

JARACZ, Marcin. Temperament and creativity – implications for mental health and education. *Journal of Education, Health and Sport*. 2024;70:55530. e-ISSN 2391-8306.

<https://dx.doi.org/10.12775/JEHS.2024.70.55530>

<https://apcz.umk.pl/JEHS/article/view/55530>

The journal has had 40 points in Minister of Science and Higher Education of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences); Health Sciences (Field of medical and health sciences). Punkty Ministerialne 40 punktów. Załącznik do komunikatu Ministra Nauki i Szkolnictwa Wyższego z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu). © The Authors 2024; This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland. Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited. The authors declare that there is no conflict of interests regarding the publication of this paper. Received: 06.10.2024. Revised: 07.10.2024. Accepted: 5.11.2024. Published: 5.11.2024.

## Temperament and creativity – implications for mental health and education

Marcin Jaracz

Uniwersytet Mikołaja Kopernika w Toruniu

M. Curie-Skłodowskiej 9 85-094 Bydgoszcz

e-mail: marcinjaracz@cm.umk.pl

ORCID: 0000-0002-6693-4266

### Abstract:

Creativity is a complex phenomenon, which level is affected by variables such as intellectual competence, temperament, personality and emotions. Research shows that patients with bipolar affective disorder have a higher level of creativity than healthy controls. The model of affective temperament developed by Hagop Akiskal enables the research on relationships between predispositions to bipolar disorder and creativity. Previous studies on the relationship between affective temperament and creativity are conducted by comparing temperaments of representatives of creative professions and people outside this group, as well as by studying the relationship between affective temperament and creativity assessed both subjectively and through objective tests. However, the temperamental traits contributing to creative potential have their downside, as they have been linked to higher risk of psychological and emotional problems. They may also be related to poorer educational and academic achievement. The article presents up to date research on the relationship between affective temperament and

creativity, as well as mechanisms explaining them. It also discusses the relationship between temperament, mental health, and educational achievement, as well as its implications for psychological and pedagogical interventions.

**Keywords:** temperament; creativity; mental health; education

### **What makes us creative**

Creative are considered activities or ideas that are innovative and valuable. The creative process takes place between the person of the creator, the domain (domain) in which the creator works, and the field (field) created by experts in a given field, which include the assessment of the quality and innovation of a given work [1]. The phenomenon of creativity can therefore be considered as a process occurring between the three areas mentioned above, or a feature possessed by individual units [2]. This work focuses on creativity in the individual dimension, treated as a trait or ability. In this approach, creativity is the ability to create ideas that are original and useful [3]. The subject of the ongoing dispute is whether creativity should be treated as a feature disclosed only by outstanding individuals whose ideas or works are part of the heritage of entire societies, or as a feature also disclosed by people whose activities are creative for a small group of people, and just for their own sake.

In the systemic approach, considering creativity as the interaction of the creator, field and field, the activity of the individual must be appreciated by experts and representatives of the field, so only those works that bring something new and valuable to the existing area of knowledge, art or the life of large groups of people [2]. Kaufman and Beghetto [4], on the other hand, adopt a broad definition of creativity and distinguish four types, whose symbols are the four letters "C". Creativity symbolized by the "C" (the Big-C creativity) refers to outstanding achievements and is a property of a small group of people. Creativity through the little "c" is widespread in the population and manifests itself in daily activities. Creativity described as "Pro-c" is present in people who have reached the level of experts in the field in which they work. The mini-c creativity is defined as an innovative and individually important way of interpreting events and incoming information.

Creativity is a complex phenomenon, determined by variables related to intellectual functioning, personality and temperament. The variables related to intellectual functioning include divergent thinking, fluency in generating ideas, and originality of thinking [5]. Temperament and personality traits, as well as the emotions associated with them, on the other hand, influence

whether an individual endowed with the necessary abilities has the power to reveal creative behavior to the degree that deserves attention, that is, whether it actually creates products or works of a creative nature. None of these variables alone determines creativity, which is rather the result of multidirectional interactions between them [6,7].

