Creativity in Persons At-Risk for Bipolar Disorder – A Pilot Study.

Eva Burkhardt^{1,2,3,4}, Andrea Pfennig¹, Gwendolin Breitling^{1,5}, Steffi Pfeiffer¹, Cathrin Sauer¹,
Andreas Bechdolf^{2,3,4,6}, Christoph U. Correll^{7,8,9}, Michael Bauer¹, Karolina Leopold^{1,2,3}

¹ Department of Psychiatry and Psychotherapy, Universitätsklinikum Carl Gustav Carus, Medical Faculty, Technische Universität Dresden, Dresden, Germany.

² Department of Psychiatry, Psychotherapy and Psychosomatic Medicine with Early Intervention and Recognition Centre (FRITZ), Vivantes Klinikum Am Urban, Teaching hospital of Charité-Universitätsmedizin, Berlin, Germany.

³ Vivantes Klinikum im Friedrichshain, Department of Psychiatry, Psychotherapy and Psychosomatic Medicine, Teaching hospital of Charité-Universitätsmedizin, Berlin, Germany.

⁴ ORYGEN, The National Centre of Excellence in Youth Mental Health, University of Melbourne, Parkville, Australia.

⁵ Kliniken der Stadt Köln gGmbH, Frauenklinik Köln-Holweide, Köln, Germany.

⁶ Department of Psychiatry and Psychotherapy, Universitätsklinikum Köln, Köln, Germany.

⁷ Department of Child and Adolescent Psychiatry, Psychosomatic Medicine and Psychotherapy, Charité-Universitätsmedizin Berlin, Berlin, Germany.

⁸ Department of Psychiatry Research, The Zucker Hillside Hospital, Northwell Health, Glen Oaks, NY, USA.

⁹ Department of Psychiatry and Molecular Medicine, Hofstra Northwell School of Medicine, Hempstead, NY, USA.

Corresponding author:

Dr. med. Eva Burkhardt

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ORYGEN, The National Centre of Excellence in Youth Mental Health, University of
Melbourne, Melbourne, Australia
Tel: +61 3 9342 2800, Fax: +61 3 9342 2941
eva.burkhardt@gmx.net

Abstract

Aim: The association between bipolar disorder and creativity may be related to symptoms of the disorder itself or personality traits present before the onset. To further explore the relationship between creativity and clinical risk for bipolar disorder, creativity among individuals with a history of depressive disorder and varying risk for future (hypo-)manic episodes was assessed and compared.

Methods: 38 participants completed the diagnostic process, including Structured Clinical Interview for DSM-IV Diagnosis, Hamilton Depression Scale and Young Mania Rating Scale. The early detection tools Bipolar Prodrome Symptom Interview and Scale-Prospicive (BPSS-P), Early Phase Inventory for Bipolar Disorders (*EPIbipolar*) and Bipolar-At-Risk-(BAR)-criteria were used to assign participants into different at-risk groups. Assessment of creativity included Barron-Welsh Art-Scale (BWAS) and Creative Achievement Questionnaire (CAQ). Scores were compared between low- and high-risk groups for the development of bipolar disorder.

Results: Participants meeting BAR-criteria scored significantly higher on the BWAS than the non-BAR group ($p=0.03$). *EPIbipolar* groups did not differ significantly in creativity scores. Participants with mood swings, especially when associated with increased activity and euphoric features, had significantly higher BWAS-scores compared to individuals without mood swings ($p=0.04$). Sleep disturbances, substance abuse, anxiety, ADHD and behavioural disturbances in childhood or adolescence had no effect on creativity level or achievement scores. Generalisability was reduced by small sample size and inclusion of depressive participants only considered at-risk for bipolar disorder.

Conclusions: There is evidence of increased creativity, but not of higher creative achievements, in persons at-risk of bipolar disorder. Mood swings are strongly associated with creativity.

