



Self-reported inhibition predicts history of suicide attempts in bipolar disorder and major depression

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ABSTRACT

Background: Studies have reliably identified an association between suicide attempts and executive functions such as decision making (DM) and inhibitory control (IC) in patients with mood disorders. As such, the present study aimed to investigate the association between inhibition, DM, impulsivity and the history of suicide attempts in individuals with bipolar (BD) or major depressive disorder (MDD), identifying which assessment instruments may be most strongly associated with suicide in clinical samples.

Methods: The sample included 80 control subjects and two groups of patients with BD and MDD, matched by age and education (26 with a history of suicide attempts [MD+], and 26 with no such history [MD−]). Participants completed behavioral and self-report measures of DM and IC, which were compared between groups using ANCOVA, followed by logistic regression for patients with mood disorders only, and the presence or absence of a history of suicide as the outcome.

Results: Cognitive performance did not differ between groups. The MD+ group showed significantly higher motor and attentional impulsivity on the BIS-11 than the MD− and control groups. A regression analysis containing these scores showed that motor impulsivity was the only significant predictor of a history of suicide (OR = 1.14; 95%CI 1.00–1.30).

Conclusions: Self-reported motor impulsivity was a significant predictor of suicide. These findings underscore the importance of self-report measures in neuropsychological assessment, and their contributions to the management and prognosis of patients with mood disorders. Lastly, they point to the role of impulsivity as a target for interventions and public policy on suicide prevention.

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1. Introduction

Suicide is a major global health challenge, and its prevention is a primary goal of the World Health Organization [1]. Suicide is the second most common cause of death in individuals aged 15 to 29 years, causing approximately 800,000 deaths a year [1]. As such, suicide assessment and intervention have become a growing concern in mental health. Suicide attempts are especially prevalent in mood disorders, including major depression disorder (MDD) and bipolar disorder (BD) [2–4]. These conditions are characterized by pathological mood states, as well as cognitive impairment and decreased functioning and quality of life [5].

According to recent epidemiological studies, the risk of suicide attempts in patients with BD is 15 times higher than that observed in the general population, with prevalence rates ranging from 32.4% in

BD type I (BDI) to 36.3% in BD type II (BDII) [6]. A literature review suggests that 5 to 6% of patients with BD die as a result of suicide [7]. The following factors have been found to contribute to an increased risk of suicide in these patients: earlier disease onset, female gender, first-episode polarity (depressive), number of depressive episodes, depressive polarity of the current or most recent mood episode, comorbid anxiety disorders, substance abuse, comorbid borderline personality disorder, history of suicide in first degree relatives, stressors prior to disease onset, recurrent mood episodes and hospitalizations [8]. In MDD, epidemiological studies have estimated the prevalence of suicide attempts at 15.9% [3]. In these patients, the following factors may increase the risk of suicide attempts: female gender, hypomania in first-degree relatives, psychotic features, and atypical features [9].

Recent studies suggest that the severity of cognitive impairment may also be associated with suicide risk [10,11]. Several lines of evidence support an association between the EF and suicide. These include the presence of executive dysfunction in a number of psychiatric conditions associated with an increased risk of suicide [10,12,13], and the

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association between suicide and several structural and functional abnormalities in the prefrontal cortex - a major neural substrate of executive functioning [14].

The most frequent cognitive impairments in patients with BD or MDD and a history of suicide attempts include alterations in executive functions (EF) [15] such as decision-making (DM) [12,14,16,17] and inhibition [12,13,16]. These cognitive functions are often associated with the concept of impulsivity, which is also a major risk factor for suicide attempts [13,18–20].

Though the relationship between executive impairments and suicide risk has been well established in the literature, the role of DM and inhibition in this phenomenon has not been fully elucidated [10,21]. Despite the existence of several studies identifying an association between suicide attempts and cognitive performance, the majority of recent studies which look into predictors of suicide in samples with mood disorders fail to account for neuropsychological variables [22–24]. Illness characteristics, such as number of episodes or age of onset, continue to be the most frequent factors investigated as predictors of suicide attempts in these conditions.

Though the study of illness characteristics has undoubtedly produced important findings regarding the need to attend to particular features when evaluating the risk of suicide in individuals with mood disorders, these variables are also associated with some limitations. When medical records are unavailable and data are collected directly from patients themselves, reporting biases may exert a significant influence on the answers obtained, especially due to the widely documented impairments in autobiographical memory in both BD and MDD [25–27]. The reliance on potentially inaccurate information to gauge the risk of suicide attempts may have drastic repercussions for clinical decision making.

Another important reason for additional investment in the study of neuropsychological predictors of suicide attempts has to do with preventive interventions. While illness characteristics are not modifiable, neuropsychological processes can often be targeted by rehabilitation or remediation programs [28–30]. As such, if certain neuropsychological impairments are found to be associated with an increased risk of suicide, these may be addressed by preventive interventions as a way to reduce the likelihood of a future suicide attempt.

