, where it may decrease the statistical validity of the analysis. In out study, however, the stepwise elimination method was suitable due to the descriptive character of the study design, relatively small number of predictive variables and large sample size. Also the choice of this logistic regression method suited the purpose of this research, as the fundamental aim was to identify independent predictors for obesity while controlling for other background factors, instead of logistic model building. Nonetheless, all statistical analyses, regardless chosen method, provide somewhat imperfect results and the obtained data must be interpreted with with caution. It is always advised to combine and support statistical results with the theoretical framework and previously known information on the topic area before concluding its clinical applicability. [53]

Conclusions

The aim of this study was to examine the characteristics and clinical manifestations of obesity in a heterogenous sample of outpatients with psychotic disorders. The results of our study, in line with previous research findings, confirm that obesity is highly prevalent among outpatients with psychotic disorders. In addition, the descriptive data analysis of background characteristics indicates common characteristics among obese outpatients. When controlling for all characteristics, the regression model suggests a high-risk profile for obesity and associated cardiometabolic co-morbidity in the patient sample.

The findings of our study highlight the need for routine health monitoring and efficient interventions, directing special attention to the patients with higher risk for obesity and associated health problems, namely patients with current antipsychotic medication and patients born outside Sweden. Early detection of the outpatients with increased risk for somatic co-morbidity is important, both in order to minimize the burden of healthcare systems as well as to improve quality of life and function level of individual patients. Several suggestions for actions to achieve this are described in this paper.

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Populärvetenskaplig sammanfattning

Projekttitel: Fetma och bakomliggande faktorer hos svenska öppenvårdspatienter med psykossjukdom

Fetma, definierat som ett body mass index, (BMI) ≥30 kg/m2 , är en etablerad och vanligt förekommande hälsorisk. Fetma ökar risken för individen att drabbas av flera, potentiellt allvarliga sjukdomar som diabetes mellitus och hjärt-kärlsjukdom vilket gör fetma till en av de vanligaste orsakerna till förlorade friska levnadsår i Sverige. Enligt Folkhälsomyndigheten (2016) drabbas 15% av Sveriges befolkningen av fetma men det är känt sedan tidigare att fetma är ojämlikt fördelat i samhället. Exempelvis har personer med psykossjukdomar en ökad risk att drabbas av fetma och relaterade metabola sjukdomar jämfört med befolkningen i stort. Patientgruppen kännetecknas också av stor demografisk variation då psykossjukdomar drabbar båda män och kvinnor i alla åldrar samt individer från olika etniska och socioekonomiska backgrunder. Tidigare forskning har visat att patienter med psykossjukdomar dör ca. 10-15 år tidigare jämfört med befolkningen i stort, framför allt beroende på ökad förekomst av kardiovaskulära sjukdomar.

Syftet med denna studie är att beskriva förekomsten av fetma samt bakomliggande kliniska och demografiska faktorer hos patienter inskrivna vid psykosöppenvården inom Sahlgrenska universitetssjukhuset. Data, som analyserades retrospektivt, är insamlat från det lokala kvalitetsregistret mellan år 2016-2019 och innehåller information om patienternas ålder, kön, demografisk backgrund (födelseområde, inkomst, levnadsförhållande, utbildning), livsstilsfaktorer (rökning), klinisk data (vikt, längd, blodtryck) samt data om psykossjukdomen (år för diagnos, pågående behandling med antipsykotiska läkemedel). Också samtidig förekomst av andra sjukdomar som diabetes, hjärt-kärlsjukdom och sköldkörtelsjukdom dokumenterades. Fokuset är att studera hur fetma och relaterade sjukdomar, de största förklarande faktorer för förtida död inom patientgruppen, kan förklaras av olika faktorer. Våra studieresultat visar att när vi kontrollerar för ålder, kön och demografiska bakgrundsfaktorer som utbildningsnivå, finns det två faktorer som är kopplat till ökad risk för fetma hos öppenvårdspatienter med psykossjukdom, vilka är pågående behandling med antipsykotiska läkemedel och att vara född utanför Sverige. Dataanalys bekräftar också att patienter med längre diagnosduration, dvs. haft längre och tidigare kontakt med vården, har mindre risk att drabbas av fetma oavsett kön och ålder.

