Journal of Affective Disorders 356 (2024) 162–166

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Waning waves of mood: The declining trend of hospitalized patients with affective disorders in Germany

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ARTICLE INFO

Keywords:
Affective disorders
Epidemiology
Incidence
Nationwide analysis

ABSTRACT

Introduction: Affective disorders profoundly affect individuals' emotional well-being and quality of life. This study investigates the epidemiology of affective disorders in Germany from 2011 to 2021, focusing on incidence rates, age- and sex-standardized rates, and developmental trends.

Methods: Using nationwide data of ICD-10 diagnosis codes from 2011 to 2021, this cross-sectional study analyzed inpatient cases of affective disorders in individuals aged 20 years or older. Age- and sex-standardized incidence rates were calculated based on the population size of each birth cohort in the 16 German federal states. Incidence rate ratios (IRRs) for 2011 to 2021 and 2019 to 2021 were compared with a two-sample z-test.

Results: Between 2011 and 2021, F30 (manic episode) showed a decline of 42.8 % to an incidence of 4.9 per 100,000 inhabitants, even though not statistically significant ($p = 0.322$). F31 (bipolar affective disorder) remained relatively stable with a reduction of 15.3 % to an incidence of 13.6 per 100,000 inhabitants in 2021 ($p = 0.653$). F32 (depressive episode) decreased statistically significant by 25.7 % to an incidence of 64.1 per 100,000 inhabitants ($p = 0.072$). F33 (recurrent depressive disorder) slightly increased by 18.3 % to an incidence of 94.6 per 100,000 inhabitants ($p = 0.267$). No statistically significant differences were found when comparing the COVID-19 pandemic year 2021 to 2019 incidences ($p \geq 0.529$).

Conclusion: The study provides valuable insights into the changing landscape of affective disorders in Germany over the past decade. The observed decline in incidence rates underscores the importance of continued efforts to promote mental health awareness and access to care.

1. Introduction

Affective disorders, commonly referred to as mood disorders, represent a group of mental health conditions characterized by significant disturbances in mood and emotions. These disorders have a profound impact on an individual's emotional well-being, behavior, and overall quality of life (Jansen et al., 2013; Sylvia et al., 2017). They encompass various subtypes, including major depressive disorder, bipolar disorder, and persistent depressive disorder, each exhibiting unique symptom patterns and varying degrees of severity (Benazzi, 2006). Depressive disorders manifest pervasive feelings of sadness, loss of interest in activities, changes in appetite and sleep patterns, and difficulty concentrating. On the other hand, bipolar disorder involves cycles of depressive episodes alternating with periods of elevated mood and heightened energy levels, known as manic or hypomanic episodes (Kessing and Bukh, 2017). Globally prevalent, affective disorders affect individuals of all ages, genders, and cultural backgrounds, posing a considerable burden on healthcare systems and society due to their high prevalence, chronicity, and potential for severe impairment. In high-income countries, depression is ranked among the top 10 causes of years lost to disability (Reiner et al., 2019). In addition, mortality rates among hospitalized patients with mood disorders is significantly higher than in the general population (Wiegand et al., 2020).

Understanding the epidemiology and trends of affective disorders is crucial for addressing the challenges posed by these conditions effectively. Various studies have investigated the lifetime prevalence of mood disorders (Rowland and Marwaha, 2018; Goodwin et al., 2022; Weinberger et al., 2018; Jansen et al., 2011; Aminoff et al., 2022). However,

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https://doi.org/10.1016/j.jad.2024.04.020
Received 3 August 2023; Received in revised form 30 March 2024; Accepted 5 April 2024
Available online 6 April 2024

despite the advantage of incidence rates providing information about the development over time, this outcome measure has only been scarcely analyzed. In addition, most of the existing studies utilized epidemiological surveys, which are limited in their information on clinical severity and thus, the need for treatment (Kessler, 2007). Further, only a few recently published reports considered the potential impact of the COVID-19 pandemic (*Lancet*, 2021; Bueno-Notivol et al., 2021; Ettman et al., 2020).

