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Posted Date: 1 April 2025

doi: 10.20944/preprints202504.0110.v1

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Article

The Role of Personality Dimensions on a Hybrid Arts-Based CBT-CP Intervention for Patients with Non-Malignant Chronic Pain: Preliminary Evidence from a Non-Randomized Control Trial

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Abstract: Background: Optimal coping with chronic pain (CP) has a positive impact on minimizing the barriers to patients' quality of life. Mindfulness-based approaches have been shown to improve emotional regulation and coping strategies in CP management, promoting a greater acceptance of pain and reducing psychological distress. Given that personality traits may influence the adjustment to chronic pain, this study aimed to investigate whether specific personality dimensions, based on Cloninger's theory of temperament-character factors, affect the response to pain treatment in an innovative hybrid Arts-CBT intervention for patients with non-malignant CP. Methods: A pre-and-post research design was implemented in a non-randomized control trial. A total number of 100 outpatients at a University Pain Management Unit participated through self-selection in either an Arts-CBT group intervention (50 patients) or a treatment as usual (TAU) control group (50 patients). All participants completed the Brief Pain Inventory (BPI), the Mental Pain Scale (MPS), the Tolerance for Mental Pain Scale (TMPS), the Temperament and Character Inventory (TCI-140), and the WHOQoL-BREF questionnaire. Pre-post measurements took place at baseline and at the end of the intervention, after a 10-week period. Statistical analyses included t-test for independent samples, Chi-square, ANCOVA, and linear regression analysis. Results: The participants of the Arts-CBT intervention group had a higher score in the novelty seeking character dimension ($M = 64.04$; $SD = 9.56$), while the TAU group was found to have higher scores in self-directedness ($M = 74.34$; $SD = 11.22$) and self-transcendence ($M = 51.42$; $SD = 6.61$), at the baseline. The Arts-CBT group reported a lower loss of control ($M = 22.94$; $SD = 6.70$) and a higher belief in the ability to cope with pain ($M = 21.10$; $SD = 3.76$) after the intervention, compared with the control group. Self-transcendence was associated with patients' quality of life, and it was found to be a significant predictor of average pain as well as patients' belief in their ability to cope with pain. Conclusion: The current study provides practice-based evidence suggesting that a group Arts-CBT intervention is a promising treatment for non-malignant CP. Personality dimensions affect patients' enrollment and response to pain treatment as well as their quality of life. Furthermore, integrating mindfulness-based strategies within such interventions may further enhance treatment outcomes by fostering acceptance, improving coping mechanisms, and reducing the emotional burden associated with chronic pain.

Keywords: chronic pain; Arts-CBT intervention; personality; self-transcendence; TCI

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Chronic pain (CP) is a common, complex, and distressing health problem with significant personal and social adverse implications. [1,2] A holistic CP management that is theoretically-driven by the biopsychosocial pain model and encompassing a variety of therapeutic strategies has repeatedly been shown to be both clinically-useful and cost-effective. [3–6] Such a broad treatment approach seeks to provide evidence-based therapies according to personalized treatment plans through the combination of various pharmaceutical and psychosocial treatment options, and the continuation of systematic and comprehensive care delivery. [7,8]

Cognitive Behavioral Therapy for Chronic Pain (CBT-CP) resonates with the current perspectives of CP management, since it conceptualizes chronic pain as resulting from complex interactions between several biological, psychological, emotional, social, and behavioral processes, and it aims to improve the traumatic pain experience by modifying the respective psychosocial factors. [9] Although CBT-CP has become the first-line psychological intervention for CP, as a validated treatment according to the National Institute of Health and Care Excellence Guideline [10] and the Society of Clinical Psychology (Division 12 of the American Psychological Association [APA]) (see https://div12.org/diagnosis/chronic-or-persistent-pain/), there is still room for further improvement due to cases of lack of treatment response to CBT and/or relapse from treatment. [11] Accumulated evidence supports the use of creative and arts-based therapeutic techniques in psychological treatments for CP management. In alignment with the growing interest in integrative therapies, mindfulness-based interventions (MBIs) have also been shown to enhance the biopsychosocial model by fostering present-moment awareness and improving patients' emotional regulation and coping mechanisms. [12] Similarly, as described in a recent paper, a hybrid Arts-CBT intervention that incorporates components of Creative Arts Therapies (CATs) into CBT-CP contributes to traditional pain management as a complementary CP treatment method. [13] The implementation of conceptual principles of CATs—such as promoting psychological change through arts-based techniques (e.g., visualization, writing exercises, creative expression of emotions)—combined with CBT-CP strategies (e.g., psychoeducation, problem-solving, positive affirmation, relaxation training) provides an explanatory framework for addressing cognitive and affective aspects of CP more effectively. [14,15]

Although personality traits have been found to play an important role in the onset and adjustment to CP [16,17], there is still limited data available regarding how specific character and temperament factors may affect patients' response to non-malignant CP treatment, particularly in cases of multi-component approaches that address patients' perceptions, emotions, and behavioral responses to pain. Interestingly enough the relationship between personality and pain has been explored throughout the ages. [18,19] Greek philosophers, such as Plato and Aristotle, believed that pain arose not only from physical stimuli but also from emotions in the soul [20], highlighting thus the ancient holistic mind-body tradition that is now reflected in the modern biopsychosocial paradigm. Along these lines, the relationship between affective disturbance and pain may be framed in terms of predisposing, precipitative, perpetuating, and exacerbating factors of CP, as well as consequences from CP. [21,22]

Given the controversy regarding the impact of personality on better coping and dealing with CP in creative ways, further research into the interplay between mindfulness, personality traits, and CP may offer deeper insights. Studies have shown that mindfulness can mitigate the influence of negative affectivity, increase psychological flexibility, and improve adaptive coping in CP patients. [23,24] Exploring how these benefits interact with individual differences, such as temperament and character dimensions, could make a significant contribution to personalized treatment approaches for CP patients. [25–29]

In line with the biopsychosocial approach to CP, Cloninger's (1987) seven-factor model of personality conceptualizes personality as including four temperament and three character dimensions, with the first reflecting genetically-determined personality characteristics, and the latter reflecting traits affected by learning processes in life. Particularly, temperament traits include: harm avoidance (HA); reward dependence (RD); novelty seeking (NS), and persistence (P). These

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temperament dimensions manifest as automatic emotional responses to life experiences and reflect neurotransmitter systems in the brain. On the other hand, character traits include: self-directedness (SD), cooperativeness (C), and self-transcendence (ST). Cloninger has suggested that character dimensions are affected by the environment and life experiences, and thus character matures until late adulthood. [30,31]

The role of Cloninger's personality factors in understanding the underlying principles and mechanisms of individuals' well-being [32,33] provides a promising theoretical background to incorporate when addressing CP management. Temperament and character traits have been associated with resilience and lifelong well-being, as well as with how people respond to their environment, in general. [27] Given the diverse nature of CP and the need for a comprehensive long-term CP management, the application of Cloninger's holistic personality theory to examine how personality traits may affect patients in a new therapeutic intervention, as well as their response to treatment will allow for customized assessment and treatment processes to be developed.

Therefore, given that personality traits may influence the adjustment to CP, this study aimed to investigate whether specific personality dimensions, based on Cloninger's theory of temperament-character factors, affect the enrollment, as well as the response to pain treatment. Such a knowledge would inform our efforts to better respond to CP by means of an individualized and patient-tailored therapeutic approach that would provide diverse treatment options. Based on these objectives, the specific research questions of the study are as follows:

1. Which personality dimensions are associated with patients' enrollment in an innovative Arts-CBT intervention designed to empower people with non-malignant CP by teaching creative use of coping strategies?
2. Which personality dimensions are associated with better response to treatment, taking into account pre-post measurements of physical pain, mental pain, and tolerance for mental pain, as well as quality of life scores of patients receiving an Arts-CBT intervention compared to Treatment-As-Usual (TAU)?
3. How do patients' personality dimensions associate with CP variables and quality of life?