### **Affective temperament and its functional significance**

Temperament is a set of biologically determined features, characterized by relative stability throughout life [6]. The configuration of these features is of great functional importance - the relationship between temperament and coping with stress, the course and risk of mental and somatic diseases, as well as professional functioning has been documented [8,9,10]. The concept of Hagop S. Akiskal's affective temperament assumes the existence of five relatively constant, genetically determined styles of emotional response, referred to as "affective temperaments" [11]. Features that characterize each of the five temperaments are widespread in the population, and to a large extent predispose to mood disorders. According to Akiskal, persistence of mood disorders in the population is caused by the fact that temperaments determine the style of adaptation to the environment and in this sense have adaptive significance. In addition, they result from specific predispositions affecting social relations and professional functioning [12]. Depressive temperament is associated with a tendency to experience sadness, guilt and a pessimistic attitude to life, thus being a predisposition to the occurrence of depressive disorders. These features also have an adaptive dimension, as they encourage dedication to work and caring for close relationships. Cyclothymic temperament favors the occurrence of significant mood, self-esteem and activity fluctuations, and in high intensity is a greater risk of bipolar disorder, as well as its more severe course [13]. Cyclothymic features also increase the intensity and scope of emotions experienced, which has a beneficial effect on creative behavior and artistic activity. People with high intensity of hyper-temperamental temperament are active, leadership, optimistic, resistant to stress and fatigue, they also tend to take risks. Features falling within the scope of this temperament have high adaptation values - they favor better coping with professional stress, are associated with a lower risk of depression in response to traumatic events, favor the pursuit of professions associated with high responsibility and high social position. Irritable temperament is characterized by a tendency to experience anger, conflict and skepticism, as well as insight and a tendency to critically analyze the incoming information. Anxiety temperament favors the occurrence of anxiety about one's own and loved ones, experiencing chronic anxiety and its somatic symptoms. It occurs in people prone to experiencing concern for others and showing altruistic attitudes [14,15]. Research to date

indicates that for these reasons, affective temperaments are associated with predispositions to perform specific professions. In a study involving representatives of various professional groups, Akiskal et al. [16] showed that doctors and lawyers display a high level of depressive temperament, while managers and entrepreneurs - hyperthymic. Artists and architects, however, show a high level of cyclothymic temperament. A number of studies have observed a high level of hyper-temperamental temperament among pilots and paramedics, as well as its beneficial effect on the ability to cope with stress in extreme situations and effective operation under time pressure [17,18,19]. Nurses and psychologists have also reported high levels of anxiety and depression in temperaments [20,21,22].

### **Affective temperament and creativity**

The first records documenting observations of the relationship between temperament and creativity come from ancient times. Aristotle made the observation that melancholy people are often eminent poets, philosophers and artists [23]. The nineteenth-century Italian psychiatrist and criminologist Cesare Lombroso, in his work on the relationship between genius and madness, described the cases of outstanding individuals, often experiencing extreme emotional states [24].

The first systematic study indicating the relationship between temperament and creativity were reports on the over-representativeness of mood disorders among creative people. They were conducted based on biographical analyzes or direct interviews. In one of the first reports of this type Andreasen [25] showed that 80% of the examined group of writers met the diagnostic criteria for mood disorders, while in the control group this percentage was 30%. 43% of the surveyed writers met the criteria for bipolar disorder. These rates far outweigh the risk of lifetime mood disorder in the general US population of 21.4% [26]. In the Jamison study [27], 38% of artists documented a history of treatment for mood disorders, with 50% among poets and 63% among playwrights. In addition to epidemiological data, the author of the study obtained interesting information on the possible impact of mood disorders on the creativity of the studied people. 89% of artists reported the occurrence of "intense creative episodes" during which they experienced an increase in enthusiasm, energy, self-esteem and confidence, accompanied by a faster pace of creation. Describing their intellectual functioning in these episodes, the respondents talked about the increase in the ability to see relationships between elements of reality and greater fluidity in generating ideas. In addition, 60% of artists asked to assess the importance of mood swings for their own work felt that they were "integral and

indispensable", while 30% rated them as "very important". Consistent with the above-mentioned are the results of studies that demonstrated a higher level of creativity in patients with mood disorders, recruited for research regardless of their profession, compared to healthy people [28]. In this group of patients, patients with bipolar disorder display particularly high creativity. In a study of patients with bipolar disorder in remission, recurrent depression in remission, healthy people in artistic professions and healthy people not involved in artistic activity, patients with bipolar disorder demonstrated creativity at a level similar to artists, and higher than the other two examined groups [29]. In the group of patients with BD, the greatest creativity is shown by people with hypomania or mania, and in remission. On the other hand, depressive symptoms are negatively correlated with the level of creativity, both measured with objective tests and in the subjective assessment of patients [30,31].