Thus, this study aims to investigate the epidemiological landscape of affective disorders in Germany over a span of ten years, from 2011 to 2021. The primary objectives are to determine the incidence rates of affective disorders, explore the standardized incidence rates adjusted for age and sex, and assess the developmental trends observed during the study period.

2. Methods

The dataset used in this nationwide cross-sectional study consists of annual ICD-10 diagnosis codes spanning from 2011 to 2021, obtained from all medical institutions across Germany ($n = 1887$) including psychiatric and psychosomatic clinics and provided by the Federal Statistical Office (Destatis). The data exclusively includes inpatient cases, and to ensure accuracy, patients with multiple occurrences of the same diagnosis were recorded as a single case, eliminating any duplicates from the dataset. The ICD-10 codes F30 ("manic episode"), F31 ("bipolar affective disorder"), F32 ("depressive episodes"), F33 ("recurrent depressive disorder"), and F34 ("persistent mood disorders") were used to identified patients aged 20 years or older treated stationary for affective disorders. The percentual distribution of subdiagnoses within each of the ICD-10 F3 chapters was calculated.

The incidences were determined using the population of individuals aged 20 years and older in Germany, and the data were standardized to account for age and sex. The population size of each birth cohort in the 16 German federal states was considered for each year between 2011 and 2021, with the cut-off date for each year set as 31 December. Next, age- and sex-standardized incidence rates were calculated for each diagnosis. Incidence rate ratios (IRRs) along with their corresponding 95 % confidence intervals (CIs) and percentage changes were determined by dividing the incidence in 2021 by the incidence of the year 2019 and 2011, respectively.

Data were analyzed using SPSS statistics version 28.0 (IBM, USA). Incidence rates were compared using the two-sample z-test. Statistical significance was set at $p < 0.05$.

3. Results

The data presented in this study illustrates a notable declining trend in the incidence of affective disorders from 2011 to 2021. Specifically, the incidences of F30 (manic episode), F32 (depressive episode), and F34 (persistent affective disorders) have shown a decrease over the years. F31 (bipolar affective disorder), on the other hand, displayed a relatively stable pattern and F33 (recurrent depressive disorder) diagnoses increased (Table 1). For the year 2021 a total of 267,067 patients received inpatient treatment for affective disorders, yielding a prevalence of 1.73 % of the general population.

The most significant decrease in incidence between 2011 and 2021 was observed in cases of F34, persistent affective disorders, with a substantial reduction of 75.4 % (incidence in 2021: 0.2 per 100,000 inhabitants). However, this decrease did not reach statistical significance ($p = 0.582$). Additionally, F30, manic episodes, demonstrated a decline of 42.8 % (incidence in 2021: 4.9 per 100,000 inhabitants) compared to 2011, even though not statistically significant ($p = 0.322$). F32, depressive episodes, showed a decrease of 25.7 % (incidence in 2021: 64.1 per 100,000 inhabitants) relative to 2011 with statistical significance ($p = 0.072$). For F31, bipolar affective disorder, there was a notable reduction of 15.3 %, resulting in an incidence of 13.6 per 100,000 inhabitants in 2021. However, like the previous diagnoses, this decrease was not statistically significant ($p = 0.653$). Conversely, F33, recurrent depressive disorder, exhibited a slight increase of 18.3 % in incidence in 2021 (94.6 per 100,000 inhabitants). Furthermore, when comparing the incidences in 2021 to those in 2019, no statistically significant differences were observed for any of the diagnoses ($p \geq 0.529$) (Table 2).

Table 1
Developmental trend of affective disorders shown as absolute numbers from 2011 through 2021.

