The Mediating Role of Depression in the Relationship Between Immature Ego Defense and Perceived Pain Intensity in Patients with Chronic Pain

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Abstract

Objective: Both defense mechanisms of ego and depression affect the intensity of the pain in the patients with chronic pain. The present study investigates the mediating role of depression in the relationship between immature ego defense and perceived pain intensity in patients with chronic pain.

Method: Research was conducted on 503 patients with chronic pain who referred to pain centers in Tehran. Participants were asked to answer Numerical Rating Scale (NRS) for perceived pain intensity, Defense Styles Questionnaire (DSQ-40), and Depression, Anxiety, and Stress Scale (DASS).

Results: The results indicate that depression plays mediating role in the relationship between immature ego defense and perceived pain intensity in patients with chronic pain.

Conclusion: the relationship between immature ego defense and perceived pain intensity is not a simple linear one, but is mediated by depression.

Keywords: Defense style, Pain intensity, Perception of pain, Depression, Chronic pain

Introduction

Pain is a complex phenomenon with various biological, psychological, social and cultural dimensions. The sensation of pain is associated with biological components while its perception is related to psychological factors. Compared to the role of biological agents, the role of psychological and social factors in intensifying and perpetuating pain becomes more evident, as pain gets more chronic (Turk, Okifuji, Sinclair & Stan, 1996). To put it another way, the psychological factors can influence the person's perception of pain (Mostafaie & et al., 2018) and lead to perceived pain with either high or low severity. One of the most effective psychological factors that contribute to pain perception is the defense style (which consists of unconscious cognitive functions that emerge by moderating the conscious experience of thinking, feeling, and emotion and reduce sudden changes in the inner and outer environment (Cramer, 2003). According to the classification put forth by Andrews, Singh and Bonds (1993), which is based on Vaillant's hierarchical classification of defenses (1988), defense mechanisms are divided into three defense styles: mature, neurotic and immature. Various defense mechanisms and styles can be explicated based upon individual's adaptive behavior; for this reason, adaptive defense mechanisms and styles can bring about better physical and mental health (Vaillant, 1994). Defense mechanisms can affect a person's experience of pain (Gamsa, 1994; Horn & Munafo, 1998; Havik, 1993; Monsen & Havik,

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2001). In fact, it is assumed that the experience of pain in patients with chronic pain originally stems from the conversion of certain emotions as well as maladaptive defense mechanisms (Engel, 1959; Freud, 1952). For example, patients with pain show higher tendency in using defense mechanisms such as reversal (Mendelson, 1984; Tauschke, Merskey & Helmes, 1990). Somatization and denial are also claimed to be associated with physical pain (Havik, 1993). Regression, masochistic tendencies and passive submission are also associated with chronic pain (Blumer, 1987).

On the other hand, research suggests that there is a correlation between chronic pain and depression (Beesdo, Jacobi, Hoyer, Low, Ho¨fler & Wittchen, 2010; Hermesdorf, Berger, Baune, Wellmann, Ruscheweyh & Wersching, 2016; Li, 2015; Thompson, Correll, Gallop, Vancampfort & Stubbs, 2016). Some researchers have also indicated that there is a causal relationship between pain and depression (Li, 2015). Comorbidity of these two disorders can, to a large extent, affect the quality of life in these patients. Findings reveal that about 75% of depressed patients complain about pain (Aguera-Ortiz, Failde, Mico, Cervilla & Lopez-Ibor, 2011; Lepine & Briley, 2004). However, various psychological factors can influence the intensity of pain perceived by depressed people. Some researchers (e.g. Thompson, Correll, Gallop, Vancampfort & Stubbs, 2016) suggest that depressed people develop a distorted perception of pain, but they associate it with unknown factors. In this regard, the question arises as to what psychological variables play a significant role in intensified perception of pain in depressed patients.

Research suggests that the immature defense style is associated with comorbid depressive symptoms and with poor physical health (Hyphantis, Bai, Siafaka, Georgiadis, Voulgari & et al., 2006; Hyphantis, Christou, Kontoudaki, Mantas, Papamichael, et al., 2008; Hyphantis, Triantafillidis, Pappa, Mantas, Kaltsouda, et al.,

2005). The immature defense style plays a key role in preventing pain. Therefore, the purpose of the present study is to answer the following questions: Can the immature defense style act as a factor in extreme perception of pain in patients with chronic pain? And can depression play a mediating role in this relationship?

