DOI: 10.22122/ijbmc.v6i2.161 Published by Vesnu Publications

International Journal of Body, Mind & Culture
Cross-Cultural, Interdisciplinary Health Studies

The Effectiveness of Metacognitive Therapy on Positive and Negative Affect and Brain/Behavior Systems of Patients with Migraine Headaches Referring to Clinics and Health Centers in Ahwaz, Iran

Masoomeh Ghanavati[1], Reza Johari-Fard[2]

[1] MSc, Department of Clinical Psychology, School of Humanities, Ahvaz Science and Research Branch, Islamic Azad University, Ahvaz, Iran
[2] Assistant Professor, Department of Psychology, School of Humanities, Ahvaz Branch, Islamic Azad University, Ahvaz, Iran

Quantitative Study

Abstract

Background: The present study investigated the effects of metacognitive therapy (MCT) on the positive and negative affect and brain/behavioral systems (BBSs) of patients with migraine headaches referred to clinics and medical centers in Ahwaz city, Iran.

Methods: The participants consisted of 30 men and women with migraine selected using convenience sampling method and based on the diagnosis of a neurologist and the initial interview. The Gray-Wilson Personality Questionnaire (GWPQ) and Positive and Negative Affect Schedule (PANAS) were used in the pretest for all patients. The participants were randomly divided into the experimental (n = 15) and control groups (n =15). Metacognitive intervention was performed during 8 weekly sessions in the experimental group. The questionnaires were again administered to both experimental and control groups in the posttest to determine the effect of the treatment intervention. In this study, multivariate analysis of covariance (MANCOVA) was used to analyze the data in SPSS software. The significance level to test the hypotheses was considered as 0.05.

Results: The individual analysis of the variables illustrated that MCT is effective on negative affect and components of escape war in BBSs and there is a significant correlation between them.

Conclusion: It can be concluded that MCT is effective on positive and negative affect and BBSs of patients with migraine headaches.

Keywords: Metacognition, Affection, Brain, Systems, Migraine

Citation: Ghanavati M, Johari Fard R. **The Effectiveness of Metacognitive Therapy on Positive and Negative Affect and Brain/Behavior Systems of Patients with Migraine Headaches Referring to Clinics and Health Centers in Ahwaz, Iran.** Int J Body Mind Culture 2019; 6(2): 87-96.

Received: 5 Jan. 2019
Accepted: 20 Mar. 2019

Introduction

The issue of the body and soul relationship has long been discussed, so that today most experts and those involved in scientific fields believe that a human is a mental, social, and physical being. To know a human being, all three aspects should be considered and it should be noted that the three dimensions

Corresponding Author:
Reza Johari-Fard
Email: rjoharifard@gmail.com

interact with each other. Belief in the unity of the soul and body, and their interaction with each other has created a discipline in medicine called psychosomatics (Khodayarifard, Sadeghi, & Abedini, 2016).

Psychosomatic disorders such as asthma, stomach ulcers, blood pressure, bone and muscle pain, and headaches make up a group of physical ailments that are caused by psychological problems, or are influenced by extreme psychological stressors. Today, there is a dominant view that almost all physical illnesses are potentially associated with psychological stress. "Specific disorders" is a term that Kaplan and Sadock (2007) used for certain medical disorders in the pathology of which psychological factors have a role. These disorders are of the gastrointestinal system (mental anorexia, mental bulimia, gastric and duodenal ulcers, irritable bowel syndrome, impaired bowel control, diarrhea, and obesity), and cardiovascular system (coronary heart disease, essential hypertension, and mitral valve prolapse). Moreover, these disorders include the respiratory system (asthma, and hyperventilation syndrome), endocrine system (hyperthyroidism, hypothyroidism, thyroid sweet, hypercortisolism, and hyperprolactinemia), skin (atopic dermatitis, psoriasis, psychogenic skin peeling, itching, localized, and extreme sweating), musculoskeletal system (rheumatoid arthritis, systemic lupus erythematosus, back pain, and fibromyalgia), headaches (migraine, cluster, and tension), and cancer psychopathology (psycho-oncology) (Johari-Fard & Ghafourpour, 2015). Comorbidity between mental and physical disorders has a great negative effect on physical patients and it is usually considered a risk factor for their physical conditions (Sadock and Sadock, 2007).