Keywords:

bipolar disorder – creativity – high-risk – mood swings – UHR

Abbreviations

BAR	Bipolar-At-Risk
BD	Bipolar disorder
BPSS-P	Bipolar Prodrome Symptom Interview and Scale-Pro prospective
BWAS	Barron-Welsh Art-Scale
BWAS rev.	Barron-Welsh Art-Scale, revised score
CAQ	Creative Achievement Questionnaire
EPI <i>bipolar</i>	Early Phase Inventory For Bipolar Disorder
HAMD	Hamilton Depression Scale
HPS	Hypomanic Personality Scale
KWT	Kruskal-Wallis test
MWT	Mann-Whitney test
NOS	Not otherwise specified
SIPS/SOPS	Structured Interview for Prodromal Symptoms and Scale of Prodromal Symptoms
SPI-A	Schizophrenia Proneness Instrument, adult version
TEMPS-A	Temperament Evaluation of Memphis, Pisa, Paris and San Diego, adult version
UHR	(ultra-)high risk
YMRS	Young Mania Rating Scale

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Introduction

Links between psychiatric disorders and creativity have long been of interest to biographers of exceptional artists, musicians and writers. During the past decades, psychiatric research has developed increasing interest in this topic. A systematic review revealed no correlation of creativity with psychiatric disorders in general, but significant links between creativity and bipolar disorder (BD) (Thys, Sabbe, & De Hert, 2014). People with BD are overrepresented in creative professions (Kyaga et al., 2011, 2013; Tremblay, Grosskopf, & Yang, 2010) and score higher on creativity measures, such as the Barron-Welsh Art Scale (BWAS) (Welsh & Barron, 1949), than healthy or unipolar depressive disorder controls (Santosa et al., 2007).

Creativity appears to be associated with certain affective and cognitive characteristics of individuals with BD, e.g., cyclothymia, intuition, openness and neuroticism (Schuldborg, 2001; Srivastava et al., 2010). This suggests that creativity is not just a symptom of BD, like heightened creative output during (hypo-)manic episodes with inflated self-esteem and increased activity, but may have its source in personality traits and subsyndromal mood swings. This theory is supported by studies showing increased creativity in people scoring high on the Hypomanic Personality Scale (HPS) (Eckblad & Chapman, 1986) and individuals with cyclothymic or hyperthymic temperament on the Temperament Evaluation of Memphis, Pisa, Paris and San Diego (TEMPPS-A) (H. S. Akiskal, Akiskal, Haykal, Manning, & Connor, 2005) (K. K. Akiskal, Savino, & Akiskal, 2005; Furnham, Batey, Anand, & Manfield, 2008; Rawlings & Georgiou, 2004; Srivastava et al., 2010; Vellante et al., 2011). If BD-associated creativity is based on personality and temperament, it may be present before the onset of BD and could be a characteristic trait of persons at-risk for the development of BD. It is recognised that persons with cyclothymic or hyperthymic temperament on TEMPS-A also show an increased risk for future BD (DeGeorge, Walsh, Barrantes-Vidal, & Kwapil, 2014; Kochman et al., 2005; Zeschel et al., 2015). Moreover, relatives of people with BD, having a heightened risk for BD themselves (Duffy et al., 2014), showed higher scores on the

BWAS than controls and were more likely to work in creative professions (Kyaga et al., 2011, 2013; Simeonova, Chang, Strong, & Ketter, 2005).

To investigate the level of creativity in persons at-risk of BD, the definition of the at-risk status is crucial. The focus of early detection tools shifted from personality styles to episodic, dynamic affective symptoms:

- Bipolar Prodrome Symptom Interview and Scale prospective version (BPSS-P) assesses sub-threshold hypomanic and depressive symptoms not meeting severity and/or duration criteria for hypomanic or depressive episodes (Correll et al., 2014).
- Early Phase Inventory for Bipolar Disorders (EPI*bipolar*) (Pfennig & Leopold, 2010) rates risk based on BPSS-P and several other risk factors, e.g. family history of BD, sleep disturbances, and decline in psychosocial functioning (Leopold et al., 2012).
- Bipolar at-risk (BAR) criteria rely on an unstructured interview assessing attenuated manic symptoms or the combination of attenuated depressive symptoms combined with either cyclothymic features or genetic risk (Bechdolf et al., 2010). Transition rates of persons fulfilling BAR-criteria were as high as 14% to 23% within a year (Bechdolf et al., 2014).

None of the aforementioned risk assessment tools have yet been tested regarding associations with creativity. To evaluate creativity - an inconsistently defined, complex construct of characteristics, talents and skills - more than one measure should be used in order to tap into different aspects of creativity (Thys et al., 2014). We chose the BWAS, having already shown correlations with BD (Santosa et al., 2007), and the Creative Achievement Questionnaire (CAQ) (Carson, Peterson, & Higgins, 2005), aiming to differentiate between creative potential and creative output. The latter not only requires talent, but also continuous activity and endeavour (Schuldborg, 2001).

