BMC Psychiatry

RESEARCH Open Access

# Factors associated with cognitive impairment for people with mental health disorders: screening from general hospitals and an emergency care unit in Brazil

Alice Hirdes[1*], Johanna de Almeida Mello[2], Wagner de Lara Machado[3], Elton Luiz Ferlin[4] and John P. Hirdes[5]

## Abstract

**Background** Emergency services and mental health units in general hospitals play a central role in the initial care and treatment of individuals with mental disorders. Early diagnosis and treatment of mental disorders and substance abuse can reduce cognitive deficits in this population. This study aims to investigate the factors associated with cognitive impairment for people with mental health disorders and addictions.

**Methods** This is a cross-sectional study performed in two general hospitals and an Emergency Care Unit (UPA) in cities in the metropolitan region of Porto Alegre, Rio Grande do Sul, Brazil. The interRAI Emergency Screener for Psychiatry (ESP) was used to describe the study population and to build an adjusted logistic model for the risk factors of cognitive impairment.

**Results** A total of 324 persons participated in the study (mean age: 41.8 ± 14.27, 50,2% female). The profile of people admitted to the different locations varied in several aspects according to the interRAI scales. The UPA received patients with acute conditions and higher scores on the Aggressive Behavior Scale, Mania Scale, the Scale of Harm to Others, and the Scale of Positive Symptoms. Patients at the university hospital had the highest rates of social withdrawal and a higher proportion of individuals with no insight into their mental health problems. The factors with the highest odds ratio were a diagnosis of schizophrenia (O.R.: 3.07; C.I. 1.13; 8.32), followed by self-care inability (O.R.: 2.87, 1.43; 5.77) and the aggressive behavior scale (2.85, 1.10; 7.44). A history of discharges, the Mania Scale and sleeping problems were also significantly associated with cognitive impairment. People being admitted to the UPA had lower odds of having cognitive impairment (O.R.: 0.18; 0.07; 0.45).

**Conclusion** People diagnosed with schizophrenia were at very high risk of cognitive impairment. A prior history of discharges, inability to self-care, aggressive behavior, symptoms of mania and sleeping disturbances were also identified as risk factors. The interRAI EPS instrument showed to be useful to identify people with mental health disorders and substance abuse who were at risk of cognitive impairment. By early detecting these clients, professionals can refer them to adequate treatment, before symptoms increase.

*Correspondence:
Alice Hirdes
alicehirdes@gmail.com

Full list of author information is available at the end of the article

© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

**Keywords** Cognitive functioning, Mental disorders, Addictions, Screening, General hospital, Emergency psychiatric services, interRAI

## Introduction

The functions of psychiatric emergency services exceed merely referring patients for comprehensive hospitalization. In structured services, they provide clinical stabilization and psychosocial support. In this sense, psychiatric emergency services in general hospitals should be expanded [1], as well as the development of acute patient hospitalization responses in these hospitals [2]. However, despite the frequent flow of people with mental problems to emergency services, medical evaluations of these patients are often inconsistent. This occurs because psychiatrists believe the evaluation should be comprehensive, while physicians from other specialties focus on stabilizing potentially fatal illnesses [3]. Emergency physicians also rely on non-medical professionals to evaluate and treat patients with psychiatric distress due to a lack of training [4].

On the other hand, early diagnosis of psychoses and treatment of the first episode are crucial, as the relationship between schizophrenia and cognitive deficits is well established [5–11], not only in chronic patients but also in the first psychotic episode [12, 13]. Studies [14–16] show that cognitive deficits play a significant role in the neurodevelopment of schizophrenia and other psychotic disorders. Impaired insight into one's illness is common in the first psychotic episode and is associated with worse symptoms and functioning, predicting a worse course of the disease [17]. Cognitive deficits in the first psychotic episode were also associated with reduced quality of life [13].

As with other mental disorders, cognitive deficits in people with Major Depressive Disorder (MDD) impair occupational and psychosocial functioning. Learning and memory, executive functions, speech processing, attention, and concentration are impaired during and between episodes [18]. Major depression is also associated with cognitive deficits after the first episode [19]. A longitudinal study of neurocognition in affective disorders including patients with Bipolar Disorders (BD) and Major Depressive Disorders (MDD) evidenced that clinically significant verbal memory impairment is associated with an increased risk of future psychiatric hospitalization [20]. The association between multiple substance use disorder, mental illness, and cognitive deficits is well established and is linked to negative treatment outcomes for substance use disorder [21, 22]. People with substance use disorders exhibit moderate deficits in memory, attention, executive functions, and decision-making [22]. Deficits in higher-order executive functions and decision-making are predictive of relapses [22], as well as cognitive impairment and psychological distress at the beginning of treatment were identified as predictors of long-term psychological distress [21].

In this context, considering the importance of early diagnosis of mental disorders, the initial interview is crucial for conducting the patient's clinical evaluation to arrive at a multidimensional diagnosis [23]. The interRAI Emergency Screener for Psychiatry (ESP) is an assessment tool developed by a group of researchers [24, 25] for general emergency departments, psychiatric emergency departments, and mobile crisis teams. It was designed to be completed by any member of the multidisciplinary team, such as nurses, social workers, or clinical doctors, at the time of crisis/emergency. In this study, patients' assessments were conducted exclusively using the interRAI ESP. One of the key advantages of the interRAI ESP is its ability to generate multiple outcome variables through built-in algorithms. These algorithms allow for the calculation of several scales, providing a comprehensive assessment of patients. One of these scales is the interRAI Cognitive Performance Scale (CPS) which has been validated internationally and captures cognitive impairment at several stages, from intact cognition to onset of cognitive problems, to very severe cognitive impairment [26].

Previous research has been instrumental in identifying the psychometric properties of the interRAI Cognitive Performance Scale (CPS). Since the original study conducted by Morris et al., the interRAI CPS scale has consistently demonstrated excellent psychometric performance [26, 27]. The scale consists of 4 items - daily decision making, making him/herself understood, short term memory and eating, capturing different stages of cognitive impairment, as specific cognitive and functional impairments must be present before advancing to a higher level of impairment. This hierarchical structure ensures consistency and reliability in assessing cognitive function [27]. The interRAI CPS can be applied to different settings and the items comprising the interRAI CPS have shown strong inter-rater assessments with weighted kappas ranging between 0.69 and 0.87 in home care, long-term care, palliative care, post-acute care and mental health settings [28]. In addition, it has demonstrated strong concurrent validity when compared against established measures of cognitive impairment such as the Mini-Mental State Examination and the Montreal Cognitive Assessment (MMSE), and clinical judgment [29, 30]. Additionally, CPS exhibits high predictive performance for clinical conditions including dementia, Alzheimer's disease, and delirium [29–31]. While CPS is as accurate

as many other measures of cognitive impairment in detecting dementia, it offers higher sensitivity, making it particularly useful as a screening tool [30].

