# Impulsivity in bipolar disorder

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## Abstract

Impulsivity has for long time been neglected in bipolar mood disorder (BPD). The concept of BPD has changed beyond clinical presentations of bipolarity to include personality, affective temperaments and important comorbidities. These changes have allowed more focused research into the evolving concepts of impulsivity. Increased impulsivity has been associated with all phases of bipolar disorder (mania, mixed and depression) including inter-episode euthymic phases. The present concept of impulsivity differentiates "state" and "trait" impulsivity; both have been associated with bipolarity. Sub-traits of impulsivity (motor activation, attention, lack of planning) have been demonstrated to influence specific phases of bipolar disorder. Recent work on emotional processing and cognitive control offers additional insight into the role of increased impulsivity in bipolar disorder. Data suggests that impulsivity changes the presentation of acute BPD symptoms and increases the risk for aggressive and suicidal behaviour, influences the course of BPD, increases the risk of complications and worsens the long-term prognosis. Data on specific therapeutic effects on impulsivity are scarce in BPD. The authors have endeavoured to offer clinically relevant data on impulsivity and therapeutic implications for everyday clinical use.

Key words: impulsivity, bipolar disorder

## Introduction

Impulsivity is conceptualized as inadequate control of thoughts and behaviour; it is broadly defined as acting without thinking (1). Impulsivity is a complex construct that involves biological, psychological, social and developmental factors on a continuum from normality (and health) towards pathology (and illness) (2). Impulsivity is not a diagnosis per se or a unified category of signs and symptoms or personal characteristics. Impulsivity is closely related to several psychiatric disorders; however, its role still has to be clarified (2). Impulsivity has great clinical and public health importance, since it is associated with worse outcome of mental disorders and therefore increases substantial morbidity, social, family and job impairments, accidents, suicides and violence (3). Biological and psychological diagnostics and treatments for psychiatric disorders should include methods aimed at assessing impulsivity during the treatment and prevention of relapses (2). BPD with depression, mixed episodes, mania and inter-episode periods of euthymic mood are characterized by mood and behavioural instability where actions precede thinking about consequences, reflecting the core feature of impulsivity. In this paper some insights into impulsivity in the context of BPD will be reviewed, as well as the interaction between them, which is highly relevant in clinical settings.

## The concept of impulsivity

There are several definitions of impulsivity. Some of them are more straightforward, such as: (a) "swift actions without forethought or conscious judgment" (4); (b) "behaviour without adequate thought" (5); (c) "tendency to act with less forethought than do most individuals of equal ability and knowledge" (6). Other conceptualizations include also subtraits such as risk taking, lack of planning and making up one's mind quickly (7). Patton et al. (8) postulated impulsivity as a three-dimensional construct, with

the following domains: (1) acting on the spur of moment (motor activation), (2) not focusing on the task at hand (attention) and (3) not planning and thinking carefully (lack of planning). This definition was operationalized in the most widely used clinical scale for impulsivity assessment BIS-11 (8). There are also several tasks available for impulsivity assessment in laboratory settings. They can be classified into three broad categories: (a) "perseverance of a response that is punished or unrewarded" (9), (b) "preference for small immediate reward over a larger delayed reward" (10), and (c) "making a response that is premature or the inability to withhold a response" (11). From the social aspect, impulsivity can be seen as learned behaviour where the child learns to react immediately to obtain what is desired for gratification (12). According to several theories, two core motivational systems regulate this kind of behaviour: (a) behavioural inhibition system (BIS) that deals with aversive motivation and avoidance or withdrawal behaviour, and (b) behavioural activation system (BAS) that deals with appetitive motivation and approach behaviour (13-14). This theory has been operationalized in the BIS-BAS scale, widely used for the assessment of impulsivity in the general and clinical population (15).

Impulsivity can be also defined as a predisposition toward unplanned reactions to internal or external stimuli without regard to the negative consequences (2). Two components of impulsivity can be identified in this regard: impulsivity as a predisposition, vulnerability or "trait" of an individual, who under certain psychological, social or psychopathological conditions might develop impulsive behaviour, which can be defined as "state". These two components of impulsivity might explain why certain individuals in acute psychiatric episodes become more impulsive, disinhibited and aggressive and others with the same clinical symptoms do not. A number of studies have demonstrated that the presence of a mood disorder correlates with a significantly higher level of impulsivity (16-17).

