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# THE TEMPERAMENT AND CHARACTER TRAITS IN PATIENTS WITH MAJOR DEPRESSIVE DISORDER AND BIPOLAR AFFECTIVE DISORDER WITH AND WITHOUT SUICIDE ATTEMPT

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## SUMMARY

**Background:** Suicide and mood disorders (especially major depressive disorder (MDD) and bipolar affective disorder (BD)) represent a significant global health burden. Major depressive disorder and bipolar affective disorder have been associated with increased risk for suicide. Some specific suicide risk factors might be found in underlying individual personality traits. Specific personality features may predispose an individual to mood disorders (MDD or BD) hence increased suicide risk. The specificity of this research is in the assessment of personality features during the acute phase of illness immediately after suicide attempt which resulted in psychiatric inpatient treatment.

**Subjects and methods:** The study included 119 unrelated Caucasian participants with MDD-severe depressive episode without psychotic symptoms (MDD) and BD-severe depressive episode without psychotic symptoms (BD-sDE). Both groups of patients with MDD and BD-sDE were divided into the suicide attempters and non-suicidal group. The diagnoses of the severe depressive episode without psychotic symptoms in major depressive disorder (MDD; F32.2) and bipolar disorder (BD-sDE; F31.4) were made according to ICD-10 (WHO 1992) diagnostic criteria. Methods of suicide attempts were also assessed according to ICD-10 and a self-report questionnaire, the Temperament and Character Inventory (TCI) was applied.

**Results:** The participants who exhibited suicide attempt had significantly higher scores on harm-avoidance (HA) ( $p < 0.001$ ), significantly lower score on persistence (PS) ( $p = 0.037$ ) and lower score, however not statistically significant, on novelty-seeking (NS) ( $p = 0.319$ ) regarding temperament dimensions. In character dimensions, the patients with suicidal attempt had significantly lower scores on self-directedness (SD) ( $p < 0.001$ ) and significantly lower scores on cooperativeness (CO) ( $p = 0.001$ ).

**Conclusion:** Patients who had suicide attempt may have some significantly different personality traits than non-suicidal patients with mood disorders. The combination of high harm-avoidance (HA) and low self-directedness (SD) may be specific for depressive episode while the combination of high HA, novelty-seeking (NS), and self-transcendence (ST) with low SD may be related to suicide attempts during the depressive episode in bipolar disorder. The novelty-seeking (NS), self-transcendence (ST) and self-directedness (SD) may be specific for suicidal group of bipolar patients.

**Key words:** major depressive disorder - bipolar disorder - suicide attempt - temperament and character

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## INTRODUCTION

Suicide and mood disorders (especially major depressive disorder and bipolar affective disorder) represent a significant global health burden (WHO, Mental Health Atlas 2014). According to the World Health Organization (WHO), it is estimated that depression affects 350 million people (WHO, Global Health Estimates 2013). Major depressive disorder (MDD) is often chronic, recurring and gradually results in reducing overall individual functioning. Therefore, depression is also a leading cause of disability worldwide, for both males and females, due to total years lost for disability

(WHO, Mental Health Action Plan 2013). Bipolar disorder (BD), is common severe and persistent mental disorder which is characterized by manic, depressive, and mixed episodes and is associated with long-term cognitive and functional impairment (Connolly & Thase 2011, Clemente et al. 2015). The lifelong prevalence rate of bipolar disorder is 0.3–1.5% (Yutzy et al. 2012). The life-expectancy has been found to be much shorter in patients with bipolar affective disorder (Laursen 2011). Both above mentioned disorders, have been associated with increased risk for suicide (Rihmer 2007). Patients with BD have a suicide rate 30 times higher than the general population and 25-50% of these

patients will attempt suicide once in their lifetime (Marangell et al. 2006). Fifteen percent of those who attempted suicide eventually make complete suicide (Izci et al. 2016). Although MDD has an overall negative health impact and is associated with morbidity which is hard to determine, its lethality becomes measurable through a perspective of completed suicide (Harwitz & Ravizza 2000). Furthermore, as many as two-thirds of people with depression reports suicidal ideation, 10-15% commit suicide and 60-70% suicide victims have had severe depression before completed suicide (Woo et al. 2014). Regardless the decline in suicide mortality, in majority of countries with high baseline suicide rates, suicidal behavior still manifests among patients with mood disorders in state-dependent order (Latalova et al. 2014, Rihmer et al. 2006, Suominen et al. 2004).