It is essential to highlight the utilization of mental health services in Emergency Care Units (UPA) located in the territory, emergency departments in general hospitals, and mental health units in general hospitals in Brazil. Mental health units aim to ensure clinical and psychiatric support, including hospital treatment for severe cases related to mental health and addiction issues [32]. Despite the advances of psychiatric reform in the country, numerous articles showed that current data on patients in emergency services and hospital admissions are scarce in Brazil [33–40].

Given the importance of maintaining cognitive skills for the recovery process, psychosocial rehabilitation, long-term functional outcomes and quality of life the goal of the study is to investigate factors associated with cognitive impairment for people with mental health disorders and addictions in acute or emergency settings. The choice of emergency services is due to the instrument being designed for use within the first 24 h of the patient's arrival at the service and because there is no recent national data available in this setting. The use of the interRAI ESP instrument aims to address the existing gap in the context of emergency psychiatry in Brazil, providing a more comprehensive and standardized assessment of patients in need of evaluation and data about cognitive impairment.

## Materials and methods

### Study design, location, participants

This is a cross-sectional study performed in two general hospitals and an Emergency Care Unit (UPA) in cities of the metropolitan region of Porto Alegre, Rio Grande do Sul, Brazil. A sample size calculation was performed previously to the start of the study using the software GPower version 3.1. Considering an effect size of 0.2, power of 95%, probability of error of 0.05, the minimum sample size for logistic regression analysis was 203. Inclusion criteria were participants aged 18 years or older, of both sexes, with mental disorders, hospitalized in the Mental Health Unit for less than 24 h; and patients awaiting psychiatric evaluation requested by professionals from the Unidade de Pronto Atendimento (UPA) for less than 24 h. All participants signed an informed consent form. Patients who could not be interviewed due to clinical conditions requiring isolation (such as COVID-19), or patients who were experiencing psychomotor agitation, acute psychotic episodes, decreased level of consciousness, intoxication or withdrawal from psychoactive substances, or were under sedation, were excluded from participation.

At the UPAs, the physicians request the patient's evaluation from a psychiatrist who does all the assessments once a day, because of logistical and economic constraints. All patients were interviewed within the first 24 h of entering the services. If the patient could not respond to a question, a family member, if present, could respond.

The interviews were carried out from May 2019 to December 2023. The team of psychiatrists at this institution responds to an average of five mental health assessment requests per day, a number that may vary, including all the days of the month and the 24 h of the day. These evaluations are requested by the general practitioner. In psychiatric emergency situations, the patient is seen immediately, and the conduct and the need for hospitalization or not are quickly defined.

### Instrument and data collection

Data were collected using dedicated software with the Portuguese version of the interRAI Emergency Screener for Psychiatry (ESP) version 9.1 instrument. The interRAI ESP is a standardized assessment tool developed for use in the first 24 h of clinical assessment of people in mental health emergency settings [24]. The tool has 13 sections with several items focusing on the immediate presence of relevant indicators for mental health aspects and risk assessment related to safety (exposure or hetero-aggressiveness and risk of harm). The purpose of the ESP is to assess and establish a care plan focused on the safety of the patient and of the clinical team, verifying the possibility of self-aggression or/and hetero-aggression, inability to take care of oneself or dependents, evaluating inability to take care of themselves or their dependents, assessing withdrawal symptoms related to chemical substances, alcohol and tobacco [24, 25]. The median time to complete the ESP is 50 min, but if the patient is unable to answer for themselves (psychotic episode or other pathology), other informants, such as family members or guardians, need to be present. The benefits of these instruments contribute to care planning, improving quality, allocating resources and measuring results [25].

The interRAI ESP was tested in Canada and in Finland and demonstrated strong internal validity and reliability, making it a suitable screening instrument for use in emergency rooms and mental health services [25]. The Brazilian version of the interRAI ESP demonstrated adequate psychometric properties regarding the internal structure of the instrument and has been validated recently [41]. To explore the associated factors with cognitive decline, the cut-off value of the CPS scale used was 2 in a range of 0 to 6, indicating mild cognitive impairment (CPS score = 2) to severe cognitive impairment (CPS score = 6) [25, 27, 29].

### Data analysis

First, descriptive statistics were performed to describe the study sample. The patients in the three mental health units were compared according to sociodemographic characteristics, provisional diagnostic category (DSM), and several scales and indexes calculated from the interRAI ESP.

Secondly, an adjusted logistic model was specified to identify the factors associated with cognitive impairment (CPS score > = 2).

Table 1 shows the scales which were used in this study and that can be calculated from the interRAI ESP instrument. These scales were used to describe the study population and were inserted in the logistic regression model. The CPS scale was used as dependent variable in the model.

## Results

The total number of cases in the pooled sample was 324. This included 152 (46.9%) participants from the first hospital (General hospital), 77 (23.8%) from the second hospital and 95 (29.3%) from the Emergency Care Unit - UPA (Table 2). Comparing the three groups, the samples had similar age distributions (mean age pooled sample: 41.8 ± 14.3), but significant differences in the distributions for gender and for most of the aspects indicated in the interRAI scales. The UPA showed significantly worse results for the Aggressive behavior scale, Mania scale, the Scale of Harm to others and the Scale of Positive symptoms of schizophrenia. Most people in this group could not care for their dependents (73.7%), with much higher proportions than in both hospitals (in the hospitals, respectively 28.9% and 36.4%). Hospital 2 had significantly poorer results for depression and the highest rates of social withdrawal, as well as the higher proportion of people with no insight into their mental problem. Regarding self-harm and self-care abilities, no significant differences were found between the groups. The distribution across the main types of diagnosis was significantly different, as the UPA had the most cases of people diagnosed with mood disorders (46.4%). Both hospitals had similar distributions for schizophrenia and anxiety disorders (about 28.0% and 26.0%) but differed for drug and mood disorders.

Table 3 shows the results for the adjusted logistic model with the Cognitive Performance Scale score of 2 or more as the dependent variable. The scale was dichotomized for 0 (intact cognition or borderline intact) and 1= (mild to severe cognitive problems).