Given that predictive values of the early detection tools are still unclear, both EPI*bipolar* (including BPSS-P) and BAR-criteria were used for the identification of persons at-risk for BD.

To ensure a sufficient proportion of persons at-risk in the sample, only individuals with a history of depressive disorder were included, as depression is associated with an increased risk for future BD (H. S. Akiskal et al., 1995; Goldberg, Harrow, & Whiteside, 2001; Kochman et al., 2005).

We hypothesised that persons fulfilling the at-risk status according to BAR or *EPIbipolar* criteria would score higher on both BWAS and CAQ than those considered at lower risk.

Methods

Participants

Our sample was recruited as part of the “Pilot study for the evaluation of the Early Phase Inventory for Bipolar disorders (*EPIbipolar*) to identify persons at-risk for bipolar disorders”, a prospective, observational study with a follow-up period of three years, aiming to examine the predictive value of *EPIbipolar* to correctly detect people at-risk for BD. The investigation was conducted in accordance with the Declaration of Helsinki “Ethical Principles for Medical Research Involving Human Subjects” (last Revision 2013) and approved by the ethics committee of the Medical Faculty “Carl Gustav Carus“, Technische Universität Dresden. All participants gave written informed consent, in case of subjects under the age of 18, the consent of a parent was obtained in addition to written assent by the minor.

Inpatients and outpatients of the department of Psychiatry and Psychotherapy and clients of the Early Recognition Centre for Mental Disorders at Universitätsklinikum Dresden, aged between 15 and 40 years with a depressive syndrome were invited to participate. The depressive syndrome was defined as fulfilling the criteria of one of the following DSM-IV-diagnoses: major depressive disorder, dysthymia, cyclothymia, adjustment disorder, or depressive disorder not otherwise specified (NOS). Clients with schizophrenia, schizoaffective disorder or bipolar disorder were excluded; other comorbid psychiatric diagnoses were allowed.

Assessment

To confirm the diagnosis of a depressive disorder the Structured Clinical Interview for DSM-IV Diagnosis (SCID-I) (First, Spitzer, Gibbon, & Williams, 1995) was performed. Inclusion also required euthymic or at most mildly depressed mood, defined as scores <7 on Young Mania Rating Scale (YMRS) (Young, Biggs, Ziegler, & Meyer, 1978) and <17 on the 17-item version of the Hamilton Depression Scale (HAMD-17) (Hamilton, 1960).

The further diagnostic process included medical and psychiatric history, sociodemographic data, Structured Clinical Interview for DSM-IV Diagnosis (SCID-II) (First, Gibbon, Spitzer, Benjamin, & Williams, 1997), BWAS (Barron & Welsh, 1952), CAQ (Carson et al., 2005), Schizophrenia Proneness Instrument (SPI-A) (Schultze-Lutter, Addington, Ruhrmann, & Klosterkötter, 2007), Structured Interview for Prodromal Symptoms and Scale of Prodromal Symptoms (SIPS/SOPS) (Miller et al., 2003), BPSS-P (Correll et al., 2014), and EPIbipolar Version 3.0 (Pfennig & Leopold, 2010).

The **BWAS** consists of 86 black-and-white drawings that the participant is asked to label with “like” or “dislike”. According to a scoring key, each answer receives one or zero points. 62 of the items count for the BWAS score and 60 for the BWAS revised score (BWAS rev.). Accordingly, scores range from 0 to 62 points (BWAS) or 0 to 60 points (BWAS rev.), with a correlation of ≥ 0.9 between both scores. BWAS scores have a positive correlation with creativity (Welsh, Hall, & Bradley, 2005).

The **CAQ** is a three-part self-report questionnaire, assessing achievements in ten creative domains, e.g. visual arts, music, inventions, and scientific discovery. It records self-reported creative talent (Part I) and creative personality traits influencing the person’s reputation (Part III). Part II lists eight questions for each domain ranking from “no training or recognised talent in this area” (0 points) to an item representing general interest and training (e.g. “I have taken lessons” – 1 point) to increasingly difficult accomplishments (e.g., “I have sold my [writing] to a publisher” – 4 points; “My work has been critiqued in national publications” – 7

points). Every achievement earns the related number of points. The 7-point-item scores multiple times if it has been accomplished more than once. The overall CAQ-score is generated by summation of the subscores. The CAQ showed good psychometric properties and resistance to self-aggrandising bias (Carson et al., 2005).