Data on the relationship between mood disorders and creativity is also provided by studies that included patient families. They indicate higher creativity in first-degree relatives of patients with bipolar disorder than in non-bipolar patients [28]. In two Swedish studies - the first, which included 300 thousand people, and re-enrollment, which included 1,173,763 people - patients hospitalized due to various mental disorders, their relatives, and people from the control group, showed that siblings of patients with bipolar disorder or schizophrenia are more likely to perform a creative - scientific or artistic profession. This phenomenon did not apply to people with recurrent depression or their siblings [32, 33]. Simeonova et al. [34] have shown that patients with bipolar disorder and their children are more creative than healthy people and their children. Interestingly, this study also proved that the duration of the disease and its treatment is associated with lower creativity rates. This coincides with the observations of Akiskal [23], which indicates that professional success, treated as an indicator of creativity, is observed in relatives of persons with bipolar disorder rather than in the patients themselves. The author concludes that beneficial to creativity are the rather mild symptoms of bipolar disorder, or sub-clinical temperamental features in healthy relatives of patients with bipolar disorder.

Previous studies on the relationship between affective temperament and creativity have been conducted by means of comparisons of temperament of persons performing creative professions with representatives of other professional groups, research on the relationship between affective temperament and subjectively assessed creativity and features conducive to creativity, and research on the relationship between affective temperament and objective results creativity tests. The results of these studies agree on the relationship between creativity and cyclothymic

temperament. In the aforementioned study by Akiskal et al. [16], the artists, together with the architects, showed a higher intensity of cyclothymic temperament, compared to other studied professional groups - doctors, engineers, lawyers and entrepreneurs. The relationship between cyclothymic temperament and creativity has been proven here indirectly, and in the authors' opinion it is indicated by the fact that the work of an artist and architect requires creativity to a greater extent than in the case of other professions. In a similar study by Figueira et al. [20], affective temperament was assessed in students of various fields - law, construction, art, medicine, psychology and nursing. As in the previous study, art students exhibited a higher level of cyclothymic temperament, a higher intensity of irritable temperament was also observed. Vellante et al. [35] conducted a study with students of artistic faculties and fields preparing for professions requiring the application of learned procedures. Also in this study, a higher level of cyclothymic temperament was demonstrated among students preparing for artistic professions. The above results were confirmed in a Polish study involving students of artistic faculties (acting, instrumental, conducting, vocal) and non-artistic students, in which students of artistic faculties exhibited a higher intensity of cyclothymic temperament [36]. Gostoli et al. [37] assessed affective temperament in a group of students of various fields, they also used a questionnaire assessing the dimensions of creativity, such as curiosity, imagination, complexity and risk-taking. They observed a positive correlation between the intensity of cyclothymic temperament and all the above dimensions of creativity.

The results of research coincide with the above, in which tasks assessing creativity were used. In most of the studies to date on the relationship between creative temperament and creativity, the Barron-Welsh Art Scale (BWAS), one of the most commonly used tools for this purpose, was used to assess creativity [36,38,39]. The test contains pictures showing shapes that differ in symmetry and regularity. The task of the examined person is to determine whether they like individual drawings or not. Responses of the respondents are compared to a key constructed on the basis of answers given by creative people who clearly preferred asymmetrical and irregular images [3]. The authors of the above-mentioned studies observed a positive correlation between the intensity of cyclothymic temperament and the result obtained on the BWAS scale. As Strong et al. [38] and Srivastava et al. [39] suppose, people with cyclothymic temperament have access to more diverse emotions, thanks to which they are more able to distinguish between liked and disliked objects. Easier access to negative emotions, however, makes it easier for people with this temperament to take a critical attitude towards what is commonly recognized.

The second of the temperaments, whose relationships with creativity have been observed in previous studies, is hyperthymic temperament. Lulich et al. [40] compared the affective temperament of dancers and people not engaged in artistic activities. The dancers showed a significantly higher intensity of hypersensitive and irritable temperament. A similar phenomenon occurred in the group studied by Vellante et al. [35], where the second, in addition to cyclothymic, temperament, the intensity of which differentiated art students from students of other fields, was hyperthymic temperament. Siwek et al. [41], in a study of 57 students of artistic faculties (music, acting, painting and graphics) and 63 technical students, compared bipolarity features using the Hirschfeld Mood Disorder Questionnaire (MDQ), which bipolarity is diagnosed on the basis of answers to questions about (hypo) manic symptoms. These symptoms were significantly more common in the group of students of artistic faculties, which indicates a higher probability of occurrence of hyperthymic temperament traits in this group.

According to the above observations, in the above-mentioned study by Gostoli et al. [37], the intensity of hyperthymic temperament was positively associated with the level of creativity, and this correlation was stronger than in the case of cyclothymic temperament. In the study by Jaracz and Borkowska [36], the intensity of hyper-temperamental temperament was positively correlated with the results of creativity tests taken from the Berlin Intelligence Scale (German: Berliner Intelligenzstruktur-test, BIS). These tests assessed three areas of creativity - verbal, visual and numerical, and each of them consisted in generating, for a limited time, as many ideas as possible, in accordance with the given criterion.