Method

This applied research uses Structural Equations Modeling (SEM) and Causal Modeling to analyze the data. Causal Modeling studies the direct and indirect effects of the research variables on pain perception in people with chronic pain. The statistical population consists of all patients with chronic musculoskeletal pain who had referred to Mahan Clinic in Tehran, in the winter of 2017. Having referred to the mentioned centers, the patients who met the criteria for entering the study were selected and evaluated through purposive sampling. The inclusion criterion for chronic musculoskeletal pain, as published in ICD-11 (beta version), is as follows: persistent pain in the bone(s), joint(s), and muscle(s) or soft tissue(s) attached to them for more than three months. Also, individuals participating in this study must be 21 to 60 years of age and have reading and writing ability. The exclusion criteria for the study include a history of injury, fractures and surgery within the last 3 months, and comorbidity with any illness or condition that explains the severity of the pain (such as cancer, spinal cord and neurological damage, osteoporosis, substance abuse, or drug addiction, as well as pregnancy). Following the sample size used in other research, the present study included 503 individuals.

Measures
Checklist of demographic characteristics
Checklist of demographic characteristics consists of participants' age, gender, education, marital status, and tests whether they are pregnant and

whether they have alcohol or drug addiction, a history of surgery, and special medical conditions (e.g. cancer, spinal and neurological disorders, osteoporosis etc.).

Numeric Rating Scale (NRS)

NRS is an 11-point numeric scale that measures the intensity of pain by asking a patient to select a number (between 0 and 10). In terms of structural validity, this scale shows a high correlation (0.86 to 0.96) with VAS (Hawker, Mian & Kendzerska, 2011). Phan et al. (2012) also reported the highest concurrent validity and reliability for this scale (r > 0.8; p < 0.01). In the present study, Cronbach's alpha for pain intensity is 1.00.

Defense Style Questionnaire (DSQ- 40)

DSQ (Andrews, Singh & Bond, 1993) is an instrument with 40 questions that measures 20 defense mechanisms based on three mature, neurotic and immature defense styles on a 9-point Likert scale (from "absolutely agree" to "absolutely disagree"). The mature style consists of sublimation, humor, anticipation and suppression. The neurotic style includes undoing, pseudo-altruism, idealization and reaction formation. The immature style consists of the following 12 mechanisms: projection, passive-aggressive, acting-out, isolation, devaluation, autistic fantasy, denial, displacement, dissociation, splitting, rationalization and somatization. Face validity and content validity of the scale were confirmed by eight experts. In the normal group, the highest mean belonged to the mature style, neurotic style, and immature style respectively. The alpha coefficient was reported to be between 0.10 (denial mechanism) and 0.81 (autistic fantasy). Psychometric properties of the Persian version of the Defense Style Questionnaire have been reviewed and approved in several research (Besharat, 2013; Besharat, Irawani & Sharifi, 2001). In these studies, Cronbach's alpha coefficients ranged from 0.83 to 0.94 for the mature style, 0.79 to 0.91 for the neurotic style, and 0.81 to 0.92 for the immature style sub-scale questions. These coefficients confirm the internal consistency of sub-scales in the Defense Styles Questionnaire. Convergent and discriminant validity of the Persian version of the Defense Style Questionnaire were confirmed through simultaneously conducting the following questionnaires and instruments on two (patient and normal) groups: the Mental Health Inventory, Inventory of Interpersonal Problems, Neuroticism and Extraversion Sub-scale of NEO Personality Inventory-Revised, Self-Esteem Rating Scale, Self-Efficacy Scale, Toronto Alexithymia Scale, and Positive and Negative Affect Schedule. The results of the confirmatory factor analysis confirmed the construct validity of the Persian version of the questionnaire by determining three factors (mature, neurotic and immature defense styles) (Besharat, Irawani & Sharifi, 2001; Besharat, 2007). In the present study, Cronbach's alpha for immature defense style was 0.74.

