

## *Dynamics of neuroticism in the healing process of individuals addicted to alcohol*

### BACKGROUND

Neuroticism conceptualised in the Five-Factor Personality Model indicates the level of adaptation. The objective of the study was to determine the dynamics of changes in neuroticism in association with the treatment of addiction to alcohol, and to compare these changes in the case of individuals maintaining a year-long abstinence and those who resumed the consumption of alcohol.

### PARTICIPANTS AND PROCEDURE

We conducted longitudinal studies. The first assessment was conducted on a group of 977 individuals. Neurotic traits were measured using the NEO-PI-R inventory at the initial stage of the treatment. During the second stage (after a year), the participants were tested again using the NEO-PI-R inventory. Abstinence was assessed on the basis of an interview, and we selected two subgroups: the ABS subgroup of patients succeeding in abstaining for a year ( $n = 116$ ), and the nABS subgroup of non-abstainers ( $n = 73$ ). In order to evaluate the dynamics of personality change in the scope of neurotic traits, the two-factor analysis of variance (ANOVA) was used; the analysis involved one factor of the repeated assessment and one inter-group factor.

### RESULTS

Only those results that pointed to significant effects of change ( $\eta^2_p > .06$ ) are described. Unlike in the nABS group, high variability was noted for Neuroticism ( $p < .001$ ,  $\eta^2_p = .18$ ) in the ABS group. Furthermore, in the ABS group, in contrast to the nABS group, there was a great decrease in constituent levels: N3 – Depression ( $p < .001$ ,  $\eta^2_p = .13$ ), N6 – Vulnerability ( $p < .001$ ,  $\eta^2_p = .13$ ), N1 – Anxiety ( $p < .001$ ,  $\eta^2_p = .11$ ), and N4 – Self-consciousness ( $p < .001$ ,  $\eta^2_p = .10$ ).

### CONCLUSIONS

It has been established that neuroticism decreases in the case of patients who maintain abstinence for a year, which improves their ability to adapt. This change can make patients experience negative emotional states less frequently, and cope better in stressful situations. The level of depression is lowered, and impulse control improves, but only in the case of patients who have abstained from alcohol for a year.

### KEY WORDS

neuroticism; alcohol dependence; treatment; abstinence; personality

ORGANIZATION – Psychiatry Institute for Medical Psychology, Jagiellonian University Medical College, Cracow, Poland

AUTHORS' CONTRIBUTIONS – A: Study design · B: Data collection · C: Statistical analysis · D: Data interpretation ·

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## BACKGROUND

Neuroticism conceptualised in the Five-Factor Personality Model determines the level of adaptation and emotional stability. The dimensions of this domain of personality are relevant to the level of anxiety, tendency to worry, inclination to experience negative emotions: anxiety, anger and depressiveness, hopelessness, the feeling of guilt, loneliness, the degree to which an individual is easily discouraged, the feeling of inferiority, anxiety in social situations, a tendency to panic in dangerous situations, coping with stress, and impulsiveness. The more exacerbated neuroticism, assessed using the NEO-PI-R inventory, is, the greater is the tendency to inhibit an activity as a result of having experienced negative stimuli, and the lower is the level of ability to control one's behaviour and orient towards the development of Self (De Fruyt, Van De Wiele, & Van Heeringen, 2000).

The meta-analyses of research indicate that a high level of neuroticism is associated with intensified consumption of alcohol (Ruiz, Pincus, & Dickinson, 2003). It is very closely associated with the risk of development of alcoholism, and that is particularly the case as far as impulsiveness and Aggressive Hostility expressed in fits of anger and having difficulty with controlling them is concerned (Hopwood et al., 2007; Jackson & Sher, 2003; Mulder, 2002; Sher, Bartholow, & Wood, 2000). In the case of addicted individuals undergoing treatment, the positive association between the exacerbation of an addiction with neuroticism was stronger than in the case of individuals not taking advantage of a therapy (Hopwood et al., 2007). In cohort studies concerning the assessment of the results after 6 and 12 months of an outpatient treatment of individuals addicted to alcohol (Bottlender & Soyka, 2005), in the case of participants who did not maintain abstinence longer than a year, a higher level of neuroticism (and a lower level of conscientiousness) in comparison with that observed in the group of abstainers was noted. In the case of women, neuroticism also makes them predisposed to the early resumption of consumption of alcohol (Meszaros et al., 1999).

In the studies conducted on the Polish population among addicted individuals reporting for the purpose of treatment, those whose constellation of personality traits was associated with a high level of neuroticism and with a low level of conscientiousness were characterised by stronger exacerbation of the symptoms of addiction, were younger, more frequently did not take up paid occupation, and also more frequently came from families with an alcohol problem than individuals whose results met the norm. The individuals having the former profile nearly two times more frequently resumed the consumption of alcohol within one year after a therapy lasting at least two months (Bętkowska-Korpała, 2010).

The axial symptom of neuroticism is anxiety, which, in the case of problems with the consumption of alcohol, is an extremely significant symptom, and also a frequent one in the course of various psychopathological disorders. According to Kushner, Abrams, and Borchardt (2000), these associations are complicated and may be explained from one of three perspectives. The first perspective is associated with the occurrence of anxiety concerning the occurrence of problems with the consumption of alcohol. The results of the studies of Kessler et al. (1996) devoted to the co-occurrence of consumption of alcohol and anxiety disorders led to the conclusion that in the case of individuals who experience anxiety and strain, a motive for resorting to alcohol is its sedative action. Since the time of conducting these studies, there have been many others confirming the significance of so-called self-treatment taking advantage of the pharmacopsychological impact of alcohol (Grant, Stewart, & Mohr, 2009; Mezquita, Stewart, & Ruipérez, 2010; Stewart & Devine, 2000; Stewart, Loughlin, & Rhyno, 2001; Theakston, Stewart, Dawson, Knowlden-Loewen, & Lehman, 2004). The models of regulation of affect indicate that reducing unpleasant emotional states by means of consumption of alcohol is present, in particular, in the case of individuals who treat drinking as a way of coping with stress (Littlefield, Sher, & Wood, 2010). Therefore, drinking alcohol functions as self-treatment, first and foremost, in the case of those individuals whose level of neuroticism is higher, whose experience of negative affect (chiefly anxiety) is stronger, and whose level of positive affect is lower (Goldstein & Flett, 2009). In that sense, the motive of self-treatment serves in an intermediary capacity between affectivity and alcoholism (Hussong, 2007). Stronger exacerbation of problems associated with alcohol in the case of individuals drinking in order to conduct self-treatment than in the case of individuals drinking alcohol in order to obtain other results (Kessler et al., 1997; Mezquita et al., 2011) was observed.