Resultatet påvisar flera oberoende faktorer som påverkar utveckling av fetma och relaterade sjukdomar hos patienter med psykossjukdomar. Denna information är av klinisk relevans då de kan användas i nya vårdriktlinjer i framtiden för att kunna erbjuda effektiva förebyggande insatser för patienter med högst risk att drabba av fetma och fysisk ohälsa. Enligt våra studieresultat, är dessa högrisk patienter är patienter de som är födda utomlands, har pågående behandling med antipsykotiska läkemedel samt de som haft sin psykosdiagnos en kortare tid.

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Appendix

A1.

Annual health check-up protocol (Årsuppföljning)

Årsuppföljning

Patientens personnummer:_____

Namn:_____

Ärendeansvarig:_____

Informationsdatum:_____(ÅÅÅÅ-MM-DD)

*

**Frågor som börjar med en asterisk (*) fylls i första gången man gör en årsuppföljning. Då det är uppgifter som inte förändras över tid behöver de därför inte fyllas igen om årsuppföljning är gjort under föregående år.*

Om kvalitetsregister

*****Är patienten informerad om nationella kvalitetsregister**?** Ringa in ett alternativ.
Årsuppföljning görs för alla patienter. Data kan skickas vidare till PsykosR och Kvalitetstjärnan om inte patienten aktivt motsätter sig deltagande. Om patienten redan inkluderats i register, tex under föregående år använd "Ja, och motsätter sig inte deltagande".

○ **Ja, och motsätter sig inte deltagande**

○ **Ja, och vill inte vara med i PsykosR**

○ **Ja, och vill inte vara med i något nationellt kvalitetsregister**

○ **Nej, patienten är inte informerad**

Patientens situation och bakgrund

*****Vilket år insjuknade patienten**?** Ringa in ett alternativ.
Avser diagnos som föranleder kontakt med Psykiatri Psykos, oavsett om detta är en psykosdiagnos eller inte.

○ **2009 eller tidigare**	○ **2012**	○ **2015**
○ **2010**	○ **2013**	○ **2016**
○ **2011**	○ **2014**	○ **2017**
○ **2018**	○ **2019**	○ **2020**

*Var är patienten född? Ringa in ett alternativ.
Avser "Födelseområde" som det använts i lokala kvalitetsregistret.

○ **Sverige**

○ **Norden (utom Sverige)**

○ **Europa (utom Sverige och Norden)**

○ **Nordamerika**

○ **Sydamerika**

○ **Asien**

○ **Afrika**

○ **Oceanien**

*Har patienten erfarenhet av att ha tvångsvårdats? Om "ja", när? Ringa in ett alternativ.
Avser tvångsvård i psykiatrin i allmänhet oberoende av var.

○ **Nej (patienten har ej tvångsvårdats)**

○ **Ja, före 2012**

○ **Ja, 2012 eller senare**

*Om "Ja,…", har patienten utvärderat tvångsvårdstiden (enligt ISP)? Ringa in ett alternativ.

○ **Ja**

○ **Inte ännu**

○ **Patienten har erbjudits och avböjt**

Hur bor patienten? Ringa in ett svarsalternativ.
Med hemlös avses person som saknar egen eller för hyrd bostad och som inte bor i något stadigvarande inneboendeförhållande eller andrahandsboende, och som är hänvisad till tillfälliga boendealternativ eller är uteliggare.

○ **Ordinärt boende utan stöd i hemmet (av socialtjänsten eller motsvarande)**

○ **Ordinärt boende med stöd i hemmet (av socialtjänsten eller motsvarande)**

○ **Permanent särskilt boende (enl SoL/LSS) med stöd av personal del av dygnet**

○ **Permanent särskilt boende (enl SoL/LSS) med stöd av personal hela dygnet**

○ **Familjehem**

○ **Boende med socialt kontrakt**

○ **Hemlös** *(se definition under frågan)*

○ **Uppgift saknas**

Hur är hushållets sammansättning?