Year	F30	F31	F32	F33	F34
2011	1272	23,796	127,678	118,278	1156
2012	1217	24,173	128,738	127,164	1078
2013	1206	24,357	126,861	132,733	984
2014	1059	24,498	125,623	136,045	936
2015	1025	24,600	121,989	141,013	816
2016	1033	24,455	118,421	145,007	697
2017	977	23,642	117,106	149,091	559
2018	959	23,432	111,004	153,164	508
2019	825	23,418	105,828	158,569	424
2020	887	21,469	924,33	141,607	326
2021	759	21,026	989,51	145,944	296

Regarding the distribution of diagnoses, most patients with manic episodes presented with psychotic symptoms (50.5 %), while the majority of patients with a depressive episode were categorized as having a severe depressive episode without psychotic symptoms (54.0 %). Patients with bipolar affective disorder were also predominantly diagnosed with a severe depressive episode without showing psychotic symptoms (30.8 %). Among patients with persistent affective disorders, dysthymia was the most frequently diagnosed subtype (82.4 %) (Fig. 1).

Analyzing age and sex-standardized incidence rates revealed that male patients aged 20–29 years were most vulnerable to manic episodes, while the highest incidence of bipolar affective disorder was found in female patients aged 50–59 years. Similarly, for recurrent depressive disorder, the subgroup of female patients aged 50–59 was predominant. Depressive episodes were most frequently found in male patients aged 20–29 years, with higher incidences observed in female patients in older age groups. Persistent mood disorders mainly affected patients in the age group of 20–29 years (Fig. 2).

4. Discussion

By analyzing comprehensive data on the prevalence and burden of affective disorders, this research endeavors to provide valuable insights that can inform public health policies, facilitate targeted interventions, and promote better mental health outcomes for those affected. Ultimately, such knowledge is essential for advancing mental health care, improving the lives of individuals with affective disorders, and reducing the societal impact of these pervasive conditions. The findings of this study reveal important insights into the epidemiology of affective disorders over the past decade presenting nationwide data from one of the largest countries in Europe. The observed declining trend in the incidence of affective disorders, except of recurrent depressive disorders, from 2011 to 2021 is a noteworthy and positive outcome. This could potentially be attributed to various factors. One possible reason could be improved mental health awareness, leading to better detection and early intervention, resulting in better management and prevention of affective disorders (Angermeyer et al., 2023). Changes in diagnostic practices might have also influenced the recorded incidence rates. Additionally, increased accessibility and affordability of mental healthcare including the development of e-mental health interventions could have encouraged more individuals to seek help for their mental health concerns (Weitzel et al., 2023; Braun et al., 2022). Similar initiatives, such as public education campaigns and the expansion of mental health services, could be implemented in other countries to achieve comparable

Table 2
Incidence per 100,000 inhabitants in 2021, incidence rate ratios relative to 2011 and 2019 shown for each diagnosis, respectively.

Diagnosis	Incidence per 100,000 inhabitants in 2021	Incidence in 2021 relative to 2011 in %	Incidence rate ratio relative to 2011 [95 % CI]	*p*-Value (two – sample z-test)	Incidence in 2021 relative to 2019 in %	Incidence rate ratio relative to 2019 [95 % CI]	p-Value (two – sample z-test)
F30 Manic episode	4.9	−42.8	0.57 [0.19–1.73]	0.322	−8.6	0.91 [0.27–1.31]	0.889
F31 Bipolar affective disorder	13.6	−15.3	0.85 [0.41–0.74]	0.653	−10.8	0.89 [0.43–0.84]	0.757
F32 Depressive episode	64.1	−25.7	0.74 [0.54–1.03]	0.072	−7.1	0.93 [0.66–1.30]	0.667
F33 Recurrent depressive disorder	94.6	+18.3	1.18 [0.88–1.59]	0.267	−8.6	0.91 [0.69–1.21]	0.529
F34 Persistent affective disorders	0.2	−75.4	0.25 [0.14–0.63]	0.582	−30.7	0.69 [0.37–1.12]	0.905