There also exists another direction of research into the correlations of anxiety and addiction described by Kushner et al. (2000). Abusing alcohol exacerbates anxiety, and is conducive to the formation of anxiety disorders (Schuckit & Hesselbrock, 1994), and, therefore, a tendency to consume alcohol for prolonged periods of time in order to reduce the states of anxiety, together with the development of an addiction, exacerbates the problem. In the case of individuals consuming alcohol because of being incapable of coping with negative states, what is more frequently diagnosed is the co-occurrence of affective and anxiety disorders which require treatment (Bizzarri et al., 2007; Grant et al., 2004).

The third perspective concerning the significance of anxiety in addiction to alcohol according to Kush-

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ner et al. (2000) refers to both of the above-mentioned correlations simultaneously. Anxiety disorders may contribute to maintained abusive consumption of alcohol, for example, by means of being convinced, and fostering an expectation, that when drinking is discontinued, anxiety will rise – this anxiety sustains drinking. Wojnar, Ślusarska, and Klimkiewicz (2007), in their review of studies, indicated that mental disorders (depressive and anxiety disorders) and personality disorders are a factor sustaining an addiction, and that they are quite conducive to relapses, even though the results of studies are not conclusive. Among the causes of the lack of cohesiveness of them, methodological considerations, the time of study – anxiety is exacerbated in the period of the occurrence of the symptoms of alcohol abstinence syndrome and afterwards it is usually of a regressive character – and other co-occurring psychopathological and somatic disorders are mentioned.

Anxiety is a predictor of relapses within one year since the beginning of treatment, both in men and women (Willinger et al., 2002). The exacerbation of psychopathological symptoms is reduced in the first 4 weeks of maintaining abstinence. Serious symptoms of anxiety lasting for more than three weeks, in particular with co-occurring depressive states, increase the risk of a relapse and require considering the continuation of treatment (Driessen et al., 2001; Kushner et al., 2000).

A symptom of neuroticism in the Big Five Model is also the trait of depressiveness. The role of depression in an addiction is a multi-dimensional one, and it is difficult to obtain conclusive estimations concerning the frequency of the occurrence of it. Similarly to anxiety disorders, depressive problems are more frequently observed in individuals who are addicted than in the healthy population (Swendsen et al., 1998). The results of studies investigating the influence of depression on the relapse of alcohol abuse are controversial because they do not indicate conclusively interactions between depressive symptoms and the predicted relapse, even though many researchers note that individuals with diagnosed depression resume the consumption of alcohol faster than those not suffering from it a shorter period of time after treatment (Greenfield et al., 1998; Willinger et al., 2002). In male patients who started undergoing therapy again after previous therapy, stronger exacerbation of depressive symptoms was observed in comparison with men starting treatment for the first time. The negative affect – depressiveness and anxiousness in the case of addicted individuals – is negatively associated with self-efficacy (Chodkiewicz, 2010), which, in turn, is of significance for the entire process of changing behaviour – since that change is initiated until it is fossilised (Łuszczynska, 2004) and the prevention of the resumption of drinking (Adamson, Sellman, & Frampton, 2009; Kadden

& Litt, 2011). Tendencies to negative affect (depressiveness) make a change associated with undertaking abstinence difficult because, in difficult situations, alcohol cravings and a tendency to continue learned reactions of coping with tension by means of resorting to alcohol are revealed. A high level of negative emotionality is an adverse prognostic factor for completing therapy and maintaining abstinence (Kucińska & Mellibruda, 1997). In the COMBINE (Combined Pharmacotherapies and Behavioral Interventions for Alcohol Dependence) study, a positive influence of psychological and pharmacological actions on the reduction of experiencing alcohol cravings, and, in consequence, weakening the association between the negative affect and the resumption of drinking in the period of treatment was found (Donovan et al., 2008; Witkiewitz, Bowen, & Donovan, 2011). In the group of patients who, within one year, resumed the consumption of alcohol, at the beginning of treatment – in comparison with individuals who maintained a year-long abstinence – higher values in the constituents of neuroticism, depressiveness and hypersensitivity and excessive self-criticism were observed. That means that individuals who resume the consumption of alcohol in the period of early abstinence are less adapted, have depressive disposition, more frequently experience depression, sadness and helplessness, are more oversensitive to assessment, and are more afraid of being rejected (Bętkowska-Korpała, 2012).

Another significant trait constituting part of the image of neuroticism is impulsiveness. This trait is associated with a broad scope of disorders, including addictions, bipolar affective disorder and personality disorders, in particular with those included in cluster B of the DSM-IV classification. In the NESARC (National Epidemiological Survey of Alcoholism and Related Conditions) epidemiological studies, 17% of the American population are characterised by impulsiveness, and it is particularly common in young men (Chamorro et al., 2012). Impulsiveness is a trait frequently analysed in the context of abusing alcohol because alcohol reduces the ability to control behaviour, and shortens the time between occurrence of a stimulus and a reaction. Impulsiveness is considered as an endophenotype, excellently suitable for the purpose of analysing the interactions of the influence of genotype and the environment in research into mental disorders. In the process of regulation of the exacerbation of impulsiveness, the activity of the dopaminergic and serotonergic system is significant. It was found that the level of impulsiveness changes together with alcohol intoxication. In the case of individuals chronically abusing alcohol, the exacerbation of that trait is associated with dysfunctions of the frontal cortical and subcortical structures (Olmstead, Hellems, & Paine, 2006). This damage directly indicates problems with controlling and in-

hibiting impulses (Yeh, Simpson, Durazzo, Gazdzinski, & Meyerhoff, 2009).