## Impulsivity and bipolar mood disorder

Although BPD has been traditionally considered a disorder with favourable long-term outcome, several studies demonstrate that a large percentage of patients with BPD have a severe course, with high rates of relapse, residual symptoms, cognitive and functional impairment, chronic course and psychosocial disability, along with two to three times higher mortality than in the general population. 10-20% of patients with BPD commit suicide during an acute episode (mainly depression and mixed episodes) and in the euthymic state (18). Impulsivity is a prominent aspect of BPD (19). Besides influence on clinical symptoms of bipolar episodes, impulsivity also contributes to the complications of BPD, including suicide (20-22), substance abuse (23-25) and aggressive behaviour (hostility, agitation and overt aggression) (26).

Impulsivity is clinically obvious in manic and mixed episodes. Although clinical symptoms of manic states may vary from patient to patient, impulsivity is ubiquitous (27). Depression, however, may appear less strongly related to impulsivity than mania is, but this relationship is obvious at least in suicidal behaviour (28). This increased level of impulsivity in depression illustrates the complexity of the relationship between impulsivity and BPD: it may be related to manic symptoms (29) or to hopelessness (21) or to the depression itself (17). Some studies reported a similarly elevated level of impulsivity in patients with BPD regardless of the phase of illness (27), suggesting that impulsivity might represent a stable component, which is not merely a manifestation of a mood state but a characteristic of a patient with BPD also during the inter-episode euthymic phase (30). There are many possible associations between impulsivity and BPD (2), which could be related to:

- susceptibility (vulnerability to develop bipolar disorder),
- episodes of illness: increased impulsivity may accompany episodes or appear earlier in the course of an episode than the diagnostic affective symptoms,
- risk of complications such as suicide or substance abuse,
- response to specific treatments of bipolar disorder,
- pathophysiology of the illness: combination of increased norepinephrine, decreased serotonin or impaired prefrontal cortex functions.

## Research on impulsivity in bipolar disorder

There are numerous studies in which assessments of impulsivity in patients with BPD have been performed, employing different instruments and in different settings. Swann et al. (27) reported a higher level of impulsivity, as measured by the Barratt Impulsiveness Scale (BIS-11), in patients with BPD in comparison to controls, even when the patients were between episodes of mania and depression. Human laboratory measures used in this study correlated with the severity of manic symptoms but did not differ from measures of impulsivity in the control group. There was also a lack of correlation with depressive symptoms (27). The authors suggested that the trait-dependent component of impulsivity measured by BIS-11 could be related to serotonin deficiency (31) and the state-dependent component of impulsivity as measured by Continuous Performance Test (IMT-DMT) (11) could be linked with manic symptoms and noradrenergic function (27, 32). According to BIS-11 manic and euthymic bipolar patients showed similarly elevated scores compared to healthy controls (19). The similarity was explained by correlation between manic symptoms and IMT-DMT scores and attributed to subsyndromal manic symptoms in the seemingly euthymic phase (19).

Peluso et al. (26) measured impulsivity using BIS-11 across all bipolar illness phases (euthymic, depressed, mixed and manic states) and did not find significantly different impulsivity scores across all mood states. However, impulsivity BIS-11 scores were higher than in the control group on the total score and on all three subscales (non-planning, attention and motor). Swann et al. (17) demonstrated an increased total BIS-11 score in depressed, manic and mixed subjects compared to inter-episode subjects, but the increase of specific BIS-11 scores was dependent on affective state. According to their study, motor impulsivity appeared to be selectively related to mania, nonplanning impulsivity to depression and attentional impulsivity to both mania and depression. All three BIS-11 subscores were elevated in mixed states of BPD. Swann et al. (17) demonstrated that some symptoms of mania (hyperactivity, increased energy and accelerated speech) and some depressive symptoms (hyperactivity, hopelessness and anaerobia) correlated with increased impulsivity measured by BIS-11.

Increased motor impulsivity in mania relates to impetuousness and venturesomeness (33), the inability to delay a reward-related response (34) and impaired stop-signal reaction time (35). The core feature is inability to withhold or to modify motor responses. Corruble et al. (36) found an increase in all three BIS-11 subscales in unipolar depressive episodes; however nonplanning impulsivity is most strongly related to bipolar depression (17). A component of impulsivity appears to be intrinsic to the depressive state itself (17) and not just subtle manic or mixed symptoms in the bipolar depressive episode or euthymic phase (37).