A diagnosis of schizophrenia yielded the highest odds ratio (O.R.: 3.07; C.I. 1.13; 8.32), followed by self-care inability (O.R.: 2.87, 1.43; 5.77) and the aggressive behavior scale (2.85, 1.10; 7.44). A history of discharges and the Mania scale also showed significant odds ratios, respectively 2.36 (C.I.: 1.04; 5.34) and 2.22 (1.06; 4.65). Sleeping problems also yielded a significant association with

**Table 1** interRAI scales, their components and cut-off values

| interRAI scales | Scale components/items | Range | interRAI instruments | Cut-off values used in the analysis after crosswalk |
|---|---|---|---|---|
| Aggressive Behavior Scale | Verbal abuse; Physical abuse; Socially inappropriate/disruptive; Resists care | 0–12 | MH, CMH, ESP | >=7 |
| Depressive Severity Index | Sad, pained facial expressions; Negative statements; Self-deprecation; Guilt/shame; Hopelessness | 0–15 | MH, CMH, ESP | >=8 |
| Cognitive Performance scale | Daily decision making, short term memory, making him/herself understood and eating | 0–6 | MH, CMH, ESP and others | >=2 |
| Mania | Inflated self-worth; Hyperarousal; Irritability; Increased sociability/hypersexuality; Pressured speech; Labile affect; Sleep problems—hypomania | 0–20 | MH, CMH, ESP | >=9 |
| Positive symptoms scale | Hallucinations; Command hallucinations; Delusions; Abnormal thought process | 0–12 | MH, CMH, ESP, BMHS | >=6 |
| Risk of harm to others | Violence/Extreme Behavior; Violent Ideation; Intimidation/threats; Aggressive Behavior Scale; Positive Symptoms Scale; Insight; Delusions; Sleep | 0–6 | MH, CMH, ESP | >=3 |
| Self-care index | Cognition; Positive Symptoms; Insight; Decreased Energy; Expressive Communication; Hygiene; Mania Scale; Anhedonia | 0–6 | MH, CMH, ESP | >=3 |
| Severity of self-harm scale | Self-harm ideation; Suicide attempts; Suicide plan; Others concerned; Depressive severity scale; Positive Symptoms Scale; Cognitive Performance Scale | 0–6 | MH, CMH, ESP | >=3 |
| Social withdrawal scale/ Negative symptoms | Withdrawal, Reduced social interactions, Anhedonia/Lack of pleasure, Lack of motivation | 0–12 | MH, CMH, ESP | >=9 |

CM: interRAI Community Mental Health instrument

MH: interRAI Inpatient Mental Health instrument

ESP: interRAI Emergency Screener for Psychiatry instrument

BMHS: interRAI Brief Mental Health Screener

**Table 2** Comparison of the characteristics of the groups in the study sample

| Characteristics | Pooled sample *N* = 324 | Hospital 1 *n* = 152 | Hospital 2 *n* = 77 | UPA *n* = 95 | *p*-values |
|---|---|---|---|---|---|
| Age (± SD) | 41.8 (± 14.3) | 42.1 (± 13.8) | 40.3 (± 14.9) | 42.5 (± 14.6) | 0.56 |
| Female gender (%) | 50.2% | 58.4% | 38.9% | 46.3% | 0.015 * |
| Mild to severe cognitive impairment (interRAI CPS scale > = 2) (%) | 37.9% | 38.8% | 38.9% | 35.8% | 0.874 |
| Depressive Severity Index (%) | 40.4% | 23.0% | 61.0% | 51.6% | 0.000 *** |
| Self-care Index (%) | 37.9% | 37.5% | 40.3% | 36.8% | 0.888 |
| Aggressive Behavior Scale (%) | 15.6% | 8.7% | 13.7% | 29.8% | 0.000 *** |
| Mania Scale (%) | 36.7% | 22.4% | 44.2% | 53.7% | 0.000 *** |
| Severity of self-harm scale (%) | 55.6% | 50.7% | 61.0% | 58.9% | 0.240 |
| Risk of harm to others scale (%) | 51.2% | 38.8% | 61.0% | 63.2% | 0.000 *** |
| Social withdrawal scale (%) | 51.5% | 34.2% | 68.8% | 65.3% | 0.000 *** |
| Positive symptoms scale (%) | 30.3% | 23.0% | 31.2% | 41.0% | 0.011 * |
| Impossibility to care for other dependents | 43.8% | 28.9% | 36.4% | 73.7% | 0.000 *** |
| No insight | 9.9% | 9.2% | 14.3% | 7.4% | 0.297 |
| Main diagnoses (DSM) (one or more) | | | | | |
| DSM Drug (%) | 27.7% | 17.2% | 36.1% | 35.7% | 0.000 *** |
| DSM Schizophrenia (%) | 23.7% | 27.9% | 27.8% | 14.3% | 0.068 |
| DSM Mood (%) | 29.1% | 28.7% | 9.7% | 46.4% | 0.000 *** |
| DSM Anxiety (%) | 19.4% | 26.2% | 26.4% | 3.6% | 0.000 *** |

*$p < 0.05$ **$p < 0.01$ ***$p \leq 0.000$

**Table 3** Adjusted logistic model for cognitive impairment (CPS > = 2)

| Factors | O.*R.* | CI- | CI+ | *P*-values |
|---|---|---|---|---|
| Age ≥ 50 | 1.50 | 0.76 | 2.95 | 0.247 |
| Gender (ref: female) | 1.22 | 0.62 | 2.40 | 0.573 |
| History of discharges | 2.36 | 1.04 | 5.34 | 0.039 * |
| Diagnosis (ref: addictions) | | | | |
| 1- Anxiety diagnosis | 0.82 | 0.29 | 2.33 | 0.711 |
| 2- Mood diagnosis | 1.16 | 0.46 | 2.96 | 0.745 |
| 3- Schizophrenia diagnosis | 3.07 | 1.13 | 8.32 | 0.027 * |
| Scale Mania ( > = 9) | 2.22 | 1.06 | 4.65 | 0.034 * |
| Positive symptoms scale ( > = 6) | 0.93 | 0.41 | 2.09 | 0.854 |
| Self-care inability | 2.87 | 1.43 | 5.77 | 0.003 ** |
| Scale Self-harm ( > = 3) | 1.21 | 0.62 | 2.39 | 0.574 |
| Aggressive behavior scale ( > = 7) | 2.85 | 1.10 | 7.44 | 0.031 * |
| Recent sleeping problems | 2.17 | 1.09 | 4.33 | 0.027 * |
| Setting (ref: General hospital -hospital 1) | | | | |
| 1- Hospital 2 | 0.46 | 0.20 | 1.03 | 0.058 |
| 2- UPA | 0.18 | 0.07 | 0.45 | 0.000 *** |

CI: Confidence Intervals C-statistic:0.823 *$p < 0.05$ **$p < 0.01$ ***$p \leq 0.000$

cognitive impairment with an odds ratio of 2.17 (1.09; 4.33). The only item in the model to yield odds ratio lower than 1 was the UPA. This means that in comparison with Hospital 1 (General Hospital), people being admitted to the UPA had lower odds of having cognitive impairment (O.R.: 0.18; 0.07; 0.45).