In the Polish studies, a higher level of impulsiveness was observed in the case of patients addicted to alcohol than in individuals not suffering from problems with alcohol (Zalewska, 2009). Hopwood et al. (2007) found that addicted individuals currently drinking differed from individuals who drank in the past solely in terms of a higher level of impulsiveness. In the research into Polish patients in which individuals maintaining a year-long abstinence and those who resumed the consumption of alcohol after treatment were compared, it was determined that the participants from the first group were characterised by a lower level of impulsiveness even at the beginning (Bętkowska-Korpała, 2012). Another aspect describing neuroticism is experiencing frustration, anger and annoyance. In the exacerbation of those traits, differences between individuals studied at the beginning of the therapy and individuals maintaining abstinence for longer than four months are visible (Zalewska, 2009). It is similar at the beginning of therapy – a lower level of exacerbation of this trait is observed in patients who maintain a year-long abstinence than in individuals who resume the consumption of alcohol directly after treatment (Bętkowska-Korpała, 2012).

In recapitulation, the regulation of affect by means of drinking alcohol is conducive to the persistence of an addiction. In the period of abstinence, assisting individuals motivated to abstain from the consumption of alcohol by means of self-treatment requires paying attention to the way of regulating emotional states. These individuals need psychotherapy directed at the ability to regulate affect, and sometimes also pharmacological support. In the period of early abstinence, from the sixth month up to a year, the predictors of relapse were chiefly associated with mood disorders, but also with neuropsychological functions and a positive history of the family with addiction to alcohol. In the case of individuals maintaining abstinence for longer than a year, more constant personality traits, for example, psychopathic, associated with anxiety deficit (Jin, Rourke, Patterson, Taylor, & Grant, 1998), were of significance. The level of adaptation – studied using the factor of Neuroticism in the Five-Factor Personality Model – is influenced by the long-lasting consumption of alcohol and its toxic impact on the organism. By means of physiological mechanisms, alcohol may cause, among others, emotional lability, impulsiveness and aggressiveness, lowered mood, problems with the assessment of reality and the consequences of one's own behaviour in completing any actions, lowered self-esteem or handicap in the scope of self-regulatory skills (Bętkowska-Korpała, 2013). The secondary deterioration of functioning and its assessment may exert a negative influence on self-esteem, weaken self-efficacy

and cause isolating oneself from others, which is conducive to further consumption of alcohol and a linear increase in alcohol abuse, and also to exacerbating and consolidating anxiety and depressive symptoms, aggressiveness, impulsiveness and low self-esteem, and results in a less and less effective way of coping with stress, and, therefore, is a constituent of neuroticism as a personality factor. The discussed factor of neuroticism and its constituents – as indicators of adaptation – are frequently researched and broadly described, not only in the context of the profile of addicted individuals, but also in reference to various psychopathological disorders (De Fruyt, De Clercq, Van De Wiele, & Van Heeringen, 2006; Malouff, Thorsteinsson, & Schutte, 2005; Nestadt et al., 2008; Preuss et al., 2009; Saulsman & Page, 2004). It is difficult to assess the degree to which abusing alcohol is the result of adaptation disorders, or strengthens the previously existing psychopathological symptoms, and to what degree it disturbs adaptation by means of dysfunctions of neurobiological mechanisms and psychosocial difficulties. However, it is not frequent that research assessing the dynamics of changes in this dimension of personality in reference to individuals who undertake treatment is attempted. Because adaptation is a continuing process of search for balance (Hartman, quoting: Oleś & Drat-Ruszczak, 2008), it is possible to assume that changes resulting from healing will be revealed in the level of adaptation as well.

## OBJECTIVE

To determine the dynamics of changes to neuroticism in connection with undertaking the treatment of an addiction to alcohol and also comparing these changes in the case of individuals maintaining a year-long abstinence and individuals who resumed the consumption of alcohol.

## PARTICIPANTS AND PROCEDURE

The research was conducted as part of the statutory programme conducted in the Psychiatry Institute for Medical Psychology of Jagiellonian University's Medical College in Cracow, and bearing the name 'Patterns of the psychosocial functioning of individuals addicted to alcohol' in the years 2009-2011. The programme was conducted in natural clinical conditions in 12 specialist addiction-treatment facilities, in which a similar strategic-structural therapeutic approach was used (Mellibruda & Sobolewska-Mellibruda, 2006). The research was of a longitudinal character, and two measurements were made: at the beginning of the treatment, and after one year.

**The study group** consisted of 997 individuals with diagnosed alcohol addiction syndrome who had completed the basic therapeutic programme in an outpatient clinic (approximately three months long), and also in a day care ward or an inpatient care ward (eight weeks long). As it was intended to obtain comparative homogeneity of the group, individuals addicted to drugs, individuals with significant cognitive dysfunctions making it difficult for them to participate in the research, and individuals who had not expressed their consent to participate in the research, were excluded from the study. The average age was 43, range 23 to 70,  $SD = 9.95$ . The largest number of individuals in the study group was in the age range from 40 to 50, and the smallest was in the age range from 60 to 70 (scarcely 2-4% of the studied individuals). The study group comprised 24% women and 76% men. Specialists in the psychotherapy of addictions diagnosing patients using the SRUA scale observed in the case of 50% of the studied individuals the greatest exacerbation of each and every symptom (Bętkowska-Korpała & Kasprzak, 2013). After one year, 650 patients (67% of 977 individuals) were randomly selected to the second stage. Of this group, it proved possible to obtain the complete results of the research in the case of 189 patients, and also, on the basis of the history, determine alcohol abstinence throughout a year. This group consisted of 116 individuals (61%) who maintained abstinence and 73 individuals (39%) who after completing at least the basic stage of the treatment resumed the consumption of alcohol.

The proportions of women and men in groups at both stages were similar, and these proportions result from the frequency of undertaking therapy among women and men in Poland. There was no difference in time since commencing the problem consumption of alcohol (about 10 years) or the exacerbation of the symptoms of an addiction between the group of ABS (abstainers) and nABS (non-abstainers). On average, patients resumed the consumption of alcohol about 20 weeks after the beginning of therapy. Half of the individuals in this group did not maintain abstinence in the 16<sup>th</sup> week. All the individuals were informed about the objectives and procedure of the study, and expressed their consent in written form.