### **Mood disorders, suicidal behavior and personality traits**

The term multicausal underlays the etiology of mood disorders and suicidal behavior. Both pathological entities consist out of a variety of possible factors involved in their appearance and development. The suicide risk factors in mood disorders can be divided into proximal and distal. The distal factors (one's unrelated to current or past mood episodes) are as follows: epigenetic factors, early onset of mood disorders, family history of suicide, alcohol/substance abuse, adverse early life situations, permanent adverse life situations (isolation, unemployment) and personality traits. The proximal factors (related to current or past mood episodes) include: hopelessness, impulsiveness, suicidal ideation, psychopathology and recent life events (Turecki et al. 2012, Undurraga et al. 2012, Rudd et al. 2006, Sokero et al. 2005). Even with an effort and recognition through clinical screening, of various suicide risk factors in MDD and BD, the prediction of suicidal behavior/attempts is still predominantly undeterminable with frequent false-positive and -negative findings (Ekinci et al. 2012, Conrad et al. 2009). In the vast amount of possible suicide risk factors, more specific one's might be found in the underlying individual personality traits. Personality, in general, refers to individual differences in characteristic patterns of thinking, feeling and consequently behaviour (McAdams & Bradley 2010). Personality features constitute a vital part of stress-diathesis model for suicidal behavior hence it is important to understand which of these features may be linked to suicidal behavior and whether suicidality emerges in the context of a duration of the psychiatric disorder or is a situation-oriented process (Mann 2013, Kampman & Poutanen 2011). As for suicide-oriented factors, specific personality features may predispose an individual to mood disorders (MDD or BD) hence

increased suicide risk. Personality can be modified after the onset of the depressive episode; personality can affect the clinical presentation of a depressive episode, and the depressive personality can be considered as a subtype of mood disorder (Richter et al. 2000, Akiskal et al. 1983). Also, it has been shown that vulnerability to suicide is partly genetically determined (Brent & Mann 2005). Apart from non-genetic factors, heritable factors in the suicide diathesis account for ~45% of this variance and based on twin studies, about 40% of personality variance is determined by genetic factors (Pawlak et al. 2016, Statham et al. 1998). The Cloninger's psychobiological model of temperament and character evaluates seven higher order personality or behaviour traits. These include four higher order temperament (novelty-seeking (NS); harm-avoidance (HA); reward dependence (RD) and persistence (PS)) traits and three higher order character (self-directedness (SD); cooperativeness (CO); self-transcendence (ST)) traits (Cloninger et al. 1993). The temperament dimensions correspond to the underlying genetic structure of personality meaning these four temperament dimensions are genetically homogeneous and independent. Contrary to temperament dimension, the character refers to self-concepts and individual differences in goals and values which affect intentions, opinionated choices and the meaning of what is experienced in life. Character differences are influenced by sociocultural learning and maturation (Cloninger et al. 1994). Heretofore, different studies were performed using the Temperament and Character Inventory (TCI) to investigate personality factors associated with suicidal behavior and mood disorders (MDD and BD). These studies were predominantly focused on correlation between euthymic states and certain aspect of mood disorder (major depressive disorder, bipolar disorder – I and II, relation to past mood episodes) and specific aspects of suicidal behaviour (suicide ideation, impulsivity, relation to previous suicide attempts, genetic and family background) (Jylhä et al. 2016, Karam et al. 2015, de Abreu et al. 2009, Calati et al. 2008). However, there is quite sparse data concerning actual suicide attempts in mood disorders (MDD and BD) during the severe depressive episode (without psychotic symptoms) and personality features (Camarera et al. 2014, Pawlak et al. 2013). In this study, we aimed to determine specific personality traits, measured with TCI, among patients with suicide attempt during the severe depressive episode without psychotic symptoms in MDD and BD (according to International Statistical Classification of Diseases and Related Health Problems 10<sup>th</sup> Revision (ICD-10), World Health Organization (WHO)). The specificity of this research is in assessment of personality features during acute phase of illness (MDD or BD) immediately thereafter suicide attempt which resulted in psychiatric inpatient treatment.