BPSS-P is a semi-structured interview consisting of three sections (Mania, Depression, General Symptoms). In our sample with a history of depressive disorder, only the 10-item Mania-section was conducted. Severity of each item is rated from absent (0 points) to extreme (6 points). Duration and onset are registered (Correll et al., 2014). For this study, the (hypo-)mania prodrome was defined as the presence of mood elevation and/or irritability and at least two other items during the last year, with at least moderate severity (3) and minimum duration of two consecutive days.

EPIbipolar is another semi-structured interview targeting changes in sleep and circadian rhythm, mood swings, atypical depressive symptoms, anxiety, psychosocial functioning, substance abuse, ADHD and other behavioural disturbances in childhood and adolescence. Mood swings are assessed with attention to character (depressive, euphoric or dysphoric), duration, intensity, frequency, existence of euthymic episodes, and changes of activity. Combined results of EPIbipolar interview and BPSS-P determined the group allocation (Table 1) (Leopold et al., 2012).

Statistical methods

Statistical analyses were performed with SPSS® 23 (Statistical Package for Social Sciences, version 23). For the characterisation of sociodemographic and clinical attributes of participants in the different groups, descriptive statistics, using Chi-square, Kruskal-Wallis (KWT) and Mann-Whitney (MWT) tests were performed. For comparison of creativity parameters (BWAS/CAQ), KWT and MWT were used again because of non-normal distribution of the parameters. When significant differences were detected with KWT, pairwise post-hoc comparisons were performed using MWT and Bonferroni correction was

applied. All tests were two-sided and alpha was set at 0.05 for all analyses, with p-values between 0.05 and 0.10 being referred to as statistical trends.

Results

Cohort

48 persons consented to participate in the study. Eight individuals did not complete data collection. One participant scored >17 points on HAMD-17 repeatedly and one participant withdrew consent. Data of the remaining 38 participants were used for statistical analysis.

Sociodemographic and clinical characteristics of the sample

The age of the participants ranged from 17 to 39 years (Table 2). Neither BAR- nor EPIbipolar groups showed significant differences of age or sex, whereas the group with mood swings contained a significantly higher percentage of females ($p < 0.001$).

In accordance with inclusion criteria, all participants were currently diagnosed with a depressive disorder (84%) or had a history of depressive episodes (16%). Most participants experienced major depressive episodes (74%). The remaining 26% fulfilled criteria for dysthymia, adjustment disorder, or depression NOS. Frequent comorbidities were substance use (32%) and anxiety disorders (24%). Nine participants (24%) were diagnosed with personality disorders, with borderline personality disorder being the most frequent (11%).

Results of the creativity measures

Barron-Welsh Art-Scale

Mean BWAS score in the sample was 30.2 points; the mean revised score was 32.0. Participants fulfilling BAR-criteria scored significantly higher on BWAS and BWAS rev. (MWT, $p = 0.030$ and $p = 0.032$) (Figure 1).

EPIbipolar groups did not differ significantly in BWAS-scores (KWT, BWAS: $p = 0.152$, BWAS rev.: $p = 0.157$), but participants reporting mood swings in EPIbipolar scored markedly higher than those without mood swings (MWT, BWAS: $p = 0.039$, BWAS rev.: $p = 0.042$) (Figure 2). These groups showed a significant difference in their sex structure, as described above.

Although no sex difference in BWAS-scores appeared in the entire sample (MWT, BWAS: $p=0.332$, BWAS rev.: $p=0.271$), a separate analysis was performed to compare the BWAS-scores of only the male participants in both groups. Despite the reduced sample size ($n=21$), the group with mood swings still scored significantly higher on the BWAS (MWT, $p=0.037$) and displayed at least a trend towards higher scores on the BWAS rev. (MWT, $p=0.084$).