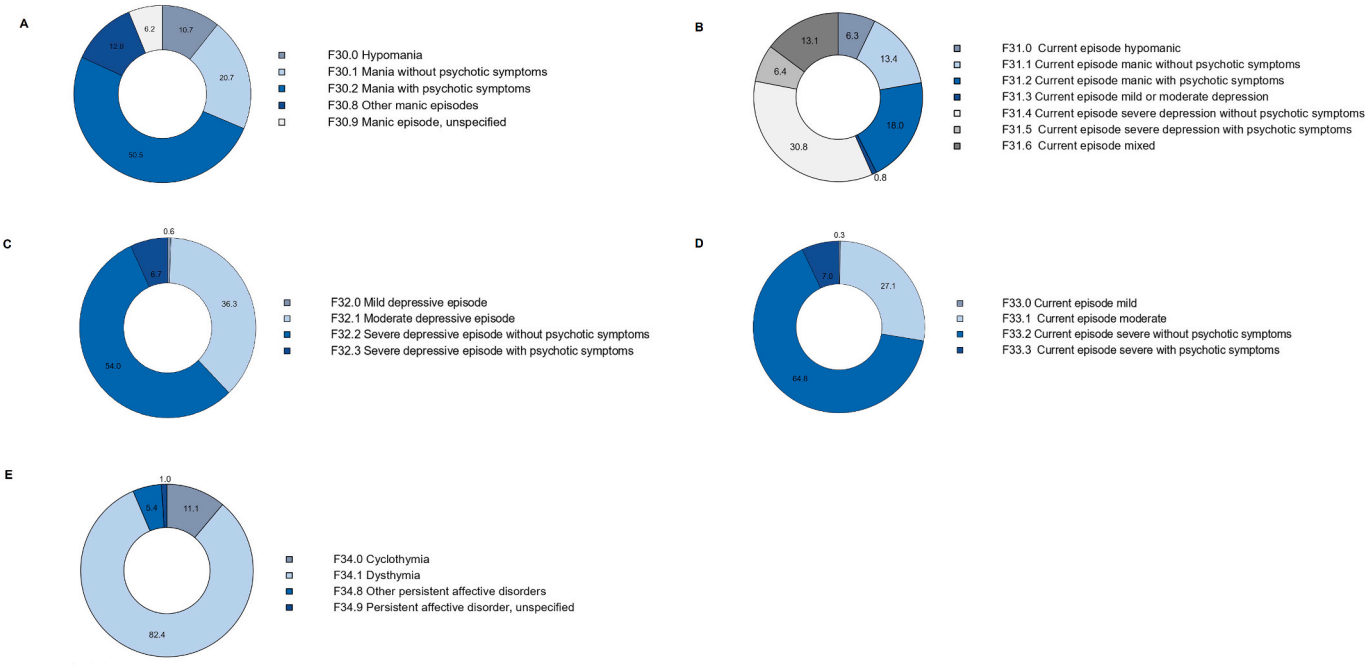

Fig. 1. Percentual distribution of the subtypes of affective disorders among inpatients shown for (A) manic episodes, (B) bipolar affective disorder, (C) depressive episodes, (D) recurrent depressive disorder, and (E) persistent mood disorders.

improvements in mental health outcomes. Additionally, efforts to destigmatize mental illness and promote early intervention may play a crucial role in reducing the prevalence of affective disorders globally. Moreover, collaborative efforts between countries and regions can facilitate the exchange of best practices and lessons learned. By sharing experiences and strategies for addressing affective disorders, stakeholders can work together to develop evidence-based interventions that are tailored to the unique needs and challenges of different populations.

