Outpatients with psychotic disorders need physical health-promoting treatment: A cross-sectional multisite study

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A B S T R A C T

Introduction: Impaired quality of life (QoL) and premature death in patients with primary non-affective psychotic disorders is related to lifestyle-induced comorbidities. Current municipal health-promoting treatment and care do not embrace the challenges of living with psychotic disorders.
Aim: This cross-sectional study aimed to identify the proportion of outpatients diagnosed with primary psychotic disorders who need health-promoting treatment and care, and who receive municipal health-promoting interventions.
Methods: Of 206 eligible invited outpatients from three psychiatric services clinics in Southern Denmark, 165 participated. Demographic and health characteristics, and use of alcohol, cannabis, drugs, and cigarettes were identified via a screening tool. Blood test information, body measurements, and medication status were extracted from the outpatients' medical records. The need for health promotion was assessed based on body mass index (BMI), and use of alcohol, cannabis, drugs, and cigarettes.
Results: Seventy-three percent of outpatients needed health promotion, of whom 61 % were not offered municipal health-promoting treatment and care. Thirty-six percent had one or more somatic comorbidities, including diabetes mellitus (15 %) and cardiovascular disease (10 %); 41 % smoked a mean (SD) of 19 (10) cigarettes daily. Mean (SD) BMI was 34 (8) kg/m^2 for women and 29 (7) kg/m^2 for men.
Conclusion: The majority of outpatients with non-affective psychotic disorders need health-promoting interventions, but only about 40 % of these patients receive such municipal health-promoting treatment and care. Future studies should clarify the impact of these interventions on the health status, QoL, and life expectancy of these patients.

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1. Introduction

People living with primary non-affective psychotic disorders such as schizophrenia or schizophreniform disorders have a reduced life expectancy of 10–15 years vs. the general population [1,2]. The most prevalent causes of premature death are caused by somatic comorbidities such as cardiovascular disease (CVD), respiratory disease, obesity, and type 2 diabetes mellitus (T2DM) [3–7].

High rates of respiratory and cardiometabolic diseases in people with non-affective psychosis are due to a complex interplay between lifestyle and mental illness- and treatment-related factors [3,6,8]. Poor nutrition, sedentary lifestyle, smoking, substance use, and poor sleep hygiene are among the main contributing lifestyle factors [9–11]. Furthermore, these unhealthy behaviors are known to be related to low socioeconomic status, use of unhealthy behaviors as coping strategies, and cognitive impairment [9,11,12]. In psychotic disorders negative symptoms such as decreased drive and avolition may also contribute to less physical activity and unhealthy eating, as well as reduced help-seeking behavior and physical health controls [13,14]. Related to treatment with antipsychotics, side effects such as weight gain, dyslipidemia, hyperglycemia, hypertension, and electrocardiogram changes are well-known risk factors for developing CVD [15–17]. Unacceptable side effects may also cause patients to discontinue their medication and thereby intensify their psychiatric symptoms, leading to difficulties in making and maintaining healthy lifestyle choices [9].

Studies have recommended a good-quality diet, recommended level of physical exercise, and smoking cessation among people with mental illness [18–21]. Additionally, guidelines for screening and monitoring of the cardiovascular and metabolic risk factors, and thereby prevention of T2DM and CVD, are available [22]. However, the improvement of physical health is still a challenge. Negative symptoms and medication side effects may make high-intensity exercise or frequent clinic visits unlikely [19]. Additionally, chaotic lifestyles and hospitalizations caused by uncontrolled positive symptoms may also interfere with consistent attendance and thereby complicate the establishment of therapeutic alliances with staff [23,24]. Therefore, successful treatment and care programs will require a longer duration, addressing multiple components together, for example diet, exercise, behavioral change, more frequent contact (especially face-to-face contact), and well-trained staff [18,25,26].