Depression, Anxiety, Stress Scale (DASS)

Depression, Anxiety, Stress Scale (Lovibond & Lovibond, 1995) is a self-report scale used to assess negative emotional states in individuals with depression, anxiety and stress. This scale has been analyzed by Antony et al. (1998). The results of their research indicated that there were three contributing factors: depression, anxiety and stress. The results of this study showed that 68% of the total scale variance was determined by these three factors. The specific values of stress, depression and anxiety in this study were 9.07, 2.89 and 1.23. The alpha coefficient for these factors was 0.97, 0.92 and 0.95 respectively. The results of the correlation analysis between factors in Antony et al. (1998) showed a correlation coefficient of 0.48 between depression and stress, 0.53 between anxiety and stress, and 0.28 between anxiety and depression. There was a high correlation between this questionnaire and Beck's Depression and Anxiety Inventory (r=0.74-0.81)

(Lovibond & Lovibond, 1995). In Iran, the validity and reliability of this questionnaire was studied by Samani and Jokar (2007). They reported the test re-test reliability for the depression, anxiety and stress scales as 0.80, 0.76 and 0.77, respectively, and Cronbach's alpha for depression, anxiety and stress as 0.81, 0.74, and 0.78. To assess the validity of this scale, the statistical method of Confirmatory Factor Analysis (CFA) was used. Based on factor analysis, three sub-scales were extracted, i.e. depression, anxiety and stress, which are in line with DASS's main test items. This study used the shortened form of DASS, which contains 21 questions. Each of the DASS-21 subscales includes 7 questions, and the final score in each is obtained through the total score of the related questions. In this study, the Cronbach's alpha for the depression subscale was 0.83.

Results

Statistical analysis

Data drawn from descriptive statistics of research variables (age, sex, marital status, education, pain intensity, immature defense style and depression) were analyzed using SPSS.

The Partial Least Squares (PLS) was used to analyze the presented model. In addition to having the properties of regression, PLS is more flexible in comparison with Standard Structural Equation Modeling (SEM) and can be used instead of it. This method is used in cases where sample size is small, the data distribution is either normal or abnormal, and the number of questions in the variables is less than 3, the model is newly developed and little research has been conducted on it, and the model is either highly complex or dimensional (Henseler, Ringle & Sarstedt, 2012). In the present study, since the hypothesized model has been newly developed with one variable having just one question, the PLS method was used for its analysis. In this model, arrows indicate the predictive relationships which can, with strong theoretical

backing, be interpreted as causal relationships (Hair, Hult, Ringle & Sarstedt, 2013). PLS model consists of two steps. The first step examines the measurement (external) models with respect to being reflective or formative. An external model shows the relationships between constructs and their observable variables (Hair et al., 2013). In other words, it demonstrates the relationship between a latent variable and its observable variables (Henseler, Ringle & Sinkovics, 2009). The second step involves the evaluation of structural (internal) models that represent the constructs and their relationships, and determines whether structural relationships are significant or not. Finally, the hypothesis is tested.

The external model determines the relationship between an index and its construct. The external model examines, in the first place, the reliability and validity of the constructs. In PLS, only valid and reliable indices are used before examining the linear relationship between constructs. Therefore, the composite reliability and Cronbach's alpha are adopted to examine the reliability of the scales. The convergent validity of constructs is measured in such a way that the average variance extracted should be above .50, and can explain more than half the variance of its indices. In order to have divergent validity, it is necessary that the AVE for each construct be larger than the highest square root of other constructs' correlations (Hair, Sarstedt, Hopkins & Kuppelwieser, 2014). In other words, the square root of AVE should be greater than the correlation between that variable and other variables (Fornell & Larcker, 1981; Hair et al., 2013).

The internal model examines the linear relationship between constructs. In PLS, the model is evaluated through the same significant paths. Also, in PLS, the R^2 is used for latent endogenous variables (in comparison with values of 0.19, 0.33 & 0.67), the f^2 is used for effect size (in comparison with the values of 0.02, 0.15 & 0.35) and the fitness

index (GOF), and the Blind Folding (BF) method are also used to measure predictive relationships.

The results of the descriptive research data are summarized in Table 1.

Results

After removing all the factor loadings with values less than .7, the factor loading of indices is shown in Table 2.

Correlation between research variables, composite reliability, Cronbach's alpha, AVE, discriminant validity, communality and redundancy are shown in table 3.

The final structural model is shown in Figure 1.

