

# Bipolar spectrum disorders in divers: risks, recognition, and recommendations

Abraham L Querido<sup>1,2</sup>, Thijs T Wingelaar<sup>2,3</sup>

<sup>1</sup> *Praktijk Querido, Hilversum, the Netherlands*

<sup>2</sup> *Dutch Society of Diving and Hyperbaric Medicine, Bilthoven, the Netherlands*

<sup>3</sup> *Royal Netherlands Navy, Diving Medical Center, Den Helder, the Netherlands*

**Corresponding author:** Dr Abraham L Querido, Praktijk Querido, Veerstraat 25, 1211 HJ Hilversum, the Netherlands  
[bram@praktijkquerido.nl](mailto:bram@praktijkquerido.nl)

## Keywords

Bipolar disorder; Diving; Executive function; Psychotropic drugs; Risk assessment

## Abstract

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Bipolar disorder is a recurrent psychiatric condition characterised by episodic mood disturbances, residual functional impairment, and high rates of psychiatric and medical comorbidity. While many individuals achieve symptomatic remission, persistent deficits in cognition, emotional regulation, and insight may remain, raising concerns for participation in safety-critical activities such as scuba diving. This systematic review synthesised evidence from psychiatric, occupational, aviation, and diving medicine literature to examine the clinical course of bipolar disorder, treatment considerations, functional outcomes, and safety-relevant factors pertinent to fitness-to-dive assessments. Bipolar disorder exhibits marked heterogeneity in syndromal and functional outcomes. Even during euthymia, subtle impairments in attention, executive functioning, and decision-making may persist. Pharmacological stability is essential for diving, but treatment regimens, particularly lithium use, polypharmacy, and antidepressant therapy, introduce additional considerations. Comorbidity, circadian disruption, sleep deprivation, and reduced insight during early relapse further complicate risk assessment. Empirical data on diving outcomes in individuals with bipolar disorder are scarce, necessitating reliance on expert opinion and extrapolation from related safety-critical domains. Fitness-to-dive assessments in bipolar disorder should prioritise sustained functional stability, reliable treatment adherence, and illness insight over symptom absence alone. A cautious, individualised approach is warranted, incorporating medication effects, comorbidity, operational context, and relapse-prevention planning, supported by collaboration between mental health professionals and diving medical examiners.

## Introduction

Bipolar disorder is a recurrent mood disorder characterised by episodes of mania, hypomania, and depression, with substantial heterogeneity in symptom patterns, course, and severity.<sup>1</sup> While many individuals achieve symptomatic remission between episodes, a significant proportion experience residual symptoms or functional limitations even during euthymia, including subtle impairments in attention, executive functioning, and emotional regulation.<sup>2–5</sup>

These features are directly relevant to diving safety. Mood instability, impaired judgment, impulsivity, and reduced insight, particularly during (hypo)manic phases, may compromise risk assessment and decision-making underwater. Psychiatric comorbidity, including anxiety disorders, attention deficit hyperactivity disorder (ADHD), and substance use disorders, is common and may further increase risk.<sup>6</sup> Additionally, irregular sleep schedules, circadian disruption, travel-related fatigue, and medication non-adherence are well-established triggers for mood destabilisation and may readily occur during dive travel.

Guidance on diving with bipolar disorder is limited. The UK Diving Medical Committee (UKDMC) recommends a minimum period of mood stability, confirmed by both psychiatrist and general practitioner, alongside treatment adherence and relapse-prevention planning.<sup>7</sup> Beyond this pragmatic advice, little published literature addresses risk assessment or clinical decision-making in this population. This review examines the clinical course, treatment considerations, and safety-relevant factors associated with bipolar disorder to support fitness-to-dive evaluations by diving medical examiners and mental health professionals. It focuses on recreational scuba diving; professional/commercial diving generally warrants a separate assessment framework and is beyond the scope of this article.

## Methods

The literature search strategy was prepared according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A structured search of PubMed (up to 31 December 2025) identified studies and case reports regarding diving and bipolar disorder. The initial

query yielded no results, prompting an expansion to include aviation and driving literature. The final search strategy combined terms for diving, aviation, and driving with bipolar disorder-related keywords: ((diving[Mesh] OR dive[tw] OR diving[tw] OR divers[tw] OR hyperbaric[tw] OR scuba[tw]) OR (aviation[mesh] OR flying[tw] OR altitude[tw]) OR (driving[mesh] OR driv[tw] OR traffic[tw])) AND (“Bipolar and Related Disorders”[Mesh] OR manic[tw] OR bipolar[tw]).