## Complications of impulsivity in bipolar disorder

Increased trait impulsivity was consistently linked to suicidal behaviour (38-40). In studies on suicides in patients with BPD the trait impulsivity or both state and trait impulsivity were demonstrated (41) with higher impulsivity scores in patients with BPD with a history of suicide attempts and also higher scores in those with multiple attempts compared to those with a single suicide attempt (42). Maser et al. (20) has demonstrated in a 14-year follow-up study that impulsivity was one of the best long-term predictors for suicide attempts and completion in affectively ill patients. According to Najt et al. (41) there is a positive link between both state and trait impulsivity in BPD that goes beyond acute illness episodes into euthymic phases but relates differently according to the presence of suicidality, impulse-control disorders, substance abuse or aggression (41).

There is a consensus that impulsivity closely relates to aggression (43). The diagnosis of mania seems to be over-represented among assaultive hospitalized patients; many studies described violent behaviour in manic patients prior to and during hospitalization (44-45). Barlow et al. (45) showed that patients with BPD had the highest risk (2.81 fold increase) for aggressive behaviour compared to all psychiatric inpatients. Similarly, the cumulative increase in total BIS-11 scores has been shown when substance abuse and BPD are present simultaneously in same patients (25). Therefore baseline or trait impulsivity may also serve as a common factor of vulnerability to comorbid substance abuse and BPD. Inter-episode patients with BPD and substance abuse show higher laboratory measures of impulsivity

(IMT/DMT) compared to those without substance abuse (25). So impulsivity may predispose an individual to both acute bipolar episodes and substance abuse that additionally increases the likelihood for new episodes through additionally increased impulsivity.

Anxiety disorders are frequently comorbid with BPD. A positive association between anxiety and impulsivity was found in various studies (46-47). Bellani et al. (48) show a direct association between anxiety and impulsivity on one hand, and anxiety and BPD on the other, adding to the understanding of the complex relationships between impulsivity and BPD.

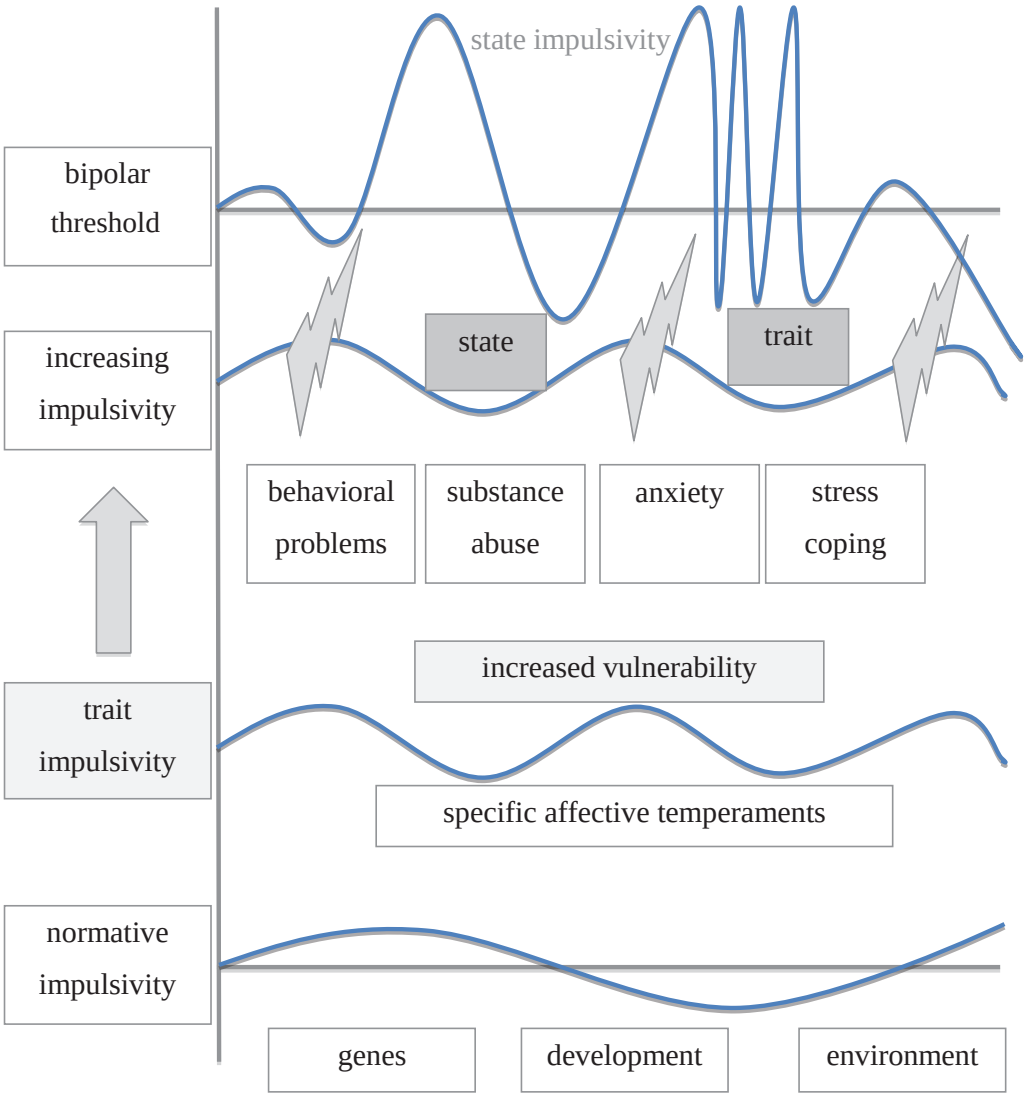
## Impulsivity and euthymia in bipolar disorder