## RESEARCH METHODS

Personality Inventory (NEO-PI-R) – it describes the adopted taxonomy of 5 chief personality factors. In the research, the factor of neuroticism and also its constituents, which determine the level of adaptation, emotional stability, tendency to experience negative emotions, controlling impulses and coping with stress, were used. In accordance with the Five-Factor Personality Model, neuroticism is conditioned bio-

logically, but – by means of changing the functioning of biological mechanisms – its exacerbation may also be the result of environmental impact (McCrae et al., 2000; McCrae & Costa, 2005). The inventory contains 240 items, and the studied individuals, using the Likert-type style (0 to 4) indicate the truthfulness of a sentence in relation to themselves, providing answers on an appropriate sheet. Using keys, a raw result is calculated, and afterwards, taking into consideration norms (for age and sex), the result is transferred to a sheet on which it is possible to find the sten value, drawing a personality profile. Results are obtained in the following sten ranges: 1 and 2 – very low; 3 and 4 – low; 5 and 6 – average; 7 and 8 – high; 9 and 10 – very high. The Polish adaptation of this test is characterised by good psychometric indicators (Siuta, 2006, 2009). Below, the symbols and full names of the chief factors and their constituents are presented, together with a very general description of them:

N – Neuroticism – it describes the level of adaptation, emotional stability, a tendency to experience negative emotions, control of impulses and coping with stress:

- N1 – Anxiety – it describes the level of anxiousness, anxiety and an inclination to worry,
- N2 – Aggressive Hostility – it describes a tendency to experience anger and frustration,
- N3 – Depressiveness – it describes a tendency to experience depressiveness, the feeling of guilt, hopelessness and loneliness, and also being discouraged easily,
- N4 – Excessive self-criticism – it describes an inclination to the feeling of inferiority, fears of being ridiculed by others, timidity and anxiety in public situations,
- N5 – Impulsiveness – it describes the level of ability to control temptations, needs and the degree of tolerance of frustration,
- N6 – Hypersensitivity – it describes susceptibility to stress, coping with stress, dependency and tendency to experience panic in dangerous situations.

Semi-structured interview – as the criterion of a year-long abstinence, maintaining alcohol abstinence without even a single example of the consumption of alcohol for a year since the moment of commencing the treatment was adopted. Two groups of studied individuals were selected: individuals who maintained a year-long abstinence (ABS), and also individuals who, in the period between completing the basic therapy and an assessment after a year resumed the consumption of alcohol (nABS). In accordance with the commonly accepted definition of healing in the case of addictions (McLellan, 2010a), abstinence was found to be a behavioural indicator of the effects of changes initiated at the beginning of the therapy. Discussions devoted to the objectives of the therapy of addictions are in progress, and they

are defined in different ways. However, from the point of view of specialists treating addicted individuals and according to international institutions responsible for the standards of treatment, an optimal, even though not the only one, objective is maintaining abstinence (among others, the standards of NICE/NIAAA; Jakubczyk & Wojnar, 2012). The results of studies indicate that in the case of individuals who report to specialist facilities, maintaining abstinence constitutes an important objective of the therapy, even though objectives may undergo modification in the course of the disaccustoming therapy (among others, Adamson, Heather, Morton, & Raistrick, 2010; Ambrogne, 2002; McLellan, 2010b).

**The study procedure** is of a quasi-experimental character (without a control group). As the first ones, the descriptive statistical data for the factor of Neuroticism and its constituents in comparison with the normative group (Student's *t*-test for single means) were presented. Subsequently, in the analysis of the dynamics of changes concerning the influence of the therapy, and, simultaneously, maintenance of abstinence by all of the studied individuals, on a change to the exacerbation of the factor of Neuroticism and its constituents, the two-factor analysis of variance ANOVA was used. In the case of obtaining statistically significant interactions, comparisons planned for differences between separate measurements, separately in groups, in terms of the criterion of abstinence, and also in terms of that of differences between groups, separately for measurements, were conducted. The size of the  $\eta^2$  effect according to the interpretation of Cohen was calculated: a small effect did not exceed .01 (which means 1% of the explained variance), the mean one did not exceed .06, and a large one did not exceed .14, which means that the values between the first and the others, for example, .10 (10%), will be defined as 'the size of the effect between mean and large' (Cohen, 1988).

## RESULTS

In order to establish whether individuals addicted to alcohol are characterised by the same values of the factor of Neuroticism and its constituents as the Polish standardization group, Student's *t*-test for a constant value was conducted, comparing the raw results. It was revealed that in the clinical group there are significantly higher values of the factor of Neuroticism and its constituents, i.e., N1-N6, than in the standardization group (Table 1).

The following step is determining the changeability of the exacerbation of the factor of Neuroticism and its constituents. In Table 2, the results for the changeability of the chief personality factors are presented.

In the case of the variable N – Neuroticism, a change in the entire group was statistically significant, and it was larger in the ABS group than in the nABS group. The effect of the interaction explained 15% of the variation of the dependent variable N – Neuroticism. In the case of the variables N1 – Anxiety, N2 – Aggressive Hostility, N5 – Impulsiveness and N6 – Hypersensitivity, the change in the entire group was statistically significant, and it was the same in both subgroups. The effect of interaction explained 13% of the variation of N6 – Hypersensitivity, and 12% of the variation of N1 – Anxiety. In the case of the variables N3 – Depressiveness and N4 – Excessive self-criticism, the change was significant in the entire study group, and it was different in the ABS group than in the nABS group. In recapitulation, in the case of the variables, in the scope of the factor N – Neuroticism, the change concerned the entire group, even though the ABS and nABS groups differed in terms of the size of those changes.

Subsequently, differences in the exacerbation of the factor N – Neuroticism and its constituents between the first and the second measurement, separately in the ABS and nABS groups (ANOVA, planned comparisons, Table 3), were compared.