Since stressful experiences, deep states of anxiety and tension, frustration, chronic depression, persistent insomnia, and other negative emotional states can lead to temporary or permanent reduction in the immune system response, and immune system defect or malfunction can result in various psychosomatic disorders, all walks of life and different age groups are vulnerable to these disorder (Liposky, 1985).

Perhaps the simplest definition for a headache is a feeling of pain and discomfort in any part of the head from the eye socket to the back of the head (Green, 2011). One of the most common headaches is migraine headaches that manifest as one-sided, and usually with a pulsating sensation accompanied by nausea, vomiting, and other symptoms of different neurological functioning (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). This type of headache may initially be periodic and associated with stress, and in its chronic form occurs almost every day (Lackner & Quigley, 2005). The start of a migraine headache attack is often associated with severe frustration, stress, depression, oppressed anger, and other emotional factors (Johari-Fard & Ghafourpour, 2015).

Personality traits, as one of the most important psychological factors, have a special place in psychosomatic disorders.

In this regard, Eisler believes that it is more important to know what type of personality has the sickness rather than to understand what kind of disease the person has (Sun-Edelstein & Mauskop, 2009). In order to explain the relationships between personality traits and physical and psychological disorders, one can refer to multiple theories such as the theory of Gray. Based on a research conducted on animals in reinforcement of sensitivity theory, Gray offered a certain biological model of character that consists of three brain/behavior systems.

These brain/behavior systems include behavioral activation systems (BASs), behavioral inhibition systems (BISs), and fight-flight systems (FFSs). Behavioral tendency systems (BTSs), which sometimes are referred to as BASs, are responsible for regulating behavior in response to provocative stimuli (Corr, 2004). People who have high BTS activity are more prone to impulsivity disorders, secondary sociopathy,

bipolar disorder, and attention deficit disorder/hyperactivity disorder (Colder et al., 2011). Moreover, it was found that low BTS predicts depression (Fredrickson & Joiner, 2002). The main areas related to these systems have been reported to be the ventral striatum and orbital frontal cortex (OFC). BIS is responsible for the regulation of behavior in order to respond to stimuli that are associated with conditional aversive events, in particular stimuli associated with punishment, and removing or ending bonuses (Corr, 2004). In other words, this system mediates the response to conditional punishment (which becomes apparent in a passive avoidance in behaviors), non-chilling bonus (which leads to the cessation of the behavior), and negative effects, especially anxiety (Colder et al., 2011).

The overactivity of this system, which has been recognized as responsible for negative feelings, is associated with anxiety-related disorders and the low activity of this system brings about primary psychopathy. Regarding the biological basis of this system, increase in the amount of gray matter in the amygdala and hippocampus is connected with increase in the sensitivity scores related to aversive events. FFS in the Revised Reinforcement Sensitivity Theory (2000) is called perplexity FFS. It was believed that FFS regulated unconditioned aversive responses to stimuli that lead to fear and a quick escape or aggression defense (Colder et al., 2011). In fact, it was considered that FFS is responsible for unconditional bothering stimuli, unconditional punishment, or lack of unconditional reward (fight) or escape behavior (flight) is (Corr, 2004). In terms of its biological structure, this system is mostly modulated through the amygdala and hypothalamus; the high sensitivity and activity of this system is associated with discrete-oriented psychotherapy (Pompili, Cosimo, Innamorati, Lester, Tatarelli, & Martelletti, 2009). This system, despite being independent, interacts with other systems. Individual differences in the functioning of these systems and their interactions form the foundation of human mood.