Several studies have demonstrated increased impulsivity during euthymia in BPD. Also in some of our studies (49-50) we demonstrated an increased total impulsivity score along with increased attentional, motor and nonplanning BIS-11 subscores, as well elevated BAS scores (Behavioural activation system) in euthymic patients with BPD comparing to healthy individuals (51). Since Akiskal et al. (52) revived the concept of affective temperaments, many studies suggested an association with BPD (53-54), where certain affective temperaments represent a potential contributor to the bipolar spectrum (55). Signoretta et al. (56) reported association of cyclothymic disposition with lifetime psychopathology and impulsivity; Stanford et al. (57) reported a high correlation between impulsivity and irritability. Some of our studies demonstrated a strong positive correlation between different aspects of impulsivity and cyclothymic, irritable and anxious temperaments in the group of euthymic outpatients with BPD which could indicate that those traits represent a relatively stable picture of BPD, which is maintained even during the remission phase (30, 49, 58). These findings are in line with the hypothesis that the relatively high level of impulsivity found in patients with BPD, persisting also during remission, may be a stable component, which is not merely a manifestation of mood state (16). The importance of increased impulsivity in euthymic inter-episode patients with BPD has been investigated further by examining the role of cognitive control processes in emotional information processing using the Emotional Go/NoGo task, a measure of cognitive inhibition (50, 59-60). We found that patients with BPD showed decrements in cognitive control processes as indexed by a reduced perceptual sensitivity to negative and neutral stimuli, more impaired response inhibition and slower processing of these stimuli. According to research results, increased impulsivity, increased emotional responses on various stimuli and diminished cognitive control with impaired cognitive and emotional processing all contributed to increased vulnerability of otherwise euthymic inter-episode patients with BPD.

## Linking impulsivity and bipolar mood disorder

Impulsivity is strongly related to the course of BPD. Trait impulsivity is increased in manic, mixed and depressive episodes, influencing clinical symptoms and increasing the likelihood of behavioural disinhibition with irritability, agitation, and aggressive and suicidal behaviour. State impulsivity was compared to healthy controls in inter-episode euthymic patients with BPD demonstrating increased vulnerability for future episodes and complications that further increase the likelihood of a more severe course of BPD. The components of trait impulsivity are associated with certain affective temperaments (stable personality characteristic), emotional processing and cognitive control and processing, influencing the behaviour of an individual in various life circumstances as well as under stress. State impulsivity may increase under similar conditions including psychopathology (substance abuse, anxiety, abnormal reactions to environmental factors). Increases in both trait and state impulsivity may together reach the threshold for new bipolar episodes influencing the course of BPD. The model of these interactions is presented in picture 1.

**Picture 1. The role of impulsivity in bipolar disorder: a model of understanding**




A model of the role of impulsivity in bipolar disorder attempts to explain the known evidence based associations and influences between trait and state impulsivity and the course of bipolar disorder: *normative trait impulsivity as a personality characteristic is shaped under the influence of genes, environment and specific development with learning and social influences. Specific personality structures and affective temperaments may increase trait impulsivity closer to the bipolar threshold. This alone or in combination with abnormal environmental influences or events, stress coping, pathological anxiety, substance abuse or dependence or other comorbid psychiatric and medical conditions of axis I or II (e.g. personality disorders) may increase further both trait impulsivity and amplitudes of state impulsivity. The Vulnerability of the individual with bipolar disorder increases further, reaching the bipolar threshold , thus increasing the risk of new bipolar episodes with specifically increased state impulsivity according to the nature of the episode.*