## SUBJECTS AND METHODS

The research included 119 unrelated Caucasian participants with MDD-severe depressive episode without psychotic symptoms (MDD) and BD-severe depressive episode without psychotic symptoms (BD-sDE). The sample consisted of 81 (68%) female and 38 (32%) male patients. The patients were recruited between February 2013 and September 2015 in the Department of Psychiatry, University Hospital Centre Osijek, Croatia. A treating psychiatrist confirmed the diagnoses of the severe depressive episode without psychotic symptoms in major depressive disorder (MDD; F32.2) and bipolar disorder (BD-sDE; F31.4) according to ICD-10 (WHO 1992) diagnostic criteria and in consensus with two psychiatrists involved in this research. The patient group (patients with a severe depressive episode without psychotic symptoms with MDD or BD-sDE) sought urgent treatment due to a suicide attempt after which followed inpatient treatment. The control group consisted of inpatients admitted due to worsening of depressive symptoms within their MDD or BD-sDE, and who had no previous or current suicidal attempts. Within 72 hours upon admittance, patients who had suicide attempt and non-suicidal patients were approached by a psychiatrist and one's who agreed to participate were asked to complete the self-report questionnaire for assessment of personality. No further subsequent participation was needed. We assessed entire sample using a semistructured socio-demographic data form based on clinical experience and investigation of the available literature (Croatian Bureau of Statistics and Croatian Institute of Public Health). This study did not include the use of structured clinical interviews; therefore, comorbid psychiatric or personality diagnoses were not determined. From the study were excluded patients with mental retardation, schizophrenia and other psychotic disorders, alcohol and drug-abuse related disorders, dementia and cognitive disorders, anxiety disorders and neurological disorders with unique personality features such as Parkinson's disease, multiple sclerosis, epilepsy, migraine, as well as some systemic disorders which may influence or are leading to cognitive impairment. After a detailed explanation of the study procedures, verbal and written informed consent was obtained from all the subjects. The study was officially approved by local Ethical Committee of the institution in which the study was conducted. Personality dimensions were assessed using the Temperament and Character Inventory (TCI version 9) a 240-item self-reported questionnaire with true-or-false statements. The TCI consists of seven higher-order scales based on psychobiological personality model. There are four temperament traits (NS, HA, RD, and PS) and three character traits (SD, CO, and ST). Suicidality was assessed based on current suicidal attempt through clinical assessment and examination and diagnosed according to ICD-10 (Category: External causes of

morbidity and mortality; Sub-category: Intentional Self-Harm; X60-X85; WHO 1992) diagnostic criteria by attending psychiatrist.

## Statistical Analysis

The data in this research were described using descriptive statistical methods (means, percentages, and standard deviations). The Mann-Whitney U-test was used to compare temperament and character dimensions in the samples (patient and control group). The Chi-square test, Student T-test and Fisher's exact test were used for assessment of differences between sociodemographic characteristics in both sample groups. The level of significance was set at P of 0.05. All the statistical analyses were performed using the SPSS version 17.0 (SPSS Inc., Chicago, IL, USA).

## RESULTS

The sample consisted of 30 (49%) patients who had suicide attempt diagnosed with the major depressive disorder (MDD) – severe depressive episode without psychotic symptoms (F32.2), 31 (51%) who had suicide attempt diagnosed with bipolar disorder – severe depressive episode without psychotic symptoms (BD-sDE). In the group of suicide attempters, there was 39 (64%) females and 22 (64%) of males. The non-suicidal group comprised of 20 (35%) MDD and 38 (65%) of BD-sDE of whom 42 (76%) were female and 16 (28%) male patients. The mean age of the sample was 45 years (SD=7.9 years). The average duration of an overall psychiatric treatment was 7.9 years (SD=3.9 years). The group with BD-sDE (N=52) had significantly more patients with current suicide attempt than the group with MDD ( $\chi^2$  test,  $p=0.040$ ). From a sociodemographic perspective of the sample, 9 (8%) participants had completed elementary school, 78 (66%) had completed high school, 16 (13%) had completed vocational college and 16 (13%) had a college degree. Regarding employment, 31 (27%) of participants were employed, 50 (42%) were unemployed, 26 (22%) had seasonal jobs, and 11 (9%) were retired. Regarding the financial status, 74 (62%) participants had monthly income less than 2 000 kn (currency Croatian kuna=kn), 22 (18%) had monthly income between 2 000-3 000 kn, 15 (13%) had monthly income between 3 000-5 000 kn and 8 (7%) had monthly income between 5 000-10 000 kn. According to data regarding family history in the sample, 49 (41%) of participants had a family member who was in psychiatric treatment, 31 (26%) had a family member who committed suicide and 39 (33%) had no family members who underwent psychiatric treatment nor committed suicide (Table 1). Initially, the sample was divided into two groups of patients. The group of patients who had suicidal attempt and non-suicidal group. The participants who exhibited suicide attempt had significantly higher scores in HA ( $p<0.001$ )