Longstanding changes in improved physical health in patients are complex and challenging. The changes require hospitals, outpatient clinics, supported housing, and psychiatric facilities to overhaul practices and provide environments to promote healthier lifestyles [27]. In addition, psychiatric and municipal healthcare systems must collaborate to provide coherent treatment and care for people with psychotic disorders [19,25].

In summary, people living with primary non-affective psychotic disorders such as schizophrenia or schizophreniform disorders have a reduced life expectancy. More information on patients' use of existing health-promoting activities is required.

1.1. Aim

The study aimed to identify the proportion of outpatients diagnosed with primary psychotic disorders who need health-promoting treatment and care, and who receive municipal health-promoting interventions.

2. Material and methods

2.1. Sample

This was a cross-sectional multisite study. Patients were recruited consecutively from three local psychiatric services outpatient clinics in the Region of Southern Denmark during four randomly selected weeks in 2020 (9–22 November and 7–20 December). All outpatients with an appointment at outpatient clinics in the selected weeks presumably resembled other outpatients associated with the clinic. All outpatient clinics had services for early intervention in psychosis. The staff was trained in delivering specialized psychiatric treatment and care to patients with different severe psychiatric conditions. The outpatient clinics were all collaborating with different municipalities.

Patients from the three outpatient clinics showed willingness to participate. Nevertheless, some did not want to participate due to a current lack of psychological resources, indicating that the symptoms of their mental illness were enough to deal with without the added stress of participating in a study.

All municipalities in Denmark are legally obliged to offer health-promoting treatment to all residents who need it. Some health-promoting treatments do not require a referral from professionals, while others require a referral either from a General Practitioner or health administration staff. All health-promoting treatments are voluntary and participants themselves decide whether they want to participate or not and whether they want to stop attending. Most health-promoting treatments are free, but some require a small monthly payment.

2.1.1. Inclusion criteria

Patients were eligible to participate in the study if they were aged >20 years; attended an appointment in one of the three outpatient clinics during the data-collection period; had schizophrenia or a related non-affective and non-organic psychotic disorder classified in chapter *F2* of the 10th revision of the World Health Organization's International Classification of Diseases *(ICD-10) as the primary diagnosis* at the latest previous in- or outpatient admission.

2.1.2. Exclusion criteria

The only exclusion criterion was not having satisfactory proficiency in Danish.

2.2. Procedure

All outpatients were asked to participate in the study by their regular healthcare professional psychiatrist, psychologist, or nurse during a prebooked, routine clinic appointment. The staff were familiar and trained in data collection on a regular basis. The interviews were held in the office with only the patient and staff present. Data extracted from patient medical records were recorded during or after the appointment.

2.3. Measures

Explanatory variables, demographic and health characteristics, as well as the use of alcohol, cannabis, drugs, and cigarettes, were identified via a screening tool. The screening tool was developed by the authors, based on their experience and knowledge in this field [5]. Medication status, body measurements, and blood test data were collected through interviews with the patients or extracted from the patients' medical records. Body measurements included weight, height, waist circumference (WC), blood pressure, and heart rate. Body mass index (BMI) was calculated. Retrieved blood test data included glycated hemoglobin (HbA1c), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and total cholesterol (TC). Whether the blood tests and body measurements were taken within the last 12 months was also recorded.

Health parameters were categorized as follows. BMI <18.5 is classified as underweight, BMI 18.5–24.9 is classified as normal weight, BMI 25.0–29.9 is classified as overweight, BMI 30.0–34.9 is classified as obesity class I, BMI 35.0–39.9 is classified as obesity class II, BMI >40 is classified as obesity class III. A WC of >94 cm and >102 cm in men >80 cm and >88 cm in women is associated with an increased risk of metabolic complications and a substantially increased risk of metabolic complications. respectively [28]. Normal blood pressure (BP) is defined as systolic <135 mmHg and diastolic <85 mmHg. Stage 1 hypertension (mild) is defined as a systolic BP (SBP) of 135–154 mmHg or a diastolic BP (DBP) of 85–94 mmHg. Stage 2 hypertension (moderate) is defined as SBP 155–174 mmHg or DBP 95–104 mmHg. Stage 3 hypertension (severe) is defined as SBP >175 mmHg or a DBP >105 mmHg [29]. HbA1c is normally 31–42 mmol/mol. T2DM can be diagnosed if HbA1c values > 48 mmol/mol are measured twice. Values between can be defined as prediabetes [30]. Regarding lipids it is recommended to aim for HDL levels >1.0 mmol/L in men and 1.2 mmol/L in women [31], levels of LDL below 3.0 mmol/L [32], and levels of TC < 5.0 mmol/L [33].