Ringa in ett eller flera alternativ.

○ **Ensamboende**

○ **Delar hushåll med make/maka/partner/sambo**

○ **Delar hushåll med förälder/föräldrar**

○ **Delar hushåll med andra vuxna (inklusive egna barn 18 år eller äldre)**

○ **Delar hushåll med barn under 18 år**

○ **Uppgift saknas**

Finns det minderåriga barn som berörs av patientens sjukdom?

Information om minderåriga barn fylls i i tillägg till patientbakgrund i Melior.

"Nej" – om det inte finns barn

"Ja", födelseår, samt vårdnad (Gemensam, Enskild eller Ingen vårdnad) för varje barn.

Födelseår (ÅÅÅÅ)	Vårdnad (Gemensam, Enskild eller Ingen vårdnad)

Vilken är patientens högsta utbildningsnivå?
Ringa in det alternativ som passar bäst.

○ **Ej fullgjord förgymnasial utbildning**

○ **Fullgjord förgymnasial utbildning**

○ **Fullgjord gymnasial utbildning**

○ **Fullgjord eftergymnasial utbildning (minst 2 år)**

○ **Fullgjord eftergymnasial utbildning (minst 3 år)**

○ **Uppgift saknas**

Vilken är patientens huvudsakliga sysselsättning de senaste 12 månaderna?
Ringa in ett eller flera alternativ.

○ **Arbete/studier på öppna marknaden mer än 50 procent**

○ **Arbete/studier på öppna marknaden 50 procent eller mindre**

○ **Arbetslös/arbetsmarknadsåtgärd**

○ **Skyddad verksamhet mer än 50 procent**

○ **Skyddad verksamhet 50 procent eller mindre**

○ **Anpassad studieform (mål vidare studier/arbete)**

○ **Arbetsrehabilitering (inkl. under utredning för klargörande av funktionsnivå)**

○ **Sysselsättning motsvarande SOL:s definition (dagcenter, brukarklubbar, etc)**

○ **Ingen sysselsättning**

○ **Uppgift saknas**

Vilken är patientens huvudsakliga försörjning de senaste 12 månaderna?

Om personer som är sjukskrivna, ej är sjukpenningsberättigade och därför får ersättning från socialtjänsten anges alternativet "Ekonomiskt bistånd enligt SOL eller motsvarande." Egen försörjning avser lönearbete, egen företagare, studiemedel, ålderspension/garantipension. Flera svarsalternativ kan anges – högst två får väljas.

○ **Egen försörjning**

○ **A-kassa**

○ **Föräldrapenning**

○ **Sjukpenning, sjukersättning eller motsvarande**

○ **Ekonomiskt bistånd enligt SOL eller motsvarande**

○ **Försörjd av anhörig**

○ **Eget kapital**

○ **Övrigt**

○ **Uppgift saknas**

Risktillstånd och antipsykotiska läkemedel

Har patienten gjort någon gång gjort suicidförsök?
Med suicidförsök avses livshotande eller skenbart livshotande beteende, i avsikt att sätta sitt liv på spel eller att göra intryck av sådan avsikt, men som inte leder till döden (exempelvis allvarlig tablettförgiftning, dränkning, skjutning, hängning/strypning).

○ **Nej**

○ **Ja**

Om ja; ange när suicidförsök skett (om de inträffat senare än 2017-01-01 och ännu inte dokumenterats i uppföljningsdatabasen)

Datum:

Ringa in aktuella risktillstånd och somatiska diagnoser
Om det inte finns några av nedanstående risktillstånd och diagnoser, markera "Inget aktuellt".