Table 1

*Comparison of raw values of the factor Neuroticism and its constituents using Student's t-test between the study group at the beginning of the treatment and the normative group*

Variables	Mean (SD)	Me	Min-Max	Reference – constant	<i>t</i>	<i>p</i>
N – Neuroticism	104.43 (22.69)	104	30-175	95.40	5.47	< .001
N1 – Anxiety	18.39 (5.32)	19	0-32	17.50	2.30	.022
N2 – Aggressive hostility	15.35 (5.14)	16	2-30	14.20	3.09	.002
N3 – Depressiveness	18.88 (5.27)	19	2-31	16.60	5.95	< .001
N4 – Excessive self-criticism	19.13 (4.94)	19	6-31	17.60	4.27	< .001
N5 – Impulsiveness	17.56 (3.98)	17	9-30	15.60	6.77	< .001
N6 – Hypersensitivity	15.12 (5.38)	15	0-32	13.80	3.36	.001

Table 2

*Analysis of variances for the changeability of the factor Neuroticism and its constituents (ANOVA with a single factor of the repeated measurement)*

Variables	Effect	df	F	p	$\eta^2_p$
N – Neuroticism	Group	1	5.87	.016	.03
	Change	1	31.54	< .001	.15
	Change × Group	1	6.01	.015	.03
N1 – Anxiety	Group	1	4.69	.032	.03
	Change	1	23.71	< .001	.12
	Change × Group	1	0.88	.349	< .01
N2 – Aggressive hostility	Group	1	9.24	.003	.05
	Change	1	9.54	.002	.05
	Change × Group	1	< 0.01	.950	< .01
N3 – Depressiveness	Group	1	3.03	.083	.02
	Change	1	17.54	< .001	.09
	Change × Group	1	4.74	.031	.03
N4 – Excessive self-criticism	Group	1	0.11	.735	< .01
	Change	1	9.43	.002	.05
	Change × Group	1	5.79	.017	.03
N5 – Impulsiveness	Group	1	1.26	.263	.01
	Change	1	4.51	.035	.02
	Change × Group	1	3.50	.063	.02
N6 – Hypersensitivity	Group	1	5.04	.026	.03
	Change	1	28.19	< .001	.13
	Change × Group	1	1.47	.227	.01

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The change in the exacerbation of the factor N – Neuroticism was statistically significant both in the ABS group and in the nABS group, but in both of the factors the size of the change was definitely larger in the case of individuals from the ABS group. The interaction effect explained 18% of variation of N – Neuroticism. A statistically significant change occurred in the ABS group, and also in the nABS group, solely in the scope of the values of the variables N1 – Anxiety and N6 – Hypersensitivity, explaining, respectively, 11% and 13% of variation for those variables, whereas in the case of the remaining constituents, statistically significant changes were observed only in the case of the ABS group in the scope of the variables N3 – Depressiveness, N2 – Aggressive Hostility, N4 – Excessive self-criticism and N5 – Impulsiveness. It is notable that the size of the change from the average to the large value concerns as many as four constituents, but only those in the ABS group. The size of the effect of 13% concerns N3 – Depressiveness and N6 – Hypersensitivity, of 11% concerns N1 – Anxiety, and of 10% concerns N4 – Excessive self-criticism.

Moreover, in the case of the personality factor of N – Neuroticism and its constituents, the differences between ABS and nABS groups were analyzed, separately in the first and second measurements (ANOVA, planned comparisons; Table 4).

In the scope of the factor of N – Neuroticism and its constituents N1 – Anxiety, N3 – Depressiveness and N6 – Hypersensitivity, the difference between the groups was not statistically significant in the first measurement, but it was significant in the second measurement. In the conducted analysis, it was proved that both in the first and in the second study, solely the constituent of N2 – Aggressive Hostility differentiates the ABS and nABS groups. In the values of the remaining five constituents, there were no statistically significant differences, whereas after one year more of them appeared, and they were relevant to the following constituents. The graphical presentation of the mean sten values of the factor of N – Neuroticism and its constituents in the first and second measurement in the ABS and nABS groups can be found in Figures 1-7.

Table 3

*Differences in the values obtained in the first and second measurement for the factor N – Neuroticism and its constituents in the ABS and nABS groups (ANOVA, planned comparisons)*

Variables	Group	Difference between first and second measurement	Statistical error	<i>p</i>	$\eta^2_p$
N – Neuroticism	ABS	1.22	.19	< .001	.18
	nABS	0.48	.24	.045	.02
N1 – Anxiety	ABS	1.06	.23	< .001	.11
	nABS	0.72	.29	.013	.03
N2 – Aggressive hostility	ABS	0.51	.20	.012	.03
	nABS	0.49	.26	.055	.02
N3 – Depressiveness	ABS	1.20	.23	< .001	.13
	nABS	0.38	.30	.201	.01
N4 – Excessive self-criticism	ABS	0.81	.18	< .001	.10
	nABS	0.10	.23	.673	< .01
N5 – Impulsiveness	ABS	0.67	.21	.002	.05
	nABS	0.04	.26	.873	< .01
N6 – Hypersensitivity	ABS	1.01	.19	< .001	.13
	nABS	0.63	.24	.010	.04

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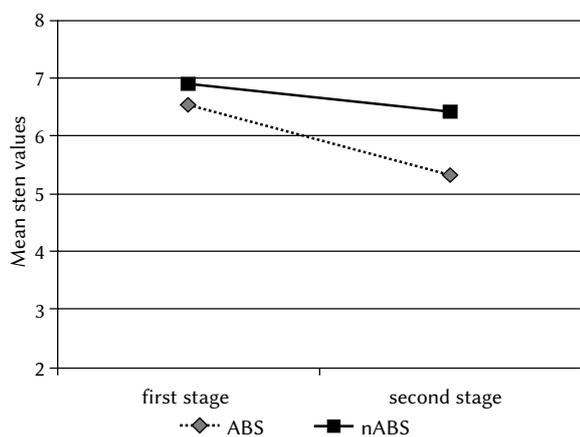
Table 4

*Comparison of the factor N – Neuroticism and its constituents between the ABS and nABS groups, respectively for the two stages of treatment: first and second (ANOVA, planned comparisons)*

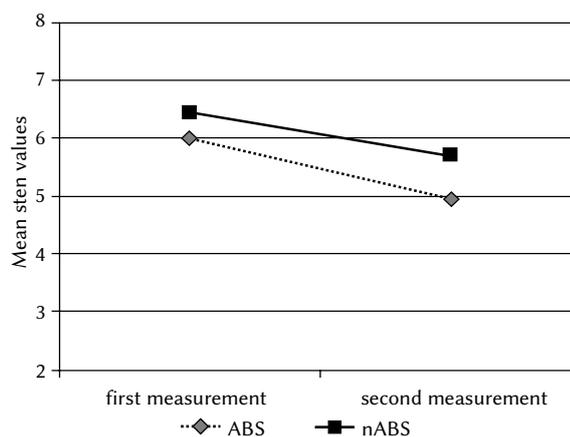
Variables	Measurement	Difference	Statistical error	<i>p</i>	$\eta^2_p$
N – Neuroticism	1.	-0.35	.31	.259	< .01
	2.	-1.09	.36	.003	.05
N1 – Anxiety	1.	-0.43	.32	.179	.01
	2.	-0.77	.35	.027	.03
N2 – Aggressive hostility	1.	-0.82	.32	.011	.04
	2.	-0.84	.32	.008	.04
N3 – Depressiveness	1.	-0.07	.33	.840	< .01
	2.	-0.89	.34	.010	.04
N4 – Excessive self-criticism	1.	0.45	.32	.162	.01
	2.	-0.26	.30	.384	< .01
N5 – Impulsiveness	1.	0.02	.30	.936	< .01
	2.	-0.61	.32	.062	.02
N6 – Hypersensitivity	1.	-0.45	.30	.141	.01
	2.	-0.82	.34	.017	.03