## Therapeutic implications

Various studies have tried to demonstrate therapeutic effect on impulsivity across different psychiatric diagnostic categories (2). Studies have demonstrated the efficacy of SSRIs in decreasing impulsivity in patients with personality disorders and schizophrenia, lithium and antiepileptic drugs in organic brain disorders, autism in adults, conduct disorders and dementia, and risperidone in different patient populations. There are no relevant studies in bipolar patients (2). No psychotropic drug has an official indication for "impulsivity". However, atypical antipsychotics are widely used in low doses to diminish both anxiety and impulsivity in real-life psychiatric settings. Belli et al. (61) recently published a review of the use of psychotropic drugs in patients with borderline and bipolar disorder and found data to support the use of mood stabilisers (valproate and lamotrigine) and atypical antipsychotics (olanzapine and quetiapine but also clozapine and risperidone) to reduce impulsivity in this patient

population (61). Until now, no drug has demonstrated ability to treat impulsivity; the effect is limited to impulsivity reduction. It is, however, not clear whether psychotropic drugs reduce state impulsivity, trait impulsivity or both.

Psychosocial and psychotherapeutic interventions are effective adjuncts to pharmacotherapy but there are almost no data on their influence on impulsivity (2, 61). The number of studies is small and the observed outcomes are life functioning, satisfaction, quality of life, treatment adherence and the number of relapses. The literature on the efficacy of insight-oriented psychotherapies is scarce and not systematic. Most popular for BPD are psychosocially-oriented approaches: interpersonal and social rhythm therapy, cognitive behaviour therapy (CBT), family-focused therapy and individual or group psychoeducation (62). CBT has been demonstrated to reduce impulsivity in different populations (drug abusers, delinquents, chronic psychiatric patients and preschool impulsive children) (2). It is, however, again not clear which impulsivity has been reduced; furthermore, specifically bipolar patients have not been included in the review.

In our study neurocognitive functioning was examined in euthymic patients with BPD who attended 6 workshops of psychoeducation (63). The patients with BPD were found to be emotionally less labile, with increased impulsivity, more prone to potentially rewarding action and avoiding potentially more dangerous situations, had impaired selective attention, and in general, poorer cognitive control of emotional stimuli and worse recognition of basic emotional facial expressions. Attendance at workshops did not significantly affect the neurocognitive deficits, with the exception of clinically improved subjects.

## Conclusions

The impact of impulsivity on the outcome of BPD and comorbidity is so important that complex interplay of state and trait impulsivity should be assessed in each patient with BPD. There are some simple and affordable research and clinical instruments for assessment of impulsivity; these should be used in everyday clinical practice, especially when bipolar patients reach the euthymic phase, to determine their "trait" impulsivity. State impulsivity in acute BPD can be expected, especially when trait impulsivity is high. So far data on treatment aimed at impulsivity are scarce and no clear recommendations can be offered. However psychotherapeutic and psychoeducational work might be effective on factors influencing impulsivity and therefore improve the long-term course of bipolar disorder.

## GP comment

### What have I learned from this paper?

This article highlights how impulsivity is increased in patients with a mood disorder. It has been linked to higher suicide behaviour rates. Impulsivity is comprised of 2 components: trait and state. This explains why some patients are more vulnerable to impulsive characteristics during acute relapses. It is therefore important to ascertain these components during assessment, particularly when patients are in the euthymic state. Although pharmacotherapy has been shown to prevent impulsivity it has not been able to treat it. Psychotherapeutic and psychoeducational resources could be effective in achieving this.

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**References**

1. Patton JH, Stanford MS, Barratt ES. Barrat Impulsiveness Scale, version 11 (BIS-11). In: Rush AJ, First MB, Blacker D (Eds.). Handbook of psychiatric measures. Second edition. Arlington; American Psychiatric Publishing, Inc., 2008: 671-4.
2. Moeller FG, Barratt ES, Dougherty DM, Schmitz JM, Swann AC. Psychiatric aspects of impulsivity. Am J Psychiatry 2001; 158: 1783–93.

