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Risk of violence among patients in psychiatric treatment: results from a national census

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ABSTRACT

Background: Adverse media coverage of isolated incidents affects the public perception of the risk of violent behavior among people with mental illness. However, the risk of violence is studied most frequently among inpatients, which falsely exaggerates the prevalence of people with mental illness because the majority of individuals receive treatment as outpatients.

Aim: To estimate the prevalence of the risk of violence among inpatients and outpatients in psychiatric treatment, as well as the associations with gender, age, socio-economic status and co-morbid substance use disorders in all major diagnostic categories.

Methods: We conducted a national census of patients in specialist mental health services in Norway, which included 65% of all inpatients ($N = 2,358$) and 60% of all outpatients ($N = 23,124$).

Results: The prevalence of the risk of violence was 32% among inpatients and 8% among outpatients, where 80% of the patients in specialist mental health services were outpatients. If we weight the prevalence rates accordingly, less than 2% of the patients in specialist mental health services had a high risk of violent behavior.

Conclusions: The stigma attached to those with mental illness is not consistent with the absence or low to modest risk of violent behavior in 98% of the patient group. Substance use disorders must be given priority in the treatment of all patient groups. Mental health care in general and interventions that target violent behavior in particular should address the problems and needs of these patients better, especially those who are unemployed, have a low level of education and have a background of being a refugee or an immigrant.

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Co-morbid substance use disorder; risk assessment; psychiatric patient; violent behavior

Background

The association between mental illness and violence has been debated since the mid-nineteenth century (1). Adverse media coverage of isolated incidents affects the public perception of the risk of violent behavior among people with mental illnesses (2,3) and it is an important factor that contributes to the stigma attached to them (4). The stigmatization of people with mental illness is a major problem and it might reduce the effectiveness of treatments (e.g. retention, adherence) and their willingness to seek help (5,6).

Torrey (7,8) argued that stigma has increased in Western countries because of growing violence among those people with mental illness who receive inadequate treatment from failing community mental health systems. A Swedish population study found that the attitudes towards people with mental illness, for instance the believe that people with mental illness commit violent acts more than others, have not changed significantly from 1976 to 2014 (9). A Danish study of attitudes towards mental illness among employees in the social services found that 20% agreed to the statement that people with

schizophrenia are dangerous (10). However, Choe et al. (11) stated that violence is still studied most frequently among inpatients, which may contribute to negative stereotypes. Studying violence only among inpatients falsely exaggerates the prevalence among all patients with mental illness because the majority receive treatments as outpatients.

A meta-analysis found the lowest rates of violence in studies of outpatients (8%) and the highest rates among involuntarily committed inpatients (36%) (12). Several studies have demonstrated a greater risk of violence among patients with severe mental illnesses compared with the general population (13,14). In general, there is a statistically significant but modest relationship between severe mental illness and violence and a stronger relationship between severe mental illness with co-occurring substance use disorder and violence (15).

The relationship between violence and schizophrenia has been the subject of rigorous research over the past two decades, where the risk of violence was identified as significantly associated with positive symptoms of schizophrenia (16,17). As found with offenders and violent individuals among the general public, violence perpetrated by individuals with

schizophrenia predominantly involves young male individuals with a disadvantageous socioeconomic status (18). Other studies have shown that people with bipolar or personality disorders are more likely to be involved in aggressive incidents than patients with schizophrenia (19). One study found that personality disorders and substance use disorders were associated with higher rates of future violent reconvictions than schizophrenia was (20). Another study showed that mechanical restraints due to the risk of harm to others were used more often in patients with organic mental disorders, cluster B personality disorders and mania than among patients with schizophrenia (21).

Thus, it might not be the illness itself but the socio-economic conditions of people with mental illness that contributes to the higher risk of violent behavior (22). In particular, severe mental illness can partly be a proxy for other often unmeasured variables such as depression, unemployment, absence of social support and financial strain, which could mediate the relationship between diagnoses and adverse outcome (23,24). An association between violent behaviors and psychiatric diagnosis that cannot be accounted for by sociodemographic variables has been found, however threat/control-override symptoms explain much of the association between violence and psychiatric diagnoses (25).

Studies have also shown that homeless people with a mental disorder account for a substantial proportion of those incarcerated in the criminal justice system (26). However, a shortcoming of several studies is that variables such as socioeconomic status and employment are not included (27,28).

In this study, we address the following research questions: (i) What is the prevalence of the risk of violence among inpatients and outpatients in psychiatric treatment estimated by patient's clinician? (ii) What are the main characteristics of patients at risk of violence? (iii) Is the association between diagnoses and risk of violence moderated by considering demographic and socio-economic variables and substance use disorders in the analyses?