## Discussion

The aim of the present study was to investigate the factors associated with cognitive impairment in people with mental disorders and addictions. Cognitive impairment is a transdiagnostic dimension [42, 43] present in multiple psychopathologies, sometimes being the cause or consequence of these disorders. Its evaluation is essential to understand the level of severity of mental disorders, as well as to understand the level of functionality of patients and prognosis.

However, before addressing this specific aim, a few comments on the sample profile are worth noting. The characteristics of the participants in our study are in line with other similar studies on the profile of psychiatric patients in many geographic regions of Brazil [36–43, 45]. The sample is predominantly characterized by adults, with a relative balance in the proportion of participants as a function of gender and having the highest prevalence of cognitive disorders (e.g. schizophrenia), mood disorders (e.g. depression), and addictions (e.g. alcohol abuse). The mean age of the whole sample is 41.8 years, and it is associated with the period in which mental disorders have a more severe course compared to the prodromal periods and initial stages [36, 37]. As for mental disorders, this profile is justified to the extent that hospitalization is due to the fact that these disorders are extremely debilitating, generate great suffering, and substantially interfere with interpersonal relationships and activities of daily living, in addition to being difficult to manage either by families or protection networks [36–40, 44].

Starting from this general scenario, the predictors of cognitive impairment according to the results of the predictive model will be examined in order of their importance. It should be noted that the logistic model includes variables that could have a bidirectional relationship with cognitive impairment.

Difficulties in activities of daily living are related to self-care inability and often associated with cognitive impairment [45–47]. Compared to people who have suffered a stroke, people with cognitive impairment have more difficulties in performing more complex tasks, such as taking care of finances, organizing work, using the transportation system, using a cell phone, etc [48]. In more severe impairments, difficulties arise in simple tasks,

such as bathing, feeding, and dressing. Thus, the severity of difficulties in daily activities is a proxy for the level of deterioration in cognition [47, 49]. Cognitive impairment is a transdiagnostic factor present in different mental disorders that share the characteristics of difficulty performing tasks of daily living [42].

The association between sleeping problems and cognitive impairment is well-established in scientific literature. Evidence shows that poor sleep quality adversely affects various aspects of cognitive function, including attention, memory, speed of thought and learning. In addition, sleep deprivation can accelerate brain aging. People with mental health disorders such as schizophrenia often experience sleep disturbances, which can also exacerbate psychotic symptoms, such as delusions and hallucinations [50, 51]. The link between mood states and sleep impairment in a population of individuals recently diagnosed with BD suggests that sleep impairments in individuals recently diagnosed with BD are already present and significantly affect nighttime awakenings (disturbances) and sleep efficiency, even during euthymia [52].

Aggressive behaviors toward self and others are important signs of cognitive impairment [53, 54]. The deterioration of cognitive functions can lead to a worsening of impulsivity control, exacerbating aggressive responses. Aggressiveness can also be the result of frustrations or problems arising from the lack of ability to handle activities of daily living or yet from the perception of loss of autonomy. In severe cases, these behaviors can become violent or pose a risk to the individual or others, such as assaults, attacks on physical or material integrity, and homicide. Thus, the presence of these signs is a strong indication of severe cognitive impairment and a higher risk of developing severe dementia [53].

Patients with cognitive impairment are more prone to readmissions, even those that are preventable [20, 55]. Readmissions are usually due to worsening in the course of a mental disorder, low or non-adherence to treatment, or due to comorbidities or psychosocial repercussions (e.g., loss of family support) that further aggravate the patient's condition. These scenarios are usually accompanied by a reduction in patients' general cognitive ability, so that they are more dependent on the care of others, with more disruptive behaviors, or with conduct problems due to their condition [47, 53]. In this sense, readmissions are predictors of cognitive impairment since they also reflect a global worsening in the patients' level of functioning. In addition, the sample profile is predominantly composed of patients with mood disorders, addictions, and schizophrenia, who are more predisposed to readmissions [56, 57].

Schizophrenia is a condition in which cognitive impairment is one of its core characteristics [8, 10]. The main cognitive dysfunctions found in people with schizophrenia, when compared to controls and patients with mood disorders, are in processing speed, verbal memory, and working memory cognitive domains [8, 16]. These changes can bring difficulties in activities of daily living, leading to patients with the condition having problems from complex tasks, such as managing finances, to simpler tasks such as self-care (e.g. hygiene, appearance). Patients with schizophrenia may have other factors that affect their functionality, such as overweight, metabolic changes, depressed mood, low functioning, and social isolation [16, 58]. Impairment in daily activities, such as personal hygiene and other basic self-care actions, is one of the central aspects that directly impact the quality of life and psychosocial functioning of people living with this condition. Poor self-care also contributes to social stigma, which can increase patient isolation and reduce the effectiveness of treatments. Specific interventions that address both cognitive and functional aspects, such as health education programs, help patients understand the importance of treatment adherence and daily practices, thereby reducing relapses and hospitalizations.

Untreated patients with first episode schizophrenia have worse global functioning than healthy groups and positive symptoms, negative symptoms, excitement, hostility, and attention/alertness are independent risk factors [15]. As a result, for a better prognosis, patients with first-episode schizophrenia require early assessment and recognition of global functioning. Furthermore, our findings are extremely useful in identifying risk factors to consider when intervening on the global functioning of patients with first-episode schizophrenia.

Bipolar disorder (BD) is characterized by pathological changes in mood as well as recurring episodes of mania, hypomania, depression and mixed symptoms. Patients with BD exhibited multidimensional cognitive impairments, including deficits in attention, memory, and executive function. Deficits in neurocognitive development are already present in the early stages of bipolar disorder onset; cognitive deficits predict the overall functional outcome of patients with BD [59]. Cognitive impairment has been found to exist not only during the acute onset of bipolar disorder [60] but also during the remission phase of the disease [61]. A systematic review indicates that cognitive impairments in BD may predict the recurrence of (hypo)manic episodes, but cognitive impairments did not predict depressive episodes or mood episodes in general [62]. Major Depressive Disorder and Bipolar Disorder are psychiatric disorders associated with psychosocial impairment. A follow up study showed the most important variables in predicting functional impairment were sexual abuse, severity of depression, anxiety, and somatic symptoms, physical neglect, emotional abuse, and physical abuse [63]. Another follow up study [64] found higher presence of subjective cognitive complaints among

individuals recently diagnosed with BD in comparison to individuals with Major Depressive Disorder during euthymia. However, another study showed that the cognitive impairments in the first-episode depression group were more severe than those in the first-episode mania group [65]. People with BD and substance use exhibit more pronounced cognitive impairment compared to those with BD without substance use, with executive function being the most affected cognitive domain [66].