3. Hollander E, Posner N, Cherkasky S. The neuropsychiatry of aggression and impulse control disorders. In: Yudofsky SC, Hales RE (Eds.). American Psychiatric Press Textbook of Neuropsychiatry. American Psychiatric Pub, Washington, DC; 2002.
4. Hinslie L, Shatzky J. Psychiatric Dictionary. New York, Oxford University Press, 1940.
5. Smith L. A Dictionary of Psychiatry for the Layman. London, Maxwell, 1952.
6. Dickman SJ. Impulsivity and information processing. In: Mc-Cown WG, Johnson JL, Shure MB (eds). The impulsive client: theory, research, and treatment.. Washington, DC, American Psychological Association, 1993: 151–84.
7. Eysenck SB, Eysenck HJ. The place of impulsiveness in a dimensional system of personality description. Br J Soc Clin Psychol 1977; 16:57–68.
8. Patton JH, Stanford MS, Barratt ES. Factor structure of the Barratt Impulsiveness Scale. J Clin Psychol 1995; 51: 768–74.
9. Matthys W, van Goozen SH, de Vries H, Cohen-Kettenis PT, van Engeland H. The dominance of behavioural activation over behavioural inhibition in conduct disordered boys with or without attention deficit hyperactivity disorder. J Child Psychol Psychiatry 1998; 39:643–51.
10. Ainslie G. Specious reward: a behavioral theory of impulsive- ness and impulse control. Psychol Bull 1975; 82:463–96.
11. Dougherty DM, Bjok JM, Huckabee HC, Moeller FG, Swann AC. Laboratory measures of aggression and impulsivity in women with boredline personality disorder. Psychiatry Res 1999; 85 : 315-26.
12. L'Abate L. A family theory of impulsivity, In: McCown WG, Johnson JL, Shure MB (Eds.). The Impulsive Client. Washington, DC, American Psychological Association; 1993: 93–117.
13. Smits DJM, Boeck PD. From BIS/BAS to the big five. Eur J Pers 2006 ; 20 : 255-70.
14. Gray JA. Brain systems that mediate both emotion and cognition. Cogn Emot 1990; 4: 269-88.
15. Carver CS, White TL. Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: the BIS/BAS scales. J Pers Soc Psychol 1994; 67 (2): 319-33.
16. Peluso MAM, Hatch JP, Glahn DC, Monkul ES, Sanches M, Najt P, Bowden CL, Barratt ES, Soares JC. Trait impulsivity in patients with mood disorders. J Affect Dis 2007; 100 (1-3): 227-31.
17. Swann AC, Steinberg JL, Lijffijt M, Moeller G. Impulsivity: differential relationship to depression and mania in bipolar disorder. J Affect Disord 2008; 106: 241-8.
18. Müller-Oerlinghausen B, Berghöfer A, Bauer M. Bipolar disorder. Lancet 2002; 359: 241–7.
19. Swann AC, Pazzaglia P, Nicholls A, Dougherty DM, Moeller FG. Impulsivity and phase of illness in bipolar disorder. J Affect Disord 2003; 73: 105–11.
20. Maser JD, Akiskal HS, Schettler P, Scheftner W, Mueller T, Endicott J, Solomon D, Clayton P. Can temperament identify affectively ill patients who engage in lethal or near-lethal suicidal behavior? A 14-year prospective study. Suicide Life-Threat 2002; 32 (1): 10–32.
21. Simon TR, Swann AC, Powell KE, Potter LB, Kresnow M, O'Carroll PW. Characteristics of impulsive suicide attempts and attempters. Suicide Life Threat Behav 2001 ; 32 : 30-41.
22. Swann AC, Dougherty DM, Pazzaglia PJ, Pham M, Steinberg JL. Increased impulsivity associated with severity of suicide attempt history in patients with bipolar disorder. Am J Psychiatry 2005; 162: 1680–7.
23. Allen TJ, Moeller FG, Rhoades HM, Cherek DR. Impulsivity and history of drug dependence. Drug Alcohol Depend 1998; 50: 137–45.
24. Moeller FG, Dougherty D, Barratt E, Oderinde V, Mathias C, Andrew HR, Swann A. Increased impulsivity in cocaine dependent subjects independent of antisocial personality disorder and aggression. Drug Alcohol Depend 2002; 68 (1): 105.
25. Swann AC, Dougherty DM, Pazzaglia PJ, Pham M, Moeller FG. Impulsivity: a link between bipolar disorder and substance abuse. Bipolar Disord 2004; 6: 204–12.
26. Peluso MA, Hatch JP, Glahn DC, Monkul S, Sanches M, Najt P, Kaur S, Bowden C, Barratt ES, Soares JC. Impulsivity and Hostility in Mood Disorders. Society of Biological Psychiatry, Atlanta, USA. 06, Abstract, 2005.
27. Swann AC, Anderson JC, Dougherty DM, Moeller FG. Measurement of inter-episode impulsivity in bipolar disorder. Psychiatry Res 2001; 101: 195–97.
28. Soloff PH, Lynch KG, Kelly TM, Malone KM, Mann JJ. Characteristics of suicide attempts of patients with major depressive episode and borderline personality disorder : a comparative study. Am J Psychiatry 2000 ; 157 : 601-8.
29. Swann AC, Moeller FG, Steinberg JL, Schneider L, Barratt ES, Dougherty DM. Manic symptoms and