In recapitulation, the conducted analysis indicates that the exacerbation of the values of N – Neuroticism in the case of individuals addicted to alcohol who reported for the purpose of treatment and un-

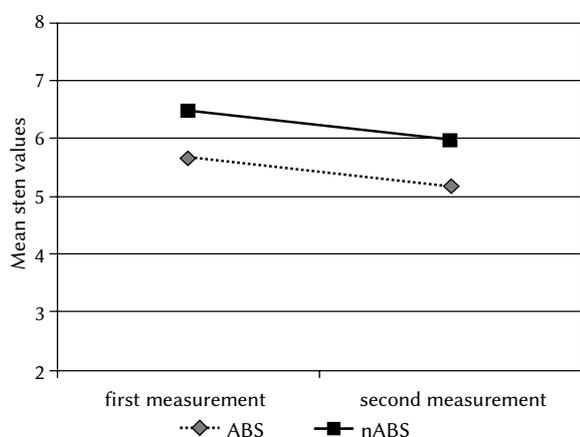
dertook abstinence at least for the time of the basic period of the therapy undergoes changes throughout a year. In the entire group, reduction in the exacerbation of the factor of N – Neuroticism was noted,



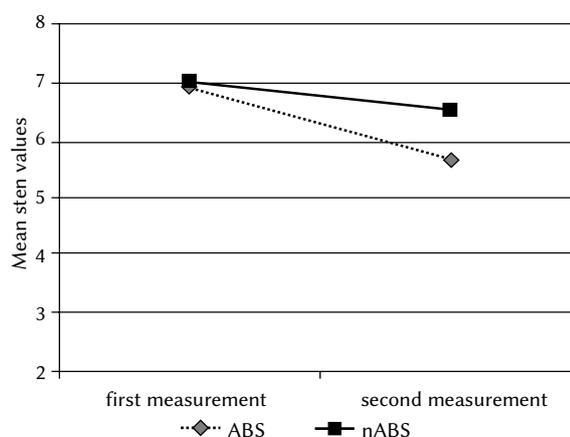
*Figure 1.* Mean sten values in the case of N – Neuroticism in the first and second measurement in the ABS and nABS groups.



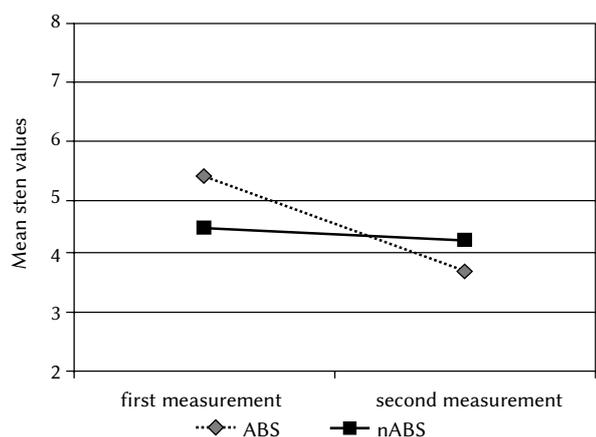
*Figure 2.* Mean sten values of the variable N1 in the first and second measurement in the ABS and nABS groups.



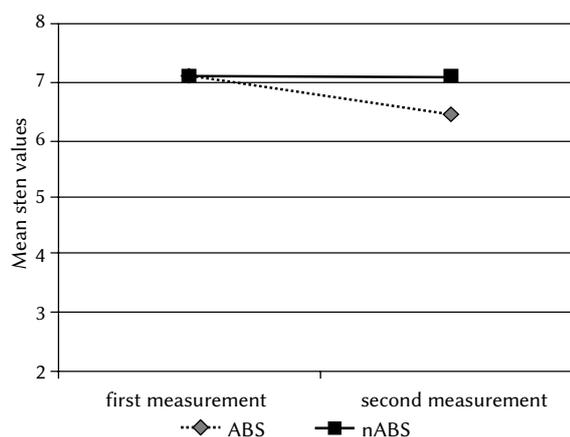
*Figure 3.* Mean sten values of the variable N2 in the first and second measurement in the ABS and nABS groups.



*Figure 4.* Mean sten values of the variable N3 in the first and second measurement in the ABS and nABS groups.



*Figure 5.* Mean sten values of the variable N4 in the first and second measurement in the ABS and nABS groups.



*Figure 6.* Mean sten values of the variable N5 in the first and second measurement in the ABS and nABS groups.

and even though at the beginning, the ABS and nABS groups did not differ in these terms, after a year in the ABS group a larger change was observed than that in the nABS group, and the difference between these

groups was statistically significant. Three aspects in particular deserve emphasizing. The first of them indicates that the changes are noticeable in the entire group who undertook abstinence, regardless of the

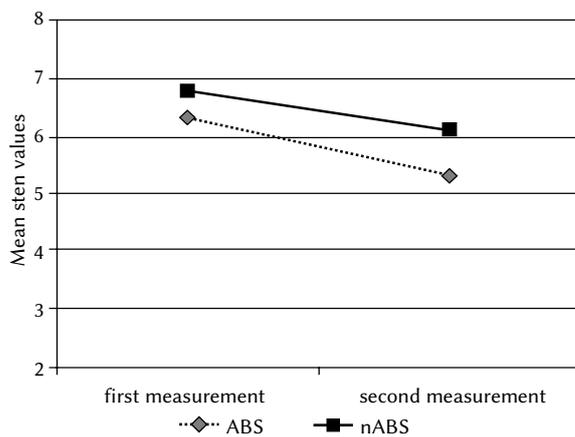


Figure 7. Mean sten values of the variable N6 in the first and second measurement in the ABS and nABS groups.

period of maintaining it. The second one indicates that the dynamics of changes are different in the ABS and nABS groups. A larger number of changes (and larger scope of them) occurs in the group who maintained alcohol abstinence for a year. The third aspect is relevant to the appearance and increase in differences in the exacerbation of the chief traits between the ABS and nABS groups after one year. The results suggest that the size of the change depends on the duration of abstinence.