Another important aspect of this study is the demonstration of heterogeneity in the populations served in these three care settings. This points to the need for person-level clinical information at the point of care to understand the needs and strengths of people receiving mental health services in different settings. The study showed that the profiles of clients being admitted to the different settings varied. These differences can be explained by the location of the UPA in the territory and ease of access during acute crises, which is characterized by open demand, while patients at the university hospital are referred by specialized care professionals, such as those at Psychosocial Care Centers (CAPS).

Therefore, cognitive interventions may be necessary aiming at improving cognitive functioning in most patients during the first psychotic episode, particularly working memory in younger patients [67]. A follow up study [20] with patients with Bipolar Disorder and Major Depressive Disorder evidenced that promoting cognitive function in individuals with affective disorders with clinically significant impairments could help in mitigating psychiatric hospitalizations. In this sense, assessment instruments are useful to organize tailored centered care on the individual, providing data for care based on specificities, being a support tool for clinical decision-making and mental health care.

## Conclusion

The application of the interRAI ESP instrument at admission in the hospitals and the emergency unit is an added value, as the instrument provides several scales and outcomes to help identify risk situations and potential for improvement and recovery. This research shed light on the risk factors of cognitive impairment among people with mental health disorders and substance abuse. People diagnosed with schizophrenia were at very high risk of cognitive impairment. In addition, a prior history of discharges, inability to self-care, aggressive behavior, symptoms of mania and sleeping disturbances were also identified as risk factors. People being admitted to the UPA were the ones with the lowest risk.

The use of the interRAI ESP and the Cognitive Performance Scale (CPS) in the routine practice of psychiatry emergency services, by general physicians or psychiatry, especially in low-and middle-income countries (LMICs), can aid in the early identification of patients with cognitive deficits across different mental disorders. This approach enables early interventions aimed at improving cognitive functioning, long-term functional outcomes and quality of life for the patients.

### Strengths, limitations and future research

This research showed that the use of the interRAI Emergency Screener for Psychiatry (ESP) in general hospitals and emergency care units is feasible in low and middle-income countries (LMICs). The instrument meets the needs for standardized assessments for both mental health specialists and generalist professionals. It is worth noting that the software's completion provides support to emergency professionals in three scales: the Severity of Self-Harm Scale, the Risk of Harm to Others Scale, and the Self-Care Index. These scales are particularly important in the clinical decision-making of professionals in emergency services because not all general hospitals have on-call psychiatrists in their emergency departments. In countries with networked computerized systems in health, it can provide information for planning continued care at other levels of attention. In this sense, assessments, early diagnosis, and treatment can reduce cognitive deficits in individuals with mental disorders or those who abuse alcohol and other drugs. Additionally, the Cognitive Performance Scale can be an added value to the screening in psychiatric wards and emergency wards, as cognitive function is an important factor for recovery and rehabilitation. As the CPS has shown high sensitivity in previous research, it can be useful as an additional screening outcome for cognitive impairment [30].

The limitations of this study include the absence of certain sociodemographic data, such as education, housing, employment, and income. The cross-sectional design may introduce potential temporal bias, since exposure and outcomes were measured at the same point in time. Although the sample may not be representative of all individuals with mental disorders seeking emergency care, these data are particularly useful for describing this population, especially in Low- and Middle-Income Countries (LMICs). In these settings, there is limited availability of information regarding sociodemographic characteristics, and the recurrence of emergency visits. Regarding to cognitive outcomes, data in these countries are even more scarce.

Future research should further test the ESP in other hospitals and emergency services, considering that data on patients seeking emergency care or being admitted to general hospitals is still incipient in Brazil. Additionally, scientific production on cognitive deficits and mental disorders is significant in high-resource countries but needs to be investigated in contexts where social determinants

of health exacerbate inequalities and access to health and mental health services. It is suggested that future research includes longitudinal studies to confirm causality and comparative studies in other LMICs and contexts.

**Abbreviations**

| | |
|---|---|
| BD | Bipolar Disorders |
| UPA | Emergency Care Unit |
| ESP | interRAI Emergency Screener for Psychiatry |
| PNAU | National Policy for Emergency Care |
| RAPS | Psychosocial Care Network |
| CAPS | Psychosocial Care Center |
| CAPS III | Psychosocial Care Center III |
| SRT | Therapeutic Residential Services |
| SUS | Unified Health System |

**Acknowledgements**
We would like to thank Dr. Manoel Ernani Garcia Junior, Mental Health Coordinator at the University Hospital, for enabling the application of screening. We would also like to thank nurses Crystalin Rocho de Borba and Luís Afonso Cabral for the application of the instrument.

**Author contributions**
AH: Project administration, Supervision, Writing original draft, Writing – review & editingJAM: Methodology, Formal analysis, Writing original draft, Writing – review & editingWLM: Methodology, Writing original draft, Writing – review & editingELF: Software, Data curation, Writing – review & editingJPH: Supervision, Visualization, Writing – review & editing.

**Funding**
This study received no funding.

**Data availability**
The data that support the findings of this study are available from the corresponding author, Hirdes, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with the permission of Hirdes.

## Declarations

**Ethics approval and consent to participate**
Ethical clearance was obtained from the Lutheran University from Brazil Ethics Committee (CAAE 61491922.6.0000.5349 and CAAE 09164119.2.0000.5349). This study adheres to the guidelines of the Declaration of Helsinki. Permission was sought from local authorities before conducting the study. Declaration of Free and Informed Consent was taken from all participants.

**Competing interests**
The authors declare no competing interests.

**Conflict of interest**
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Ethics statement**
The research was conducted in accordance with the guidelines and regulatory standards for research involving human beings and was approved under n° 3.291.055 and n° 5.852.852 by the Ethics Committee of the Lutheran University of Brazil. All participants signed the Free and Informed Consent Form. The ethical aspects relating to research with human beings were respected, as determined by Brazilian Resolution n°. 466/2012 (70).