Method

Participants

The sample consisted of 100 outpatients with non-malignant CP who were enrolled in the Pain Management Unit of a University General Hospital in Greece. The inclusion criteria of participants were: (a) to have an age from 18 to 60 years old, (b) to be suffering from non-malignant CP of any etiology, and (c) to be willing not to receive any other psychosocial treatment during the course of the study. The exclusion criteria applied to those who: (a) did not speak the native language fluently enough to be able to participate in a therapeutic group, and/or (b) were diagnosed with any mental health disorder, based on a psychiatric interview prior to the participation in the study.

Tools

According to the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) [34], the following scales were used in the study:

The Brief Pain Inventory (BPI)

The BPI is a 9-item self-completed scale that evaluates patients' experience of pain in a number of different pain states, as it is a reliable tool for monitoring both the effect of pain and the treatment of pain, in terms of a patient's functional ability or disability over time. [35] Cronbach's alphas range from .77 to .91. The BPI has been validated in Greek (G-BPI) with adequate internal consistency (α = .80). [36]

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The Mental Pain Scale (MPS)

The MPS consists of 45 self-rated items that conceptualize mental pain as a perception of negative emotions. The items of the MPS are divided into nine factors, namely irreversibility, loss of control, narcissistic wounds, emotional flooding, freezing, self-estrangement, confusion, social distancing, and emptiness. [37] The MPS has been translated and validated in Greek. Cronbach's alphas have been found to be .96 for the total score and from .74 to .91 for the subscales, with social distancing having poor reliability (α = .39) as it was also the case in the original version. [38]

The Tolerance for Mental Pain Scale (TMPS)

The 20-item TMPS was developed to assess tolerance of psychological pain. The TMPS measures three facets of tolerance for psychological pain that reflect respective theoretical perspectives in the literature: surfeit of mental pain, belief in the ability to cope with mental pain, and containment of mental pain. [39] The TMPS has been translated and validated in Greek. The Greek version showed adequate internal consistency estimates. Cronbach's alphas were .84 for the total scale, and .87, .76, and .72 for the three aforementioned subscales, respectively.

The Temperament and Character Inventory (TCI-140)

The TCI-140 is a well-known personality inventory consisting of seven subscales that measure four temperament and three character dimensions, as separate personality variants. Temperament subscales include harm avoidance, novelty seeking, reward dependence, and persistence. Character subscales include self-directedness, cooperativeness, and self-transcendence. [40,41] The TCI-140 has been translated and validated in Greek, showing adequate psychometric properties and retaining the initial factorial structure. The Cronbach's alpha scores ranged from .51 to .83. [42]

The WHO Quality of Life-BREF (WHOQOL-BREF) Questionnaire

The WHOQOL-BREF is a self-completed questionnaire that evaluates individuals' perceptions of quality of life and it is broadly used to assess interventions aimed at improving health-related QOL in patients with chronic medical conditions. This questionnaire consists of four broad domains, as follows: physical health, psychological health, social relationships, and environment. In addition, the WHOQOL-BREF includes two stand-alone questions to assess self-rated overall quality of life as well as satisfaction with health. [35] The WHOQOL-BREF has been standardized for use within the Greek population and the confirmatory factor analysis produced acceptable fit values for the original model. Cronbach's alpha values of the WHOQOL-BREF Greek version ranged from .67 to .81. [31]

Procedure

The research protocol of the study was approved (RN#EBD2106/6-2-2017) by the Research Ethics Board of the Medical School of the National and Kapodistrian University of Athens. The study was a non-randomized control trial conducted from February 2017 to November 2019. Pre-post measurements took place at baseline (T0) and at the end of the Arts-CBT intervention (T1), after a 10-week period. All outpatients with non-malignant CP complaints, who were new admissions at the Pain Management Unit of a University General Hospital, were referred by their physician to the research group to assess their eligibility for participation in the study. From a total number of 160 new admissions, 115 patients were accepted to participate in the study, after a psychiatric assessment interview took place so as to exclude any individuals with comorbid conditions. Fifteen of them quit after the assessment and prior to the intervention, without attending any sessions. Finally, a total of 100 patients participated voluntarily, from which 50 patients accepted to form the arts-based CBT intervention group, while 50 of them declined, and instead they preferred to follow the treatment as usual (TAU) approach, which included routine check-ups and medication management with a primary care physician (i.e., control group). A pre-and-post research design was implemented in the study. The goal of treatment for the Arts-CBT intervention was stated to all patients as "*to learn active*

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use of coping strategies to deal with pain, as well as skills that would help you in your daily life and in adopting healthy lifestyles". [13] All participants signed an informed consent form, prior to their participation in the study. The Arts-CBT groups were run by an experienced mental health occupational therapist who was trained in CBT with a certified training program and had a 10-year working experience with CP patients. Every experimental group consisted of 8-10 participants (except an initial pilot one with 4 patients), who attended ten weekly structured and manualized 2-hour sessions, in total (more details about the structure/content of the Arts-CBT intervention are provided in a previous paper). [13] No attrition occurred.

Statistical Analysis

Quantitative variables were presented as mean values, standard deviations (SD), and minimum, maximum values across the total population and between groups. Qualitative variables were expressed as absolute and relative frequencies (N, %). Patient characteristics at baseline were compared using the non-parametric Mann-Whitney-U test and Chi-square or Fisher's exact test, when necessary. Pearson and Spearman correlation coefficients were also used. In order to compare the TCI scores on the seven dimensions of personality between patients participating in the intervention group and those in the control group, independent t-tests were used for normally-distributed personality dimensions, while Mann-Whitney tests were applied for non-normally distributed dimensions. When significant differences were found on a personality dimension, additional analyses on the subscales of the particular dimension were performed. Statistical analyses also included ANCOVA in quality of life dimension in the total sample. All models were adjusted for age and gender. Linear regression analyses were conducted in order to examine the association between TCI dimensions and pre-post intervention differences for pain, mental pain and tolerance for mental pain scores. All statistical analyses were performed using IBM SPSS Statistics 25.0. [45] All the aforementioned statistical tests were two-sided and were performed at a 0.05 significance level.

Results

Patients' demographic characteristics, such as age, gender, marital status, education level, employment status, coping strategies, and health habits, are presented in Table 1. The vast majority of participants were females (84%) in both groups, with younger participants being included in the intervention group (48.9 ± 9.29 vs. 55.8 ± 3.67, $p < 0.001$). No other significant differences were found between the two groups. Similarly, there were no significant differences on pain classification, or preferred coping mechanisms. [46]

Table 1. Demographic characteristics across samples.

	Group			
	Intervention (N=50)	**Control (N=50)**	**t-statistic (p-value)**	**Effect size (eta-squared)**
Gender (female)	42(84%)	42(84%)	1	
Age	48.9±9.29 (22-60)	55.8±3.67 (40-60)	-3.898 (<0.001)[b]	0.15
Education(years)	12.1±4.35 (6-18)	11.8±3.53 (6-18)	-0.140 (0.889)[b]	0.00
Marital status			3.337 (0.068)[a]	
Married	29(64.4%)	39(81.3%)		
Living alone	16(35.6%)	9(18.7%)		
Non-malignant chronic pain classification (ICD-11)[77]			5.709 (0.320)[a]	
Headache/Orofacial pain	5(10%)	2(4%)		
Musculosceletal pain	16(32%)	19(38%)		
Neuropathic pain	9(18%)	11(22%)		
Chronic posttraumatic/postsurgical pain	0(0%)	3(6%)		
Visceral pain	1(2%)	0(0%)		
Mixed pain	19(38%)	15(30%)		

Note. M±SD (range) or N (%) are displayed, as appropriate. [a]χ^2 or Fisher's exact test. [b]Mann-Whitney.