Method

Design

In Norway, comprehensive national census of patients was conducted in all psychiatric wards and departments providing inpatient treatment on a specific date in 2012 and in all clinics and departments providing outpatient treatment during a specific 14-day period in 2013. Each patient's clinician was responsible for completing the form.

The study had a national cross-sectional design with fairly high coverage, so it was possible to estimate the point prevalence for the entire patient population. Patients in long-term treatment and patients with more frequent consultations were likely to be included because they were more probably receiving treatment at any given time.

Data collection

All inpatients on a given day (20 November, 2012) and all outpatients who had one or more consultations during a

fortnight (15–28 April, 2013) were the targeted participant group. All mental health services in public and private sectors were invited to participate.

Several months prior to the data collection, the service managers and clinicians received information, which described the project and the data collection procedures. Because of information technology firewall restrictions at the institutions and clinics, it was not possible to collect the data electronically, so all of the units received printed forms according to the number of patients registered at the same time in the previous year, but with 20% extra in case the number of patients had increased.

The clinicians completed one form per patient. Excluding those who were expected to react negatively, patients were invited to participate in the completion of the form, but the clinician rather than the patient answered the questions in the census. Over half of the inpatients (55%) and outpatients (57%) participated in the completion of their forms.

The completed forms were returned by registered mail to a firm, which scanned all of the forms and performed coarse quality control. Further quality control of the data files was performed by the project team.

Sample

Ninety-four of the 104 inpatient departments and 107 of the 110 outpatient clinics participated. Most of the units that did not participate were small and they cited a lack of time as their reason for not participating. Non-participating clinics comprised 1% of all outpatient consultations and non-participating institutions comprised 4% of all inpatient days during 2012.

Data were returned for 2,358 inpatients and 23,124 outpatients. The response rates were estimated based on data from the National Patient Register for the number of inpatients ($N=3,618$) on the specific day and outpatients ($N=38,904$) during the specified 2 weeks. We estimated that 65% of all inpatients and 60% of all outpatients were included in the census.

Variables

The registration form was six pages for inpatients and four pages for outpatients. A wide range of topics were included, such as unmet needs for services, previous use of services, main and secondary diagnoses (International Classification of Diseases, ICD-10), voluntary/involuntary commitment and socio-demographics (including gender, age marital status, main source of income, highest education, housing situation, refugee status and country of birth).

The assessed risk of violence was rated by a single item with four levels of severity (none, low/moderate, high and very high). No specific assessment instrument was required, but the guidelines from the Norwegian health authorities require that all clinicians in the mental health services be trained in the systematic assessment of the risk of violence (29). Most mental health services use V-RISK-10 as a clinical

tool for assessing the risk of violence (30,31) and clinicians are expected to be fairly competent in this assessment.

Suicidal risk was assessed by a question that asked whether the patient had made a suicide attempt. To time frame the risk period we asked about the current stay for inpatients and during the last four weeks for outpatients.

Data analyses

The ordinal nature of the 'risk of violence' variable as the dependent variable implies an ordered response model, which we estimated with ordered probit models because this technique does not assume that the difference between no risk and low/moderate risk is the same as the difference between high risk and very high risk. Ordered probit captures the qualitative differences between different risk severities (32). The STATA software package was used for all analyses (Stata/MP 11.2 for Windows; StataCorp LP, College Station, TX).

The coefficients are counter-intuitive and complex to interpret, but in this study, we were most interested in changes in the statistical associations and not the marginal effects. We performed separate analyses for inpatients and outpatients and for patients with and without co-occurring substance use disorder to study the risk of violent behavior and substance use in all of the main diagnostic groups.

Results

Prevalence of risk of violence

The descriptive statistics are shown in Tables 1 and 2 for inpatients and outpatients, respectively. The first row in each table gives the prevalence rates.

Among the inpatients, 68% had no estimated risk of violent behavior in the current treatment episode, 27% had low/moderate risk, 4% had high risk and 1% had very high risk. The estimated risk of violence was much higher among involuntarily committed inpatients (34% of all inpatients), where 59% of these patients were assessed as at risk of being violent (46% low/moderate risk, 10% high risk and 3% very high risk).

Among the outpatients, 92% had no estimated risk of violent behavior during the 4 weeks preceding the registration date, 7% had low/moderate risk, 0.6% had high risk and 0.2% had very high risk. Among patients committed to involuntary outpatient treatment (3.3% of all outpatients), 31% were at risk of violent behavior (24% low/moderate risk, 4% high risk and 2% very high risk).

Main characteristics of patients with high or moderate risk of violence

The estimated risk of violent behavior was systematically higher among men, who comprised 48% of the inpatients and 37% of the outpatients. The percentage of patients at risk of violence decreased with age among both inpatients and outpatients.

The highest estimated risk of violent behavior was found among patients with no income from their own labor and

patients with lower education levels. The following characteristics also correlated with an elevated risk of being violent: no fixed address, being a refugee (current or previously), being born outside Norway, having had a recent suicide attempt and living in one of the five regional cities in Norway.