○ **Diabetessjukdom**

○ **Cancer**

○ **Thyroideasjukdom**

○ **Amning**

○ **KOL**

○ **Hjärt- och kärlsjukdom**

○ **Njursjukdom**

○ **Graviditet**

○ **Rökning** (röker dagligen)

○ **Inget aktuellt**

Behandlas patienten med antipsykotiska läkemedel? ○ **Ja** ○ **Nej**

Nu följer två sidor. Den första innehåller remissionsskattning (RSS) som görs av dig som CM/behandlare om patienten har psykossjukdom. Den andra är en patientskattning av

funktionsnivå (WHODAS). Patientskattningen görs av personer med alla olika typer av diagnoser.

Remissionsskattning (RSS) – Behandlarskattning vid psykossjukdom

P1 **Vanföreställningar**
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

P2 **Tankemässig desorganisation**
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

P3 Hallucinatoriskt beteende
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

N1 Avtrubbade affekter
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

N4 Passiv/apatisk tillbakadragenhet
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

N6 Bristande spontanitet och samtalsförmåga
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

A5 Manér och kroppshållning
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

A9 Udda tankeinnehåll
Ett svarsalternativ kan anges
○ **1 Saknas**
○ **2 Minimala**
○ **3 Lätta**
○ **4 Måttliga**
○ **5 Måttligt svåra/Medelsvåra**
○ **6 Svåra**
○ **7 Extrema**
○ **8 Uppgift saknas**

Detta frågeformulär handlar om svårigheter på grund av ditt hälsotillstånd. Med hälsotillstånd avses sjukdomar och andra hälsoproblem som kan vara kortvariga eller långvariga, skador, psykiska eller känslomässiga problem, och problem med alkohol eller droger.

Tänk tillbaka på de senaste 30 dagarna och besvara dessa frågor utifrån hur svårt det har varit för dig att i genomsnitt utföra följande aktiviteter på grund av ditt hälsotillstånd. Var god och ringa in endast ett svar per fråga.

Vilken svårighet har du haft på grund av ditt hälsotillstånd under de senaste 30 dagarna med:

S1	**Att stå under längre perioder, såsom 30 minuter?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S2	**Att ta hand om ditt hushåll?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S3	**Att lära dig en ny uppgift (till exempel hur man tar sig till en ny plats)?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S4	**Hur stort problem har du med att delta i aktiviteter i samhället (till exempel festligheter, religiösa eller andra aktiviteter) på samma sätt som andra kan?**	*Inget*	*Lite*	*Måttligt*	*Stort*	*Extremt/ kan inte*
S5	**Hur mycket har du påverkats känslomässigt av ditt hälsotillstånd?**	*Inget*	*Lite*	*Måttligt*	*Stort*	*Extremt/ kan inte*
S6	**Att koncentrera dig under 10 minuter på att göra något?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S7	**Att gå en längre sträcka såsom en kilometer?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S8	**Att tvätta hela kroppen?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S9	**Att klä dig?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S10	**Att bemöta människor som du inte känner?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S11	**Att bibehålla en vänskapsrelation?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*
S12	**Ditt dagliga arbete eller studier?**	*Ingen*	*Liten*	*Måttlig*	*Stor*	*Extrem/ kan inte*

Detta var den avslutande frågan. Tack för ditt deltagande!

WHODAS 2.0
WORLD HEALTH ORGANIZATION
DISABILITY ASSESSMENT SCHEDULE 2.0

A2.

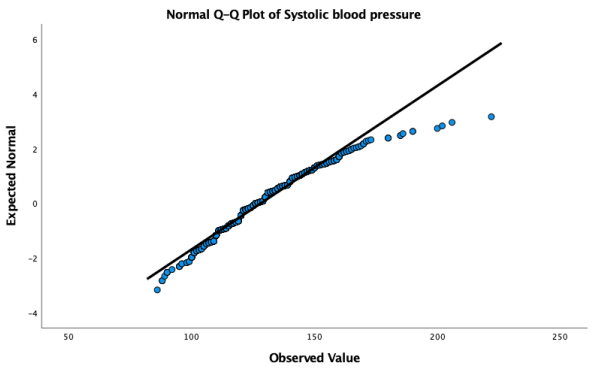
Bilaga 2. Systematisk kontroll av somatisk hälsa