Affect is defined as a fluctuating reaction that is constantly affected by thinking and cognition of the individual (Efklides, 2006). Research shows the lack of impact of positive affect on the negative affect. Moreover, often with a focus on the relationship between stress, pain, and negative mood, it has been highlighted that people with chronic pain experience negative mood such as depression and anxiety, and with increase in negative mood states, they show more sensitivity to painful stimuli (Efklides, 2011). Many studies have compared BBSs and positive and negative affect in normal and abnormal groups in physical and psychological areas. For example, comparing BBSs in patients with migraine and healthy volunteers showed significant differences between the two groups in terms of components of passive avoidance and silence, but showed no significant differences in the components of active avoidance and FFS (Turner, Jensen, & Romano, 2000). Evaluation of positive and negative affect as a sign of positive and negative functioning is of the utmost importance and is taken into account as one of the predictors of life satisfaction. Most people in their judgment of their level of satisfaction with their lives pay attention to the balance between positive and negative affect that represents the overcome of the positive feeling on their negative feelings (Price, Harkins, & Baker, 1987).

Fredrickson and Joiner (2002) found that negative affect increases the activity of the sympathetic system and the secretion of epinephrine in nerve terminals. It sensitizes pain receptors and leads to increased pain. Moreover, negative affect reduces the level of some of the neuropeptides or neutralizes the effect of opioids that are built in the body to moderate experience. This may lead to a decrease in pain tolerance and increase in pain intensity.

It has been proved that thoughts have a significant effect on psychological and

affectual well-being. The basic assumption of the metacognitive approach is that psychological disorders are the result of the expansion and spin of some thoughts and denial and cessation of some others. In fact, the way we respond to our thoughts can lead to affectual suffering (Papageorgiou & Wells, 2009). Metacognitive therapy (MCT), like the cognitive-behavioral model, considers psychological disorders to be the result of distorted thinking; however, these two approaches differ in the explanatory strategy of distorted thinking and its nature and causes. Negative beliefs do not necessarily lead to disruptive thought patterns and sustainable emotional suffering. Metacognitive theory suggests that psychological disorders are the product of sub-metacognitions that have many differences with other thoughts and beliefs emphasized in cognitive-behavioral therapy (CBT) (Papageorgiou & Wells, 2009). MCT, instead of considering emotional problems as the same as self-thoughts, considers a painful internal state as completely related to processes of ineffectiveness, concern, worrying, and mental control strategies. Metacognition always focuses on internal cognitive factors that have the duty of controlling, revising, monitoring, and evaluating thoughts. Metacognition can be divided into three general categories of metacognitive knowledge (for example, "to meet the requirements, I should be concerned"), metacognitive experiences (for example, the feeling of knowing), and metacognitive strategies (for example, ways to control the thoughts and beliefs protection). Based on the metacognitive approach, treatment should include elimination of worry and rumination, letting go of threat-seeking strategies, concern to people to experience intrusive thoughts without avoiding, their reacting through inefficient strategies or strategies including exaggeration of thoughts or worry. Since this treatment does not emphasize challenging thoughts or beliefs related to traumatic events or frequent confrontation with traumatic memories, it is different from the cognitive-behavioral approach (Papageorgiou & Wells, 2009). Patients with migraine headaches have certain personality traits that at the onset may have an effect on the severity of headaches. According to studies, migraine patients are mostly concerned, anxious, and obsessive. These traits lead to internalization of affects and headaches that can become migraine headaches with chronicity and lack of attention to personality traits of the person (Weeks, Baskin, Rapoport, Sheftell, & Arrowsmith, 1983).

Comparison of BBSs in patients with migraine and healthy people showed that the two groups have significant differences in the components of passive avoidance and silence; however, their differences in the components of active avoidance approach and FFS are not significant (Crombez, Eccleston, Van den Broeck, Van, & Goubert, 2002).

In a study, it was found that people with migraine headaches, due to headache, are sensitive to punitive symptoms with higher possibility. Therefore, it can be expected that the BIS, which has the responsibility to respond to punishment and its symptoms, is more active in these people. The results suggest that over time people with migraines learn to avoid these stimulants through the activity of the BIS; this results in the higher activity of BIS in people with migraine (BashiriNejadian, Heidari, & Bakhtiarpoor, 2014).