Explaining the observed relationships, the authors of the cited works draw attention to the fact that features associated with hyper-temperamental temperament, such as a high level of activity, energy and enthusiasm, as well as high self-confidence, facilitate the disclosure of creative features [40]. Indeed, the authors of a number of studies have shown that people with hyperimic traits also have a higher motivation to achieve goals that favor the disclosure of creative traits. Johnson and Carver [41] in a study of 780 students from various fields have shown that hyperimimic traits translate into focusing on gaining significant social position and recognition, feeling pride in this connection, and strong involvement in activities that can bring these benefits. In a study involving a similar experimental group, Carver and Johnson [43] showed that people with hyper-asymmetrical features respond more strongly to stimuli of a motivational significance, use emotional regulation strategies conducive to intensification and persistence of positive emotions, and set ambitious goals. In a Korean study carried out with 543 students, it

was shown that a feature of hyperthymic people, conducive to creativity, is the high sensitivity of the behavioral activation system (BIS), which translates into more frequent feelings of positive emotions, persistence in achieving goals and lower sensitivity to failures [44]. These features are very important in the case of professions in which the implementation of a creative product is a long-term process, requiring self-discipline and continued in the absence of clear criteria of success and external instructions.

The above studies agree that there is a relationship between affective temperament and creativity. Due to the fact that creativity is a complex phenomenon, and as mentioned at the beginning of work, is determined by different intellectual abilities, the question seems to be interesting whether individual affective temperaments are related to various aspects of creativity. This possibility is indicated by the already mentioned results of Jaracz and Borkowska's research [36] with the participation of a group of students of artistic and non-artistic faculties. They observed that the level of cyclothymic temperament correlates with the performance of the Barron Welsh Art Scale test, but not with the tasks of the Berlin Intelligence Scale. Similarly, the level of hyper-temperamental temperament is associated with the performance of tasks from BIS, but not with the performance of the BWAS test. The level of creativity measured by BWAS depends on your preferences for atypical and asymmetrical shapes. One of the aspects of creativity measured by this test is therefore the originality of thinking, which is also indicated by the results of studies in which the performance of BWAS was related to the level of schizotype [30,45]. In the case of tasks taken from BIS, the goal of the examined person is to provide as many different answers as possible according to the given criterion, which is a measure of the fluidity of generating ideas and divergent thinking. Therefore, the study showed that hyperimic and cyclothymic temperaments are associated with various aspects of creativity. This relationship can be explained by the mood with which both temperaments are associated and its influence on thinking. People with hyperthymic temperament enthusiastically respond to new challenges and often experience positive emotions. Research to date has shown that positive emotions have a beneficial effect on creativity, in particular on the ability to generate new ideas, as well as fluidity and flexibility of thinking [46,47]. However, taking into account other aspects of creativity, such as originality of thinking or the ability to look critically at traditional ways of acting, the role of positive mood is not so clear. According to the Vosburg study [48] with 188 students of art and psychology, a positive mood favors the adoption of an optimal strategy for solving the problem, which results in a large number of solutions proposed. In a situation where it is necessary to reject many



possible solutions in favor of the best, and therefore adopt a critical attitude towards the already developed proposals, better results are achieved by people experiencing negative emotions during work. Mixed emotional states, characteristic of cyclothymic temperament, favor perception of the situation as unusual and ambiguous. They also increase the likelihood of adopting a critical attitude to existing solutions, and the motivation to adopt atypical and unconventional solutions [49.50]. Based on the results of previous research, it can therefore be hypothesized that hyperthymic and cyclothymic temperaments are associated with various aspects of creativity, but it requires further verification.

### **Affective temperament, creativity and mental health**

As the research cited above has shown, a higher level of temperament traits associated with a predisposition to bipolar disorder is beneficial to creativity. However, this temperament profile of creative people is also associated with the risk of mental disorders. Numerous studies linked affective temperaments to higher risk of psychiatric disorders and their worse course. Simonetti et al. [51] found high levels of cyclothymic and hyperthymic temperaments in patients with bipolar disorder, and that the level of these temperaments is related to earlier onset of the disease. Cyclothymic temperament is also related to poorer overall functioning and quality of life in patients with bipolar disorder [52]. Mood instability related to cyclothymic temperament has been linked to problematic relationships, risky behavior and substance abuse in patients with mental disorders. Affective temperaments may also exert an influence on psychological well-being of healthy individuals. It was demonstrated that cyclothymic, among other temperaments, is related to higher level of depressive symptoms in university students [53]. Cyclothymic, hyperthymic and depressive temperaments are a risk factor of developing depression under exposure to stress [54], and as a result of childhood trauma [55].