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Comparisons Between the Intervention Group and the TAU Group

Concerning the TCI dimensions, there were statistically significant differences at the baseline measurement between the control group and the intervention group for novelty seeking ($p < 0.001$, effect size = -2.88), self-directedness ($p = 0.021$, effect size = 0.47), and self-transcendence ($p < 0.001$, effect size = 0.73). Specifically, participants of the control group were found to have higher scores in the self-directedness (M = 74.34; SD = 11.22) and self-transcendence (M = 51.42; SD = 6.61), while participants of the intervention group had a higher score in novelty seeking (M = 64.04; SD = 9.56) (Table 2). Notably, prior to the intervention, the latter group also had a significant higher total pain-related interference score ($p < 0.001$, effect size = 0.17), whereas after the intervention the mean score was slightly lower in this group compared to the TAU group. However, this difference was not statistically significant. Similarly, the average pain prior and after the intervention was found to be significantly higher in the intervention group ($p < 0.001$, effect size = 0.35 and $p = 0.004$, effect size = 0.08, respectively) compared with the TAU group. On the other hand, the Arts-CBT group had a significantly lower loss of control score after the intervention ($p < 0.001$, effect size = 0.63) compared with the control group. With regard to the participants' belief in their ability to cope with pain, although patients in the Arts-CBT group believed that they were less able to cope with pain prior to the intervention ($p = 0.008$, effect size = 0.07), they reported having a higher belief in their ability to cope with pain ($p < 0.001$, effect size = 0.42) after the intervention, as compared with the TAU group (Table 3).

Table 2. Differences in TCI dimensions between groups (t-tests).

	Mean (Sd)		**t-statistic (p-value)**	**Effect size (Cohen's d)**
	Control	*Intervention*		
Novelty Seeking	41.78 (5.29)	64.04 (9.56)	-14.402 (<0.001)[a]	-2.88
Harm Avoidance	59.46 (13.78)	61.96 (12.46)	-0.951 (0.344)	-0.19
Reward Dependence	68.44 (9.61)	66.22 (12.19)	1.011 (0.314)	0.20
Persistence	68.96 (9.83)	70.94 (11.54)	-0.924 (0.358)	-0.18
Self-Directedness	74.34 (11.22)	68.14 (14.94)	2.346 (0.021)[a]	0.47
Cooperativeness	76.82 (9.99)	77.02 (10.82)	-0.096 (0.924)	-0.02
Self-Transcendence	51.42 (6.61)	45.84 (8.62)	3.631 (<0.001)[a]	0.73

Note.[a] p<0.05.

Table 3. Differences in the Brief Pain Inventory (BPI), Orbach, the Mikulincer Mental Pain Scale (MPS) and the Tolerance for Mental Pain Scale (TMPS) dimensions between groups (Mann-Whitney).

	Mean (Sd)		**z-statistic (p-value)**	**Effect size (eta-squared)**
	Control	*Intervention*		
Total pain-related interference with functioning Pre **(BPI)**	5.20 (1.50)	6.45 (2.45)	-4.074 (<0.001)[a]	0.17
Total pain-related interference with functioning Post	5.55 (1.32)	4.72 (2.47)	-1.616 (0.106)	0.03
Average Pain Pre **(BPI)**	3.90 (1.49)	6.26 (1.89)	-5.901 (<0.001)[a]	0.35
Average Pain Post	3.66 (1.47)	4.74 (2.27)	-2.861 (0.004)[a]	0.08
Loss of control Pre **(MPS)**	31.38 (6.61)	28.72 (6.92)	-1.678 (0.093)	0.03
Loss of control Post	37.94 (4.41)	22.94 (6.70)	-7.926 (<0.001)[a]	0.63
Belief in the ability to cope with the pain Pre **(TMPS)**	20.54 (8.14)	19.10 (4.06)	-2.657 (0.008)[a]	0.07
Belief in the ability to cope with the pain Post	13.7 (5.31)	21.10 (3.76)	-6.435 (<0.001)[a]	0.42

Note.[a] p<0.05.

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Associations Between Patients' Personality Dimensions and Pain Variables

Loss of control score prior to the intervention showed a moderate positive correlation with harm avoidance (r = 0.341, p = 0.015) and self-transcendence (r = 0.307, p = 0.030) in the Arts-CBT group. Correlations between loss of control score prior to the intervention with harm avoidance were found to be significantly different across the two groups (Fisher's z = -1.999, p = 0.046) (Table 4 and Table 5). No significant associations were observed between TCI dimensions and loss of control score after the intervention between the two groups, although a significant difference in self-directedness across the groups was noticed (Fisher's z = -3.188, p = 0.001). Significant associations between the overall quality of life with self-directedness and self-transcendence, across the groups were noticed (Table 6). Self-transcendence was found to be a significant predictor of average pain score (B = -0.048, p = 0.007), and of the belief in the ability to cope with pain score (B = -0.193, p = 0.013) in patients with non-malignant chronic pain participating in the study (Table 7).

Table 4. Spearman r correlations between TCI dimensions and the Orbach and Mikulincer Mental Pain Scale (MPS) **loss of control score** in both groups before the intervention and differences of correlation coefficients between the groups.

	Control r (p-value)	**Intervention r (p-value)**	**Fisher's z (p-value)**
Novelty Seeking	0.099 (0.495)	0.071 (0.624)	0.137 (0.891)
Harm Avoidance	-0.057 (0.693)	0.341* (0.015)	-1.999* (0.046)
Reward Dependence	0.120 (0.406)	-0.177 (0.220)	1.452 (0.147)
Persistence	0.007 (0.964)	-0.215 (0.133)	1.093 (0.275)
Self-Directedness	-0.161 (0.264)	-0.275 (0.053)	0.581 (0.561)
Cooperativeness	-0.079 (0.586)	-0.066 (0.651)	-0.063 (0.949)
Self-Transcendence	0.240 (0.093)	0.307* (0.030)	-0.351 (0.725)

*Note.**p<0.05 level.

Table 5. Spearman r correlations between TCI dimensions and the Orbach and Mikulincer Mental Pain Scale (MPS) **loss of control score** in both groups after the intervention and differences of correlation coefficients between the groups.

	Control r (p-value)	**Intervention r (p-value)**	**Fisher's z (p-value)**
Novelty Seeking	0.14 (0.331)	0.180 (0.212)	-0.199 (0.842)
Harm Avoidance	0.027 (0.854)	0.351 (0.012)	-1.646 (0.100)
Reward Dependence	0.079 (0.584)	-0.081 (0.576)	0.777 (0.437)
Persistence	-0.046 (0.75)	-0.235 (0.100)	0.938 (0.348)
Self-Directedness	-0.252 (0.077)	0.380 (0.006)	-3.188* (0.001)
Cooperativeness	-0.023 (0.874)	-0.167 (0.248)	0.706 (0.480)
Self-Transcendence	0.224 (0.117)	-0.09 (0.535)	1.542 (0.123)

*Note.**p<0.05 level.

Table 6. Mixed ANCOVA in the WHOQOL-Bref overall QOL dimension in the total sample.