The comparison of anxiety, depression, brain-behavioral system, coping styles, anger, and hostility between women with asthma and non-infected individuals showed higher anxiety, depression, and activity of BIS, and lower activity of BAS in women with asthema (Colder et al., 2011).

In a study on people with high blood pressure, Corr (2004) found that sensitivity to punishment (which is a characteristic of BIS) and self-efficacy are interacting in elevated systolic blood pressure and heart rate. The results showed that sensitivity to punishment

and self-efficacy have a negative relationship with cardiovascular index. Balderson, Lin, and Von Korff (2004) have showed the role of positive and negative affect in pain. Some studies have shown that 40 to 50% of patients with chronic pain suffer from depression.

Depression is usually associated with pain through one's assessment of the impact of pain in life and ability to control pain, and the belief in one's ability to function. Increased autonomic arousal intensifies pain and reduces motivation for compliance with treatment and pain control. Anxiety can cause functional disability and intensification of pain in patients with chronic pain through the desire to avoid previous behavior and activities (Zautra, Smith, Affleck, & Tennen, 2001). It should be noted that the experience of pain has a negative relationship with positive affect such as happiness and optimism, so that these affects relieve pain in people with chronic pain (Sullivan, Tripp, & Santor, 2000).

In a study, the relationship between physical pleasure and positive and negative affects was evaluated in students of the University of Isfahan, Iran. The results showed that the higher the students' physical pleasure is, the higher their positive affect is. In addition, the pleasure of kindness has a relationship with positive affect in the past and total positive affect, and can significantly predict 6.8% of total positive affect. However, increasing physical pleasure had no relation with negative affect (Vervoort, Eccleston, Goubert, Buysse, & Crombez, 2010).

Higher weekly positive affect and higher average of positive affect, either directly or indirectly, in dealing with pain and stress resulted in lower levels of negative affect. Increase in weekly negative affect and higher average of negative affect were associated with greater levels of pain in the coming weeks. In contrast, a higher level of positive affect is a predictor of pain in the coming weeks.

Methods

The study population included all patients with migraine who referred to neurology clinics and centers in Ahvaz, Iran, in the fall of 2015. The number of subjects, according to research design and type, was 30 people, who were selected through convenience sampling.

These subjects were randomly assigned to two groups of 15 individuals (control and experimental groups). Since biopsychosocial factors have a facilitator role in the development and exacerbation of migraines- and each of them has a special relationship with personality traits and psychological factors of the person- the attempt to control the most common of these factors was the study inclusion criteria, so that a precise explanation of the activity of the study variables could be achieved. As a result, the inclusion criteria consist of the following:

1. The diagnosis of migraines by a neurologist
2. Lack of drug abuse
3. The lack of proven physical and mental diseases associated with migraine
4. The lack of use of hormones and oral contraceptives

The Gray-Wilson Personality Questionnaire (GWPQ): The Gray-Wilson Personality Questionnaire (GWPQ) assesses the activity of BBSs and their components, is a character self-assessment questionnaire designed by Wilson, Barrett, and Gary in 1989, and consists of 120 items. BBSs that are measured by this questionnaire include BAS, BIS, and FFS. Each of these systems are described at three levels: the behavioral level (analysis of internalization/externalization), neural level (brain functioning and structure), and cognitive level (the uses of information processing derived from the related neural processes) (Wilson, Gray, & Barrett, 1990).

BAS is sensitive to conditional signs of reward and punishment removal. Two behavioral components of this system are tendency (active seeking of reward) and active avoidance (showing special behavior to avoid punishment). BIS is sensitive to conditional signs of punishment and reward removal. Its two behavioral components include passive avoidance (avoiding punishment by inactivity

or surrender) and silence (cessation of behaviors that do not have rewards).