Higher risk of mental disorders have also been observed in subjects performing creative professions. In the study of Siwek et al. [41] discussed above, students of artistic faculties experienced periods of increased and depressed mood much more often than students of polytechnic faculties. The probability of being in a group of people with such a mood pattern was five times higher for students of artistic faculties. Analysis of the use of psychoactive substances in both groups of students showed that students of artistic faculties significantly smoke cigarettes and marijuana more often, and also more often take drugs other than marijuana. Researchers also showed that students of artistic faculties significantly more often take psychotropic drugs, and use the help of a psychiatrist and / or psychologist.

Murray and Johnson [56] discuss aspects of work in creative professions, and above all in artistic professions, which may pose a threat to people susceptible to the occurrence of bipolar disorder. The first of these is experiencing intense emotions. Artistic activities are often associated with high emotional arousal, and the ability of emotional involvement in their performance is positively assessed by the recipients. With an already existing tendency to experience mood swings, this can increase the difficulty of regulating emotions. Characteristic features of work in the artistic profession are also the unpredictability of the professional path, competition, lack of regular income and the associated risk of remaining unemployed, or the need to retrain. These factors can become a source of chronic stress, thus increasing the risk of a depressive episode or anxiety disorder. In addition, the rhythm of the artists' performance of work deviates from typical periods of daily activity, and is associated with the need to work and travel at night. Circadian arrhythmias may be the causative agent of an affective disorder episode [57]. Another threat to the mental health of people working in artistic professions is higher than in the general population, consumption of psychoactive substances [58]. Use of these substances by artists can help them cope with emotions accompanying performances, or support creativity itself. In addition, artists are more likely to participate in social situations in which such substances are consumed. However, the negative consequence of this phenomenon is increased emotional lability and a higher risk of mood disorders [59].

Thus, there may exist a multidirectional relationship between temperament, creativity and mental health. Subjects engaged in creative professions have more risk factors of developing mental health problems, which are related to both nature of their work and the specific temperament. These factors should thus be taken into account in prevention and therapy of mental health problems in individuals engaging in creative professions, or students of artistic disciplines.

### **Implications for education**

Although there are no studies on relationship between affective temperament and academic achievement, some conclusions can be drawn from the studies using other models of temperament. Relationship between temperament and educational achievement have been studied for three decades, and there is strong evidence for relationship between these variables [60,61]. A meta-analysis of 57 studies on relationship between temperament and school achievement show that temperament trait labeled as effortful control defined as the ability to self-regulate through inhibitory control, and attention focus and shifting, is related to better

educational achievement. Conversely, negative affectivity, defined by sadness, fear, anger, frustration, and poor soothability are related to higher level of scholar difficulties [62]. Temperament, may exert an influence on school achievement through its relationship with self-esteem. Wang et al. [63] shown that temperament traits such as conscientiousness, extraversion, and openness to experience are beneficial for students' self efficacy and thus aid school achievements. Temperament also has influence on the adjustment to school environment. Students with more positive emotionality and better self-regulation show higher adjustment to school environment, whereas those with negative emotionality and poorer self-regulation experience more conflicts with peers and teachers, they also have problems in obeying the educational demands [64].

Thus, temperaments related to poorer self-regulation and negative affectivity result in higher probability of problems in school adjustment and, consequently, lower academic achievement. These temperament qualities are also related to cyclothymic temperament, thus, a hypothesis can be formulated, that temperament traits contributing to creativity, may also hamper educational achievement, which results in students abandoning their potential. It is thus proposed, that such students should be supported within the framework of temperament-conscious pedagogy. It encourages the understanding that temperament is a background of behavior and as such, cannot be cause of good and bad school grades [65,66]. Consequently, teachers should be educated in understanding the nature of temperament and its relationship with emotionality, self-regulation and attentional capabilities. Students with negative emotionality, or poorer self-regulation should be supported, in order to prevent them from dropping out of the educational system or being socially excluded. It also can secure their abilities to fulfill their creative and intellectual potential.

## **Conclusions**

Hagop Akiskal's theory of affective temperament is a useful model in the study of relationships between predispositions to mood disorders and creativity. Research to date has shown the temperaments associated with creativity, but further research is needed to refine these observations. The issue of temperamental differences between representatives of various creative professions, as well as the relationship between temperaments and various areas of creativity remains interesting and little studied. These studies enable a better understanding of the phenomenon of creativity, and enrich clinical knowledge with a better understanding of those at risk of mood disorders. Finally, understanding the relationships between temperament,

creativity and psychological and emotional problems, enable the elaboration of prevention and therapeutic strategies aimed at supporting those at risk.