Source	**SS**	**df**	**MS**	**F**	**p-value**	η_p^2
			Between- Subjects			
Group	0.902	1	0.902	0.119	0.731	0.001
Age	3.442	1	3.442	0.455	0.502	0.005
Novelty Seeking	0.708	1	0.708	0.094	0.760	0.001
Harm Avoidance	0.004	1	0.004	0.001	0.981	0.000
Reward Dependence	2.068	1	2.068	0.273	0.602	0.003

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Persistence	5.615	1	5.615	0.743	0.391	0.008
Self-Directedness	115.927	1	115.927	15.331	**<0.001**	0.146
Cooperativeness	4.688	1	4.688	0.620	0.433	0.007
Self-Transcendence	65.218	1	65.218	8.625	**0.004**	0.087
Within- Subjects						
Time	2.472	1	2.472	3.890	0.052	0.041
Group#Time	11.707	1	11.707	18.424	**<0.001**	0.170

*Notes.*SS= Sum of Squares; df= degrees of freedom; MS= Mean Square; ANCOVA= Analysis of Covariance.

Table 7. Prediction of difference in pain, mental pain and tolerance for mental pain by TCI dimensions in the total sample.

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**p-value**
	B	**Std. Error**	**beta**		
DV[a]: Diff[b] (total pain-related interference with functioning score-BPI)					
Novelty Seeking	-0.014	0.012	-0.141	-1.198	0.234
Harm Avoidance	0.004	0.008	0.035	0.445	0.657
Reward Dependence	-0.003	0.010	-0.024	-0.313	0.755
Persistence	-0.010	0.009	-0.082	-1.195	0.235
Self-Directedness	0.002	0.008	0.015	0.187	0.852
Cooperativeness	0.001	0.010	0.007	0.093	0.926
Self-Transcendence	-0.014	0.013	-0.084	-1.122	0.265
Group	-1.754	0.332	-0.641	-5.279	<0.001
DV: Diff(average pain score-BPI)					
Novelty Seeking	-0.015	0.017	-0.148	-0.921	0.359
Harm Avoidance	-0.007	0.011	-0.062	-0.581	0.563
Reward Dependence	0.006	0.013	0.045	0.422	0.674
Persistence	0.004	0.012	0.032	0.343	0.733
Self-Directedness	-0.013	0.011	-0.128	-1.155	0.251
Cooperativeness	0.003	0.014	0.024	0.220	0.827
Self-Transcendence	**-0.048**	**0.017**	**-0.282**	**-2.756**	**0.007**
Group	-1.014	0.461	-0.365	-2.200	0.030
DV: Diff(loss of control score-MPS)					
Novelty Seeking	0.065	0.082	0.104	0.792	0.430
Harm Avoidance	0.004	0.056	0.006	0.069	0.945
Reward Dependence	-0.024	0.067	-0.031	-0.357	0.722
Persistence	0.029	0.061	0.037	0.487	0.627
Self-Directedness	-0.005	0.057	-0.008	-0.090	0.928
Cooperativeness	-0.002	0.072	-0.003	-0.034	0.973
Self-Transcendence	0.046	0.087	0.044	0.534	0.595
Group	-13.329	2.292	-0.786	-5.817	<0.001
DV: Diff(Belief in the ability to cope with the pain score-TMPS)					
Novelty Seeking	-0.062	0.072	-0.123	-0.869	0.387
Harm Avoidance	-0.040	0.049	-0.078	-0.832	0.408
Reward Dependence	0.064	0.058	0.102	1.096	0.276
Persistence	0.006	0.053	0.009	0.113	0.911
Self-Directedness	-0.071	0.049	-0.139	-1.429	0.157
Cooperativeness	-0.004	0.062	-0.006	-0.065	0.948
Self-Transcendence	**-0.193**	**0.076**	**-0.230**	**-2.549**	**0.013**
Group	8.721	1.994	0.641	4.374	<0.001

Note.[a]: DV=Dependent Variable, [b]: Diff=(Post-Pre).

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Discussion

The aim of this study was to compare an arts-based CBT-CP intervention group with a TAU group as to whether specific temperament and character dimensions affect patients' response to non-malignant CP treatment. According to the main findings of the study, participants of the Arts-CBT group were found to have a higher score in the novelty seeking dimension prior to the intervention, while their levels of loss of control were associated with harm avoidance compared with the TAU group. Additionally, in the Arts-CBT group the average pain levels were significantly higher, and patients believed that they were less able to cope with pain compared with the TAU group, prior the intervention. The average pain was found to be significantly higher in the Arts-CBT group after the intervention, as well. However, after the intervention the Arts-CBT group had a significantly lower loss of control score, and the patients reported having a higher belief in their ability to cope with pain as compared with the TAU group. This finding aligns with evidence suggesting that therapeutic approaches fostering self-awareness and acceptance, such as mindfulness-based interventions (MBIs), can enhance self-regulation and reduce perceived helplessness in the context of CP. [11,12] Moreover, the patients' overall quality of life was found to be associated with self-directedness and self-transcendence, in both groups. Notably, the character dimension of self-transcendence was found to be a significant predictor of average pain as well as the patients' belief in their ability to cope with chronic pain for all patients who participated in the study. These findings are consistent with the literature suggesting that higher levels of self-transcendence and mindfulness are linked to greater psychological flexibility and improved emotional resilience in individuals with chronic pain. [40,41]

Additionally, our findings are in line with recent studies using Cloninger's TCI model of personality, which suggest that higher harm avoidance and lower self-directedness emerge to be the most distinguishing personality features of CP patients. High harm avoidance refers to patients' tendency to be pessimistic, sensitive to criticism and punishment, and to seek reassurance. Low self-directedness often manifests as low motivation, a difficulty in setting meaningful goals, and having problems with adaptive coping. Such a personality profile is associated with a fear-avoidance response to pain, which contributes to the development and maintenance of CP. Consequently, patients with higher harm avoidance and lower self-directedness may be more vulnerable, presenting a low threshold at which pain is perceived as threatening, and they find it difficult to stop chronic rumination, take action to overcome avoidance, and engage in more active coping behaviours. [43,49,57] Cloninger argues that high self-directedness and low harm avoidance are powerful predictors of well-being and life satisfaction. [36,65].Indeed, the findings of our study showed that these two personality dimensions are important for the quality of life of patients with non-malignant CP, and that arts-based therapeutic models for CP, such as the Arts-CBT intervention, may help CP patients to overcome fear and avoidance, and instead feel more empowered to deal with their chronic health problems.

Along with the aforementioned personality dimensions that could be an integral part of any CP management, this study sheds light on how treatment could be customized to adequately "match" patients' clinical and demographic variables with specific therapeutic techniques (i.e., arts-based CBT techniques vs. medicine-based interventions). Patients who participated in the hybrid Arts-CBT group for CP were more novelty seekers and younger in their age compared with the group of patients who preferred to receive a medical treatment for CP. The temperament factor of novelty seeking (i.e., a tendency toward exhilaration or excitement in response to cues of potential reward or relief of punishment) may explain the willingness of the patients in the Arts-CBT group to participate in the intervention, and it might compensate for other vulnerability personality factors. Cloninger's model suggests that dimensions of temperament are heritable and that novelty seeking and harm avoidance are closely related to the behavioral approach system and behavioral inhibition system, respectively. In addition, the model suggests a link between certain temperaments and specific neurotransmitters, i.e., between novelty seeking and dopamine, and between harm avoidance and serotonin. [52,53] Despite their higher average of pain and total pain-related interference, patients in the Arts-CBT group expressed a preference for adaptive and creative coping strategies. Interestingly,