A total of 2,734 studies were screened, with 12 identified as potentially relevant. Six of these were found through the PubMed database, and another six were identified through the reference lists of these studies. Additionally, handbooks on diving medicine addressing psychiatry or psychology were also reviewed for relevant information. Further details of the search process are illustrated in the PRISMA flowchart (Figure 1).

**CLASSIFICATION**

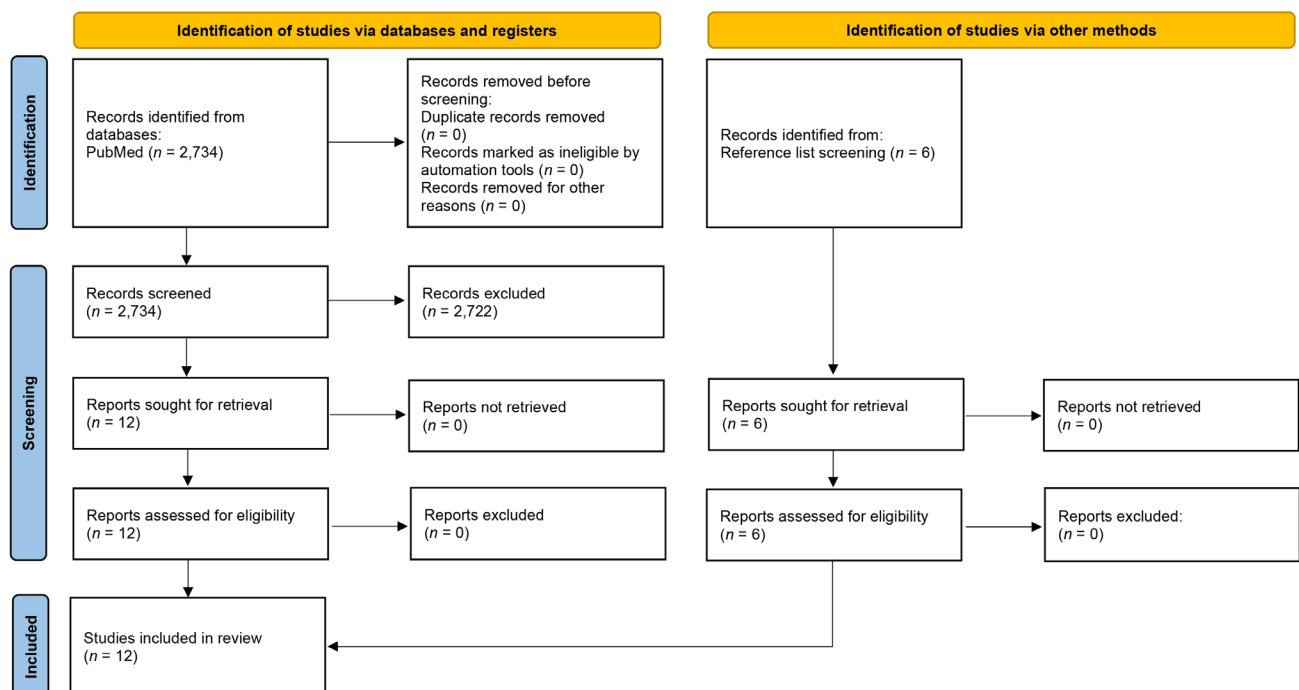
Bipolar disorder encompasses a spectrum of conditions characterised by distinct mood episodes and functional impairments.<sup>1</sup> Bipolar I disorder is defined by at least one manic episode, marked by persistently elevated or irritable mood, increased energy, reduced need for sleep, pressured speech, impulsivity, and impaired judgment. Major depressive episodes are common but not required

for diagnosis. Bipolar II disorder involves recurrent major depressive episodes alternating with hypomanic episodes, which are characterised by elevated mood and energy without psychosis or marked social or occupational impairment. Cyclothymic disorder is distinguished by chronic, fluctuating mood disturbances with hypomanic and depressive symptoms that do not meet full criteria for manic or major depressive episodes. Other specified bipolar disorders include subthreshold syndromes or bipolar symptoms secondary to substances, medications, or medical conditions. For clarity and readability the DSM-5-TR definitions of bipolar disorder are displayed in Table 1.<sup>1</sup>