The Norwegian specialist health services use ICD-10. Inpatients with pervasive and specific developmental disorders (F80–F89) and intellectual disabilities (F70–F79) had the highest risk of being violent, followed by individuals with schizophrenia spectrum disorder (F20–F29) and mental illness due to substance use (F10–F19).

Among outpatients, people with intellectual disabilities (F70–F79) had the highest estimated risk of being violent in the 4 weeks before the consultation. Outpatients with substance use disorders (F10–F19) were at higher estimated risk of being violent than patients suffering from schizophrenia spectrum disorder (F20–F29).

The last columns in Tables 1 and 2 show the number of patients in each diagnostic group. We calculated the number of patients who were at risk of being violent according to their clinician. Because of the large numbers of patients with mood and anxiety disorders, the number of patients with these common mental disorders who were at risk of violence was almost the same as those with schizophrenia spectrum disorder.

Associations between diagnoses and risk of violence

The regression results are given in Table 3. Six models were estimated for both the inpatient and outpatient samples. We were interested to see whether the correlation between diagnosis and violence would change when we added more patient characteristics. Model 1 only included diagnoses and in Model 2 gender, age and socio-economic characteristics (income, education) and other patient characteristics (including no fixed address, refugee, born outside Norway, suicide attempt in the last 4 weeks and living in one of the biggest cities in each region were all included as dummy variables) was added. We were also interested in the difference between patients with and without substance use disorders. Substance use disorder included the ICD-10 codes F10–F19 as a secondary diagnosis (reported for inpatients and outpatients) or tertiary diagnosis (only reported for inpatients), which we analyzed separately for inpatients and outpatients.

The base diagnostic category was schizophrenia (F20–29, schizophrenia spectrum disorders) and all other diagnostic groups were compared with this category.

Patients with mood disorders, anxiety disorders and behavioral syndromes all had a significantly lower risk of being violent than patients suffering from schizophrenia, but the difference weakened systematically when more patient characteristics were included.

There were some differences between inpatients and outpatients, so the results for each group are described separately. Among inpatients, no diagnostic group had a statistically higher risk of violence than individuals suffering from schizophrenia. However, only patients suffering from

Table 1. Descriptive statistics and risk of violence among inpatients.

	% of patients				Sum	Of all patients	(N)
	No risk	Low/moderate risk	High risk	Very high risk			
All patients	67.6	26.8	4.4	1.2	100	100.0	2240
Male	52.2	38.7	6.8	2.3	100	47.6	1041
Female	81.9	15.7	2.3	0.2	100	52.4	1147
Age							
18–23 years old	68.9	26.3	3.0	1.8	100	15.3	334
24–29 years old	62.3	29.8	6.0	1.8	100	15.2	332
30–39 years old	56.0	36.6	5.5	1.9	100	21.5	470
40–49 years old	64.4	27.4	7.4	0.8	100	17.3	379
50–59 years old	74.4	22.4	3.2	0.0	100	14.3	313
60–69 years old	83.5	15.4	0.5	0.5	100	8.3	182
70 years and older	83.8	15.6	0.6	0.0	100	8.2	179
ICD-10 diagnoses							
F01–F09 Mental disorders due to known physiological conditions	72.2	24.1	0.0	3.7	100	2.6	54
F10–F19 Mental and behavioral disorders due to psychoactive substance use	56.8	36.9	5.4	0.9	100	5.4	111
F20–F29 Schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders	48.5	42.0	7.4	2.1	100	39.8	819
F30–F39 Mood [affective] disorders	83.5	14.8	1.6	0.0	100	26.5	546
F40–F48 Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders	91.3	7.8	0.4	0.4	100	11.2	231
F50–F59 Behavioural syndromes associated with physiological disturbances and physical factors	93.0	7.0	0.0	0.0	100	3.4	71
F60–F69 Disorders of adult personality and behavior	64.0	27.9	7.0	1.2	100	4.2	86
F70–F79 Intellectual disabilities	42.9	42.9	14.3	0.0	100	0.7	14
F80–F89 Pervasive and specific developmental disorders	41.4	41.4	10.3	6.9	100	1.4	29
F90–F98 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence	60.9	34.8	4.3	0.0	100	1.1	23
F99–F99 Unspecified mental disorder	66.7	33.3	0.0	0.0	100	0.1	3
Z-diagnosis as main diagnosis: factors influencing health status and contact with health services	90.0	10.0	0.0	0.0	100	1.5	30
Other diagnoses	69.8	27.9	2.3	0.0	100	2.1	43
Socio-economic status							
Income							
Income from labor	82.9	15.3	1.8	0.0	100	9.9	222
Health-related benefits	63.4	30.3	4.9	1.4	100	65.1	1459
Other economic support from national insurance	72.6	22.2	4.3	0.9	100	25.0	559
Education							
High education (completed lower or higher university degree)	83.9	14.9	1.2	0.0	100	15.0	335
Medium education (completed upper secondary school)	75.1	21.1	3.3	0.5	100	37.0	828
Low education (did not complete upper secondary school)	56.8	34.8	6.3	2.0	100	48.1	1077
Other							
No fixed address	40.3	45.9	9.7	4.1	100	12.9	290
Refugee	34.3	45.7	11.4	8.6	100	1.6	35
Born outside Norway	51.4	36.3	9.6	2.8	100	11.2	251
Suicide attempt (last 4 weeks)	81.8	15.5	2.7	0.0	100	4.9	110
Living in one of the five regional cities	59.7	33.6	5.2	1.4	100	24.8	556
Unit							
Hospital ward	60.1	31.8	6.4	1.8	100	63.1	1414
District psychiatric center	83.2	15.6	1.1	0.1	100	32.9	737
Other institutions	58.4	40.4	1.1	0.0	100	4.0	89
Referral formality							
Voluntarily committed	81.5	16.8	1.5	0.2	100	65.8	1474
Involuntarily committed	41.0	46.0	10.1	3.0	100	34.2	766