In 2021, 1.73 % of the general German population underwent inpatient treatment for affective disorders. However, it is worth noting that the Global Burden of Disease study estimated a higher prevalence, with approximately 5 % of the population in 195 countries being affected by major depressive disorders in 2017 (GBD 2016 Disease and Injury Incidence and Prevalence Collaborators, 2017). Similarly, in the U.S., a lifetime prevalence of 16.2 % (95 % confidence interval [CI], 15.1–17.3; 32.6–35.1 million US adults) for major depressive disorder was reported based on diagnostic interviews (Kessler et al., 2003). In Canada, about 5.4 % (equivalent to 1.5 million) of Canadians aged 15 years and older exhibited symptoms consistent with a mood disorder, but only half of them reported receiving a professional diagnosis (Pelletier et al., 2017). It is important to consider that the present study only assessed severe affective disorders necessitating inpatient treatment. For a comparison, in a nationally representative German sample of $n = 5318$ participants, mood disorders were found in 9.3 % (Jacobi et al., 2014). These figures indicate that the actual number of people with affective disorders may be significantly higher than currently reported, warranting attention to potential underestimations. In this stance, one should also be aware that affective disorder are associated with an increased risk of physical conditions and multimorbidity as well as a higher risk of suicide after discharge (7.77 % for bipolar disorders and 6.67 % for unipolar affective disorders) (Frank et al., 2023; Nordentoft et al., 2011).

Data comparing the years 2019 to 2021 was included with the aim of exploring the potential impact of the COVID-19 pandemic on affective disorders. The COVID-19 pandemic has been linked with widespread social and economic disruptions, elevated stress levels, and heightened anxiety and depression among the general population (Manchia et al., 2022). However, this was not reflected in the current analysis indicating that the pandemic's influence on mental health might have manifested in unexpected ways. Although the pandemic was initially associated with increased mental health challenges, various coping mechanisms, community support, and adaptation to new circumstances might have