**Table 1.** Sociodemographic factors of the sample

	Number of (%) participants			p*
	Suicide attempt group	Non-suicidal group	Total	
Mood disorders				0.137
Major depressive episode – without psychotic symptoms	30 (49)	20 (35)	50 (42)	
Bipolar disorder – severe depressive episode without psychotic symptoms	31 (51)	38 (65)	69 (58)	
Gender				0.334 <sup>‡</sup>
Male	22 (36)	16 (28)	38 (32)	
Female	39 (64)	42 (72)	81 (68)	
Age (years) (Mean±SD)	44.7±8.1	45.2±7.8	45±7.9	0.774 <sup>†</sup>
Level of education				0.550
Elementary school	5 (8)	4 (7)	9 (8)	
High school	43 (70)	35 (60)	78 (66)	
University	7 (11)	9 (16)	16 (13)	
College	6 (10)	10 (17)	16 (13)	
Level of employment				0.004
Employed	10 (16)	22 (38)	32 (27)	
Unemployed	35 (57)	15 (26)	50 (42)	
Seasonal work	11 (18)	15 (26)	26 (22)	
Retired	5 (8)	6 (10)	11 (9)	
Monthly income				0.116
Less than 2 000 kn	44 (72)	30 (52)	74 (62)	
From 2 000 to 3 000 kn	9 (15)	13 (22)	22 (18)	
From 3 000 to 5 000 kn	6 (10)	9 (16)	15 (13)	
From 5 000 to 10 000 kn	2 (3)	6 (10)	8 (7)	
Duration of psychiatric treatment (years) (Mean±SD)	8.1±3	7.7±3.9	7.9±3.9	0.559 <sup>†</sup>
Living circumstances				0.298
In the apartment	15 (25)	12 (21)	27 (23)	
In the house	7 (11)	15 (26)	22 (18)	
With parents	13 (21)	8 (14)	21 (18)	
With parents and my family	7 (11)	8 (14)	15 (13)	
As sub-tenant	19 (31)	15 (26)	34 (29)	
Marital status				0.732
Single	9 (15)	8 (14)	17 (14)	
Married	27 (44)	24 (41)	51 (43)	
In a relationship	9 (15)	9 (16)	18 (15)	
Widowed person	3 (5)	7 (12)	10 (8)	
Divorced	13 (21)	10 (17)	23 (19)	
Family history (anamnesis)				0.870
Family member in psychiatric treatment	25 (41)	24 (41)	49 (41)	
Family member committed suicide	17 (28)	14 (24)	31 (26)	
No family members in psychiatric treatment/ nor committed suicide in family	19 (31)	20 (34)	39 (33)	
Total	61 (100)	58 (100)	119 (100)	

\* $\chi^2$  test; <sup>†</sup>Student T-test; <sup>‡</sup>Fisherov exact test

and significantly lower score in PS ( $p=0.037$ ) temperament dimensions. In character dimensions, the patients with suicidal attempt had significantly lower scores on SD ( $p<0.001$ ) and significantly lower scores on CO ( $p=0.001$ ). The non-suicidal BD-sDE group had significantly lower scores on HA ( $p=0.001$ ) and significantly higher scores on NS ( $p=0.003$ ), SD ( $p<0.001$ ) and ST ( $p<0.001$ ) subscales (Table 2). Within the MDD group, the participants who attempted suicide had significantly higher scores on HA ( $p<0.001$ ) with significantly lower scores on NS ( $p<0.001$ ) and SD ( $p=0.042$ ). In the group with BD-sDE, participants who attempted suicide had