Characteristics like increased activity associated with mood swings and occurrence of euphoric episodes appeared to correlate with BWAS-scores (Figure 3). However, only the difference between the group with euphoric phases and the group without mood swings met the Bonferroni-corrected significance level in post-hoc testing (MWT, BWAS: $p=0.015$, BWAS rev.: $p=0.009$).

None of the other *EPIbipolar* risk factors, sleep disturbances (MWT, BWAS: $p=0.236$, BWAS rev.: $p=0.248$), anxiety (MWT, BWAS: $p=0.916$, BWAS rev.: $p=0.683$), ADHD and other behavioural disturbances in childhood and adolescence (MWT, BWAS: $p=0.734$, BWAS rev.: $p=0.880$), and abuse of alcohol (KWT, BWAS: $p=0.479$, BWAS rev.: $p=0.397$), cannabis (KWT, BWAS: $p=0.388$, BWAS rev.: $p=0.420$) or other drugs (MWT, BWAS: $p=0.733$, BWAS rev.: $p=0.936$), showed significant correlation with BWAS-scores. Analyses for family history of BD and decline in psychosocial functioning could not be performed as only one participant had a relative with BD and all participants showed relevant decline in functioning.

Creative Achievement Questionnaire

CAQ results of the sample ranged from 0 to 38 points. BAR group and *EPIbipolar* UHR group showed a trend towards higher CAQ-scores compared to their respective control groups (Table 3). Participants with mood swings and associated increase of activity displayed elevated CAQ-scores, but group differences did not meet the Bonferroni-corrected significance level ($p<0.017$) in post-hoc testing (MWT, with increased activity vs. without increased activity: $p=0.017$, with increased activity vs. no mood swings: $p=0.063$).

Discussion

Interpretation of the results

Persons fulfilling BAR-criteria score higher than controls on the BWAS implying that a connection between BD and creativity is present before full manifestation of the disease. Distinct mood swings appear to be the most influential factor linking BD and creativity, consistent with previous research showing associations between cyclothymic temperament and BWAS-scores (Srivastava et al., 2010). Mean BWAS-scores of participants with typical hypomanic features of mood swings (increased activity and euphoric episodes) were even higher than those of participants with BD and creative controls in previous studies (Santosa et al., 2007).

Although *EPIbipolar* ratings also depend on the occurrence of mood swings, no significant group differences of BWAS-scores were found. This may result from the high selectivity of *EPIbipolar*. Of 27 persons reporting mood swings, only four met criteria for the primary risk factor “increasing mood swings with increased activity”, defined as progressive cyclothymia, with activity changes and euthymic episodes. All participants who fulfilled this primary risk factor or the (hypo-)mania prodrome one the BPSS-P also met BAR-criteria. The BAR group however included several additional participants, e.g., with constant cyclothymia or mood swings without euthymic phases or changes in activity. Altogether, the BAR group contained 13 participants, while the UHR group only consisted of nine persons. Given the high prevalence of mood swings in the sample (71%), selectivity of measures appears to be necessary. However, some participants struggled to characterise their mood swings in detail, e.g. the presence of euthymic phases or dynamic character; and there is no evidence for mood swings becoming more pronounced before the first episode of mania. The predictive values of both at-risk definitions need be assessed in prospective trials with long-term follow-up.

In contrast to the BWAS, CAQ results did not appear to be significantly associated with mood

swings, nor did they reveal a significant difference between BAR- or EPI**bipolar** UHR-group and controls. Thus, persons at-risk for BD might have a high innate creativity that does not necessarily lead to recognised creative output. Interestingly, Vellante et al. (2011) did find a correlation between cyclothymic temperament and CAQ-scores. A possible explanation for this discrepancy is that all participants in our sample experienced depressive symptoms, including low mood, lack of energy and reduced self-esteem. Creative productivity and willingness to present one's own work in public may decrease during depressed episodes. Population-based Swedish studies showed that although the study of artistic subjects in secondary or tertiary education was associated with a higher risk of both, BD and unipolar depression (MacCabe et al., 2018), only people with BD were found to be overrepresented in artistic professions (Kyaga et al., 2011). Not surprisingly, participants of our study reporting increased activity associated with mood swings scored comparably high on the CAQ.