mood disorders, anxiety and behavior syndromes had a systematically lower risk than other patients after controlling for the demographic and socio-economic characteristics of the patients and other characteristics (Model 2).

This result implies that the diagnosis itself does not determine the risk of violence, but instead the demographic and socio-demographic characteristics of the patients are more important, especially among patients without substance use disorders.

Inpatients with a substance use disorder as their main diagnosis had a lower probability of being at risk of violent behavior in the view of their clinicians than patients with schizophrenia and co-morbid substance use disorders, but

the difference was smaller although still significant after we controlled for demographic and social factors. Furthermore, patients with mood and anxiety disorders had a lower probability of being considered violent than patients with co-morbid schizophrenia and substance use disorder. Patients in the other main diagnostic groups with substance use disorder as secondary or tertiary diagnosis did not have a systematically different probability of being considered violent compared with patients with co-morbid schizophrenia and substance use disorder.

This was not the case when we analyzed the risk of violence in the group of inpatients without substance use disorders, where in this group, inpatients in several of the main

Table 2. Descriptive statistics and risk of violence among outpatients.

	% of patients in risk group				Sum	Of all patients	(N)
	No risk	Low/moderate risk	High risk	Very high risk			
All patients	92.3	6.8	0.6	0.2	100	100.0	20,329
Male	86.5	11.8	1.2	0.4	100	37.1	7469
Female	95.8	3.8	0.3	0.1	100	62.9	12,681
Age							
18–23 years old	90.1	8.7	0.8	0.3	100	16.3	3199
24–29 years old	91.3	7.5	0.8	0.3	100	18.0	3537
30–39 years old	92.2	7.1	0.5	0.2	100	25.3	4977
40–49 years old	92.7	6.3	0.7	0.3	100	21.1	4144
50–59 years old	94.1	5.2	0.6	0.1	100	11.8	2321
60–69 years old	96.5	3.1	0.4	0.0	100	4.2	833
70 years and older	94.8	4.7	0.5	0.0	100	3.4	659
ICD-10 diagnoses							
F01–F09 Mental disorders due to known physiological conditions	94.0	6.0	0.0	0.0	100	0.3	50
F10–F19 Mental and behavioral disorders due to psychoactive substance use	77.1	19.2	2.7	0.9	100	2.8	546
F20–F29 Schizophrenia, schizotypal, delusional and other non-mood psychotic disorders	84.8	13.4	1.3	0.6	100	12.1	2327
F30–F39 Mood [affective] disorders	95.4	4.2	0.3	0.1	100	32.2	6191
F40–F48 Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders	95.5	4.1	0.3	0.1	100	26.5	5099
F50–F59 Behavioural syndromes associated with physiological disturbances and physical factors	98.2	1.8	0.0	0.0	100	3.8	733
F60–F69 Disorders of adult personality and behavior	89.8	9.1	0.8	0.3	100	8.8	1693
F70–F79 Intellectual disabilities	79.3	14.4	3.6	2.7	100	0.6	111
F80–F89 Pervasive and specific developmental disorders	88.9	9.4	1.7	0.0	100	1.2	235
F90–F98 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence	90.0	9.2	0.7	0.1	100	4.8	921
F99–F99 Unspecified mental disorder	90.4	8.7	0.0	0.9	100	0.6	115
Z-diagnosis as main diagnosis: factors influencing health status and contact with health services	89.8	9.2	0.8	0.2	100	5.0	968
Other diagnoses	93.9	4.8	0.9	0.4	100	1.2	229
Socio-economic status							
Income							
Income from labor	94.6	5.0	0.3	0.1	100	26.8	5441
Health-related benefits	91.5	7.4	0.8	0.3	100	53.0	10,783
Other economic support from national insurance	91.5	7.4	0.7	0.4	100	20.2	4105
Education							
High education (completed lower or higher university degree)	97.0	2.9	0.1	0.0	100	20.7	4203
Medium education (completed upper secondary school)	93.7	5.6	0.5	0.2	100	44.0	8944
Low education (did not complete upper secondary school)	87.9	10.5	1.1	0.4	100	35.3	7182
Other							
No fixed address	77.8	19.1	3.1	0.0	100	1.4	288
Refugee	83.3	14.6	1.6	0.6	100	3.4	699
Born outside Norway	88.3	10.4	1.1	0.2	100	12.2	2476
Suicide attempt (last 4 weeks)	77.9	15.4	3.7	2.9	100	0.7	136
Living in one of the five regional cities	90.9	8.2	0.6	0.3	100	23.2	4725
Unit							
Psychiatric outpatient clinics	93.6	5.7	0.5	0.2	100	83.3	16,933
Substance abuse treatment teams	83.1	15.3	1.0	0.6	100	2.4	491
Crises resolution teams	84.8	13.6	1.3	0.4	100	2.7	552
Day treatment units	92.1	7.7	0.2	0.0	100	2.3	466
Inpatient units	92.1	7.9	0.0	0.0	100	0.8	164
Assertive community treatment teams	80.6	16.1	2.0	1.2	100	4.3	881
Other units	89.5	9.3	0.8	0.4	100	4.1	842
Referral formality							
Voluntarily committed to outpatient treatment	93.1	6.2	0.5	0.2	100	96.7	19,666
Involuntarily committed to outpatient treatment	69.4	24.4	3.8	2.4	100	3.3	663