statistically significant higher scores on NS ( $p=0.001$ ) and significantly lower scores on PS ( $p=0.003$ ), SD ( $p<0.001$ ) and CO ( $p=0.001$ ) (Table 3). The majority of patients who had suicidal attempt used non-violent methods. Them 28 (45.9%), used the method of deliberate self-poisoning with antiepileptics, sedative-hypnotics, antiparkinsonian and psychotropic medications (X61.0; according to ICD-10). The 16 (26.2%) of participants, attempted suicide with deliberate self-poisoning with other and unspecified drugs, medicinal and biological substances (X64.0; according to ICD-10). There were no statistically significant differences between

**Table 2.** Scores of temperament and character dimensions according to patient groups

	Median (25%-75%)		Total	p*
	Suicide attempt group	Non-suicidal group		
Harm Avoidance (HA)	72.6 (63.8–77.1)	63.1 (59.03–68.2)	66.8 (60.9–74.1)	<0.001
Novelty Seeking (NS)	44.5 (37.8–53.65)	47 (40.78–53.23)	44.5 (39.5–52.8)	0.319
Reward Dependence (RD)	42 (35.2–46.6)	39.8 (35.2–48.9)	42 (35.2–46.6)	0.972
Persistence (PS)	36.3 (31.1–41.6)	37 (35–4.6)	36.3 (31.1–41.6)	0.037
Self-Directedness (SD)	35.7 (29.75–41.75)	41.1 (35.7–45.43)	38.4 (31.7–43.7)	<0.001
Cooperativeness (CO)	35.7 (31.5–39.2)	39.9 (33.95–44.35)	37.1 (32.9–42.6)	0.001
Self-Transcendence (ST)	40.2 (33.8–44.9)	38.6 (33.8–44.9)	40.2 (33.8–44.9)	0.628
	Major depressive disorder-severe depressive episode	Bipolar disorder-severe depressive episode		
Harm Avoidance (HA)	73.35 (62.4–77.1)	65.3 (59.4–69.7)	66.8 (60.9–74.1)	0.001
Novelty Seeking (NS)	41.2 (37.8–51.2)	47.8 (42–54.5)	44.5 (39.5–52.8)	0.003
Reward Dependence (RD)	40.9 (33–48.9)	42 (37.5–46.6)	42 (35.2–46.6)	0.554
Persistence (PS)	36.3 (36.3–41.6)	36.3 (31.1–41.6)	36.3 (31.1–41.6)	0.075
Self-Directedness (SD)	42.4 (37.1–45.1)	35.7 (30.4–41.75)	38.4 (31.7–43.7)	<0.001
Cooperativeness (CO)	38.5 (32.9–41.2)	35.7 (32.9–42.6)	37.1 (32.9–42.6)	0.648
Self-Transcendence (ST)	41.7 (38.2–46.5)	35.4 (32.2–42.5)	40.2 (33.8–44.9)	<0.001

\*Mann Whitney U test

**Table 3.** The scores of temperament and character dimensions according to suicide attempters and non-suicidal patients in the groups of patients with major depressive disorder or with bipolar disorder