Mean CAQ-scores in our sample were markedly lower than the scores of non-psychiatric samples (Carson et al., 2005), although the mean age of our participants was several years older, which should have given them more time to accomplish creative achievements. However, older age did not correlate with higher CAQ scores in our sample. Creative achievements depend not only on talent, cognitive abilities, personality and motivation, but also on economic security, familial and institutional support (Carson et al., 2005). All participants showed a decline in psychosocial functioning, and depressive disorders are associated with a reduced socioeconomic status (Jacobi et al., 2014, 2015). Hence, it is possible that the life circumstances of depressive patients prevent or delay the full development of their creative potential.

Limitations

The sample of clients with a history of a depressive syndrome represents one subgroup of the BD at-risk population. Thus, findings cannot be generalised for the population of help-seeking young people. Another limitation is the small sample size. The problem of multiple statistical testing was addressed by the application of Bonferroni correction. Difficulties of

identifying persons at-risk for BD have been accounted for by using different at-risk definitions. Quantifying creativity is also controversial. However, BWAS and CAQ have proven good reliability (Carson et al., 2005; Gough, Hall, & Bradley, 1996) and address different aspects of creativity.

Clinical implications

Future research should examine how creativity influences the course of BD. It is important to avoid pathologising of creative interest and talent, especially in the context of early intervention. Screening for BD in creative populations cannot be recommended based on the results of this study and needs to be discussed critically in regards to ethical considerations like the distinction between help-seeking and screening populations. Nevertheless, predictive values of creativity measures for the development of BD should be analysed to assess their utility as one additional component in the risk assessment.

Creativity may also play a role in distinguishing risk constellations for BD and other conditions. No associations between schizophrenia or borderline personality disorder and creativity have been found yet (Thys et al., 2014), thus creativity may have a specific value in predicting BD. Unfortunately, our small sample size did not allow statistical analyses for associations between mania-like features, psychotic symptoms, emotional instability and creativity.

Working with clients with BD, creativity can have an enormous impact on the therapeutic course and treatment decisions. Dopamine antagonists, lithium and other mood stabilisers may inhibit creative motivation (Flaherty, 2011; Wingo, Wingo, Harvey, & Baldessarini, 2009). Clients should be asked proactively about adverse effects of the medication, including their effect on creativity, to find a tolerable medication and dosage, especially during euthymic phases. Otherwise, fear and misconception may lead to generally negative attitudes towards medications, thus decreasing adherence (Flaherty, 2011; Lambert et al., 2004). However, it is also possible that the course of BD itself leads to declining creativity,

through worsening of cognitive and psychosocial functioning (Simeonova et al., 2005).

As creativity is an important part of a person's identity, it is crucial to obtain a better understanding of links between BD, treatment options and creativity to provide effective treatment while maintaining creative thinking and activities. Ideally, addressing creativity in the therapeutic process could help to activate resources and support self-efficacy.

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Conflict of Interest

Eva Burkhardt reports grants from Janssen and Otsuka (both outside the submitted work).

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Table 1 Allocation to BAR, EPIbipolar and mood swing groups and subgroups for mood swing characteristics

BAR	BAR	1. Attenuated manic symptoms <i>and/or</i> 2. Depressive symptoms + cyclothymic features <i>and/or</i> 3. Depressive symptoms + genetic risk of BD			
	Non-BAR	Fulfilling none of the above mentioned criteria			
EPIbipolar	UHR	1. Genetic risk of BD <i>and/or</i> 2. (Hypo-)mania prodrome in BPSS-P <i>and/or</i> 3. Increasing mood swings associated with changes in activity			
	Risk	1. Specific disturbances of sleep or circadian rhythm <i>and/or</i> 2. Increasing mood swings without changes in activity <i>and/or</i> 3. Depressive episodes with specific characteristics			
	No current risk	Fulfilling none of the above mentioned criteria			
Mood swings (assessed with EPIbipolar)	No mood swings (no mood swings or only depressed phases)	No mood swings	No mood swings	No mood swings	No mood swings
	Mood swings (experiencing euphoric or irritable phases)	Constant swings	Swings without changes in activity	Swings without euphoric phases	Swings without euthymic phases
		Increasing swings	Swings with changes in activity	Swings with euphoric phases	Swings with euthymic phases
		Dynamic character	Changes in activity	Presence of euphoric phases	Presence of euthymic phases