FFS is sensitive to unconditional aversive stimuli. Its two behavioral components include fight (aggression defensive rather than offensive aggression) and flight (flight from the source of the threat) (Wilson et al., 1990). Wilson et al. (1990) evaluated the validity of this questionnaire. They obtained Cronbach's alpha coefficients of 0.71, 0.61, 0.58, 0.61, 0.65, and 0.65 for men and 0.68, 0.35, 0.59, 0.63, 0.71, and 0.71 for women for the components of tendency, active avoidance, passive avoidance, silence, and fight and flight, respectively. These coefficients indicate the good internal consistency of the questionnaire. Moreover, using the correlation between GWPQ components and Eysenck Personality Questionnaire (EPQ), they showed the convergent validity of the GWPQ. In this study, the reliability of each of the subscales of GWPQ was calculated using Cronbach's alpha, which were, respectively, 0.74, 0.63, and 0.68 for the subscales of activation, inhibition, and fight and flight.

Positive and Negative Affect Schedule: The Positive and Negative Affect Schedule (PANAS) was prepared and presented by Watson, Clark, and Tellegen, and assesses 20 affects (10 positive and 10 negative affects) in the form of words, which are generally evaluated using a 5-point scale (ranging from 1 = not at all to very high = 5). The Cronbach's alpha coefficient of this scale has been reported to be 0.85, and the internal correlation coefficients of the scale and its components, which were in the range of 0.74-0.94 and all were meaningful, provided evidence of its construct validity. The validity of the test in terms of recovery with an interval of 8 weeks is 0.68 in the positive affect subscale and 0.71 in the negative affect subscale (Watson, Clark, & Tellegen, 1988). In terms of validity, the correlation of these subscales with some assessment tools that assess structures related to these affects such as anxiety and depression has been reported. The validity of the test has been reported by the Beck Depression Inventory as 0.23-0.58 (Watson & Tellegen, 1985). In this study, the reliability of each of the subscales was calculated using Cronbach's alpha; thus, the reliability of the positive and negative affect subscales was 0.70 and 0.75, respectively.

Results

The distribution of the participants in this study in terms of gender indicates that 3 (20%) experimental group participants were men and 12 (80%) were women. The control group consisted of 6 (40%) male and 9 (60%) female patients.

The contents of table 1 show that MCT has been effective on at least one of the dependent variables, i.e., positive affect, negative affect, and BBSs. For further examination, one-way analysis of covariance (ANCOVA) in the context of MANCOVA was conducted on each of the dependent variables. Table 2 shows one-way ANCOVA in the context of MANCOVA on the score of both dependent variables (positive and negative affect, BAS, BIS, and FFS).

Results in table 2 show that ANCOVA is significant in the negative affect variable (P = 0.301 and F = 1.117) and the fight-flight variable (P = 0.021 and F = 6.158).

Table 1. Multivariate analysis of covariance on the scores of dependent variables (positive and negative affect, behavioral activation system, behavioral inhibition system, and fight and flight system)

	Effect size	P	df error	The degree of freedom Hypothesis	F	Value
Pillai'sTrace	0.787	0.001	19	5	13.658	0.782
Wilks' Lambda	0.787	0.001	19	5	13.658	0.218
Hotelling's Trace	0.787	0.001	19	5	13.658	3.254
Roy’s Largest Root	0.787	0.001	19	5	13.658	3.594

Table 2. The results of one-way analysis of covariance in the context of MANCOVA on the score of the dependent variables

The dependent variable	Eta coefficient	P	F	Sum of squares	df	Sum of squares
Positive Affect	0.023	0.474	0.531	11.549	1	11.549
Negative Affect	0.556	0.001	28.762	925.748	1	925.748
Behavioral activation system	0.046	0.301	1.117	36.422	1	36.422
Behavioral inhibition system	0.095	0.134	2.412	140.329	1	140.329
Fight-flight system	0.211	0.021	6.158	226.023	1	226.023

Thus, it can be stated that MCT significantly reduced negative affect and fight-flight variable in migraine patients. ANCOVA was not significant in positive affect (P = 0.474 and F = 0.531), BAS (P = 0.301 and F = 1.117), and BIS (P = 0.34 and F = 2.412); thus, it can be stated that MCT has not created significant changes in positive affect, BAS, and BIS in migraine patients.