diagnostic groups had a lower probability of being violent than patients with the base diagnostic category of schizophrenia (F20–F29). This included patients with behavioral syndromes associated with physiological disturbances and physical factors (F50–F59), personality disorders (F60–F69), developmental disorders (F80–F89), behavioral and emotional disorders with onset usually occurring in childhood and adolescence (F90–F98), and other diagnoses.

These findings became even clearer when we investigated the results for the outpatients. Only patients with substance

use disorders (no other co-morbid mental illness reported) and those with mood and anxiety disorders had a systematically lower risk of being violent than people with schizophrenia and substance use disorders. There were no significant differences in the risk of violence between patients suffering from schizophrenia and patients suffering from other mental illnesses if they had co-morbid substance use disorders.

Compared with patients with schizophrenia, patients with intellectual disabilities and patients with substance use disorders had a higher risk of violent behavior (positive coefficients),

Table 3. Regression results, coefficients and ordered probit with risk of violence (no risk, low/moderate risk, high risk or very high risk) as dependent variable (statistically significant associations only).

	Inpatients						Outpatients					
	All patients			Without substance use disorder			All patients			With substance use disorder		
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Base: F20-F29 Schizophrenia, schizotypal, delusional and other non-mood psychotic disorders												
F01-F09 Mental disorders due to known physiological conditions	-0.56*** (-3.12)	-0.16 (-0.78)	1.01 (1.56)	1.28* (1.90)	-0.59*** (-3.07)	-0.30 (-1.37)	-0.54* (-1.91)	-0.17 (-0.59)	-0.32*** (-3.45)	-0.22** (-2.16)	-0.42 (-1.46)	-0.093 (-0.32)
F10-F19 Mental and behavioral disorders due to psychoactive substances	-0.21* (-1.77)	-0.11 (-0.90)	-0.68*** (-4.79)	-0.49*** (-3.02)	-	-	0.28*** (4.30)	0.22*** (3.27)	-	-	-	-
F30-F39 Mood [affective] disorders	-0.99*** (-13.20)	-0.58*** (-6.82)	-1.06*** (-4.94)	-0.72*** (-2.99)	-0.90*** (-11.10)	-0.54*** (-5.81)	-0.65*** (-15.70)	-0.45*** (-9.84)	-0.85*** (-5.25)	-0.60*** (-3.43)	-0.54*** (-12.0)	-0.37*** (-7.52)
F40-F48 Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders	-1.36*** (-11.10)	-1.16*** (-8.54)	-1.91*** (-5.01)	-1.79*** (-4.27)	-1.22*** (-9.39)	-1.03*** (-7.17)	-0.66*** (-15.20)	-0.53*** (-11.0)	-0.65*** (-3.77)	-0.54*** (-2.80)	-0.55*** (-11.80)	-0.45*** (-8.82)
F50-F59 Behavioural syndromes associated with physiological disturbances and physical factors	-1.51*** (-6.59)	-1.03*** (-4.15)	-1.03 (-1.40)	-0.85 (-1.06)	-1.46*** (-5.90)	-0.99*** (-3.70)	-1.08*** (-9.29)	-0.80*** (-6.37)	-4.23 (-0.058)	-4.00 (-0.024)	-0.95*** (-8.10)	-0.71*** (-5.65)