## DISCUSSION

The research indicated the influence of abstinence and therapy on changes in the area of the factor Neuroticism and its constituents as indicators of the level of adaptation.

In spite of the tradition of adopting, in psychological research models, the assumption that personality traits are comparatively constant, in the presented analyses this paradigm of research was given up on, and replaced with the assessment of the dynamics of the changes of this dimension of personality. It seems that the obtained results are part of the discussion devoted to the mechanisms of changes resulting from the treatment and maintenance of abstinence, because in the literature of the subject there are no studies investigating the issue of changes of personality in addicted individuals. In the case of the clinical study group, discontinuing intoxication with alcohol, and also the longer time of abstinence, may directly improve the functioning of the brain, providing a chance of stabilizing the mental state associated with improvement in the functioning of emotional and cognitive processes (Fein, Torres, Price, & Di Sclafani, 2006; Lezak, Howieson, & Loring, 2004; Cozolino, 2002). In turn, a strong influence of the external influence, for example, the psychotherapy of an addiction – with the intermediary participation of the mechanisms of

learning and memory, and also the neuroplasticity of the brain, and, therefore, by means of neurobiological mechanisms – exerts an influence on a change of adaptation (Witkiewitz, et al., 2011; Cozolino, 2002; Rakowska, 2005; Murawiec, 2005).

It was determined that, in comparison with the normative group, patients (not having the symptoms of abstinent alcohol syndrome) commencing the therapy are characterised by a higher level of neuroticism and, in the clinical picture, by the dominating experience of negative emotions: anxiety, depressive-ness, experiencing hostility and the feeling of guilt.

These individuals are characterised by artificially lowered self-esteem, a greater susceptibility to experiencing stress, and also manifest problems in controlling needs and sudden impulses. The obtained results are consistent with the results of the most frequently conducted research and meta-analyses concerning the psychological functioning of addicted individuals. Neuroticism is a factor broadly described and researched in clinical groups because a lot of mental and personality disorders are associated with high values of it and/or its constituents. A generally high level of neuroticism is associated with a lower level of adaptation, and an addiction strengthens pathogenetic mechanisms, which cause the secondary exacerbation of adaptation problems (Nestadt et al., 2008; Malouff et al., 2005; De Fruyt et al., 2006; Saulsman & Page, 2004; Preuss et al., 2009). These disorders, co-occurring with an addiction, make it difficult to make changes in the life of a patient, and are negative prognostic factors of the effects of treatment (Willinger et al., 2002; Kushner et al., 2000; Driessen et al., 2001; Greenfield et al., 1998). A high level of neuroticism in the study group is associated with the strong exacerbation of an addiction (Ruiz et al., 2003; Hopwood et al., 2007; Bętkowska-Korpała, 2010), and also makes one predisposed to relapse (Bottlender & Soyka, 2005), in particular in the case of women (Meszaros et al., 1999). In the study group, impulsiveness may be associated with dysfunctions of the frontal cortical and subcortical structures (Olmstead et al., 2006; Zalewska, 2009). Its exacerbation changes together with alcohol intoxication (Hopwood et al., 2007; Yeh et al., 2009), and patients who as soon as at the beginning of the therapy are diagnosed as suffering from a lower level of impulsiveness have a greater chance of maintaining abstinence (Bętkowska-Korpała, 2012; Evren, Durkaya, Evren, Dalbudak, & Cetin, 2012). In connection with the fact that alcohol fulfils a sedative role in alleviating affective states, but also exacerbates the negative affective states, secondarily sustaining an addiction, it is likely that in the study group there were individuals who abused alcohol also because of ineffective coping with stress and the difficulties of daily life (among others, Stewart & Devine, 2000; Stewart et al., 2001; Theakston et al., 2004; 2010; Goldstein & Flett, 2009; Hussong, 2007).

A high level of neuroticism indicates problems with controlling impulsive behaviours manifesting themselves, among others, in difficulties with controlling needs and impulses, or is associated with experiencing anxiety, depression and helplessness. In the case of acquisition of skills to maintain abstinence by addicted individuals and making changes in the scope of the way of functioning, those predispositions make it substantially more difficult to learn new behaviours, especially adaptive ones, due to inclinations to ill-conceived, risky behaviours, and problem with delaying gratification. Moreover, the development of an addiction may weaken adaptive skills manifesting themselves in the form of problems with the regulation of affect, which, as a result, causes difficulties with gaining positive experiences.

Another analysed issue concerned the significance of abstinence and participation in the therapy in the dynamics of changes in the scope of neuroticism. It was established that in the case of individuals addicted to alcohol – who undertook abstinence, and also completed at least the initial stage of the therapy – there appeared the dynamics of changes in the exacerbation of personality traits in the direction of better adaptation. In the scope of the variable N – Neuroticism in the entire group, lowering the level of anxiety and Hypersensitivity was recorded, which suggests that therapy and the period of abstinence lasting for at least 10 to 20 weeks contributed to improvement, first and foremost, in the scope of coping with stress. It seems justifiable to claim that in spite of the fact that the group resumed drinking, the change in these areas of neuroticism may be a factor of strengthening, in the period of therapy, of resources for coping with stress and anxiety in an alternative way to resorting to alcohol. It is known that abusing alcohol exacerbates anxiety, and the experience of the latter kind sustains an addiction (Kushner et al., 2000). In the period of stable abstinence, the sustaining symptoms of anxiety, which are associated with experiencing stressful situations and coping with them, are conducive to the activation of alcohol cravings and relapse (Sinha & Li, 2007), whereas the reduction of anxiety and hypersensitivity may be explained by stabilizing the activity of the hypothalamus-pituitary gland-suprarenal glands axis in the period of abstinence (among others, Brykalski, Załuska, & Brower, 2010). It is noteworthy that a high level of neuroticism suggests that the chief motive was coping with the regulation of emotional states. Therefore, the elimination of the toxic influence of alcohol from the organism ensures improvement in the state of health, and, to a different degree, regression in adverse health effects, including the neurobiological ones. In turn, improvement in the scope of executive functions (Jodzio, 2008; Lezak et al., 2004) may be conducive to taking advantage of the therapy, and making changes to the way of reacting to different situations, and, by lowering the level of

anxiety, it might improve the effectiveness of coping with stress, which is the source of relapses. Usually, these issues constitute the objective of psychotherapy in the first months of healing.