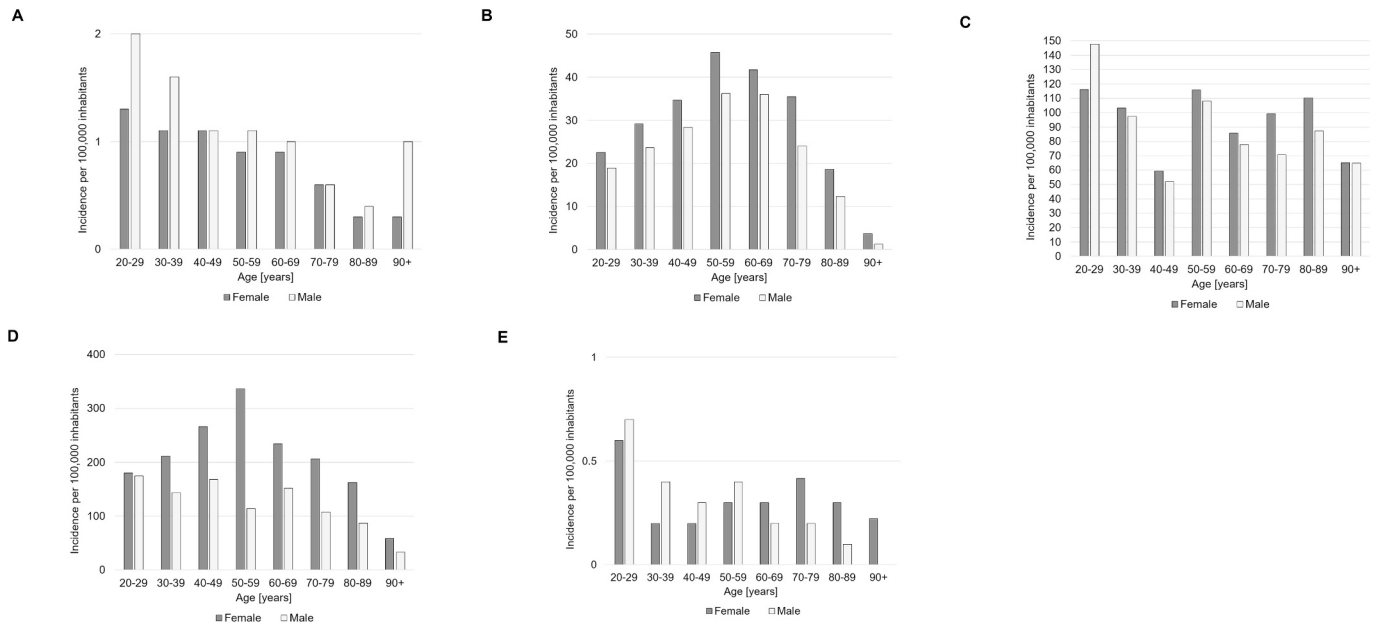

Fig. 2. Age and sex-standardized incidence rates per 100,000 inhabitants in 2021 shown for (A) manic episodes, (B) bipolar affective disorder, (C) depressive episodes, (D) recurrent depressive disorder, and (E) persistent mood disorders. Female patients are illustrated in the dark grey bars and male cases are shown in the light grey bars.

had a positive impact on the overall mental health of some individuals (Riazi et al., 2023; Penninx et al., 2022). The demonstrated decrease of inpatients with mood disorders between the years 2019 to 2011 is in line with previous reports. For instance, it was shown that during both the first phase (spring 2020) and the second phase (winter 2020/2021) of high COVID-19 incidence in Germany, psychiatric hospitals experienced a significant reduction in inpatient occupancy, reaching 80 % of the levels recorded in 2019 (Wiegand et al., 2022). At the same time the analysis of routine data from a German psychiatric hospital network revealed a general decline in emergency hospital admissions. However, there was a notable rise in the percentage of involuntary and urgent admissions (Fasshauer et al., 2021a; Fasshauer et al., 2021b).

4.1. Limitations

The present study has several limitations that should be acknowledged. Firstly, the study relies on secondary data obtained from the Federal Statistical Office (Destatis) and includes only inpatient cases aged 20 years or above. Consequently, the dataset may not capture the full spectrum of affective disorders, as milder or outpatient cases are not included, leading to potential underestimation of the true incidence. This aspect raises important considerations regarding the healthcare system and access to mental health services in Germany. For instance, less severe patients may tend to seek treatment from private psychiatrists or outpatient facilities, potentially contributing to a declining trend in hospitalized patients rather than indicating a declining trend in the overall incidence of affective disorders. This phenomenon could be influenced by various factors, including mental health policies, public awareness campaigns, and evolving healthcare practices. Further, the dataset used in this study only provides aggregated information and does not include detailed clinical characteristics of individual patients, limiting the ability to explore associations with specific subtypes or severity of affective disorders. Second, as with any large-scale administrative dataset, the possibility of coding errors or misclassifications cannot be ruled out. Variability in diagnostic practices across different medical institutions might affect the accuracy of recorded diagnoses. However, it may be assumed that the diagnoses were coded correctly since the DRG-based reimbursement depends on it and is strictly controlled by the health insurance funds. Hence, the data collection process and quality control measures employed by Destatis aim to uphold high standards of accuracy, completeness, and reliability in the ICD-10 healthcare data, facilitating robust analyses.

5. Conclusion

The study provides valuable insights into the changing landscape of affective disorders in Germany over the past decade. The observed decline in incidence rates underscores the importance of continued efforts to promote mental health awareness and access to care.

Funding sources

No funding was received for this study.

Ethics approval

Since the underlying data is deidentified, it was exempt from review by the Institutional Review Board. Accordingly, IRB approval was waived by the ethic committee of the University Hospital Regensburg, Germany.

CRediT authorship contribution statement

Nike Walter: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Markus Rupp:** Writing – review & editing, Validation, Investigation, Conceptualization, Resources. **Adolfo Lambert-Delgado:** Writing – review & editing, Resources, Investigation, Conceptualization. **Alberto Erconvaldo Cobián Mena:** Writing – review & editing, Investigation, Conceptualization, Resources. **Thilo Hinterberger:** Writing – review & editing, Validation, Conceptualization. **Thomas Loew:** Resources, Conceptualization, Validation, Writing – review & editing.

Declaration of competing interest

The authors have no conflicts of interest to declare.

Data availability

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Acknowledgement

We thank the Federal Statistical Office of Germany (Destatis) for their support of this work.

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