F60-F69 Disorders of adult personality and behavior	-0.33** (-2.39)	-0.040 (-0.27)	-0.46 (-1.39)	-0.44 (-1.29)	-0.26* (-1.75)	0.048 (0.29)	-0.24*** (-4.71)	-0.058 (-1.05)	-0.32* (-1.75)	-0.093 (-0.46)	-0.14*** (-2.62)	0.015 (0.25)
F70-F79 Intellectual disabilities	0.14 (0.45)	0.034 (0.11)	-5.12 (-0.037)	-4.40 (-0.042)	0.34 (1.10)	0.23 (0.71)	0.28** (2.10)	0.27** (1.97)	1.22 (1.52)	-4.61 (-0.014)	0.37*** (2.69)	0.38*** (2.72)
F80-F89 Pervasive and specific developmental disorders	0.27 (1.27)	0.10 (0.46)	-0.19 (-0.34)	-0.41 (-0.69)	0.39* (1.73)	0.25 (1.03)	-0.19* (-1.68)	-0.22* (-1.90)	-0.12 (-0.16)	-0.22 (-0.30)	-0.075 (-0.66)	-0.12 (-0.99)
F90-F98 Behavioural and emotional disorders with onset usually occurring in childhood and adolescence	-0.33 (-1.31)	-0.28 (-1.02)	0.65 (1.03)	0.89 (1.36)	-0.48* (-1.66)	-0.49 (-1.55)	-0.26*** (-4.08)	-0.21*** (-3.06)	-0.026 (-0.12)	-0.036 (-0.16)	-0.20*** (-2.88)	-0.17** (-2.25)
Other diagnoses	-0.80*** (-4.94)	-0.53*** (-3.06)	-0.34 (-0.52)	-0.41 (-0.57)	-0.72*** (-4.27)	-0.46** (-2.56)	-0.28*** (-4.93)	-0.17*** (-2.74)	-0.12 (-0.16)	-0.0076 (-0.010)	-0.16*** (-2.65)	-0.083 (-1.29)
Men	0.58*** (8.91)	0.77*** (4.93)	-	0.77*** (4.93)	-	0.49*** (6.74)	-	0.49*** (16.1)	-	0.58*** (5.82)	-	0.46*** (14.3)
Age	-0.005** (-2.48)	-0.0075 (-1.40)	-	-0.0075 (-1.40)	-	-0.0027 (-1.18)	-	-0.007*** (-6.75)	-	-0.001*** (-2.72)	-	-0.01*** (-5.95)
Health-related benefits (b: labor)	0.35*** (2.71)	0.25 (0.78)	-	0.25 (0.78)	-	0.35** (2.37)	-	-0.00011 (-0.0029)	-	0.43*** (2.60)	-	-0.043 (-1.05)
Other economic support from national insurance (b: labor)	0.24* (1.70)	0.24* (1.70)	-	0.30 (0.88)	-	0.21 (1.31)	-	0.055 (1.21)	-	0.48*** (2.66)	-	0.030 (0.63)
Medium education (b: high)	-0.038 (-0.35)	0.098 (0.26)	-	0.098 (0.26)	-	-0.089 (-0.77)	-	0.25*** (5.10)	-	0.13 (0.71)	-	0.26*** (5.06)
Low education (b: high)	0.34*** (3.19)	0.36 (0.95)	-	0.36 (0.95)	-	0.31*** (2.78)	-	0.48*** (9.68)	-	0.37** (1.98)	-	0.48*** (9.14)
No fixed address	0.49*** (5.99)	0.35** (2.09)	-	0.35** (2.09)	-	0.53*** (5.49)	-	0.26*** (2.75)	-	0.37** (2.27)	-	0.081 (0.68)
Refugee	0.38* (1.82)	-0.12 (-0.24)	-	-0.12 (-0.24)	-	0.51** (2.23)	-	0.19** (2.50)	-	0.17 (0.66)	-	0.20** (2.57)
Born outside Norway	0.24** (2.51)	0.44*** (1.99)	-	0.44*** (1.99)	-	0.22** (2.05)	-	0.18*** (3.77)	-	0.14 (0.86)	-	0.20*** (4.02)
Suicide attempt last 4 weeks	-0.29* (-1.85)	-0.92* (-1.73)	-	-0.92* (-1.73)	-	-0.17 (-1.02)	-	0.59*** (4.56)	-	0.66** (2.32)	-	0.57*** (3.90)
Living in one of the five regional cities	0.023 (0.33)	-0.16 (-1.05)	-	-0.16 (-1.05)	-	0.085 (1.07)	-	0.10*** (3.14)	-	0.10 (1.12)	-	0.086** (2.39)
Observations	2060	1978	383	369	1677	1609	19,218	18,512	1181	1147	18,037	17,365
Pseudo R2	0.098	0.17	0.093	0.17	0.094	0.16	0.049	0.10	0.029	0.087	0.032	0.084

z-Statistics in parentheses.