Discussion

The aim of this study was to investigate the effectiveness of MCT on positive and negative affect and behavioral and brain systems in migraine patients referring to clinics and medical centers in Ahvaz. In this regard, statistical analysis used was multivariate analysis of variance (MANOVA) with pretest scores control. The findings can be summarized in the significant reduction in negative affect and FFS as a result of the intervention in the experimental group compared to the control group (did not receive the intervention). In other words, the second and fifth hypotheses of the study were confirmed.

According to the results, the main research hypothesis was confirmed, and it can be said that MCT caused a significant change in the dependent variables (positive and negative affect, BAS, BIS, and FFS) in the posttest and the changes were statistically significant in relation to changes in the control group. In other words, the main research hypothesis was confirmed. Although a similar study simultaneously examining all these variables was not found, generally, this result is consistent with the findings of similar researches. The results show that MCT has not significantly changed positive affect in patients with migraine and hypothesis one was not confirmed. In other words, the process of treatment with MCT in patients with migraine, compared to the control group, has not been able to make significant changes in positive affect in the patients. This finding is inconsistent with the findings of other researches on the impact of MCT such as that by Ivory and Kambouropoulos (2012). The aim of MCT is not to influence positive affects, but to treat problematic thoughts and affects are taken into consideration. Even if positive affects are not included in the process of treatment, as patients with migraine deal with a chronic disease, they are more inclined to use any learned technique or method associated with negative and annoying thoughts and not is all their thoughts.

Moreover, MCT has significantly reduced negative affect in migraine patients, and therefore, the second hypothesis was confirmed. In the other words, the process of MCT has caused a significant reduction in negative effect in migraine patients compared to the control group. Negative affect increases the activity of the sympathetic system and the secretion of epinephrine in nerve terminals. It sensitizes pain receptors and leads to increased pain. Moreover, negative affect reduces the level of some neuropeptides or neutralizes the effect of opioids produced by the body to moderate the pain experience. This may lead to a decrease in pain tolerance and increase in pain intensity. According to said the abovementioned facts, the role of negative affect in the perception of pain in migraine patients is quite clear.

The results showed that MCT has not led to significant alterations in BAS in migraine patients, and the third hypothesis was not confirmed. In other words, the process of MCT in patients with migraine, compared to the control group, could not create significant changes in BAS. In this regard, a study that is exactly in line with the present study was not found. The overall results of this study are inconsistent with the results of studies on the efficiency of MCT on clinical symptoms or clinical disorders, such as the study by Tota-Faucette, Gil, Williams, Keefe, and Goli (1993). To explain these findings, we must first consider the fact that in many studies, no significant differences have been observed between patients and healthy subjects in terms of this BBS. Maybe treatments focus more on the negative aspects and avoiding losses, which are less involved in the activation system. Therefore, individuals in the experimental and control groups, most likely because of the activity of this system for removing obstacles, try to look for positive outcomes.

According to the results obtained, it can be said that MCT has not caused significant changes in BIS in migraine patients and hypothesis 4 was not confirmed. In other words, the process of treatment with MCT in patients with migraine, compared to the control group, has failed to make significant changes in BIS. In this regard, a study that is exactly in line with the present study was not found. The overall results are inconsistent with the results of previous studies on the effectiveness of MCT on clinical symptoms or disorders, such as the study by Tota-Faucette et al. (1993). Migraine sufferers, due to their migraine headache, are more likely to be sensitive to punitive signs. In patients with migraine with aura, symptoms such as nausea and fear of light can be seen as a sign of punishment or reward removal. Perhaps migraine sufferers, with time, learn that they should avoid these stimuli by BIS, the outcome of this process is that the activity of BIS is higher in people with migraine and the results of previous researches approve this (Pompili et al., 2009).