**PREVALENCE**

Global prevalence estimates for bipolar disorder vary significantly depending on case definition and time frame. In the analyses from the Global Burden of Disease Study (2019) bipolar disorder had an age-standardised prevalence of approximately 0.49%, corresponding to about 39.5 million affected individuals worldwide.<sup>8</sup> Despite its relatively low prevalence, bipolar disorder accounts for a disproportionate share of years lived with disability, reflecting its early onset, recurrent course, and substantial functional impact.<sup>8</sup> Broader epidemiological estimates, including lifetime prevalence and extended diagnostic approaches, report higher figures of approximately 2–3% of the global population.<sup>9</sup> These estimates often incorporate bipolar spectrum conditions and

**Figure 1**  
PRISMA 2020 flow diagram



**Table 1**  
Classification and core clinical features of bipolar disorders (DSM-5-TR)

Disorder	Core diagnostic features
Bipolar I disorder	At least one manic episode, characterised by persistently elevated or irritable mood, increased energy, reduced need for sleep, pressured speech, impulsivity, and impaired judgment. Major depressive episodes are common but not required.
Bipolar II disorder	Recurrent major depressive episodes alternating with hypomanic episodes. Hypomania involves elevated mood and energy without psychosis or marked social/occupational impairment. A major depressive episode is required for diagnosis.
Cyclothymic disorder	Chronic, fluctuating mood disturbances with hypomanic and depressive symptoms that do not meet full criteria for manic or major depressive episodes.
Other specified bipolar disorders	Subthreshold syndromes or bipolar symptoms secondary to substances/medications (e.g., stimulants, corticosteroids) or medical conditions (e.g., hyperthyroidism, epilepsy).

subthreshold presentations, better capturing the full clinical spectrum but increasing sensitivity to methodological variation. Bipolar II disorder may be under-recognised and recorded as recurrent unipolar depression; this highlights the importance of briefly screening for past hypomanic symptoms when divers report a history of ‘depression’, particularly if episodes were recurrent, severe, or required psychotropic treatment.<sup>10</sup>

**CLINICAL COURSE OF BIPOLAR DISORDER**

Bipolar disorder is a recurrent condition characterised by episodic mood disturbances, with considerable heterogeneity in long-term outcomes. Clinical outcomes can be described along two complementary dimensions: syndromal outcome, which refers to the presence, severity, and recurrence of mood episodes, and functional outcome, which reflects the individual’s capacity to function in daily life, including occupational performance, social relationships, and overall quality of life.<sup>5</sup>

Cognitive impairment is a key determinant of functional outcome in bipolar disorder and often persists into euthymia; deficits are frequently observed across multiple cognitive domains, particularly executive function, verbal learning and memory, processing speed, and working memory.<sup>2,11,12</sup> However, cognitive outcomes are highly variable. A substantial proportion of individuals with bipolar disorder demonstrate normal or near-normal cognitive functioning, particularly in the absence of a history of psychosis, multiple manic episodes, or early illness onset.<sup>3,4,13,14</sup>

Bipolar disorder rarely presents in isolation. Over 50% of individuals meet criteria for additional psychiatric or medical comorbidities, including anxiety disorders, ADHD, substance use disorders, eating disorders, obesity, metabolic syndrome, and cardiovascular disease.<sup>6,15,16</sup> Comorbidity is associated with earlier illness onset, greater symptom

burden, poorer treatment response, increased suicidality, and higher healthcare utilisation.<sup>16</sup>

**CONSIDERATIONS IN AVIATION**

In aviation medicine, mental health is considered essential to operational safety and should be actively evaluated as part of the aeromedical assessment, with emphasis on the identification of common and potentially detectable mental health conditions rather than on routine in-depth psychiatric testing.<sup>17</sup>

Fear of losing one’s licence or livelihood may discourage pilots from disclosing medical or psychiatric symptoms during aeromedical assessments.<sup>18</sup> Survey data indicate that aircraft pilots may engage in healthcare avoidance behaviour because of concerns about aeromedical certificate loss, resulting in under-reporting of conditions relevant to flight safety.<sup>18,19</sup> Bipolar disorder is traditionally regarded as incompatible with flight duties due to the potential for episodic and unpredictable cognitive and behavioural impairment, which may occur even during prolonged asymptomatic periods despite treatment. Retrospective analyses identified only two fatal general aviation accidents in the United States between 1994 and 2014 in which the pilot had a probable diagnosis of bipolar disorder, forming the sole basis for incidence estimates (0.023%).<sup>20</sup> The Germanwings Flight 9525 crash in 2015 further illustrated the challenges of self-reporting and post hoc psychiatric assessment in safety-critical professions.<sup>21</sup> Additional aviation safety reports have described fatal accidents in which psychotropic medications used in bipolar disorder, including lithium and antidepressants, were detected in postmortem toxicology, such as a Canadian case involving lithium and a separate report of fluoxetine use in a pilot with a documented bipolar diagnosis.<sup>22,23</sup> However, insufficient clinical information precluded confirmation of psychiatric

diagnosis or causal inference, and these cases were therefore not included in incidence estimates.