	BAR-criteria			EPIbipolar				Mood Swings (according to EPIbipolar)			
	non-BAR n=25	BAR n=13	p	no risk n=6	R n=23	(U)HR n=9	p	no MS [†] n=11	MS [†] n=27	p	all
Age, years	29.4	25.7	0.150 ^a	29.0	28.4	27.0	0.940 ^c	28.9	27.8	0.849 ^a	28.1
Sex											
female, %	36.0	61.5	0.178 ^b	33.3	43.5	55.6	0.685 ^b	0.0	63.6	0.000^b	44.7
Occupation											
student, %	32.0	30.8		33.3	34.7	22.2		45.5	25.9		31.6
employed, %	44.0	23.1		66.7	30.4	33.3		36.4	37.0		36.8
unemployed, %	16.0	30.8		0.0	21.7	33.3		18.2	22.2		21.1
other, %	8.0	15.4		0.0	13.0	11.1		0.0	14.8		10.5
Suicide attempts, %	28.0	46.2	0.301 ^b	0.0	39.1	44.4	0.151 ^b	27.3	37.0	0.714 ^b	34.2
Diagnoses											
criteria for MDE fulfilled, %	68.0	84.6	0.441 ^b	33.3	82.6	77.8	0.048^b	54.5	81.5	0.116 ^b	73.7
>1 diagnosis in SKID I, %	36.0	30.8	1.000 ^b	16.7	39.1	33.3	0.585 ^b	27.3	37.0	0.714 ^b	34.2
personality disorder, %	20.0	30.8	0.689 ^b	16.7	26.1	22.2	0.884 ^b	36.4	18.5	0.401 ^b	23.7
Borderline PD, %	4.0	23.1	0.107 ^b	0.0	8.7	22.2	0.351 ^b	0.0	14.8	0.303 ^b	10.5
Medication											
antidepressants, %	80.0	46.2	0.064 ^b	83.3	73.9	44.4	0.189 ^b	81.8	63.0	0.444 ^b	68.4
Lithium, %	16.0	7.7	0.643 ^b	0.0	17.4	11.1	0.521 ^b	9.1	14.8	1.000 ^b	13.2
antipsychotics, %	16.0	30.8	0.407 ^b	0.0	17.4	44.4	0.093 ^b	18.2	22.2	1.000 ^b	21.1
Alcohol use											
never, %	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0
intermittent ^d , %	64.0	69.2		83.3	56.5	77.8		54.5	70.4		65.8
regularly ^e , %	36.0	30.8		16.7	43.5	22.2		45.5	29.6		34.2
Cannabis use											
never, %	48.0	23.1		33.3	52.2	11.1		36.4	40.7		39.5
intermittent ^d , %	44.0	53.8		50.0	43.5	55.6		54.5	44.4		47.4
regularly ^e , %	8.0	23.1		16.7	4.3	33.3		9.1	14.8		13.2
Drug use (e.g. heroin, cocaine, amphetamines)											

never, %	92.0	69.2	83.3	95.7	55.6	81.8	85.2	84.2
intermittent ^d or regularly ^e , %	8.0	30.8	16.7	4.3	44.4	18.2	14.8	15.8
^a Mann-Whitney test ^b Chi ² test ^c Kruskal-Wallis test ^d less than once per week ^e at least once per week ^f mood swings								

Table 3 CAQ-scores				
	n	CAQ	SD	p
BAR-criteria				
non-BAR	25	7.5	8.3	0.087 ^a
BAR	13	12.0	10.1	
EPI <i>bipolar</i> groups				
No increased risk	6	9.0	11.2	0.080 ^b
Risk (R)	23	6.7	6.8	
(Ultra-)high risk (UHR)	9	15.0	10.9	
Mood Swings (according to EPI <i>bipolar</i>)				
no mood swings	11	7.6	8.4	0.735 ^a
mood swings	27	9.6	9.4	
^a Mann-Whitney test				
^b Kruskal-Wallis test				

Figure Legend

- Figure 1 BWAS score and revised score by BAR criteria
- Figure 2 BWAS score and revised score by mood swings
- Figure 3 BWAS score by dynamic of mood swings, increased activity, euphoric and euthymic phases

fig 1.tif

fig 2.tif

fig 3.tif

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Author/s:

Burkhardt, E;Pfennig, A;Breitling, G;Pfeiffer, S;Sauer, C;Bechdorf, A;Correll, CU;Bauer, M;Leopold, K

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