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although their levels of pain did not differ significantly at the end of the intervention, those patients decreased their loss of control and they increased the belief in their ability to cope with pain, having also enhanced their tolerance for mental pain. These findings parallel with other pain studies, which suggest that acceptance and cognitive distraction have a positive impact on pain tolerance. [54,55] Thus, despite the lack of decrease of physical pain, meaning-making of and coping with pain appear as important resilience factors against suffering, which is possible to achieve depending on the cultivation of a person's positive attitude, management resources, as well as choices and commitments related to attachment to life and the world. [14,55–57]

An innovative finding of this study was that the character dimension of self-transcendence was found to be a significant predictor of both low levels of pain and the belief in the ability to cope with pain. Self-transcendence refers to transpersonal character strengths and the interest of people in finding something superior to their individual existence. [58] According to Cloninger's model, self-transcendence manifests as a superior personality trait, like compassion, morality, and a thorough understanding of art and culture. Self-transcendence can be regarded not only as a personality trait, but also as a psychological state, a developmental process, a value orientation, a motivational force, and finally a worldview that produces a spiral effect in which meaning, virtue, and happiness interact and are cumulatively built. [58,59] Given that self-transcendence indicates individual differences in self-concepts, attitudes, and goals that influence voluntary choices, intentions, and the meaning and salience of what is experienced in life, research has shown a positive association of self-transcendence with an optimistic adaptive coping style. [60,61] Similarly, high self-transcendence scores have been associated with positive emotions and well-being. [31,41,62] Self-transcendence experience is also considered multifaceted in itself, composed of mindfulness, flow, self-transcendent emotions such as awe, peak moments, and mystical experiences. [63] The antecedents and attributes of self-transcendence are organized into five interrelated domains: creativity, relationships, introspection, contemplation, and spirituality. [64–67] Spirituality is a determinant of psychological well-being, independently of health-related behavior, and there is increasing evidence to support the inclusion of spiritual factors as an important component in the assessment and treatment of CP. [68,69] Of note, spiritual intervention programs have received relatively little attention within the field of pain medicine itself. [70–72]

Taken together, our study supports the idea that addressing spirituality and creativity as central elements of the fundamental character strength of self-transcendence can enhance patients' adjustment to a major stressor such as CP. This adjustment is facilitated by replacing a 'threat' perspective of pain—which triggers harm avoidance and loss of control—with a 'challenge' perspective that promotes resilient coping, quality of life, and well-being. Studies indicate that practices enhancing self-transcendence, including mindfulness-based interventions, can lead to reduced emotional reactivity and greater acceptance of pain, fostering psychological resilience. [73] Given the key role of self-transcendence in managing CP effectively, addressing its negative effects through arts, creativity, cognitive processing, and group interaction may stimulate cognitive openness and psychological flexibility. This aligns with research suggesting that mindfulness and other attention-based practices can refocus the cognitive system on positive and previously overlooked aspects of experience, reducing the intensity of negative appraisals and encouraging a sense of control and agency. [74] Re-aligning attention in this manner creates the possibility of positively re-appraising the CP condition, potentially resulting in higher levels of experienced meaningfulness. These outcomes reflect the integration of emotional awareness and cognitive reappraisal strategies, as described in frameworks emphasizing mindfulness and positive psychology. [75] As Cloninger has argued, psychological well-being depends on the development of three personality dimensions, such as (a) autonomy and life purpose as stemmed from self-directedness, (b) positive relations with others derived from cooperativeness, and (c) personal growth and self-actualization emerged from self-transcendence. [76] The present study provides preliminary evidence for the clinical utility of these character and temperament dimensions for a customized treatment planning and delivery for patients with non-malignant CP.

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Given that the arts and mindfulness-based interventions could provide a framework for understanding recovery, a major strength of the present study was that it contributes to filling the gap of exploring the link between personality and creativity in real clinical conditions, by showing that clinical characteristics and patients' personality are relevant to the patient-related treatment outcomes. [2,77–79] Moreover, this study offers new practice-based preliminary evidence suggesting that self-transcendence is a broad and more complex clinical construct that may enrich the current therapeutic objectives of CBT-CP, such as fear-avoidance and self-efficacy. Another strength of the study was that all the intervention groups were moderated by the same mental health professional with expertise at implementing both CBT and arts interventions, minimizing thus the therapist's confounding effects, while there was systematic supervision by a psychiatrist specialized in CBT throughout the implementation of the study. Other strengths include the participants' retention and adherence to the treatment program, the comparable groups at baseline, and that the outcomes of the study cover a range of different types of non-malignant CP.

On the other hand, the limitations of the study need to be taken into account. First, this was a non-randomized clinical trial, since the control group constituted of patients who volitionally received the routine clinical management, including CP medical treatment. Although this was the most salient limitation of the study, the particular method was considered to increase patients' participation in an innovative CP intervention, while it also allowed to have an even 50-50 split between the two groups. Also, the sample was primarily female and White patients with non-malignant CP, which leads to a lack of generalizability of the findings. In addition, no follow-up procedures were undertaken in order to explore the effects of the Arts-CBT intervention in a long run. Furthermore, the question whether personality traits may predispose an individual to CP or whether the personality characteristics emerge after the onset of CP remains an issue to be examined in future research. Investigating the relationship between TCI dimensions and several clinical variables (e.g., age of onset, duration of CP, previous CP treatment, patient's motivation, patient's satisfaction, etc.) as well as specific components of the therapeutic intervention (e.g., group vs. individual delivery of treatment, specific techniques, etc.) is an additional array of further research. Finally, future studies that would examine the efficacy of the Arts-CBT intervention with the participation of more mental health clinicians (e.g., CBT-trained psychologists) are necessary for building robust evidence about the outcomes of such a hybrid intervention in CP management.

In conclusion, the study provided preliminary evidence of the relationship between personality dimensions and optimal coping in non-malignant CP. Harm avoidance, self-directedness and self-transcendence appear to play an important role in CP treatment, the latter being a personality dimension that influences coping behavior and contributes to patients' tolerance of pain and quality of life. The findings of the study indicate that assessing and fostering self-transcendence, among other personality dimensions, through integrative therapeutic interventions that recognize the added health value of creativity and combine arts and CBT-CP and mindfulness-based exercises, may help young patients who are vulnerable to entering a vicious cycle of CP to become more resilient against suffering and disability. Hence, future clinical practice and research may expand to include integrative and holistic therapeutic interventions that promote health and well-being, by taking into account patients' personality dimensions in the assessment and delivery of CP management.

Author Contributions: Conceptualization, Asimina Kalmanti; Methodology, Asimina Kalmanti, Vasiliki Yotsidi, Athanassios Douzenis and Ioannis Michopoulos; Software, Ioannis Michopoulos; Validation, Vasiliki Yotsidi and Ioannis Michopoulos; Formal analysis, Asimina Kalmanti and Ioannis Michopoulos; Investigation, Asimina Kalmanti, Athanassios Douzenis and Ioannis Michopoulos; Resources, Asimina Kalmanti, Vasiliki Yotsidi, Vasiliki Moraiti, Athanassios Douzenis and Ioannis Michopoulos; Data curation, Ioannis Michopoulos; Writing – original draft, Asimina Kalmanti and Ioannis Michopoulos; Writing – review & editing, Vasiliki Moraiti and Ioannis Michopoulos; Visualization, Ioannis Michopoulos; Supervision, Ioannis Michopoulos; Project administration, Ioannis Michopoulos.

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Institutional Review Board Statement: The research protocol of the study was approved (RN#EBD2106/6-2-2017) by the Research Ethics Board of the Medical School of the National and Kapodistrian University of Athens.