According to the results obtained, it can be said that MCT has significantly reduced FFS in migraine patients and hypothesis 5 was confirmed. In other words, the process of MCT has led to a significant reduction in FFS in migraine patients compared to the control group. In this regard, a study that is exactly in line with the present study was not found; however, the overall results of this study are consistent with the results of researches on the effectiveness of MCT on clinical symptoms or disorders, such as the study by Tota-Faucette et al. (1993). To explain this finding, the effects of cognitions on pain and pain perception should be considered. Assessments and cognitive beliefs regarding pain can have serious effects on the emotional and behavioral responses of the individual to pain. If a signal sign is interpreted as traumatic pain (threat assessment) and the individual believes that he/she has suffered an actual or potential injury, the sign may be perceived as intolerable and more elusive behaviors and avoidance may be recalled. For example, cancer-related pain is assessed as more intolerable than labor pain (Price et al., 1987). In addition, estimates and beliefs associated with pain are important determinants in coping with chronic pain (Jensen, Turner, Romano, & Karoly, 1991).

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

The authors would like to thank all those who participated in the study.

References

Balderson, B. H. K., Lin, E. H. B., & Von Korff, M. (2004). The management of pain-related fear in primary care. In G. Asmundson, J. Vlaeyen, & G. Crombez (Eds.), *Understanding and Treating Fear of Pain* (1st ed., pp. 267-292). Oxford, UK: Oxford University Press.

BashiriNejadian, A., Heidari, A., & Bakhtiarpoor, S. (2014). The comparison of brain-behavioral systems and positive and negative affect between patients with migraine and healthy individuals. *Journal of Developmental Psychology (Iranian Psychologist), 11*(42), 195-208.

Colder, C. R., Trucco, E. M., Lopez, H. I., Hawk, L. W., Jr., Read, J. P., Lengua, L. J. et al. (2011). Revised Reinforcement Sensitivity Theory and Laboratory Assessment of BIS and BAS in Children. *J Res Pers., 45*(2), 198-207. Retrieved from PM:21603055

Corr, P. J. (2004). Reinforcement sensitivity theory and personality. *Neurosci Biobehav Rev, 28*(3), 317-332.

Crombez, G., Eccleston, C., Van den Broeck, A., Van, H. B., & Goubert, L. (2002). The effects of catastrophic thinking about pain on attentional interference by pain: no mediation of negative affectivity in healthy volunteers and in patients with low back pain. *Pain.Res Manag., 7*(1), 31-39. doi:10.1155/2002/576792 [doi]. Retrieved from PM:16231065

Efklides, A. (2011). Interactions of Metacognition with Motivation and Affect in Self-Regulated Learning: The MASRL Model. *Educ Psychol, 46*(1), 6-25.

Efklides, A. (2006). Metacognition and affect: What can metacognitive experiences tell us about the learning process? *Educ.Res.Rev., 1*(1), 3-14.

Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychol Sci, 13*(2), 172-175. doi:10.1111/1467-9280.00431 [doi]. Retrieved from PM:11934003

Gatchel, R. J., Peng, Y. B., Peters, M. L., Fuchs, P. N., & Turk, D. C. (2007). The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull, 133*(4), 581-624. doi:2007-09203-002 [pii];10.1037/0033-2909.133.4.581 [doi]. Retrieved from PM:17592957

Green, M. W. (2011). Headaches: Psychiatric Aspects. *Neurol Clin., 29*(1), 65-80.

Ivory, N. J., & Kambouropoulos, N. (2012). Coping mediates the relationship between revised reinforcement sensitivity and alcohol use. *Pers Individ Dif., 52*(7), 822-827.

Jensen, M. P., Turner, J. A., Romano, J. M., & Karoly, P. (1991). Coping with chronic pain: a critical review of the literature. *Pain., 47*(3), 249-283. Retrieved from PM:1784498

Johari-Fard, R., & Ghafourpour, R. (2015). The Effectiveness of Unified Treatment Approach on Quality of Life and Symptoms of Patients with Irritable Bowel Syndrome Referred to Gastrointestinal Clinics. *Int J Body Mind Culture, 2*(2), 85-94.