impulsivity during bipolar depressive episodes. Bipolar Disord 2007; 9: 206-12.
30. Dolenc B. Affective temperaments and trait impulsivity in the group of bipolar outpatients and healthy volunteers : could it also be relevant in the early diagnostic picture of bipolar mood disorder? Rev Psychol 2010; 17 (2): 91-5.
31. Manuck SB, Flory JD, McCaffery JM, Matthews KA, Mann JJ, Muldoon MF. Aggression, impulsivity, and central nervous system serotonergic responsivity in a nonpatient sample. Neuropsychopharmacol 1998; 19:287–99.
32. Swann AC, Koslow SH, Katz MM, Maas JW, Javaid J, Secunda SK, Robins E. Lithium carbonate treatment of mania: cerebrospinal fluid and urinary monoamine metabolites and treatment outcome. Arch Gen Psychiatry 1987; 44:345–54.
33. Miller E, Joseph S, Tudway J. Assessing the component structure of four self-report measures of impulsivity. Pers Individ Differ 2004; 37: 349-58.
34. Swann AC, Bjork JM, Moeller FG, Dougherty DM. Two models of impulsivity: relationship to personality traits and psychopathology. Biol Psychiatry 2002; 51: 988-94.
35. Gorlyn M, Keilp JG, Tryon WW, Mann JJ. Performance test correlates of component factors of impulsiveness. Pers Individ Differ 2005 ; 38 : 1549-59.
36. Corruble E, Benyamina A, Bayle F, Falissard B, Hardy P. Understanding impulsivity in severe depression ? A psychometrical contribution. Prog Neuropsychopharmacol Biol Psychiatry 2003 ; 27 (5) : 829-33.
37. Akiskal KK, Akiskal HS. The theoretical underpinnings of affective temperaments: implications for evolutionary foundations of bipolarity and human nature. J Affect Dis 2005; 85 (1), 231-9.
38. Apter A, Kotler M, Sevy S, Plutchik R, Brown SL, Foster H, Hillbrand M, Korn ML, van Praag HM. Correlates of risk of suicide in violent and nonviolent psychiatric patients. Am J Psychiatry 1991; 148, 883–7.
39. Oquendo MA, Waternaux C, Brodsky B, Parsons B, Haas GL, Malone KM, Mann JJ. Suicidal behavior in bipolar mood disorder: clinical characteristics of attempters and nonattempters. J Affect Disord 2000; 59: 107–17.
40. Michaelis BH, Goldberg JF, Davis GP, Singer TM, Garno JL, Wenze SJ. Dimensions of impulsivity and aggression associated with suicide attempts among bipolar patients: a preliminary study. Suicide Life Threat Behav 2004; 34: 172–6.
41. Najt P, Perez J, Sanches M, Peluso MAM, Glahn D, Soares JC. Impulsivity and bipolar disorder. Eur Neuropsychopharmacol 2007; 17: 313-20.
42. Michaelis BH, Goldberg JF, Singer TM, Garno JL, Ernst CL, Davis GP. Characteristics of first suicide attempts in single versus multiple suicide attempters with bipolar disorder. Compr Psychiatry 2003; 44: 15–20.
43. Logue AW. Self-control : waiting until tomorrow for what you want today. Prentice-Hall, Engelwood Cliffs, NJ; 1995.
44. Feldmann TB. Bipolar disorder and violence. Psychiatr Q 2001; 72: 119–29.
45. Barlow K, Grenyer B, Ilkiw-Lavalle O. Prevalence and precipitants of aggression in psychiatric inpatient units. Aust NZ J Psychiatry 2000; 34, 967–74.
46. Taylor CT, Hirschfeld-Becker DR, Ostacher MJ, Chow CW, LeBeau RT, Pollack MH, et al. Anxiety is associated with impulsivity in bipolar disorder. J Anxiety Disord 2008; 22: 868-76.
47. Perugi G, Del Carlo A, Benvenuti M, Fornaro M, Toni C, AkiskaL K, et al. Impulsivity in anxiety disorder patients: is it related to comorbid cyclothymia? J Affect Dis 2011; 133: 600-6.
48. Bellani M, Hatch JP, Nicoletti MA, Ertola AE, Zunta-Soares G, Swann AC, Brambilla P, Soares JC. Does anxiety increase impulsivity in patients with bipolar disorder or major depressive disorder? J psychiatry Res 2012; 46: 616-21.
49. Dolenc B, Šprah L. Could the relationship between trait impulsivity and affective temperaments represent a distinctive predictor of increased vulnerability to bipolar disorder? Rev Psychol 2010; 17 (1): 176.
50. Novak T, Šprah L, Tavčar R, Dernovšek MZ. The impact of mood stabilisers on the emotionally modulated response inhibition in euthymic bipolar patients. In: Papers of the 24th ECNP Congress, 3-7 September 2011, Paris, France, (Eur Neuropsychopharmacology, vol. 21, suppl. 3). Amsterdam: Elsevier; Utrecht: ECNP, 2011: S421-S422.
51. Dolenc B, Šprah L, Dernovšek MZ. Motivational systems and trait impulsivity in euthymic outpatients with bipolar mood disorder and healthy volunteers: P01-203. In: 19th European