Informed Consent Statement: All participants signed an informed consent form, prior to their participation in the study.

Data Availability Statement: The original contributions presented in this study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author(s).

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Fayaz: A.; Croft, P.; Langford, R. M.; Donaldson, L. J.; Jones, G. T. Prevalence of Chronic Pain in the UK: A Systematic Review and Meta-Analysis of Population Studies. BMJ Open 2016, 6 (6), e010364. https://doi.org/10.1136/bmjopen-2015-010364.
2. Fernandez, E.; Kernz, R. D. Pain and Affective Disorders: Looking beyond the "Chicken and Egg" Conundrum; IASP Press, 2012; pp. 279–296.
3. Cunningham, J. L.; Rome, J. D.; Kerkvliet, J. L.; Townsend, C. O. Reduction in Medication Costs for Patients with Chronic Nonmalignant Pain Completing a Pain Rehabilitation Program: A Prospective Analysis of Admission, Discharge, and 6-Month Follow-up Medication Costs. Pain Medicine 2009, 10 (5), 787–796. https://doi.org/10.1111/j.1526-4637.2009.00582.x.
4. Pergolizzi, J.; Ahlbeck, K.; Aldington, D.; Alon, E.; Coluzzi, F.; Dahan, A.; Huygen, F.; Kocot-Kępska, M.; Mangas, A. C.; Mavrocordatos, P.; Morlion, B.; Müller-Schwefe, G.; Nicolaou, A.; Pérez Hernández, C.; Sichère, P.; Schäfer, M.; Varrassi, G. The Development of Chronic Pain: Physiological CHANGE Necessitates a
Multidisciplinary Approach to Treatment. Current Medical Research and Opinion 2013, 29 (9), 1127–1135. https://doi.org/10.1185/03007995.2013.810615.
5. Thieme, K.; Gracely, R. H. Are Psychological Treatments Effective for Fibromyalgia Pain? Current Rheumatology Reports 2009, 11 (6), 443–450. https://doi.org/10.1007/s11926-009-0065-6.
6. Turk, D. C. Clinical Effectiveness and Cost-Effectiveness of Treatments for Patients with Chronic Pain. The Clinical Journal of Pain 2002, 18 (6), 355–365. https://doi.org/10.1097/00002508-200211000-00003.
7. Dysvik, E.; Kvaløy, J. T.; Stokkeland, R.; Natvig, G. K. The Effectiveness of a Multidisciplinary Pain Management Programme Managing Chronic Pain on Pain Perceptions, Health-Related Quality of Life and Stages of Change—a Non-Randomized Controlled Study. International Journal of Nursing Studies 2010, 47 (7), 826–835. https://doi.org/10.1016/j.ijnurstu.2009.12.001.
8. Scascighini, L.; Toma, V.; Dober-Spielmann, S.; Sprott, H. Multidisciplinary Treatment for Chronic Pain: A Systematic Review of Interventions and Outcomes. Rheumatology 2008, 47 (5), 670–678. https://doi.org/10.1093/rheumatology/ken021.
9. Gatchel, R. J.; Turk, D. Psychological Approaches to Pain Management; The Guilford Press, 1996; pp. 3–32.
10. Hofmann, S. G.; Asnaani, A.; Vonk, I. J. J.; Sawyer, A. T.; Fang, A. The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-Analyses. Cognitive Therapy and Research 2012, 36 (5), 427–440. https://doi.org/10.1007/s10608-012-9476-1.
11. Veehof, M. M.; Oskam, M.-J.; Schreurs, K. M. G.; Bohlmeijer, E. T. Acceptance-Based Interventions for the Treatment of Chronic Pain: A Systematic Review and Meta-Analysis. Pain 2011, 152 (3), 533–542. https://doi.org/10.1016/j.pain.2010.11.002.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 1 April 2025 doi:10.20944/preprints202504.0110.v1

12. Garland, E. L.; Manusov, E. G.; Froeliger, B.; Kelly, A.; Williams, J. M.; Howard, M. O. Mindfulness-Oriented Recovery Enhancement for Chronic Pain and Prescription Opioid Misuse: Results from an Early-Stage Randomized Controlled Trial. Journal of Consulting and Clinical Psychology 2014, 82 (3), 448–459. https://doi.org/10.1037/a0035798.
13. Kalmanti, A.; Batistaki, C.; Christodoulou, C.; Gerolouka-Kostopanagiotou, G.; Douzenis, A.; Michopoulos, I. Effectiveness of a Hybrid Arts-Based Cognitive Behavioral Therapy Intervention for Patients with Non-Malignant Chronic Pain. Psychiatriki 2022. https://doi.org/10.22365/jpsych.2022.064.
14. Camic, P. M. Expanding treatment possibilities for chronic pain through expressive arts therapies. https://www.researchgate.net/publication/237090153_Expanding_treatment_possibilities_for_chronic_pain_through_expressive_arts_therapies (accessed 1999).
15. Kohl, A.; Rief, W.; Glombiewski, J. A. Acceptance, Cognitive Restructuring, and Distraction as Coping Strategies for Acute Pain. The Journal of Pain 2013, 14 (3), 305–315. https://doi.org/10.1016/j.jpain.2012.12.005.
16. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, Regional, and National Incidence, Prevalence, and Years Lived with Disability for 328 Diseases and Injuries for 195 Countries, 1990-2016: A Systematic Analysis for the Global Burden of Disease Study 2016. Lancet (London, England) 2017, 390 (10100), 1211–1259. https://doi.org/10.1016/S0140-6736(17)32154-2.
17. Wade, J. B.; Dougherty, L. M.; Hart, R. P.; Cook, D. B. Patterns of Normal Personality Structure among Chronic Pain Patients. Pain 1992, 48 (1), 37–43. https://doi.org/10.1016/0304-3959(92)90129-y.
18. Merskey, H. History of Psychoanalytic Ideas Concerning Pain. Personality characteristics of patients with pain. 2000, 25–35. https://doi.org/10.1037/10376-001.
19. Wolfradt, U.; Pretz, J. E. Individual Differences in Creativity: Personality, Story Writing, and Hobbies. European Journal of Personality 2001, 15 (4), 297–310. https://doi.org/10.1002/per.409.
20. Bonica, J. J. The Management of Pain; 1990.
21. Ferguson, E. Personality and Coping Traits: A Joint Factor Analysis. British Journal of Health Psychology 2001, 6 (4), 311–325. https://doi.org/10.1348/135910701169232.
22. Soumani, A.; Damigos, D.; Oulis, P.; Masdrakis, V.; Ploumpidis, D.; Mavreas, V.; Konstantakopoulos, G. Tolerance for Mental Pain Scale--Greek Version. PsycTESTS Dataset 2011. https://doi.org/10.1037/t72909-000.
23. Chiesa, A.; Serretti, A. Mindfulness Based Cognitive Therapy for Psychiatric Disorders: A Systematic Review and Meta-Analysis. Psychiatry Research 2011, 187 (3), 441–453. https://doi.org/10.1016/j.psychres.2010.08.011.
24. Mehling, W. E. If It All Comes down to Bodily Awareness, How Do We Know? Assessing Bodily Awareness. Kinesiology Review 2020, 1–7. https://doi.org/10.1123/kr.2020-0021.
25. Fancourt, D.; Finn, S. What Is the Evidence on the Role of the Arts in Improving Health and Well-Being? A Scoping Review; WHO Regional Office for Europe: Copenhagen, 2019.
26. Garfield, M. J.; Taylor, N. J.; Dennis, A. R.; Satzinger, J. W. Research Report: Modifying Paradigms—Individual Differences, Creativity Techniques, and Exposure to Ideas in Group Idea Generation. Information Systems Research 2001, 12 (3), 322–333. https://doi.org/10.1287/isre.12.3.322.9710.
27. Martindale, C.; Dailey, A. Creativity, Primary Process Cognition and Personality. Personality and Individual Differences 1996, 20 (4), 409–414. https://doi.org/10.1016/0191-8869(95)00202-2.
28. Moore, J. E.; Armentrout, D. P.; Parker, J. C.; Kivlahan, D. R. Empirically-Derived Pain Patient Mmpi Subgroups: Prediction of Treatment Outcome. Pain 1984, 18, S178. https://doi.org/10.1016/0304-3959(84)90400-7.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 1 April 2025 doi:10.20944/preprints202504.0110.v1