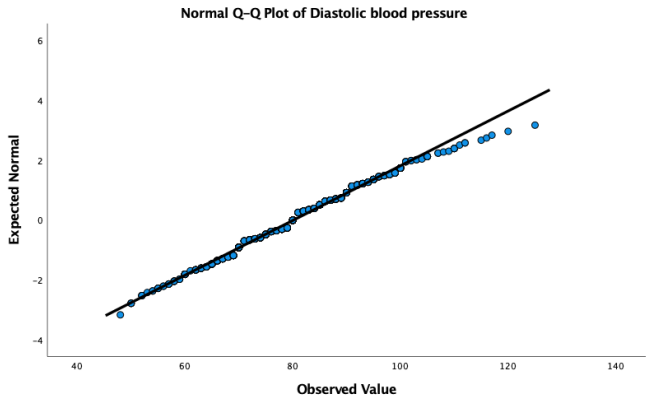
Årlig systematisk kontroll av somatisk hälsa

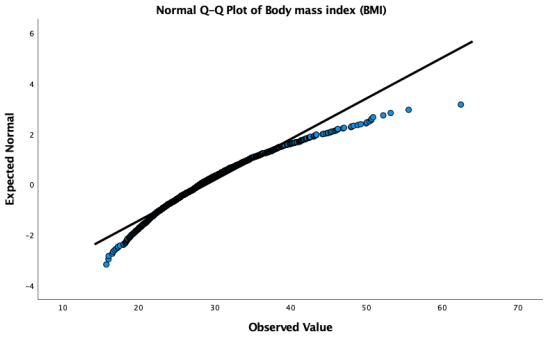
	Årligen, alla patienter
Anamnes och somatiskt status; hereditet för eller känd hjärt- & kärlsjukdom, lungsjukdom, cancer och diabetes. Håll hälsosamtal samt kartlägg tandvårdsbehov.	X
Vikt	X
EKG	X (vid indikation)
Spirometri med screeninginstrument (rökare eller nyligen slutat)	X (vid indikation)
Midjemått (a)	X
Blodtryck (b) + Puls (reg/oreg.)	X
f-glukos (c)	X
HbA1c	X
Lipidstatus (totalkolesterol, HDL, LDL, triglycerider (d)	X
Överväg lab-screening även av t ex thyreoideastatus, lever- och njurprover, elektrolyter, blodstatus, B-Peth	X

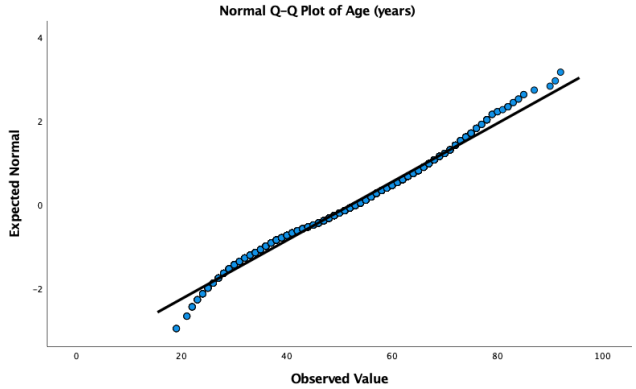
A3.

Q-Q normality plots for the continuous variables (BMI, age, blood pressure)









A4.

Mean, standard deviation (SD), median for the continuous variables including skewness and kurtosis distribution values.

	Mean, SD, median	Skewness	Kurtosis
BMI (kg/m2)	29.9, 6.2, 28.1	0.918	1.545
Age (years)	52.2, 14.3, 53	-0.107	-0.695
Systolic blood pressure (mmHg)	128.1, 16.7, 126.0	0.781	1.727
Diastolic blood pressure (mmHg)	80.2, 10.9, 80.0	0.194	0.425