Disclosure:

Author input:

Marcin Jaracz: koncepcja pracy, przegląd literatury, przygotowanie manuskryptu.

## References

1. Csikszentmihalyi M. Creativity. The psychology of discovery and invention. New York,: HarperCollins Publishers; 1996;
2. Runco MA, Beghetto RA. Primary and secondary creativity. *Curr. Opin. Behav. Sci.* 2019; 27: 7-10;
3. Barron F. Creative Person and Creative Process. New York: Holt, Rinehart Winston; 1969;
4. Kaufman JC, Beghetto RA. Beyond Big and Little: The Four C Model of Creativity. *Review of General Psychology.* 2009; 13: 1-12;
5. Jauk E. A bio-psycho-behavioral model of creativity. *Curr. Opin. Behav. Sci.* 2019; 27: 1-6;
6. Strelau J. Różnice indywidualne. Historia, determinanty, zastosowania. Warszawa: Scholar; 2014;
7. Caselli R.J., (2009). Creativity: an organizational schema. *Cogn Behav Neurol.* 2009; 22: 143-54;
8. Wodzinski A, Bendeżú JJ, Wadsworth ME. Temperament, coping, and involuntary stress responses in preadolescent children: the moderating role of achievement goal orientation. *Anxiety Stress Coping.* 2018; 31: 79-92;
9. Panek M, Kuna P, Witusik A, Wujcik R, Antczak A, Pietras T. Temperament and stress coping styles in bronchial asthma patients. *Postepy Dermatol Alergol.* 2016; 33: 469-474;
10. Sakai Y, Akiyama T, Miyake Y, Kawamura Y, Tsuda H, Kurabayashi L, Tominaga M, Noda T, Akiskal K, Akiskal H. Temperament and job stress in Japanese company employees. *J Affect Disord.* 200; 85: 101-12;

11. Akiskal HS, Mendlowicz MV, Jean-Louis G, Rapaport MH, Kelsoe JR, Gillin JC, Smith TL. TEMPS-A: validation of a short version of a self-rated instrument designed to measure variations in temperament. *J Affect Disord.* 2005; 85: 45-52;
12. Akiskal HS, Akiskal KK. The theoretical underpinnings of affective temperaments: implications for evolutionary foundations of bipolar disorder and human nature. *J Affect Disord.* 2005; 85: 231-9;
13. Fico G, Caivano V, Zinno F, Carfagno M, Steardo LJ, Sampogna G, Luciano M, Fiorillo A. Affective Temperaments and Clinical Course of Bipolar Disorder: An Exploratory Study of Differences among Patients with and without a History of Violent Suicide Attempts. *Medicina (Kaunas).* 2019; 55: 390;
14. Akiskal HS, Placidi GF, Maremmani I, Signoretta S, Liguori A, Gervasi R, Mallya G, Puzantian VR. TEMPS-I: delineating the most discriminant traits of the cyclothymic, depressive, hyperthymic and irritable temperaments in a nonpatient population. *J Affect Disord.* 1998; 51: 7-19;
15. Akiskal HS. Toward a definition of generalized anxiety disorder as an anxious temperament type. *Acta Psychiatr. Scand.* 1998; 393: 66-73;
16. Akiskal KK, Savino M, Akiskal HS. Temperament profiles in physicians, lawyers, managers, industrialists, architects, journalists, and artists: a study in psychiatric outpatients. *J Affect Disord.* 2005; 85: 201-6;
17. Szczupacki Ł, Falkowska N, Jaracz M, Augustyn S, Borkowska A. *Psychiatria* 2010; 7: 47-52;
18. Maremmani I, Dell'Osso L, Rovai L, Arduino G, Montagnari A, Abbenante D, Popovic D, Maremmani AG, Perugi G, Akiskal K, Akiskal HS. Discriminant and convergent validity of TEMPS-A[P] correlation with MMPI and the emotional-affective state following a stressful situation. *J Affect Disord.* 2011; 129: 27-33;
19. Jaracz M, Paciorek P, Buciuński A, Borkowska A. Affective temperament and executive functions in emergency medicine professionals. *J Affect Disord.* 2014; 168: 192-6;
20. Figueira ML, Caeiro L, Ferro A, Cordeiro R, Duarte PM, Akiskal HS, Akiskal KK. Temperament in Portuguese university students as measured by TEMPS-A: implications for professional choice. *J Affect Disord.* 2010; 123: 30-5;
21. Kikuchi Y, Nakaya M, Ikeda M, Takeda M, Nishi M. Job stress and temperaments in female nurses. *Occup Med (Lond).* 2013; 63: 123-8.