While direct evidence in diving is limited, aviation-based safety reasoning provides a useful framework for clinical risk assessment in diving medicine, where self-certification, limited rescue options, and exposure to physiological and psychological stressors may amplify the consequences of sudden incapacitation.

#### CONSIDERATIONS IN DRIVING

In a controlled simulator study, euthymic outpatients with bipolar disorder exhibited significant impairments in car-following and road-tracking tasks compared to healthy controls, with sustained attention identified as the primary cognitive domain associated with impaired performance.<sup>24</sup> Supporting evidence from a small controlled study revealed longer reaction times and poorer performance in attention, executive functioning, and psychomotor speed among remitted patients, correlating with driving-related task execution.<sup>25</sup> An epidemiological study further reported a 1.66-fold increased risk of road traffic injury in individuals with bipolar disorder. These findings suggest that subtle cognitive deficits may persist during euthymia, with implications for activities requiring sustained vigilance and complex task management.<sup>26</sup>

#### PHARMACOLOGICAL CONSIDERATIONS

Pharmacological maintenance treatment for bipolar disorder primarily involves mood stabilisers, including lithium and anticonvulsants such as valproate, carbamazepine, and lamotrigine, alongside second-generation antipsychotics. Adjunctive antidepressants are employed selectively, though their use remains contentious. Despite the availability of multiple evidence-based therapies, achieving sustained long-term euthymia presents a significant clinical challenge, particularly in patients with rapid cycling, high comorbidity, or suboptimal treatment adherence.

Lithium use in divers raises specific concerns due to the potential for fluid balance disruption during diving.<sup>27</sup> Breathing dry compressed gas, immersion-induced diuresis, and increased sweating in warm environments may promote dehydration, thereby destabilising serum lithium concentrations within its narrow therapeutic range. Although post-dive rehydration may partially mitigate these effects, fluctuations in volume status elevate the risk of lithium toxicity. Consequently, the use of lithium in divers necessitates a cautious and individualised risk assessment rather than routine approval for diving activities.

Anticonvulsant mood stabilisers, such as valproate and carbamazepine, are generally regarded as effective and reasonably well-tolerated, though they are frequently

associated with gastrointestinal discomfort, weight gain, sedation, and tremor.<sup>28,29</sup> Lamotrigine, by contrast, is typically well-tolerated, with a side-effect profile in some studies comparable to placebo.<sup>30</sup> Diving while undergoing treatment with low-dose second-generation antipsychotics may be considered acceptable in carefully selected cases, provided there are no significant side effects or cardiovascular risk factors.<sup>27</sup>

Depressive symptoms represent the most persistent and disabling aspect of bipolar disorder, particularly in bipolar I disorder, with residual symptoms persisting between episodes in approximately one-third of patients.<sup>31</sup> These symptoms substantially impair quality of life and functional outcomes. The role of antidepressants in bipolar disorder remains controversial, especially in individuals with bipolar I disorder, rapid cycling, or a history of antidepressant-induced mood elevation. In clinical practice, antidepressant treatment in bipolar disorder usually occurs in combination with mood stabilisers and is most often considered in patients with persistent or clinically severe depressive symptoms, reflecting a more complex illness course.<sup>32</sup> From a diving medicine perspective, the combination of illness severity, polypharmacy, central nervous system effects, and the potential for mood destabilisation raises significant safety concerns. As such, ongoing antidepressant treatment in individuals with bipolar disorder is generally considered incompatible with recreational scuba diving.