Outcome variables were (1) the need for health promotion and (2) an offer of municipal health-promoting treatment and care offered within the last 12 months. The patients were asked to self-report their participation in municipal health-promotion treatment and care such as smoking cessation, diet improvement, and physical activities like swimming, Nordic Walking, or other sports offered at the municipalities. The need for a specialist health-promoting intervention was defined as one or more of the following characteristics: BMI >30 kg/m^2 (i.e. obese), cannabis or other drug use once or more in the previous month (including heroin and other opioids, sedative-hypnotics, cocaine, amphetamine, and other psychoactive substances, e.g. hallucinogens and volatile solvents), smoking, or the consumption of ≥14 units of alcohol (1 unit = 12 g pure alcohol) per week for women and ≥21 units per week for men [34].

2.4. Statistical analyses

Sample size calculation was based on the primary analysis of the proportion of patients who smoked vs. patients who did not who received a specialist referral. The required number was 170 patients.

Baseline outpatient characteristics are reported as mean (SD) for continuous characteristics or as number and percent (%) for categorical characteristics. The group of outpatients in need of specialist health-promoting treatment is defined in measures. Only outpatients who answered all health needs questions were included in the analyses. Logistic regression models were used to analyze associations between the need of specialist health-promoting treatment and care and demographic and health characteristics, as well as associations between being offered health promotion and the demographics and health characteristics of patients in need of specialist health care. The following were considered: age (years); sex (women: 1; men: 2); housing (living alone: 0; living with others: 1); income (government transfer payment: 1; self-sufficient: 2); somatic comorbidities (no: 0; yes: 1); treatment (no: 0; yes: 1); alcohol use above the recommended limit (no: 0; yes: 1); cigarette, cannabis, or other substance use (no: 0; yes: 1); units of alcohol consumed per week; number of cigarettes smoked daily; BMI (kg/m^2); waist (cm); SBP and DBP (mmHg); heart rate (beats/min); and HbA1c (mmol/mol), HDL (mmol/L), LDL (mmol/L), and TC (mmol/L). Analyses on being offered municipal health promotion were adjusted for sex, age, and smoking status. A Hosmer–Leweshow test for goodness of fit showed no significant deviation between observed and predicted probabilities. There was no indication of multicollinearity in any model (all variance inflation factors <1.6).

All statistical analyses were performed with STATA, version 17 (StataCorp, College Station, TX, USA), and the significance threshold was set at a *p*-value of 0.05.

2.5. Ethics

All participants provided written informed consent before any study procedure was conducted. Furthermore, the interviews were conducted in a private environment and the anonymity of all participants was guaranteed. The Scientific Ethics Committee of Southern

Table 1
Characteristics of the outpatients, n = 165.