Congress of Psychiatry, 12-15 March, 2011, Vienna, Austria. Abstracts on CD-ROM, (European psychiatry, Vol. 26, suppl. 1). Paris: Elsevier, cop. 2011.
52. Akiskal HS, Dienderedijan AH, Rosenthal RH, Khani MK. Cyclothymic disorder: validation criteria for inclusion in the bipolar affective group. Am J Psychiatry 1977; 134 (11): 1227-33.
53. Matsumoto S, Akiyama T, Tsuda H, Miyake Y, Kawamura Y, Noda T, Akiskal KK, Akiskal HS. Reliability and validity of TEMPS-A in a Japanese non-clinical population: application to unipolar and bipolar depressives. J Affect Dis 2005; 85 (1-2): 85–92.
54. Mazzarini L, Pacchiarotti I., Colom F, Sani G, Kotzalidis GD, Rosa AR, Sanna L, De Rossi P, Girardi N, Bonnin CM, Sanchez-Moreno J, Vazquez GH, Gasto C, Tatarelli R, Vieta E. Predominant polarity and temperament in bipolar and unipolar affective disorders. J Affect Dis 2009; 119 (1-3): 28-33.
55. Akiskal HS, Pinto O. The evolving bipolar spectrum. Prototypes I, II, III, and IV. Psychiatr Clin North Am 1999; 22 (3): 517-34.
56. Signoretta S, Maremmani I, Liguori A, Perugi G, Akiskal HS. Affective temperament traits measured by TEMPS-I and emotional-behavioral problems in clinically-well children, adolescents, and young adults. J Affect Disord 2005; 85 (1-2): 169-80.
57. Stanford MS, Greve KW, Dickens Jr. TJ. Irritability and impulsiveness: relationship to self-reported impulsive aggression. Pers Individ Dif 1995; 19 (5): 757-60.
58. Šprah L, Dolenc B, Dernovšek MZ. P02-142-Association between affective temperaments and impulsivity in the group of healthy volunteers and remitted bipolar outpatients. European Psychiatry. [Online ed.], 2010; 25 (supl. 1): 762.
59. Novak T, Šprah L. The psychoeducational impact on cognitive inhibition among euthymic bipolar patients. Rev Psychol 2010; 17: 105-9.
60. Dernovšek MZ, Novak T, Šprah L. Assessment of cognitive functioning within different emotional contexts in the group of euthymic bipolar patients : PW01-09. In: 18th European Congress of Psychiatry, February 27 - March 2 - 2010, Munich, Germany. Abstracts on CD-ROM, (European psychiatry, Vol. 25, suppl. 1). Paris: Elsevier, cop. 2010.
61. Belli H, Ural C, Akbudak M. Borderline personality disorder: bipolarity, mood stabilisers and atypical antipsychotics in treatment. J Clin Med Res 2012; 4 (5): 301-8.
62. Miklowitz DJ. A review of evidence-based psychosocial interventions for bipolar disorder. J Clin Psychiatry; 2006: 67 Suppl 11:28-33.
63. Dernovšek MZ. Evaluation of a psychoeducation and pharmacotherapeutic effects in patients with bipolar mood disorder (applied research project), L3-9698 (B), final report; 2008. http://www.dlib.si/details/URN:NBN:SI:doc-12E8806H