in the groups of patients with major depressive disorder or with bipolar disorder				
	Median (interquartile range)			p*
	Suicide attempt group	Non-suicidal group	Total	
Major depressive disorder-severe depressive episode				
Harm Avoidance (HA)	76.35 (74.1–78.5)	62.4 (58.28–66.43)	73.35 (62.4–77.1)	<0.001
Novelty Seeking (NS)	38.65 (35.78–44.5)	53.65 (44.05–57.4)	41.2 (37.8–51.2)	<0.001
Reward Dependence (RD)	44.3 (34.65–49.45)	35.2 (31.28–46.6)	40.9 (33–48.9)	0.070
Persistence (PT)	37 (35.18–46.8)	36.3 (36.3–41.6)	36.3 (36.3–41.6)	0.734
Self-Directedness (SD)	40.4 (35.38–44.05)	43.7 (39.08–46.4)	42.4 (37.1–45.1)	0.042
Cooperativeness (CT)	38.5 (32.2–41.2)	38.5 (33.25–43.65)	38.5 (32.9–41.2)	0.138
Self-Transcendence (ST)	40.2 (37–43.7)	44.9 (39–51.3)	41.7 (38.2–46.5)	0.051
Bipolar disorder-severe depressive episode				
Harm Avoidance (HA)	65.3 (59.4–71.2)	63.8 (59.03–69.7)	65.3 (59.4–69.7)	0.502
Novelty Seeking (NS)	52.8 (44.5–61.2)	45.35 (39.08–51.2)	47.8 (42–54.5)	0.001
Reward Dependence (RD)	42 (35.2–46.6)	44.3 (37.5–49.45)	42 (37.5–46.6)	0.134
Persistence (PT)	36.3 (31.1–36.3)	38.95 (31.1–46.8)	36.3 (31.1–41.6)	0.003
Self-Directedness (SD)	31.7 (29.1–35.7)	39.7 (34.08–45.1)	35.7 (30.4–41.75)	<0.001
Cooperativeness (CT)	34.3 (31.5–38.5)	40.55 (33.95–45.4)	35.7 (32.9–42.6)	0.001
Self-Transcendence (ST)	37 (30.6–46.5)	34.6 (32.2–40.58)	35.4 (32.2–42.5)	0.573

\*Mann Whitney U test

females and males in methods used for a suicide attempt. Of total 14 (46.7%) participants who attempted suicide according to diagnostic criteria X61.0, there were significantly more female patients in the group of MDD (Fisher exact test,  $p=0.028$ ). In the group of patients who had suicide attempt with BD-sDE, there were no statistically significant differences by sex.

## DISCUSSION

The goal of this study was to determine specific personality traits, measured with TCI, among patients with recent suicide attempt during the severe depressive

episode without psychotic symptoms in MDD and BD-sDE. However, the emphasis in this research was to find those particular personality features during an acute phase of illness (MDD or BD-sDE) referring to a period immediately after a suicide attempt. We found that patients who had recent suicide attempt during the depressive episode of a mood disorder (respectively, MDD or BD-sDE) presented with different personality profile than the non-suicidal control group. In the group of suicide attempters, we found significantly higher scores on HA and significantly lower scores in SD, CO, and PS when compared to the non-suicidal group. Previous studies found results somewhat similar to ours,

i.e., higher HA and lower SD in the group of patients with mood disorders who had suicide attempt (see Woo et al. 2014, Brezo et al. 2006, Engstrom et al. 2004). Higher HA, defined as a tendency to respond intensely to signals or aversive stimuli, may be state-dependent personality trait in depressive states (Pelissolo & Corruble 2002). This particular temperament trait could be observed from several aspects. Therefore, relatively high HA is often correlated with the severity, duration or remission of depressive states although one study questioned that state-dependency of HA and postulated it as a stable component not solely as a manifestation of mood (see Ekinici et al. 2012). Likewise, HA, according to Cloninger's neurobiological model, is highly heritable temperament dimension linked to the serotonergic system (see Pelissolo & Corruble 2002). Dysfunction of the serotonergic system was found to have a significant role in the neurochemistry and genetics of suicidal behavior (Ebstein 2006, Peirson et al. 1999). These complex heritable, neurobiological and psychopathological interconnections undoubtedly accentuate the HA as a temperament trait with the particular role in suicidal behavior and mood disorders. This could explain why high scores in HA dimension were found in both suicidal and non-suicidal group of this research. However, we can not discriminate whether these high scores are due to primary personality traits, state-dependent (influence of depressive episode) or appoint to suicidal behavior. Different studies also had consistent findings regarding on personality features in mood disorders regarding low SD and its association with depression. Self-directedness, as a character trait, encompasses personality features like responsibility, self-acceptance, effectiveness. Adversely, low SD has been associated with immaturity, destructiveness, poor self-integration, ineffective (see Cloninger et al. 1994). Therefore, experience of a depressive episode may have adverse consequences for maturation of this character feature leading to immature self-concept which is a vulnerability factor for negative affect in general (Matsudaira & Kitamura 2005). Low self-directedness (SD), besides its relation to depressive states, is also related to suicidality. Our results are accordant to previous studies that reported lower SD scores among suicide attempters compared with non-attempters (Becerra et al. 2005, Grucza et al. 2005). In the overall sample, we did not find any significant differences in NS, RD, and ST between the group of suicide attempters and non-suicidal group. The NS dimension was found be higher in the both patient groups, but slightly, albeit not significantly, higher in the non-suicidal group. Studies regarding other temperament dimensions (NS, CO, and PS) have heterogeneous findings. It has been proposed that this is probably related to sample size, study methodology, patient selection and severity of suicidal attempt (Perroud et al. 2013, Kampman et al. 2012, see Kampman et al. 2011). Our findings in the group of suicide attempters with severe depressive episode in