22. Jaracz M, Rosiak I, Bertrand-Bucińska A, Jaskulski M, Nieżurawska J, Borkowska A. (2017). Affective temperament, job stress and professional burnout in nurses and civil servants. *PLoS One*. 2017; 12: e0176698;
23. Akiskal, HS, Akiskal KK. In search of Aristotle: temperament, human nature, melancholia, creativity and eminence. *J Affect Disord*. 2007; 100: 1-6;
24. Lombroso C. *Genio e follia*. Milano; Giuseppe Chiusi: 1864;
25. Andreasen NC. Creativity and mental illness: prevalence rates in writers and their first-degree relatives. *Am J Psychiatry*. 1987; 144: 1288–1292;
26. Kessler RC, Merikangas KR, Wang PS. Prevalence, comorbidity, and service utilization for mood disorders in the United States at the beginning of the twenty-first century. *Annu Rev Clin Psychol*. 2007; 3: 137-58;
27. Jamison KR. Mood disorders and patterns of creativity in British writers and artists. *Psychiatry*. 1989; 52: 125-34;
28. Richards R, Kinney DK, Lunde I, Benet M, Merzel AP. Creativity in manic-depressives, cyclothymes, their normal relatives, and control subjects. *J Abnorm Psychol*. 1988; 97: 281-8.
29. Santosa CM, Strong CM, Nowakowska C, Wang PW, Rennie CM, Ketter TA. Enhanced creativity in bipolar disorder patients: a controlled study. *J Affect Disord*. 200; 100: 31-9;
30. Rybakowski JK, Klonowska P. Bipolar mood disorder, creativity and schizotypy: an experimental study. *Psychopathology*. 2011; 44: 296-302.
31. Miller N, Perich T, Meade T. Depression, mania and self-reported creativity in bipolar disorder. *Psychiatry Res*. 2019; 276: 129-133;
32. Kyaga S, Lichtenstein P, Boman M, Hultman C, Långström N, Landén M. Creativity and mental disorder: family study of 300,000 people with severe mental disorder. *Br J Psychiatry*. 2011; 199: 373-9;
33. Kyaga S, Landén M, Boman M, Hultman CM, Långström N, Lichtenstein P. Mental illness, suicide and creativity: 40-year prospective total population study. *J Psychiatr Res*. 2013; 47: 83-90;
34. Simeonova DI, Chang KD, Strong C, Ketter TA. Creativity in familial bipolar disorder. *J Psychiatr Res*. 2005; 39: 623-31;
35. Vellante M, Zucca G, Preti A, Sisti D, Rocchi MB, Akiskal KK, Akiskal HS. Creativity and affective temperaments in non-clinical professional artists: an empirical psychometric investigation. *J Affect Disord*. 2011; 135: 28-36;

36. Jaracz M, Borkowska A. Creativity and Affective Temperament in Artistic and Non-artistic Students: Different Temperaments are Related to Different Aspects of Creativity. *J Creat Behav*. doi:10.1002/jocb.426;
37. Gostoli S, Cerini V, Piolanti A, Rafanelli C. Creativity, Bipolar Disorder Vulnerability and Psychological Well-Being: A Preliminary Study. *Creativity Research Journal*. 2017; 29: 63-70;
38. Strong CM, Nowakowska C, Santosa CM, Wang PW, Kraemer HC, Ketter TA. Temperament-creativity relationships in mood disorder patients, healthy controls and highly creative individuals. *J Affect Disord*. 2007; 100: 41-8;
39. Srivastava S, Childers ME, Baek JH, Strong CM, Hill SJ, Warsett KS, Wang PW, Akiskal HS, Akiskal KK, Ketter TA. Toward interaction of affective and cognitive contributors to creativity in bipolar disorders: a controlled study. *J Affect Disord*. 2010; 125: 27-34;
40. Lolich M, Vázquez GH, Zapata S, Akiskal KK, Akiskal HS. Affective temperaments in tango dancers. *J Affect Disord*. 2015; 173: 27-30;
41. Siwek M, Dudek D, Arciszewska A, Filar D, Rybicka M, Cieciora A, Pilecki MW. The analysis of the bipolarity features in students of arts and the students of technology. *Psychiatr Pol*. 2013; 47: 787-97;
42. Johnson SL, Carver CS. The dominance behavioral system and manic temperament: motivation for dominance, self-perceptions of power, and socially dominant behaviors. *J Affect Disord*. 2012; 142: 275-82;
43. Carver CS, Johnson SL. Tendencies Toward Mania and Tendencies Toward Depression Have Distinct Motivational, Affective, and Cognitive Correlates. *Cognit Ther Res*. 2009; 33: 552-569;
44. Kim BN, Kwon SM. The link between hypomania risk and creativity: The role of heightened behavioral activation system (BAS) sensitivity. *J Affect Disord*. 2017; 215: 9-14;
45. Eysenck HJ. Creativity and personality: suggestions for a theory. *Psychol. Inquiry*. 1993; 4: 147–178;
46. Phillips LH, Bull R, Adams E, Fraser L. Positive mood and executive function: Evidence from Stroop and fluency tasks. *Emotion*. 2002; 2: 12–22;
47. Hirt ER, Devers EE, McCrea SM. I want to be creative: exploring the role of hedonic contingency theory in the positive mood-cognitive flexibility link. *J Pers Soc Psychol*. 2008; 94: 214-30;