Sex % (n)	
Female	43.64 (72)
Male	56.36 (93)
Age, mean (SD)	40.04 (13.07)
Housing, % (n)	
Living alone	58.79 (97)
Living with other	41.21 (68)
Main income, % (n)	
Self-sufficient[a]	14.55 (24)
Government transfer payment	85.45 (141)
Somatic comorbidities, % (n) [f]	
Total[b]	35.98 (59)
Diabetes mellitus type 2 (T2DM)	14.63 (24)
Cardiovascular disease	10.37 (17)
Treatment, % (n)	
Antipsychotic medication	
No	8.48 (14)
Yes	91.52 (151)
Antipsychotic polypharmacy[c]	
No	59.60 (90)
Yes	40.00 (61)
Substance use, % (n)	
Alcohol consumption >14 units (women), >21 units (men)[d]	2.42 (4)
Smoking	40.61 (67)
Cannabis and other substance use[e]	4.85 (8)
Substance use, mean (SD)	
Alcohol (units per week)	2.86 (7.72)
Cigarettes (number smoked daily among smokers)	19.34 (10.14)
Body measures, mean (SD)	
BMI, women (kg/m^2), mean (SD)	34.03 (8.44)
BMI, men (kg/m^2), mean (SD)	29.23 (6.53)
Waist circumference, women (cm), mean (SD)[f]	109.29 (20.05)
Waist circumference, men (cm), mean (SD)[f]	106.97 (17.82)
Systolic blood pressure (mmHg)	130.16 (16.80)
Diastolic blood pressure (mmHg)	83.53 (10.63)
Heart rate (beats per minute)	84.86 (14.82)
Blood samples, mean (SD)	
HbA1c (mmol/mol)[f]	38.16 (9.71)
HDL (mmol/L)[f]	1.23 (0.35)
LDL (mmol/L)[f]	2.65 (0.93)
Cholesterol, total (mmol/L)[f]	4.54 (0.96)
Body measures in groups, % (n)	
BMI groups	
Underweight (<18.4)	2.42 (4)
Normal weight (18.5–24.9)	19.79 (31)
Overweight (25.0–29.9)	29.70 (49)
Obesity class I (30.0–34.9)	22.42 (37)
Obesity class II (35.0–39.9)	12.73 (21)
Obesity class III (>40)	13.94 (23)
Waist circumference, women[f]	
<80 cm	8.70 (6)
80–88 cm	7.25 (5)
>88 cm	84.06 (58)
Waist groups, men[f]	
<94 cm	22.99 (20)
94–102 cm	19.54 (17)
>102 cm	57.47 (50)
Systolic blood pressure groups	
Normal (<134 mmHg)	65.45 (108)
Stage 1 hypertension (135–154 mmHg)	26.06 (43)
Stage 2 hypertension (155–174 mmHg)	6.67 (11)
Stage 3 hypertension (≥175 mmHg)	1.82 (3)
Diastolic blood pressure groups	
Normal (<84 mmHg)	56.36 (93)
Stage 1 hypertension (85–94 mmHg)	29.70 (49)
Stage 2 hypertension (95–104 mmHg)	11.52 (19)
Stage 3 hypertension (≥105 mmHg)	2.42 (4)
Blood samples in groups, % (n)	
HbA1c[f]	
Non-diabetic (31–42 mmol/mol)	78.38 (116)

Table 1 (*continued*)

Prediabetes (42–47 mmol/mol)	11.49 (17)
Type-2-diabetes (≥48 mmol/mol)	10.14 (15)
HDL, men[f]	
<1.0 mmol/L	30.49 (25)
≥1.0 mmol/L	69.51 (57)
HDL, women[f]	
<1.2 mmol/L	29.23 (19)
≥1.2 mmol/L	70.77 (46)
LDL[f]	
<3.0 mmol/L	62.59 (92)
≥3.0 mmol/L	37.41 (55)
Cholesterol, total[f]	
<5.0 mmol/L	65.31 (96)
≥5.0 mmol/L	34.69 (51)
Health-promotion, % (n)	
Has been offered municipal health promotion within the past 12 months	37.58 (62)
Accepted the municipal health promotion offer	70.97 (44)
Using the municipal health promotion offered currently	68.18 (30)
Dropouts of those not currently in the municipal health promotion offer	57.14 (8)

[a] Self-sufficient includes job, government financial support to students, sickness benefit, and no income.