29. Unterrainer, H. F.; Lewis, A. J.; Fink, A. Religious/Spiritual Well-Being, Personality and Mental Health: A Review of Results and Conceptual Issues. Journal of Religion and Health 2012, 53 (2), 382–392. https://doi.org/10.1007/s10943-012-9642-5.
30. Cloninger, C. R. A Systematic Method for Clinical Description and Classification of Personality Variants. Archives of General Psychiatry 1987, 44 (6), 573. https://doi.org/10.1001/archpsyc.1987.01800180093014.
31. Cloninger, C. R.; Svrakic, D. M.; Przybeck, T. R. A Psychobiological Model of Temperament and Character. Archives of general psychiatry 1993, 50 (12), 975–990. https://doi.org/10.1001/archpsyc.1993.01820240059008.
32. Cloninger, C. R. Feeling Good : The Science of Well-Being; Oxford Oxford Univ. Press, 2004.
33. Gureje, O.; Von Korff, M.; Simon, G. E.; Gater, R. Persistent Pain and Well-Being. JAMA 1998, 280 (2), 147. https://doi.org/10.1001/jama.280.2.147.
34. Dworkin, R. H.; Turk, D. C.; Farrar, J. T.; Haythornthwaite, J. A.; Jensen, M. P.; Katz, N. P.; Kerns, R. D.; Stucki, G.; Allen, R. R.; Bellamy, N.; Carr, D. B.; Chandler, J.; Cowan, P.; Dionne, R.; Galer, B. S.; Hertz, S.; Jadad, A. R.; Kramer, L. D.; Manning, D. C.; Martin, S. Core Outcome Measures for Chronic Pain Clinical Trials: IMMPACT Recommendations. PAIN 2005, 113 (1), 9–19. https://doi.org/10.1016/j.pain.2004.09.012.
35. Cleeland CS Ryan KM. Pain Assessment: Global Use of the Brief Pain Inventory. Ann Acad Med Singapore (1994 Mar) 23(2):129-38. Rehabilitation Oncology 1995, 13 (1), 29–30. https://doi.org/10.1097/01893697-199513010-00022.
36. Mystakidou, K.; Mendoza, T.; Tsilika, E.; Befon, S.; Parpa, E.; Bellos, G.; Vlahos, L.; Cleeland, C. Greek Brief Pain Inventory: Validation and Utility in Cancer Pain. Oncology 2000, 60 (1), 35–42. https://doi.org/10.1159/000055294.
37. Guimarães, R.; Fleming, M.; Cardoso, M. F. Validation of the Orbach & Mikulincer Mental Pain Scale (OMMP) on a Drug Addicted Population. Social Psychiatry and Psychiatric Epidemiology 2013, 49 (3), 405–415. https://doi.org/10.1007/s00127-013-0751-6.
38. Soumani, A.; Damigos, D.; Oulis, P.; Masdrakis, V.; Ploumpidis, D.; Mavreas, V.; Konstantakopoulos, G. Mental Pain and Suicide Risk: Application of the Greek Version of the Mental Pain and the Tolerance of Mental Pain Scale. Psychiatrike = Psychiatriki 2011, 22 (4), 330–340.
39. Orbach, I.; Mikulincer, M.; Gilboa-Schechtman, E.; Sirota, P. Mental Pain and Its Relationship to Suicidality and Life Meaning. Suicide and Life-Threatening Behavior 2003, 33 (3), 231–241. https://doi.org/10.1521/suli.33.3.231.23213.
40. Cloninger, C. R.; Svrakic, D. M.; Bayon, C.; Przybeck, T. R. Measurement of Psychopathology as Variants of Personality. Personality and psychopathology (pp. 33–65). 1999.
41. Cloninger, C. R.; Zohar, A. H. Personality and the Perception of Health and Happiness. Journal of Affective Disorders 2011, 128 (1-2), 24–32. https://doi.org/10.1016/j.jad.2010.06.012.
42. Giakoumaki, S. G.; Karagiannopoulou, L.; Rózsa, S.; Zouraraki, C.; Karamaouna, P.; Cloninger, C. R. Psychometric Properties of the Greek TCI-R and Its Clinical Correlates: Schizotypy and the Self-Regulation of Affective and Cognitive Functioning. PeerJ 2016, 4, e1830. https://doi.org/10.7717/peerj.1830.
43. Group, W. Development of the WHOQOL: Rationale and Current Status. International Journal of Mental Health 1994, 23 (3), 24–56. https://doi.org/10.1080/00207411.1994.11449286.
44. Ginieri-Coccossis, M.; Triantafillou, E.; Tomaras, V.; Soldatos, C.; Mavreas, V.; Christodoulou, G. Psychometric Properties of WHOQOL-BREF in Clinical and Health Greek Populations: Incorporating New Culture-Relevant Items. Psychiatrike = Psychiatriki 2012, 23 (2), 130–142.
45. Arroyo Resino, D. Análisis Descriptivos de Datos Con IBM SPSS Statistics. Revista Complutense de Educación 2017, 29 (1). https://doi.org/10.5209/rced.57160.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 1 April 2025 doi:10.20944/preprints202504.0110.v1