48. Vosburg SK. The Effects of Positive and Negative Mood on Divergent-Thinking Performance. *Creativity Research Journal*. 1998; 11: 165–172;
49. Vosburg SK. 'Paradoxical' Mood Effects on Creative Problem-solving Cogn. *Emot*. 1997; 11: 151-170;
50. Verleur R, Verhagen PW, Heuvelman A. Can mood-inducing videos affect problem-solving activities in a web-based environment? *Br. J. Educ. Technol*. 2007; 38: 1010-1019;
51. Simonetti A et al. Effect of affective temperament on illness characteristics of subjects with bipolar disorder and major depressive disorder. *J Affect Disord*. 2023 Aug 1; 334: 227-237;
52. Luciano M et al. Affective Temperaments and Illness Severity in Patients with Bipolar Disorder. *Medicina (Kaunas)*. 2021 Jan 9; 57(1): 54.
53. Bartosik NK et al. The association between affective temperaments and depressive symptoms in a population of medical university students, Poland. *Front Psychiatry*. 2023;14:1077940.
54. Gonda X et al. Nature and Nurture: Effects of Affective Temperaments on Depressive Symptoms Are Markedly Modified by Stress Exposure. *Front Psychiatry*. 2020; 11 :599;
55. Higashiyama M, Hayashida T, Sakuta K, Fujimura Y, Masuya J, Ichiki M, Tanabe H, Kusumi I, Inoue T. Complex effects of childhood abuse, affective temperament, and subjective social status on depressive symptoms of adult volunteers from the community. *Neuropsychiatr Dis Treat*. 2019 Aug 27;15:2477-2485.
56. Murray G, Johnson SL. The clinical significance of creativity in bipolar disorder. *Clin Psychol Rev*. 2010; 30: 721-32;
57. Harvey AG, Talbot LS, Gershon A. Sleep Disturbance in Bipolar Disorder Across the Lifespan *Clin Psychol*. 2009; 16: 256-277;
58. Iszaj F, Kapitány-Fövény M, Farkas J, Kökönyei G, Urbán R, Griffiths MD, Demetrovics Z. Substance Use and Psychological Disorders Among Art and Non-art University Students: an Empirical Self-Report Survey. *Int J Ment Health Addict*. 2018; 16: 125-135;
59. Azorin JM, Perret LC, Fakra E, Tassy S, Simon N, Adida M, Belzeaux R. Alcohol use and bipolar disorders: Risk factors associated with their co-occurrence and sequence of onsets. *Drug Alcohol Depend*. 2017; 179: 205-212.



60. Al-Hendawi M. Temperament, school adjustment, and academic achievement: existing research and future directions. *Educational Review* 2012; 65(2): 177–205;
61. Piepiora P, Szczepanska K. Students personality and field of study. *Pedagogy and Psychology of Sport*. 2020; 6: 122-134.
62. Nasvytienė D, Lazdauskas T. Temperament and Academic Achievement in Children: A Meta-Analysis. *Eur J Investig Health Psychol Educ*. 2021; 12: 736-757;
63. Wang H, Liu Y, Wang Z, Wang T. The influences of the Big Five personality traits on academic achievements: Chain mediating effect based on major identity and self-efficacy. *Front Psychol*. 2023 Jan 27;14:1065554;
64. Ato E et al. Relation Between Temperament and School Adjustment in Spanish Children: A Person-Centered Approach. *Front Psychol*. 2020; 11: 250.
65. Leino M, Mullola S. Temperament-Conscious Humanistic Pedagogy. *Psychology* 2014; 5: 753-761 .
66. Piepiora P. A review of personality research in sport. *Pedagogy and Psychology of Sport*.2020; 6: 64-83.