**Clinical trial number**
Not applicable.

**Author details**
[1]Graduate Program in Nursing, Federal University of Rio Grande, Rio Grande, Brazil
[2]LUCAS – Centre for Care Consultancy, KU Leuven, Leuven, Belgium
[3]Graduate Program in Psychology, Pontifical Catholic University of Rio Grande do Sul, Porto Alegre, Brazil
[4]Biostatistic and Data Analysis Unit, Hospital de Clínicas de Porto Alegre, Porto Alegre, Brazil
[5]School of Public Health Sciences, University of Waterloo, Waterloo, ON, Canada

Received: 3 December 2024 / Accepted: 1 April 2025
Published online: 22 April 2025

**References**

1. Barros REM, Tung TC, Mari JJ. Psychiatric emergency services and their relations with the Brazilian mental health network. Rev Bras Psiquiatr. 2010. https://doi.org/10.1590/S1516-44462010000600003. Oct;32 Suppl 2:S71-7.
2. Almeida JMC. Mental health policy in Brazil: what's at stake in the changes currently underway. Cad Saúde Pública. 2019;35(11):e00129519. https://doi.org/10.1590/0102-311x00129519.
3. Wilson MP, Hamrick E, Stiebel V, Nordstrom K. Contemporary practices for medical evaluation of the psychiatric patient in the emergency department. Focus (Am Psychiatr Publ). 2023;21(1):28–34. https://doi.org/10.1176/appi.focus.20220063.
4. Brodeur J, Ley AF, Bonnet M. A survey of Midwest physicians' experiences with patients in psychiatric distress in the emergency department. J Osteopath Med. 2021;121(10):773–9. https://doi.org/10.1515/jom-2021-0123.
5. Schaefer J, Giangrande E, Weinberger DR, Dickinson D. The global cognitive impairment in schizophrenia: consistent over decades and around the world. Schizophr Res. 2013;150:42–50. https://doi.org/10.1016/j.schres.2013.07.002.
6. Bora E, Lin A, Wood SJ, Yung AR, McGorry PD. Cognitive impairment in schizophrenia: description, meta-analyses and future directions. IntechOpen. 2016. https://doi.org/10.5772/64392.
7. Bora E, Murray RM. Long-term changes in cognitive functioning in individuals with schizophrenia. JAMA Psychiatry. 2019 Dec 11. https://doi.org/10.1001/jamapsychiatry.2019.3663
8. Gebreegziabhere Y, Habatmu K, Mihretu A, Cella M, Alem A. Cognitive impairment in people with schizophrenia: an umbrella review. Eur Arch Psychiatry Clin Neurosci. 2022;272(7):1139–55. https://doi.org/10.1007/s00406-022-01416-6.
9. Bora E, Akdede BB. Metabolic syndrome causing cognitive impairment in patients with schizophrenia: A systematic review. Cureus. 2023 Oct;24. https://doi.org/10.7759/cureus.45678.
10. McCutcheon RA, Keefe RSE, McGuire PK. Cognitive impairment in schizophrenia: aetiology, pathophysiology, and treatment. Mol Psychiatry. 2023;28(5):1902–18. https://doi.org/10.1038/s41380-023-01949-9.
11. Kaloglu HA, Nazli SB. Evaluation of the relationship between disability and disease severity, cognitive functions, and insight in patients with schizophrenia. Clin Psychopharmacol Neurosci. 2024;22(2):333–44. https://doi.org/10.9758/cpn.23.1126.
12. Bora E, Pantelis C. Meta-analysis of cognitive impairment in first-episode bipolar disorder: comparison with first-episode schizophrenia and healthy controls. Schizophr Bull. 2015;41(5):1095–104. https://doi.org/10.1093/schbul/sbu198.
13. Mwesiga EK, Ssemata AS, Gumikiriza J, Nanteza A, Nakitende AJ, Nakku J, Akena D, Nakasujja N. The association of cognitive impairment with quality of life and functional impairment in Ugandan first-episode psychosis patients: a cross-sectional study. Health Qual Life Outcomes. 2022;20(1):113. https://doi.org/10.1186/s12955-022-02020-x.
14. Carrion RE, Walder DJ, Auther AM, McLaughlin D, Zyla HO, Adelsheim S, Calkins R, Carter CS, McFarland B, Melton R, Niendam T, Ragland JD, Sale TG, Taylor SF, McFarlane WR, Cornblatt BA. From the psychosis prodrome to the first-episode of psychosis: no evidence of a cognitive decline. J Psychiatr Res. 2018;96:231–8. https://doi.org/10.1016/j.jpsychires.2017.10.014.
15. Cao X, Chen S, Xu H, Wang Q, Zhang Y, Xie S. Global functioning, cognitive function, psychopathological symptoms in untreated patients with first-episode schizophrenia: A cross-sectional study. Psychiatry Res. 2022;313:114616. https://doi.org/10.1016/j.psychres.2022.114616.
16. Deng X, Lu S, Li Y, Fang X, Zhang R, Shen X, Du J, Xie S. Association between increased BMI and cognitive function in first-episode drug-naïve male schizophrenia. Front Psychiatry. 2024;15:1362674. https://doi.org/10.3389/fpsyt.2024.1362674.