[b] Total includes diabetes mellitus type 2 (T2DM), cardiovascular (CVD), respiratory, neurological, metabolic, infectious diseases, and cancer.

[c] Polypharmacy = two or more antipsychotic drugs.

[d] Number of outpatients consuming ≤14 drinks per week for women and ≤21 drinks per week for men, as recommended by the Danish Health Authority.[28]

[e] Other substance use = heroin and other opioids, sedative-hypnotics, cocaine, amphetamine, and other psychoactive substances (e.g. hallucinogens and volatile solvents).

[f] Missing values (n): Somatic comorbidities (1), Waist women (3), Waist men (6), HbA1c (17), HDL men (11), HDL women (7), LDL (18), cholesterol, total (18).

Table 2

Associations between need of health-promoting treatment and care and demographic characteristics, n = 165.

	Need of health promoting treatment and care		Associations
	No	Yes	OR (95 % CI)/*p*-value
Total, % (n)	26.67 (44)	73.33 (121)	N/A
Age in years, mean (SD)	*41.72 (13.91)*	*39.41 (12.75)*	0.99 (0.96–1.01)/0.31
Sex, % (n)			
Female	34.09 (15)	47.11 (57)	Ref.
Male	65.91 (29)	52.89 (64)	0.58 (0.28–1.19)/0.14
Housing, % (n)			
Living alone	56.82 (25)	59.50 (72)	1.12 (0.56–2.24)/0.76
Living with other	43.18 (19)	40.50 (49)	Ref.
Income, % (n)			
Self-sufficient[a]	22.73 (10)	11.57 (14)	Ref.
Government transfer payment	77.27 (34)	88.43 (107)	2.25 (0.92–5.52)/0.08
Somatic comorbidities, % (n)			
Total[b]	30.23 (13)	38.02 (46)	1.42 (0.67–2.99)/0.36
Diabetes mellitus type 2	16.28 (7)	14.05 (17)	0.84 (0.32–2.19)/0.72
Cardiovascular disease	6.98 (3)	11.57 (14)	1.74 (0.48–6.39)/0.40
Treatment, % (n)			
Antipsychotic medication			
No	6.82 (3)	9.09 (11)	1.37 (0.37–5.15)/0.64
Yes	93.18 (41)	90.91 (110)	Ref.
Antipsychotic polypharmacy[c]			
No	65.85 (27)	57.27 (63)	0.70 (0.33–1.47)/0.34
Yes	34.15 (14)	42.73 (47)	Ref.

[a] Self-sufficient includes job, government financial support to students, sickness benefit and no income.

[b] Total includes diabetes mellitus type 2, cardiovascular, respiratory, neurological, metabolic, infectious diseases, and cancer.

[c] Polypharmacy = two or more antipsychotic drugs.

Denmark and the Danish Data Protection Agency approved the study protocol, including data extraction from patient medical records (Project-ID 20202000-69).

3. Results

3.1. Sample characteristics

A total of 206 consecutive outpatients with primary non-affective psychotic disorders were invited to participate; 165 agreed and 39 declined to participate. No statistically significant differences in the sex ($p = 0.6$) and age ($p = 0.9$) of participants and non-participants were found. Two outpatients were excluded because they did not meet the inclusion criteria.

The characteristics of the included outpatients are provided in Table 1. Altogether, 36 % of outpatients had one or more of the investigated somatic comorbidities; 15 % had T2DM and 10 % CVD. In total, 92 % were treated with antipsychotic medication, 40 % of whom were treated with polypharmacy (defined as two or more antipsychotic drugs).

Table 3
Associations between being offered municipal health-promoting treatment and care, and demographic and health characteristics among outpatients who were classified as needing a health-promoting intervention, n = 121.