#### FITNESS-TO-DIVE RECOMMENDATIONS

From a diving medicine perspective, pharmacological stability represents a fundamental prerequisite for assessing fitness to dive in individuals with bipolar disorder. This necessitates the absence of recent dose adjustments or medication changes, consistent treatment adherence, and sustained clinical stability without significant adverse effects. Stability in medication regimens, characterised by unchanged drugs and dosages without recent titration or rescue interventions, is essential. However, such stability is contingent upon critical clinical preconditions, including adequate illness insight, diagnostic acceptance, comprehensive psychoeducation, a robust therapeutic alliance, and reliable adherence. The absence of insight or adherence poses a substantial safety risk, even in the presence of minimal mood symptoms.

In practice, inadequate insight or unreliable adherence may be indicated by relapse linked to non-adherence, repeated emergency interventions or hospitalisations, and/or a history of involuntary admission; these are high-risk markers in fitness-to-dive decisions.

Given the lack of empirical data defining the precise duration of stability required for safe diving, recommendations are based on expert consensus. Drawing parallels with diving

medicine guidelines for epilepsy, which emphasise prolonged seizure-free and treatment-stable periods, recreational scuba diving may be considered only for individuals who have maintained euthymia, treatment adherence, and pharmacological stability for an extended period, typically several years, without hospitalisations, major mood episodes, or clinically significant adverse effects. Notably, treatment complexity (including polypharmacy or frequent regimen changes) should be interpreted primarily as a marker of illness severity or instability; the central requirement remains sustained adherence and reliable self-regulation on a stable plan over a prolonged period, potentially several years in higher-risk histories. This conservative approach reflects the potential severity of mood destabilisation and the limited capacity for managing psychiatric emergencies in underwater environments.

Fitness-to-dive assessments should prioritise functional recovery over mere symptom absence, as residual cognitive or emotional dysregulation may persist even during euthymia, and early relapse may impair judgment and insight. Diving should be deferred during any period of psychotropic medication adjustment, including initiation, dose modifications, or discontinuation, as these changes disrupt stability.

Eligibility for diving further requires sustained psychosocial functioning, absence of comorbid conditions that could compromise safety, robust illness insight with early warning sign recognition, a well-defined relapse-prevention strategy, and consistent treatment adherence. Neurocognitive impairments and comorbidities must be evaluated holistically rather than in isolation.

The operational diving context also plays a critical role. Factors such as remote locations, irregular sleep patterns, jet lag, and high task demands may elevate relapse risk, necessitating additional caution or restrictions. Safe diving participation demands not only symptom absence but also demonstrated, enduring functional stability and self-regulatory capacity, supported by close collaboration among the treating psychiatrist, general practitioner, and diving medical examiner.

#### LIMITATIONS AND FUTURE DIRECTIONS

This review underscores key considerations for assessing fitness to dive in individuals with bipolar disorder, yet several critical limitations and knowledge gaps persist. Current recommendations are largely derived from clinical experience, expert consensus, and extrapolation from related fields such as epilepsy, aviation medicine, and occupational psychiatry, rather than empirical data specific to divers with bipolar disorder. Prospective studies examining relapse risk, incident rates, and functional outcomes in this population remain lacking.

There is a lack of direct evidence regarding the effects of hyperbaric exposure and diving-related stressors, including narcosis, decompression stress, immersion-induced physiological changes, and post-dive fatigue, on mood stability or relapse risk in bipolar disorder. Similarly, the impact of circadian disruption, sleep deprivation, and long-haul travel, all established triggers for mood episodes, has not been systematically investigated in diving contexts.

Data on the behaviour of psychotropic medications under hyperbaric conditions are sparse. While modern mood stabilisers, antipsychotics, and antidepressants are generally well-tolerated, their pharmacokinetic and pharmacodynamic interactions with diving-specific stressors remain poorly understood. Additionally, the functional implications of residual neurocognitive deficits during euthymia, particularly concerning situational awareness, decision-making, and underwater emergency response, have yet to be quantified.

Current fitness-to-dive evaluations often rely on broad diagnostic classifications rather than individualised risk profiles that integrate illness trajectory, comorbidity, treatment stability, adherence, and psychosocial functioning. The scarcity of documented bipolar-related diving incidents further complicates risk estimation, potentially reflecting both low incidence and underreporting. Future research, including structured cohort studies, detailed case analyses, and multicentre registries, is essential to refine risk stratification and develop precise, personalised recommendations.

#### Conclusions

Fitness-to-dive assessments in individuals with bipolar disorder must prioritise functional stability, treatment adherence, and illness insight over symptom absence alone. A cautious, individualised approach, integrating medication effects, comorbidity, and operational context, is essential. Collaboration between mental health professionals and diving medical examiners is critical to ensure safe participation in diving activities.

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