It seems that the duration of abstinence is of significance for the improvement in the scope of adaptation. It was observed that in the studied individuals after a year of abstinence, the dynamics and scope of changes to personality are greater than in the individuals who resumed the consumption of alcohol within a year. After a year, patients maintaining abstinence are characterised by a better degree of adaptation, manifested in a lower level of negative emotions (anxiety, depressiveness, the feeling of guilt, anger), a better self-image, and also better coping with stress and impulsiveness than in the case of individuals who resumed the consumption of alcohol. The mean values after a year in the group of individuals after a year of abstinence were in the scope of mean sten values, which would suggest gaining good adaptation skills. Only in the group of individuals after a year of abstinence was the level of impulsiveness significantly lowered; therefore, it can be concluded that individuals from this group control their stimulation better. In the research of Hopwood et al. (2007), in the case of individuals addicted to alcohol and drinking in the past, a lower level of impulsiveness than in the case of currently drinking individuals was observed. Because the exacerbation of this trait is associated with dysfunctions of the frontal cortical and subcortical structures manifesting themselves in problems with controlling and inhibiting impulses (Olmstead et al., 2006; Yeh, et al., 2009), the result supports the interpretation that the change may be a result of improvement in the scope of functioning processes in the brain. Consequently, the increase in the efficiency of executive functions, manifesting themselves also in the stabilization of, and better regulation of, emotional states, and also enriching the resources in the scope of coping with problems, may reduce the risk of relapse in the case of addicted individuals (among others, Demirbas, Ilhan, & Dogan, 2012). Usually, these issues constitute the objective of psychotherapy in the first months of healing.

The traits which significantly changed as the result of a year-long abstinence are, first and foremost: decrease in the level of neuroticism in the scope of anxiety, depressiveness, hostility, excessive self-criticism, impulsiveness, and hypersensitivity. These traits are of particular significance in the area of mental health because they are described in reference to psychopathological disorders (Malouff et al., 2005; Saulsman & Page, 2004; Preuss et al., 2009). Due to the risk of co-occurrence of psychopathological disorders and alcohol addiction syndrome, a precise clinical diagnosis, and, possibly, considering pharmacological support in the group of individuals who re-

sumed the consumption of alcohol, even though they had undertaken the therapy and had maintained abstinence, are important.

The obtained results confirm the assumption in the Five-Factor Personality Theory that in spite of the endogenous character of traits, a change in personality is possible, and constitutes the result of the influence of many mechanisms (McCrae & Costa, 2005; McCrae et al., 2000). In the studied group, changes may be associated with different mental processes, also explained using the construct of executive functions. Most generally, following the description of the factor N – Neuroticism, it is possible to hypothetically ascribe to them the processes of self-regulations encompassing, first and foremost, emotional processes (the ventromedial prefrontal cortex, as well as the connections of the limbic system with the frontal gyrus and the amygdaloid body), and the general integration of mental functions (hierarchical networks between the frontal cortex and loops in the different areas of the cortex, the limbic system and the brain stem) (among others, Lezak et al., 2004). Of course, these assignments are of a very hypothetical and simplified character because putting such theses forward requires integrated research into the assessment of personality traits and neuropsychological functions, and also the results of neuroimaging, in order to assess the structure and activities of the brain tissue. A neurobiological improvement may, therefore, directly improve mental processes and the degree of adaptation, even though it seems to be impossible to conduct an assessment of the scope of that improvement in relation to the state of health and an ability to adapt from the time before the period of the development of the mechanisms of an addiction.

The second way of changing personality traits concerns a strong external influence exerted by biological mechanisms. Participation in the basic therapy of an addiction is usually of an intensive character, and an individual undertaking the therapy concentrates on changes in their own life. Initially, they are relevant to strengthening the ability to maintain abstinence, and, later on, they are directed at the different spheres of life of an addicted individual, and they also include the family system (among others, Cierpiałkowska, 2010; Mellibruda & Mellibruda-Sobolewska, 2006). Thanks to the mechanisms of learning and memory, and also to the role of neuroplasticity, new experiences, appearing as the result of the therapy and life in sobriety, may weaken the mechanisms of an addiction and exert a positive influence on the formation of new mnemonic traces, and also improvement in the functioning of the brain as ‘the organ of adaptation’ (Cozolino, 2002). Therefore, as it is indicated by the conception of allostasis of Koob and LeMoal (Ericsson, 2007), in accordance with which neurobiological mechanisms tend to achieve optimal adaptation in the course of the development of an addiction, elimi-

nating alcohol intoxication in a longer period of time perhaps re-activates the processes leading to regulating processes in the organism and setting the new form of homeostasis. New experiences acquired in the process of the therapy may be conducive to strengthening the ability to adapt and improving affective regulation, which is revealed by means of the factor N – Neuroticism.

## CONCLUSIONS

In the studied clinical group – in comparison with the standardization group – a higher level of neuroticism indicates a lowered level of adaptation, a high level of suffering, problems with the regulation of negative emotions, negative self-esteem, problems with controlling impulses and ineffectiveness in coping with stress.

A high level of neuroticism in the case of patients in the initial period of the treatment suggests that the crucial motive in the case of the consumption of alcohol is reducing strain and negative affectivity.

It was determined that maintaining alcohol abstinence and participation in the therapy lowers the level of neuroticism, and, *ipso facto*, improves adaptation skills. That may be manifested by less frequently experiencing negative emotional states, and coping in situations of strain. In addition, in the case of individuals after a year-long abstinence only, the level of depressiveness is lowered, and self-esteem and control of impulses are improved.

The conducted analysis leads us to conclude that participation in the therapy and stabilizing abstinence even in the case of individuals who later resumed the consumption of alcohol exerts an influence on lowering the level of anxiety and on increasing the skill of coping with stress, whereas a fossilised abstinence (for a period of time longer than a year) is conducive to the increased scope and effect of changeability of personality traits in the direction of better adaptation.

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