46. World Health Organisation. ICD-11 for Mortality and Morbidity Statistics. icd.who.int. https://icd.who.int/browse/2024-01/mms/en.
47. Jensen, J. N.; Karpatschof, B.; Labriola, M.; Albertsen, K. Do Fear-Avoidance Beliefs Play a Role on the Association between Low Back Pain and Sickness Absence? A Prospective Cohort Study among Female Health Care Workers. Journal of Occupational and Environmental Medicine 2010, 52 (1), 85–90. https://doi.org/10.1097/jom.0b013e3181c95b9e.
48. Leeuw, M.; Goossens, M. E. J. B.; Linton, S. J.; Crombez, G.; Boersma, K.; Vlaeyen, J. W. S. The Fear-Avoidance Model of Musculoskeletal Pain: Current State of Scientific Evidence. Journal of Behavioral Medicine 2007, 30 (1), 77–94. https://doi.org/10.1007/s10865-006-9085-0.
49. Naylor, B.; Boag, S.; Gustin, S. M. New Evidence for a Pain Personality? A Critical Review of the Last 120 Years of Pain and Personality. Scandinavian Journal of Pain 2017, 17, 58–67. https://doi.org/10.1016/j.sjpain.2017.07.011.
50. Grucza, R. A.; Goldberg, L. R. The Comparative Validity of 11 Modern Personality Inventories: Predictions of Behavioral Acts, Informant Reports, and Clinical Indicators. Journal of Personality Assessment 2007, 89 (2), 167–187. https://doi.org/10.1080/00223890701468568.
51. Sievert, M.; Zwir, I.; Cloninger, K. M.; Lester, N.; Rozsa, S.; Cloninger, C. R. The Influence of Temperament and Character Profiles on Specialty Choice and Well-Being in Medical Residents. PeerJ 2016, 4, e2319. https://doi.org/10.7717/peerj.2319.
52. Glazer, Y.; Buskila, D.; Cohen, H.; Ebstein, R. P.; Neumann, L. Differences in the Personality Profile of Fibromyalgia Patients and Their Relatives with and without Fibromyalgia. Clinical and experimental rheumatology 2010, 28 (6 Suppl 63), S27-32.
53. Mazza, M.; Mazza, O.; Pomponi, M.; Di Nicola, M.; Padua, L.; Vicini, M.; Bria, P.; Mazza, S. What Is the Effect of Selective Serotonin Reuptake Inhibitors on Temperament and Character in Patients with Fibromyalgia? Comprehensive Psychiatry 2009, 50 (3), 240–244. https://doi.org/10.1016/j.comppsych.2008.08.004.
54. Jensen, M. P.; Turner, J. A.; Romano, J. M.; Karoly, P. Coping with Chronic Pain: A Critical Review of the Literature. Pain 1991, 47 (3), 249–283. https://doi.org/10.1016/0304-3959(91)90216-k.
55. Braude, H. D. Affecting the Body and Transforming Desire: The Treatment of Suffering as the End of Medicine. Philosophy, Psychiatry, & Psychology 2024, 19 (4), 265–278.
56. Smith, D. E.; Tegano, D. W. Relationship of Scores on Two Personality Measures: Creativity and Self-Image. Psychological Reports 1992, 71 (1), 43–49. https://doi.org/10.2466/pr0.1992.71.1.43.
57. Svenaeus, F. The Phenomenology of Suffering in Medicine and Bioethics. Theoretical Medicine and Bioethics 2014, 35 (6), 407–420. https://doi.org/10.1007/s11017-014-9315-3.
58. Self-Transcendence as the Path to Virtue, Happiness and Meaning. Dr. Paul Wong. http://www.drpaulwong.com/self-transcendence-path-virtue-happiness-meaning/.
59. Frankl, V. E. Self-Transcendence as a Human Phenomenon. Journal of Humanistic Psychology 1966, 6 (2), 97–106. https://doi.org/10.1177/002216786600600201.
60. Campbell-Sills, L.; Cohan, S. L.; Stein, M. B. Relationship of Resilience to Personality, Coping, and Psychiatric Symptoms in Young Adults. Behaviour Research and Therapy 2006, 44 (4), 585–599. https://doi.org/10.1016/j.brat.2005.05.001.
61. Cloninger, C. R. Spirituality and the Science of Feeling Good. Southern Medical Journal 2007, 100 (7), 740–743. https://doi.org/10.1097/smj.0b013e318070d177.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 1 April 2025 doi:10.20944/preprints202504.0110.v1

62. Cloninger, C. R.; Salloum, I. M.; Mezzich, J. E. The Dynamic Origins of Positive Health and Wellbeing. International journal of person centered medicine 2012, 2 (2), 179–187. https://doi.org/10.5750/ijpcm.v2i2.213.
63. Csikszentmihalyi, M. & Rathunde, K. (1992). The measurement of flow in everyday live Toward a theory of emergent motivation. In J. E. Jacobs (Ed.), Nebraska Symposium on Motivation (pp. 57-97). Lincoln University of Nebraska Press. - References - Scientific Research Publishing. Scirp.org. https://www.scirp.org/reference/referencespapers?referenceid=391189 (accessed 2024-12-26).
64. Guilford, J.P. Intelligence, Creativity, and Emotional Implications. Knapp, San Diego. - References - Scientific Research Publishing. Scirp.org. https://www.scirp.org/reference/referencespapers?referenceid=1386138 (accessed 2024-12-26).
65. Kitson, A.; Chirico, A.; Gaggioli, A.; Riecke, B. E. A Review on Research and Evaluation Methods for Investigating Self-Transcendence. Frontiers in Psychology 2020, 11. https://doi.org/10.3389/fpsyg.2020.547687.
66. McCarthy, V. L.; Hall, L. A.; Crawford, T. N.; Connelly, J. Facilitating Self-Transcendence: An Intervention to Enhance Well-Being in Late Life. Western Journal of Nursing Research 2017, 40 (6), 854–873. https://doi.org/10.1177/0193945917690731.
67. Worth, P.; Smith, M. D. Clearing the Pathways to Self-Transcendence. Frontiers in Psychology 2021, 12. https://doi.org/10.3389/fpsyg.2021.648381.
68. Effects of Spirituality and Psychosocial Well-Being on Health Risk Behaviors in Appalachian Pregnant Women. Journal of Obstetric, Gynecologic & Neonatal Nursing 2004, 33 (6), 739–747. https://doi.org/10.1177/0884217504270669.
69. Yaden, D. B.; Haidt, J.; Hood, R. W.; Vago, D. R.; Newberg, A. B. The Varieties of Self-Transcendent Experience. Review of General Psychology 2017, 21 (2), 143–160. https://doi.org/10.1037/gpr0000102.
70. Nieto, R.; Miró, J.; Huguet, A. The Fear-Avoidance Model in Whiplash Injuries. European Journal of Pain 2009, 13 (5), 518–523. https://doi.org/10.1016/j.ejpain.2008.06.005.
71. Shinde, F.; Wagani, Dr. R. Does Spirituality Work as a Buffer in Suicide: A Systematic Review. JOURNAL OF PSYCHOSOCIAL RESEARCH 2020, 14 (2), 249–256. https://doi.org/10.32381/jpr.2019.14.02.1.
72. Siddall, P. J.; Lovell, M.; MacLeod, R. Spirituality: What Is Its Role in Pain Medicine? Pain Medicine 2015, 16 (1), 51–60. https://doi.org/10.1111/pme.12511.
73. Baer, R. A.; Smith, G. T.; Hopkins, J.; Krietemeyer, J.; Toney, L. Using Self-Report Assessment Methods to Explore Facets of Mindfulness. Assessment 2006, 13 (1), 27–45. https://doi.org/10.1177/1073191105283504.
74. Shapiro, S. L.; Carlson, L. E.; Astin, J. A.; Freedman, B. Mechanisms of Mindfulness. Journal of Clinical Psychology 2006, 62 (3), 373–386. https://doi.org/10.1002/jclp.20237.
75. Hölzel, B. K.; Lazar, S. W.; Gard, T.; Schuman-Olivier, Z.; Vago, D. R.; Ott, U. How Does Mindfulness Meditation Work? Proposing Mechanisms of Action from a Conceptual and Neural Perspective. Perspectives on Psychological Science 2011, 6 (6), 537–559. https://doi.org/10.1177/1745691611419671.
76. Cloninger, C. R.; Przybeck, T. R.; Svrakic, D. M. The Tridimensional Personality Questionnaire: U.S. Normative Data. Psychological Reports 1991, 69 (3), 1047–1057. https://doi.org/10.2466/pr0.1991.69.3.1047.
77. Costa, P. T.; McCrae, R. R. Normal Personality Assessment in Clinical Practice: The NEO Personality Inventory. Psychological Assessment 1992, 4 (1), 5–13. https://doi.org/10.1037/1040-3590.4.1.5.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 1 April 2025
doi:10.20944/preprints202504.0110.v1

78. Crofford, L. J. Psychological Aspects of Chronic Musculoskeletal Pain. Best practice & research. Clinical rheumatology 2015, 29 (1), 147–155. https://doi.org/10.1016/j.berh.2015.04.027.
79. Deaver, S. P.; Shiflett, C. Art-Based Supervision Techniques. The Clinical Supervisor 2011, 30 (2), 257–276. https://doi.org/10.1080/07325223.2011.619456.

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