17. DeTore NR, Bain K, Wright A, Meyer-Kalos P, Gingerich S, Mueser KT. A randomized controlled trial of the effects of early intervention services on insight in first episode psychosis. Schizophr Bull. 2022;48(6):1295–305. https://doi.org/10.1093/schbul/sbac099.
18. Pan Z, Park C, Brietzke E, et al. Cognitive impairment in major depressive disorder. CNS Spectr. 2019;24(1):22–9. https://doi.org/10.1017/S1092852918001207.
19. Ronold EH, Schmid M, Oedegaard KJ, Hammar Å. Risk factors and cognitive deficits in first episode major depression: A five-year longitudinal study of explorative subgroups. Front Psychiatry. 2020;11:575867. https://doi.org/10.3389/fpsyt.2020.575867.
20. Sankar A, Ziersen SC, Ozenne B, Beaman EE, Miskowiak KW. Association of neurocognitive function with psychiatric hospitalization and socio-demographic conditions in individuals with bipolar and major depressive disorders. EClinicalMedicine. 2023;55:101746. https://doi.org/10.1016/j.eclinm.2023.101746.
21. Hetland J, Lundervold AJ, Erga AH. Cognitive impairment as a predictor of long-term psychological distress in patients with polysubstance use disorders: a prospective longitudinal cohort study. BMC Psychiatry. 2024;24(1):143. https://doi.org/10.1186/s12888-024-05600-x.
22. Verdejo-Garcia A, Garcia-Fernandez G, Dom G. Cognition and addiction. Dialogues Clin Neurosci. 2019;21(3):281–90. https://doi.org/10.31887/DCNS.2019.21.3/gdom.
23. Dalgalarrondo P. Psicopatologia e semiologia Dos Transtornos Mentais. 3 – ed. ed. Porto Alegre: Artmed Editora; 2019.
24. Rabinowitz T, Hirdes JP, et al. interRAI emergency screener for psychiatry (ESP). Assessment form and user's manual. Version 9.1. Washington DC: interRAI; 2013.
25. Hirdes JP, van Everdingen C, Ferris J, Franco-Martin M, Fries BE, Heikkilä J, Hirdes A, Hoffman R, James ML, Martin L, Perlman CM, Rabinowitz T, Stewart SL, Van Audenhove C. The interRAI suite of mental health assessment instruments: an integrated system for the continuum of care. Front Psychiatry. 2020;10:926. https://doi.org/10.3389/fpsyt.2019.00926.
26. Morris JN, Fries BE, Mehr DR, Hawes C, Phillips C, Mor V, Lipsitz LA. MDS cognitive performance scale. J Gerontol. 1994;49(4):174–82. https://doi.org/10.1093/geronj/49.4.M174.
27. Morris JN, Howard EP, Steel K, et al. Updating the cognitive performance scale. J Geriatr Psychiatr Neurol. 2016;29(1):47–55. https://doi.org/10.1177/0891988715598231.
28. Hirdes JP, Ljunggren G, Morris JN, Frijters DHM, Finne Soveri H, Gray L, Björkgren M, Gilgen R. Reliability of the interRAI suite of assessment instruments: a 12-country study of an integrated health information system. BMC Health Serv Res. 2008;8:1–11. https://doi.org/10.1186/1472-6963-8-277.
29. Jones K, Perlman CM, Hirdes JP, Scott T. Screening cognitive performance with the resident assessment instrument for mental health cognitive performance scale. Can J Psychiatry. 2010;55(11):736–40. https://doi.org/10.1177/070674371005501108.
30. Travers C, Byrne GJ, Pachana NA, Klein K, Gray L. Validation of the interRAI cognitive performance scale against independent clinical diagnosis and the Mini-Mental state examination in older hospitalized patients. J Nutr Health Aging. 2013;17(5):435–9. https://doi.org/10.1007/s12603-012-0439-8.
31. Lee JSW, Chau PPH, Hui E, Chan F, Woo J. Survival prediction in nursing home residents using the minimum data set subscales: ADL Self-Performance hierarchy, cognitive performance and the changes in health, End-stage disease and symptoms and signs scales. Eur J Pub Health. 2009;19(3):308–12. https://doi.org/10.1093/eurpub/ckp006.
32. Brasil. Ministério da Saúde. Portaria nº 1.600 de 7 de julho de 2011. Reformula a política Nacional de Atenção às urgências e institui a Rede de Atenção às urgências no sistema Único de Saúde (SUS). Diário oficial [da] União. 2011 jul 8. http://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt1600_07_07_2011.html
33. Santos ME, Amora JA, Del-Ben CM, Zuardi AW. Psychiatric emergency services in a university general hospital: a prospective study. Rev Saúde Pública. 2000;34(5):468–74. https://doi.org/10.1590/S0034-89102000000500006.
34. Del-Ben CM, Rufino ACTBF, Azevedo-Marques JM, Menezes PR. Differential diagnosis of first-episode psychosis: importance of an optimal approach in psychiatric emergency. Rev Bras Psiquiatr. Oct; 2010;32(Suppl 2):S78–86. https://doi.org/10.1590/S1516-44462010000600004.
35. Santos RS, de Sena EP, Aguiar WM. Perfil de internações psiquiátricas Em Unidade hospitalar de Salvador, Bahia. Rev Ciênc Méd Biol. 2017;16(3):374–9. https://doi.org/10.9771/cmbio.v16i3.24385.
36. Rocha HAD, Reis IA, Santos MAD, Melo APS, Cherchiglia ML. Psychiatric hospitalizations by the unified health system in Brazil between 2000 and 2014. Rev Saúde Pública. 2021;55:14. https://doi.org/10.11606/s1518-8787.2021055002155.
37. Melo FCP, Oliveira ASS, Oliveira AKS, Melo Júnior EB, Campelo LLCR, Ibiapina ARS, França LC. Psychiatric hospitalizations by the SUS in Piauí, Brazil, from 2008 to 2020. Cogitare Enfermagem. 2022;27:e81576. https://doi.org/10.5380/ce.v27i0.81576.
38. Miliauskas CR, Faus DP, Junkes L, Rodrigues RB, Junger W. Association between psychiatric hospitalizations, coverage of psychosocial care centers (CAPS) and primary health care (PHC) in metropolitan regions of Rio de Janeiro (RJ) and São Paulo (SP), Brazil. Ciência Saúde. Coletiva. 2019;24(5):1935–44. https://doi.org/10.1590/1413-81232018245.18862017.
39. Silva MG, Daros GC, Bitencourt RM, Iser BPM. Psychiatric hospitalizations in Brazil: exploratory and trend analysis from 2009 to 2019. J Bras Psiquiatr. 2021;70(1):39–44. https://doi.org/10.1590/0047-2085000000303.
40. Jarek M, Costa ACU. Analysis of psychiatric hospitalizations by the unified health system in Paraná, 2008 to 2021. Rev Saúde Pública Paraná. 2023;6(4):1–17. https://doi.org/10.32811/25954482-2023v6n4.838.
41. Cabral LAB, Machado WL, Ferlin EL, Hirdes JP, Marrone LCP, Hirdes A. Evidence of validity of the instrument interRAI emergency screener for psychiatry for the Brazilian context. Res Soc Dev. 2021;10(13):e525101321185. https://doi.org/10.33448/rsd-v10i13.21185.
42. Abramovitch A, Short T, Schweiger A, The C, Factor. Cognitive dysfunction as a transdiagnostic dimension in psychopathology. Clin Psychol Rev. 2021;86:102007. https://doi.org/10.1016/j.cpr.2021.102007.
43. Wenzel J, Badde L, Haas SS, et al. Transdiagnostic subgroups of cognitive impairment in early affective and psychotic illness. Neuropsychopharmacol. 2024;49:573–83. https://doi.org/10.1038/s41386-023-01729-7.
44. Lara APM, Volpe FM. Evolution of the profile of psychiatric hospitalizations by the unified health system in Minas Gerais, Brazil, 2001–2013. Ciência Saúde Coletiva. 2018;24(2):659–68. https://doi.org/10.1590/1413-81232018242.14652017.
45. Dillon C, Serrano CM, Castro D, Leguizamón PP, Heisecke SL, Taragano FE. Behavioral symptoms related to cognitive impairment. Neuropsychiatr Dis Treat. 2013;9:1443–55. https://doi.org/10.2147/NDT.S47133.
46. Jekel K, Damian M, Wattmo C, et al. Mild cognitive impairment and deficits in instrumental activities of daily living: a systematic review. Alz Res Therapy. 2015;7:17. https://doi.org/10.1186/s13195-015-0099-0.
47. Dunne RA, Aarsland D, O'Brien JT, Ballard C, Banerjee S, Fox NC, Isaacs JD, Underwood BR, Perry RJ, Chan D, Dening T, Thomas AJ, Schryer J, Jones AM, Evans AR, Alessi C, Coulthard EJ, Pickett J, Elton P, Jones RW, Burns A. Mild cognitive impairment: the Manchester consensus. Age Ageing. 2021;50(1):72–80. https://doi.org/10.1093/ageing/afaa228.
48. Lee PH, Yeh TT, Yen HY, et al. Impacts of stroke and cognitive impairment on activities of daily living in the Taiwan longitudinal study on aging. Sci Rep. 2021;11:12199. https://doi.org/10.1038/s41598-021-91838-4.
49. Bruderer-Hofstetter M, Sikkes SAM, Münzer T, et al. Development of a model on factors affecting instrumental activities of daily living in people with mild cognitive impairment – a Delphi study. BMC Neurol. 2020;20:264. https://doi.org/10.1186/s12883-020-01843-9.
50. Ashton JE, Harrington MO, Langthorne D, Ngo HV, Cairney SA. Sleep deprivation induces fragmented memory loss. Learn Mem. 2020;27(4):130–5. https://doi.org/10.1101/lm.050757.119.
51. Waite F, Myers E, Harvey AG, et al. Treating sleep problems in patients with schizophrenia. Behav Cogn Psychother. 2016;44(3):273–87. https://doi.org/10.1017/S1352465815000430.
52. Vieira IS, Barreto NT, Pedrotti Moreira F, Mondin TC, Simjanoski M, Cardoso TA, Kapczinski F, Jansen K, Souza LDM, da Silva RA. Sleep alterations in individuals recently diagnosed with bipolar disorder across different mood stages. Psychiatry Res. 2021;299:113824. https://doi.org/10.1016/j.psychres.2021.113824.
53. Bidzan L, Grabowski J, Przybylak M, Ali S. Aggressive behavior and prognosis in patients with mild cognitive impairment. Dement Neuropsychol. 2023;17:e20200096. https://doi.org/10.1590/1980-5764-DN-2020-0096.
54. Yu R, Topiwala A, Jacoby R, Fazel S. Aggressive behaviors in alzheimer disease and mild cognitive impairment: systematic review and Meta-Analysis. Am J Geriatr Psychiatry. 2019;27(3):290–300. https://doi.org/10.1016/j.jagp.2018.10.008.
55. Mitsutake S, Ishizaki T, Tsuchiya-Ito R, Furuta K, Hatakeyama A, Sugiyama M, Toba K, Ito H. Association of cognitive impairment severity with potentially avoidable readmissions: A retrospective cohort study of 8897 older patients.