In order to advance the literature in this regard, the present study focused on the neuropsychological variables which may be investigated in future studies as potential predictors of suicide attempt in MDD and BD. The variables selected were those found to be most commonly impaired in individuals with a history of suicide attempts. As such, the aim of the present study was to investigate the association between inhibition, DM, impulsivity and the history of suicide attempts in individuals with BD or MDD and control participants with no mood disorders, in order to obtain a better understanding of these cognitive functions in the context of mood disorders and suicide.

2. Method

2.1. Participants

The study involved a sample of 132 participants, including 52 subjects with MDD or BD, and 80 control participants with no mood disorders. Patients were recruited from the outpatient clinic of a psychiatric hospital, a university clinic and private practice. Control participants were recruited by convenience from workplace and university settings, as well as the general community.

This was a retrospective study, which allowed for the selection of participants with MDD and BD which differed only in terms of the presence or absence of previous suicide attempts. Age, education, gender and diagnosis were counterbalanced across both participant groups, in order to minimize the potential confounding effects of any of these variables. These procedures resulted in the selection of 26 patients with mood disorders ($n = 8$ with MDD; $n = 9$ with BDI; $n = 9$ with BDII)

and at least one previous suicide attempt, and 26 age-, education- and gender-matched individuals with no such history ($n = 7$ with MDD; $n = 10$ with BDI; $n = 9$ with BDII). Suicide attempts were characterized by self-report during a semi-structured diagnostic interview, and defined as de facto attempts clearly described by participants rather than simply suicidal ideation or plans. The type and severity of suicidal acts were not considered during data analysis.

The sample consisted of native Brazilian males and females, aged 18 to 67 years, with 1 to 26 years of formal education. The following exclusion criteria were applied: (1) uncorrected sensory or physical impairments which interfered with neuropsychological testing; (2) history of neurological conditions; (3) current pregnancy or lactation; (4) psychotic symptoms at the time of testing; (5) substance abuse in the thirty days prior to the study. The same inclusion and exclusion criteria were applied to the control group, who was also screened for depressive or bipolar disorders according to DSM-5 criteria.

2.2. Procedures and instruments

All procedures were conducted according to the Helsinki declaration and good clinical practice guidelines. Subjects provided written consent for participation, and were only recruited after study approval by an institutional ethics committee (CAEE n° 23995513.5.0000.5336; project number 482.688).

Data were collected using diagnostic interviews and neuropsychological assessment instruments. Psychiatric screening was conducted using the Mini International Neuropsychiatric Interview (MINI) [31] as well as DSM-5 diagnostic criteria [6]. The history of suicide attempts was examined using Section C of the MINI, and mood symptoms at the time of testing were evaluated using the Hamilton Depression Rating Scale (HDRS) [32] and the Young Mania Rating Scale (YMRS) [33].

DM, inhibition and impulsivity were evaluated using neuropsychological tasks, as well as questionnaires and scales. Though these instruments are widely used during psychological and psychiatric assessments, they are also important in neuropsychological evaluations as a complement to behavioral measures of DM and impulsivity. Since these instruments are developed based on different underlying theories, they may evaluate distinct aspects of these cognitive processes, which may not necessarily be examined by classical neuropsychological instruments. Given the potential contributions of questionnaires and scales to the assessment process, they have been included in neuropsychological assessment batteries in several previous studies of patients with mood disorders and suicide attempts [34,35]. Measures of general cognitive ability were also used to screen for inclusion and exclusion criteria. The Mini-Mental State Examination (MEEM) [36] was used to screen for dementia, while the Block Design and Vocabulary Subtests of the Wechsler Adult Intelligence Scale (WAIS-III) [37] were used to obtain estimated IQ scores [38] and exclude intellectual disability.

Inhibition and impulsivity were evaluated using two neuropsychological instruments and one assessment scale. The Stroop Color Word Test (SCWT) [39] was used to evaluate interference control, while verbal inhibition was examined using the Hayling Sentence Completion Test (HSCT) [40]. Participants also completed the Barratt Impulsivity Scale (BIS-11) [41,42]. This instrument contains 30 items describing common symptoms of impulsivity, divided into three domains: motor, attentional and non-planning impulsivity.

DM was also examined both behaviorally and by self-report. Participants were first administered the Melbourne Decision Making Questionnaire (MDMQ) [43], in adaptation to Brazilian Portuguese by Cotrena et al. [44], which provides four scores, corresponding to adaptive (vigilance) and maladaptive patterns of DM (hypervigilance, buck passing and procrastination). Participants also completed the IGT [45]. In this instrument, the subject must choose between four decks of cards, two of which (A and B) are associated with high gains in the short term, but net losses overall, while the other two (C and D) lead to smaller gains in the short term, but net gains in the long term.

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