	Was offered municipal health promotion		Associations	
	No	Yes	OR, crude	OR (95 % CI), Adjusted[d]/p-value
Total % (n)	61.16 (74)	38.84 (47)	N/A	N/A
Age in years, mean (SD)	*39.61 (13.02)*	*38.18 (11.56)*	1.01	1.00 (0.97–1.03)/0.79
Sex, % (n)				
Female	52.70 (39)	38.30 (18)	Ref.	Ref.
Male	47.30 (35)	61.70 (29)	0.56	0.60 (0.28–1.30)/0.20
Housing, % (n)				
Living alone	54.05 (40)	68.09 (32)	0.55	0.56 (0.25–1.26)/0.26
Living with other	45.95 (34)	31.91 (15)	Ref.	Ref.
Income, % (n)				
Self-sufficient[a]	10.81 (8)	12.77 (6)	Ref.	Ref.
Government transfer payment	89.19 (66)	87.23 (41)	1.21	1.08 (0.34–3.44)/0.90
Somatic comorbidities, % (n)				
Total[b]	37.84 (28)	38.30 (18)	0.98	0.79 (0.34–1.84)/0.59
Type-2-Diabetes mellitus	8.11 (6)	23.40 (11)	0.29	0.13 (0.04–0.50)/0.00
Cardiovascular disease	9.46 (7)	14.89 (7)	0.60	0.51 (0.15–1.70)/0.27
Treatment, % (n)				
Antipsychotic medication				
No	9.46 (7)	8.51 (4)	1.12	1.13 (0.30–4.34)/0.86
Yes	90.54 (67)	91.49 (43)	Ref.	Ref.
Antipsychotic polypharmacy[e]				
No	58.21 (39)	55.81 (24)	1.10	1.18 (0.53–2.64)/0.68
Yes	41.79 (28)	44.19 (19)	Ref.	Ref.
Substance use, % (n)				
Alcohol (above limit)[c]	2.70 (2)	4.26 (2)	0.63	0.78 (0.10–5.99)/0.81
Smoking	51.35 (38)	61.70 (29)	0.66	0.75 (0.34–1.62)/0.46
Cannabis + other substance use[f]	6.76 (5)	6.38 (3)	1.06	1.15 (0.25–5.18)/0.86
Substance use, per one unit increase				
Alcohol (units per week)	N/A	N/A	0.96	1.0 (0.92–1.02)/0.22
Cigarettes (numbers per day among smokers)	N/A	N/A	0.99	1.03 (0.97–1.08)/0.34
Other body measures, per one unit increase				
BMI (kg/m²)	N/A	N/A	1.00	0.97 (0.92–1.03)/0.28
Waist (cm)	N/A	N/A	0.99	0.98 (0.96–1.01)/0.17
Systolic blood pressure (mmHg)	N/A	N/A	1.01	1.01 (0.98–1.03)/0.53
Diastolic blood pressure (mmHg)	N/A	N/A	1.00	1.00 (0.96–1.03)/0.83
Pulse (beats per minute)	N/A	N/A	1.00	1.00 (0.97–1.02)/0.77
Blood samples, per one unit increase				
HbA1c (mmol/mol)	N/A	N/A	1.00	1.02 (0.96–1.08)/0.52
HDL (mmol/L)	N/A	N/A	1.23	0.92 (0.29–2.91)/0.86
LDL (mmol/L)	N/A	N/A	1.57	1.73 (1.10–2.74)/0.02
Cholesterol, total (mmol/L)	N/A	N/A	1.61	1.65 (1.06–2.57)/0.03

[a] Self-sufficient includes job, government financial support to students, sickness benefit, and no income.

[b] Total includes diabetes mellitus type 2, cardiovascular, respiratory, neurological, metabolic, infectious diseases, and cancer.

[c] Number of outpatients consuming ≤14 drinks per week for women and ≤21 drinks per week for men, as recommended by the Danish Health Authority[28].

[d] Adjusted for sex, age, and smoking status.

[e] Polypharmacy = two or more antipsychotic drugs.

[f] Other substance use = heroin and other opioids, sedative-hypnotics, cocaine, amphetamine, and other psychoactive substances (e.g. hallucinogens and volatile solvents).