Alzheimer's Dement (Amsterdam Netherlands). 2021;13(1):e12147. https://doi.org/10.1002/dad2.12147.
56. Morel D, Yu KC, Liu-Ferrara A, Caceres-Suriel AJ, Kurtz SG, Tabak YP. Predicting hospital readmission in patients with mental or substance use disorders: A machine learning approach. Int J Med Inf. 2020;139:104136. https://doi.org/10.1016/j.ijmedinf.2020.104136.
57. Owusu E, Oluwasina F, Nkire N, Lawal MA, Agyapong VIO. Readmission of patients to acute psychiatric hospitals: influential factors and interventions to reduce psychiatric readmission rates. Healthc (Basel). 2022;10(9):1808. https://doi.org/10.3390/healthcare10091808.
58. Liu G, Zhang X, Huo X, Li W, Prevalence. Influencing factors, and clinical characteristics of cognitive impairment in elderly patients with schizophrenia. Front Psychiatry. 2022;13:910814. https://doi.org/10.3389/fpsyt.2022.910814.
59. Bora E, Can G, Ildiz A, Ulas G, Ongun CH, Inal NE, et al. Neurocognitive heterogeneity in young offspring of patients with bipolar disorder: the effect of putative clinical stages. J Affect Disord. 2019;257:130–5. https://doi.org/10.1016/j.jad.2019.07.015.
60. Jiménez E, Solé B, Arias B, Mitjans M, Varo C, Reinares M, et al. Characterizing decision-making and reward processing in bipolar disorder: a cluster analysis. Eur Neuropsychopharmacol. 2018;28:863–74. https://doi.org/10.1016/j.euroneuro.2018.04.001.
61. Chumakov EM, Petrova NN, Limankin OV, Ashenbrenner YV. Cognitive impairment in remitted patients with bipolar disorder. Zh Nevrol Psikhiatr Im S S Korsakova. 2021;121:12–8. https://doi.org/10.17116/jnevro202112104112.
62. Miskowiak KW, Mariegaard J, Jahn FS, Kjærstad HL. Associations between cognition and subsequent mood episodes in patients with bipolar disorder and their unaffected relatives: A systematic review. J Affect Disord. 2022;297:176–88. https://doi.org/10.1016/j.jad.2021.10.044.
63. Rodrigues de Aguiar K, Braga Montezano B, Gabriel Feiten J, Watts D, Zimerman A, Campos Mondin T, Azevedo da Silva R, Dias de Mattos Souza L, Kapczinski F, de Azevedo Cardoso T, Jansen K, Passos IC. Predicting functional impairment in euthymic patients with mood disorder: A 5-year follow-up. Psychiatry Res. 2023;328:115404. https://doi.org/10.1016/j.psychres.2023.115404.
64. Simjanoski M, Jansen K, Mondin TC, Pedrotti Moreira F, Vieira IS, da Silva RA, Souza LDM, Frey BN, Cardoso TA, Kapczinski F. Cognitive complaints in individuals recently diagnosed with bipolar disorder: A cross-sectional study. Psychiatry Res. 2021;300:113894. https://doi.org/10.1016/j.psychres.2021.113894.
65. Wang Z, Cao H, Cao Y, Song H, Jiang X, Wei C, Yang Z, Li J. Clinical characteristics and cognitive function in bipolar disorder patients with different onset symptom. Front Psychiatry. 2023;14:1253088. https://doi.org/10.3389/fpsyt.2023.1253088.
66. Gogia M, Shah AQ, Kapczinski F, de Azevedo Cardoso T. The impact of substance use disorder comorbidity on cognition of individuals with bipolar disorder: A systematic review. Psychiatry Res. 2022;311:114525. https://doi.org/10.1016/j.psychres.2022.114525.
67. Mueser KT, Sussman RF, DeTore NR, Eberlin ES, McGurk SR. The impact of early intervention for first episode psychosis on cognitive functioning. Schizophr Res. 2023;260:132–9. https://doi.org/10.1016/j.schres.2023.07.021.

## Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.