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.

where this result persisted across model specifications. Furthermore, the difference in the risk of violence between patients with schizophrenia and personality disorders disappeared after controlling for age, gender and socio-economic status, while the difference in risk between patients with schizophrenia and organic mental disorders disappeared after only controlling for gender and age.

When we considered outpatients without co-morbid mental illness and substance use disorders, we found that most patients had a lower risk of being violent than people with schizophrenia, except patients with intellectual disabilities, who had a higher risk.

For the socio-demographic variables, we found that men had a higher risk of being violent than women according to all of the model specifications. Young patients had a higher probability of being at risk of being violent, but there was no systematic association between age and risk of being violent for inpatients with co-morbid substance use disorders when we included the socio-economic characteristics of the patients.

Being a recipient of health-related benefits or other benefits was associated with a higher risk of being violent among inpatients without co-morbid substance use disorders and among outpatients with co-morbid substance use disorders.

A low level of education was positively associated with a higher risk of being violent according to all models, except among inpatients with substance use disorder. Compared with a high level of education, having a medium level of education was associated with a higher risk of being violent among outpatients only, but there was no systematic association among outpatients with co-morbid substance use disorders. We found that not having a fixed address was associated with a higher risk of being violent in all cases, but no systematic variation was found among outpatients without co-morbid substance use disorders. Being a refugee was associated with higher risk of being violent in both inpatients and outpatients, but no association was found in patients with co-morbid substance use disorders. Being born outside Norway was associated with a higher risk of being violent among all patients but not for outpatients with co-morbid substance use disorders.

Inpatients who had made a suicide attempt had a lower estimated risk of being violent, except for inpatients without co-morbid substance use disorder (no systematic association), but outpatients who had made a suicide attempt had a systematically higher estimated risk of being violent than outpatients who had not attempted suicide. Among inpatients, there was no association between living in one of the five regional cities and the risk of violent behavior, but there was a positive association among outpatients without co-morbid substance use disorder.

How long the patient had received treatment at the institution or the clinic could have been important when the clinician evaluated the risk of being violent. Thus, lack of familiarity with patients may have led to an overestimation of the risk of violence by a clinician, but we did not find a systematic pattern in the data (Table 4).

Patients with a perceived high risk of violent behavior are typically patients who have been under treatment for a long time.

Table 4. Days since first admitted to the unit (inpatients) and days since first consultation (outpatients), showing the mean and median.

	Days since first admitted to the unit (inpatients)		Days since first consultation (outpatients)	
	Mean	Median	Mean	Median
No risk	91	26	502	226
Low/moderate risk	382	42	479	187
High risk	416	89	503	189
Very high risk	935	423	781	548

Discussion

Prevalence of the risk of violence

We found that 8% of outpatients and 32% of inpatients were considered to be at risk of violent behavior by their clinicians. These results are quite similar to those obtained in a recent meta-analysis, which showed that the lowest rates of violence were among outpatients in treatment (8%) and the highest rates were among involuntarily committed inpatients (36%) (12). We found even higher rates among involuntarily committed patients (59%) than Swanson et al. (12), which might indicate that the threshold for the involuntary commitment of patients with a high risk of violence is lower in Norway than that in the countries studied previously. However, Swanson et al. (12) studied actual violence, whereas we investigated the perceived risk evaluated by the clinicians without using standardized instruments, so these findings may suggest an overestimation of the risk of violence based only on clinical judgement.

In recent decades, specialized tools have been developed for the prediction and management of violence (33). However, their predictive accuracy varies according to how they are used (34), the best approach to risk assessment involves a combination of well-validated actuarial risk instruments and structured clinical judgments (35).

We must also stress that most of the patients who were considered being at risk of violence had only a low/moderate risk. In Norway, 80% of the patients in the mental health services are outpatients. When the prevalence rates were weighted accordingly, we found that 87% of all patients had no risk of violent behavior and 11% had a low/moderate risk. Only 1.4% of the patients had a high risk and 0.4% had a very high risk. In addition, many patients are treated only by private psychiatrists and psychologists, so it is assumed that they had an even lower risk of being violent than outpatients in public services. This indicates that less than 2% of the patients in the mental health services had a high risk of violent behavior, which strongly supports Choe et al.'s (11) findings and their suggestion that focusing only on inpatients may contribute to negative stereotypes.