bipolar disorder (BD-sDE) confirmed the results from several previous studies on higher scores of particular temperament dimensions: NS and HA, and lower scores on character dimensions SD, PS, CO (see Izci et al. 2016, Engstrom et al. 2003). Interestingly, in the previously mentioned group of patients and also in the group of suicide attempters in general, we found lower scores on SD and CO character dimensions. Some authors proposed that lower scores of these specific character dimensions may predict the development of personality disorder (Slama et al. 2004). These results were not present in the group of suicide attempters with a severe depressive episode in major recurrent depressive disorder where we found higher scores in HA and lower scores in NS and SD dimensions also confirmed in some previous studies (see Woo et al. 2014, see Conrad et al. 2009). In our study, the results in NS and PS scores opposite than HA scores may be perceived as clinically significant findings associated with depressive episode (see Kampman et al. 2012). As mentioned afore, the lower scores in SD and CO (i.e. in suicide attempters in BD-sDE and suicide attempters in the sample, in generally) could be the predictors of personality disorder, and this could also suggest that personality disorder may be more frequent in patients with bipolar disorder (Kessing 1998). We have also found, however not significantly, higher scores in ST character dimension in the group of suicide attempters with a severe depressive episode with bipolar disorder. These results are comparable with one's in previous studies due to association between high ST and suicidality, as high ST is associated with low SD which is earmarked by immature and illogical behavior (Aukst Margetic et al. 2011, Bulik et al. 1999). In the group of non-suicidal patients with a severe depressive episode of bipolar disorder, we found lower scores in HA when compared to the non-suicidal group with a severe depressive episode in recurrent major depressive disorder and higher scores on NS, SD, and ST. In comparison to previously mentioned results and studies, lower scores in HA and higher scores in NS, SD and ST may be interpreted as possibly sample specific or from the wider perspective, perceived as protective factors in this group of patients. According to some studies, the possible influence of sociodemographic factors and methods used for suicide attempt may not be disregarded (Stenbacka & Jokien 2015, Mendlowicz et al. 2000). Our sample showed of high level of unemployment (42% of all patients), low average monthly income (62% of all patients) with predominantly non-violent methods of suicide attempts. This might have had some impact on the obtained results (low PS scores, heterogeneous scores in NS) in temperament and character dimensions in our research. Since we included baseline parameters in this study, the long-term associations between personality traits and clinical characteristics were not addressed. Some future research could thoroughly follow the course of mood disorders in these

subjects and evaluate the personality features and their complex interrelations to suicidal behavior, sociodemographic properties as well as the impact of psychopharmacological interventions.

## Limitations of the study

This study had some limitations such as sample size, sole use of self-report questionnaires, research methodology (lacking evidence from biological (i.e. genetic) methods), and potential impact of adverse sociodemographic factors which probably influenced our results and its interpretation when compared to some previous studies.

## CONCLUSION

Patients who had suicide attempt may display some significantly different personality traits than non-suicidal patients with mood disorders. The combination of high HA and low SD may be specific for depressive episode. The combination of high HA, NS, and ST with low SD may be related to suicide attempts in mood disorders, especially for depressive episode in bipolar disorder. The Temperament and Character Inventory could be helpful for detailed exploration of personality traits underlying suicidality and mood disorders.

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## Contribution of individual authors:

Anamarija Petek Erić: study conception and design; acquisition of data; analysis and interpretation of data; drafting manuscript;

Ivan Erić: acquisition of data, drafting manuscript; critical revision;

Mario Ćurković: acquisition of data;

Katarina Dodig-Ćurković: acquisition of data;

Kristina Kralik: analysis and interpretation of data;

Vlatka Kovač: acquisition of data;

Pavo Filaković: critical revision.

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