Regarding lifestyle-related characteristics, 41 % of the outpatients were smokers and the mean (SD) number of cigarettes smoked daily was 19 (10). The mean (SD) BMI for women was 34 (8) kg/m^2 and 29 (7) kg/m^2 for men. Eighty percent had a BMI outside the normal range (i.e. > 18.5–24.9 kg/m^2). In total, 14 % of outpatients had a BMI >40 kg/m^2. Mean blood test values and other body measures were within the normal ranges.

3.2. Need for health treatment and care

Most of the outpatients (73 %) needed a health-promoting treatment and care, as defined by a BMI >30 kg/m^2 (49 %), cannabis or other drug use (5 %), drinking more than 14 (women) or 21 (men) units of alcohol weekly (<5 %), and/or smoking (41 %). Despite this, 61 % of outpatients classified as needing a health-promoting intervention were not offered municipal health-promoting treatment and care.

The associations between the need for health promotion and demographic characteristics are provided in Table 2.

Details of associations between characteristics (demographics, medication and smoking status, body measurements, and blood test data) of outpatients who were classified as needing a health-promoting intervention and offered municipal health-promoting treatment and care are given in Table 3. The likelihood of being offered municipal health-promoting treatment and care was significantly decreased in outpatients diagnosed with T2DM (adjusted odds ratio [aOR] 0.13, $p = 0.00$). The odds of being offered municipal health-promoting treatment and care was significantly increased among outpatients with high LDL (>3.0 mmol/L) levels (aOR 1.73, $p = 0.02$) and TC (>5.0 mmol/L; aOR 1.65, $p = 0.03$).

4. Discussion

A total of 206 eligible outpatients from three psychiatric services clinics in the Region of Southern Denmark were invited and 165 agreed to participate. Most (73 %) needed health promotion, but more than half who were classified as having a need (61 %) were not offered any municipal health-promoting treatment or care. Our study showed that we must reassess and improve municipal health services so that patients who need them the most get the necessary help to use and benefit from them.

Our study found a high prevalence of smoking (41 %) compared with the general Danish population (18 %) [35]. In addition, the smokers were heavy smokers (average 19 cigarettes smoked daily). A high rate of morbidity and mortality caused by smoking in this group of patients must be expected; hence, previous studies found an association between smoking and substantially lower life expectancy in people with psychotic disorders [36]. Importantly, one study has suggested that smoking may be one of the most important modifiable risk factors for mortality in patients with psychotic disorders [36]. It is also noteworthy that cigarette use can be an economic burden for patients – up to 85 % of outpatients in our study were primarily on government transfer income.

The mean BMI was 34 kg/m^2 for women and 29 kg/m^2 for men. This is in agreement with other studies and clarifies that overweight and obesity is a major problem among patients; hence, obesity results in an increased risk of developing comorbidities, lower quality of life, and mortality [9,37,38].

Blood test data and other body measures besides BMI and WC were, on average, within the normal range. This information is routinely collected in the clinic and can be medically regulated. These values and measures were expected to be above the normal range due to medication side effects and patient lifestyle [17]. Our results indicate that factors such as blood pressure and lipids are regulated medically by clinicians. Treatment with more than one antipsychotic drug is associated with more side effects and is not recommended as a first-line treatment [39]. As two-fifths of the outpatients in our sample were treated with more than one antipsychotic drug, side effects were expected.

Surprisingly, outpatients with T2DM were offered municipal health-promoting treatment and care to a lesser degree. One explanation is that clinicians have confidence that they are receiving treatment and care for T2DM in the somatic clinic. Furthermore, previous studies have suggested a barrier in existing health promotion in that staff in T2DM clinics may lack an understanding of mental illness and do not feel competent in offering special treatment and care to patients with both psychiatric illness and T2DM [23, 25]. Staff training is suggested as a possible route to overcoming this [23,25].