Main characteristics of patients with a high or moderate risk of violence

The socio-demographic characteristics had clear associations with the risk of violence. The main characteristics of patients at risk of being violent differed between inpatients and

outpatients and between patients with and without substance use disorders. The most stable associations across specifications and types of patients were found between gender, age, housing situation and country of origin. Male patients had a higher risk of being violent than female patients and young patients had a higher risk than older patients. Being born outside Norway was associated with a perceived higher risk of being violent, when other factors were equal. This supports the findings of previous studies (22,23), but we stress the importance of distinguishing between patients with and without co-morbid substance use disorders.

Associations between diagnoses and risk of violence

The association between diagnosis and risk of violence decreased systematically after we introduced socio-demographic variables into the analyses. The results showed that patients suffering from schizophrenia did not have a higher risk of being violent than patients with behavioral syndromes, personality disorders, intellectual disabilities, developmental disorders and other diagnoses or patients who only suffered concurrently from substance use disorder. In the patient group with substance use disorders, only three main diagnostic groups had a lower probability of being violent than people with co-morbid schizophrenia and substance use disorders: patients with substance use disorders without mental illnesses as the main diagnosis and patients with mood or anxiety disorders. However, for patients in the main diagnostic groups, the difference was much stronger when we compared only patients without reported substance use disorders.

When we separated the patients in specialist mental health services into patients with and without substance use disorders and into inpatients and outpatients, the mixed results obtained in previous studies are easier to understand (19,21). These results highlight the importance of variation caused by the type of patient groups considered. This result agrees with the findings of Fazel et al. (36), who also showed that the excess risk of violence among individuals with schizophrenia and other mental illnesses appears to be mediated by substance abuse co-morbidity.

We found that 98% of the patients had no or a low/moderate risk of being violent. This means that the stigma attached to people suffering from mental illnesses and those with substance use disorders is not consistent with the risk of violent behavior in this patient group.

Strengths and limitations

A major strength of this study was that it included 65% of all inpatients and 60% of all outpatients in Norway during the specific periods considered. Each patient's clinician was responsible for completing the registration form.

In this study, a clinical evaluation of the risk of violence was used (no risk, low risk, high risk and very high risk), but it was not combined with an actuarial instrument. However, we consider that the quality of the assessments was

reasonably high and consistent across sites because all of the clinicians in the mental health services have been trained to assess the risk of violence in a systematic manner according to national standards. However, we did not know the actual occurrence of violence and we only had the clinicians' evaluations of the risk of violence by patients, which is a major limitation of this study.

An important limitation of the study is that only those who receive treatment is included. The prevalence numbers presented are valid for patients in specialist mental health treatment and not for the population suffering from mental illness in general. We do not have information about those not receiving treatment.

We received feedback from the clinicians that completing the form was time-consuming and they did not have time to include all of their patients. Thus, another limitation is that the clinicians might have incentive to include the least complex cases, in order to save time. It is possible that inpatients who were admitted or discharged on the day of the data collection and that outpatients (especially those with substance use disorder) who missed their appointed consultations were unlikely to be included.

Another shortcoming is that we did not know the reasons why patients were considered to be at risk of being violent. For instance, people with severe mental illness are more frequently victims than perpetrators of violence and other crimes (15). There is also a strong association between being a victim and being a perpetrator. Therefore, being a victim is a strong predictor of being a perpetrator. This study did not assess victimization, so we lacked a strong predictor of being at risk of violence.

Conclusion and policy implications

Our findings contrast with the widespread myth that many psychiatric patients are violent and dangerous and this knowledge may be used in policies and campaigns to overcome the public stigma attached to mental illness. Patients with co-morbid mental illness and substance use disorders were at higher risk than other patients in the view of the clinicians, but the differences in the risk of violence were modified when we controlled for the socio-demographic characteristics of patients. People with schizophrenia were often perceived to be at a higher risk of being violent than those with other mental illnesses, but this was only the case when there was not a co-morbid substance use disorder. Indeed, with co-morbid substance use disorders, people with schizophrenia were not at a higher risk than many of the other main diagnostic categories. This implies that substance use disorders must be given priority in all patient groups and not just in patients with severe mental illness.

Individuals with mental illness become violent for the same reasons as the general population. Services and interventions that aim to prevent and reduce violent behavior should also target people who are at risk of being violent due to contributing factors such as unemployment, a low level of education and being a refugee or an immigrant.

Ethics

The study was approved by the Regional Committee for Medical and Health Research Ethics (2012/848/REK midt).

Consent to publish

This study comprised a census conducted on behalf of the national health authorities. Written consent was obtained from the inpatients but not from the outpatients because the identities of the outpatients were not registered.

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Disclosure statement

The authors have no conflicts of interest.

Availability of supporting data

The data can be made available by agreement with the first author.

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