Khodayarifard, M., Sadeghi, K., & Abedini, Y. (2007). Cognitive-behavioral family therapy combined with chiropractic in treatment of psychosomatic disorders. *Research in Psychological Health, 1*(1), 5-15.

Lackner, J. M., & Quigley, B. M. (2005). Pain catastrophizing mediates the relationship between worry and pain suffering in patients with irritable bowel syndrome. *Behav.Res Ther, 43*(7), 943-957. doi:S0005-7967(04)00177-9 [pii];10.1016/j.brat.2004.06.018 [doi]. Retrieved from PM:15896288

Papageorgiou, C., & Wells, A. (2009). A prospective test of the clinical metacognitive model of rumination and depression. *Int J Cogn Ther, 2*(2), 123-131.

Pompili, M., Di, Cosimo D., Innamorati, M., Lester, D., Tatarelli, R., & Martelletti, P. (2009). Psychiatric comorbidity in patients with chronic daily headache and migraine: A selective overview including personality traits and suicide risk. *J Headache.Pain., 10*(4), 283-290. doi:10.1007/s10194-009-0134-2 [doi]. Retrieved from PM:19554418

Price, D. D., Harkins, S. W., & Baker, C. (1987). Sensory-affective relationships among different types of clinical and experimental pain. *Pain., 28*(3), 297-307. doi:0304-3959(87)90065-0 [pii]. Retrieved from PM:2952934

Sadock, B. J., & Sadock, V. A. (2007). *Kaplan & Sadock's synopsis of psychiatry: Behavioral sciences/clinical psychiatry, 10th ed*. Philadelphia, PA: Lippincott Williams and Wilkins.

Sullivan, M. J. L., Tripp, D. A., & Santor, D. (2000). Gender Differences in Pain and Pain Behavior: The Role of Catastrophizing. *Cognit Ther Res, 24*(1), 121-134.

Sun-Edelstein, C., & Mauskop, A. (2009). Foods and supplements in the management of migraine headaches. *Clin.J Pain., 25*(5), 446-452. doi:10.1097/AJP.0b013e31819a6f65 [doi];00002508-200906000-00015 [pii]. Retrieved from PM:19454881

Tota-Faucette, M. E., Gil, K. M., Williams, D. A., Keefe, F. J., & Goli, V. (1993). Predictors of response to pain management treatment. The role of family environment and changes in cognitive processes. *Clin.J Pain., 9*(2), 115-123. Retrieved from PM:8358134

Turner, J. A., Jensen, M. P., & Romano, J. M. (2000). Do beliefs, coping, and catastrophizing independently predict functioning in patients with chronic pain? *Pain., 85*(1-2), 115-125. doi:S0304-3959(99)00259-6 [pii]. Retrieved from PM:10692610

Vervoort, T., Eccleston, C., Goubert, L., Buysse, A., & Crombez, G. (2010). Children's catastrophic thinking about their pain predicts pain and disability 6 months later. *Eur.J Pain., 14*(1), 90-96. doi:S1090-3801(09)00052-4 [pii];10.1016/j.ejpain.2009.03.001 [doi]. Retrieved from PM:19359203

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers.Soc Psychol, 54*(6), 1063-1070. Retrieved from PM:3397865

Watson, D., & Tellegen, A. (1985). Toward a

consensual structure of mood. *Psychol Bull., 98*(2), 219-235.

Weeks, R., Baskin, S., Rapoport, A., Sheftell, F., & Arrowsmith, F. (1983). A comparison of MMPI personality data and frontalis electromyographic readings in migraine and combination headache patients. *Headache., 23*(2), 75-82. Retrieved from PM:6853156

Wilson, G. D., Gray, J. A., & Barrett, P. T. (1990). A factor analysis of the Gray-Wilson Personality Questionnaire. *Pers Individ Dif., 11*(10), 1037-1045.

Zautra, A., Smith, B., Affleck, G., & Tennen, H. (2001). Examinations of chronic pain and affect relationships: applications of a dynamic model of affect. *J Consult.Clin.Psychol, 69*(5), 786-795. Retrieved from PM:11680555