Only 8 outpatients (5 %) in our study used psychoactive substances and we believe this can be explained by the fact that patients with a drug addiction are largely offered treatment in the addiction system. Therefore, a selection has taken place where these patients are not, generally, part treated as outpatients.

The odds of being offered municipal health-promoting treatment and care were significantly increased in outpatients with high LDL (odds ratio [OR] 1.73, 95 % confidence interval [CI] 1.10–2.74) and TC (OR 1.65, 95 % CI 1.06–2.57). This may be due to the organization of the Danish healthcare system where all patients with psychiatric diagnoses are offered regular screening at all contacts with psychiatry, with blood tests for diabetes and elevated lipoprotein/cholesterol blood levels. The treatment of abnormal values in these screenings is straightforward and follows established routines. Likewise, it is easy and affordable for patients to follow treatment as it will often consist of medical treatment; in Denmark this treatment is largely publicly subsidized and thus patients are only required to make small out-of-pocket payments.

4.1. Strengths and limitations

A strength of this study was that the data collection weeks were randomly picked and all outpatients with an appointment at outpatient clinics within the selected weeks were asked to participate. The outpatient clinics are in three different municipalities. These two factors indicate that patients seen in the outpatient clinics not only resemble other outpatients associated with the clinic, but

also other patients with psychotic disorders. Furthermore, no differences in the sex and age of participants and non-participants were found. The participation rate was high, which strengthened the power and generalizability of the study and reduced the risk of bias.

We included 165 patients in the study, which was only slightly less than required by our sample size calculation (n = 170).

A limitation of this study was that it included medical record data that may have been up to 1 year old. Furthermore, we did not use a validated instrument to evaluate the use of psychoactive substances; instead, we collected the data based on the method used in our clinical practice, while recognizing that we might have collected lower-quality data. No objective measures of alcohol, cannabis, drug, and cigarette use were applied to validate the self-reported outcomes, which may have decreased the internal validity of the findings. Furthermore, prescription data were extracted from the medical records; although most patients were prescribed antipsychotics, it is not certain that every patient was compliant with their medication.

Another limitation is that due to more missing WC data, we chose to base the analysis on BMI. WC may actually be as good as or better than BMI in assessing the risk of T2DM and cardiovascular problems in patients with serious mental illness [40]. In our study, WC, and BMI were both elevated in male and female patients.

The study used a cross-sectional design and therefore it was not possible to show a cause-and-effect relationship or changes over a period. A longitudinal or experimental study could have increased the validity and transferability of the results to other locations.

5. Conclusions

Most outpatients (73 %) in this study needed health promotion, but more than half (61 %) were not offered any municipal health-promoting treatment or care. We must reassess and improve municipal health services and so that patients who need them the most get the necessary help to use and benefit from them.

For future studies we recommend a focus on barriers to successful health-promoting activities and treatment offered to patients with primary non-affective psychotic disorders. Preventing and treating lifestyle-induced comorbidities may increase patients' quality of life and life expectancy.

Data availability statement

The authors do not have permission to share data.

CRediT authorship contribution statement

Didde Marie Kaasgaard: Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Lene Stryhn:** Writing – review & editing, Writing – original draft, Conceptualization. **Pia Veldt Larsen:** Writing – review & editing, Formal analysis. **Lone Fisker:** Writing – review & editing, Conceptualization. **Anja Friis Elliott:** Writing – review & editing, Conceptualization. **Lene Høgh:** Writing – review & editing, Conceptualization. **Rolf Thunberg:** Writing – review & editing, Investigation, Conceptualization. **Mette Knudsgaard Sørensen:** Writing – review & editing, Investigation, Conceptualization. **Pernille Martinsen:** Writing – review & editing, Investigation, Conceptualization. **Hanne Kjær Hansen:** Writing – review & editing, Investigation, Conceptualization. **Povl Munk-Jørgensen:** Writing – review & editing, Conceptualization. **Peter Hjorth:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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