Research scales have a composite reliability higher than .٧٠. AVE is above .٥٠ on all scales,

Table 1: Descriptive research data

	Average	Standard deviation
Age	41.21	10.34
Pain intensity	6.94	1.78
Immature style	57.52	11.53
Depression	8.40	7.43

	Number	Percentage
Man	198	39.36
Woman	305	60.63
Married	357	70.97
Single	101	20.07
Divorced	30	5.96
Widow	15	2.98
Diploma and lower	266	52.88
Bachelor	171	33.99
Master's degree and higher	66	13.12

Table 2: Factor loadings of research indices

	Depression	Immature style	Pain
Pain intensity			1.000
d11		.638	
d22		.851	
ss10	.761		
ss13	.833		
ss17	.772		
ss21	.831		
ss3	.700		

Table 3: Correlation between research variables, composite reliability, Cronbach's alpha, AVE, discriminant validity, communality and redundancy

	Immature style	Pain intensity	Depression	CR	AVE	AVE√	Average Communality	Average Redundancy
Immature style	1.000	.226**	.212**	.719	.566	.752	.723	0.022
Pain intensity		1.000	.276**	1.00	1.000	1.000	1.000	0.000
Depression			1.000	.885	.608	.779	.769	0.043

CR: Composite reliability; AVE: Average variance extracted (Convergent validity); √AVE: square root of AVE to indicate whether or not discriminant validity is satisfactory.
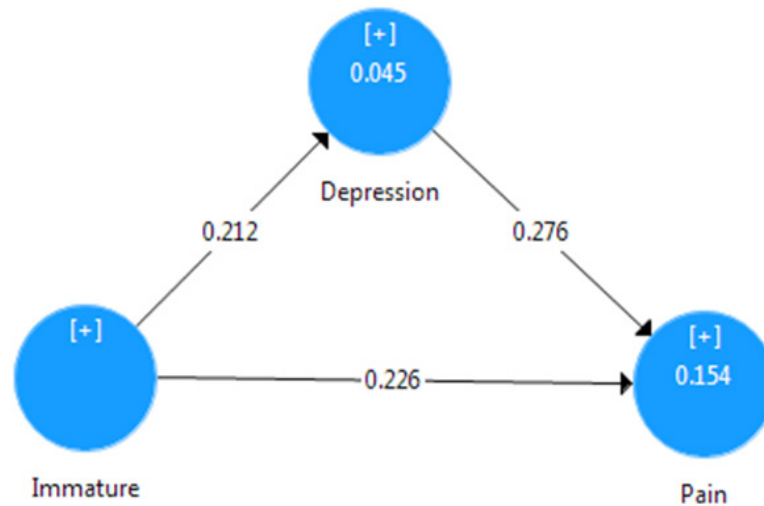
Figure 1: Final structural model

confirming the convergent validity of all scales. AVE for each construct is larger than the highest square of the correlation of other structures and represents the divergent validity of the scales.

The results of the path significance in the internal research model are shown in Figure 1. The immature defense style is correlated with pain intensity (B = .22, SE = .04, T = 5.50, P < .01). Depression is correlated with severity of pain (B = .27, SE = .04, T = 6.84, P < .01). The immature defense style is also correlated with depression (B = .21, SE = .04, T = 5.24, P < .01). To determine the mediating role of depression in the relationship between the immature defense styles and pain intensity, Sobel's test was used (B = .059, Z = 4.286, P < .01). According to these findings, depression can have a mediating role in the relationship between the immature defense style and the intensity of pain at p<.01. Based on the results of the R2 test, immature defense style and depression can account for 19% of pain intensity. This value is relatively small in comparison with the three values (.19, .33, .67) given by Chin (1998). The Cv Com index was used to assess the quality of the measurement model and the results for depression, immature defense style and pain intensity were .40, .11 and .32, respectively. Compared to the values provided by Henseler, Ringle and Sinkovics (2009) (.02, .15,

.35), they represent the strong and average quality of the variables listed, respectively. These results indicate that relatively good indices are used to measure variables. The Cv Red index was used to evaluate the quality of the structural model. The results for depression and immature defense styles were .42 and .16, which, in comparison with the values indicated, show that independent variables are extracted properly from the literature, and that they can properly predict pain intensity.

Discussion and conclusion

The results of this study showed that immature defense style in patients with chronic pain is correlated with the perceived severity of pain. These results are consistent with previous research findings (Mendelson, 1984; Egle, Schwab, Rudolf, Schaefer, Bassler & Hoffmann, 1987; Blumer, 1987; Havik, 1993; Monsen & Havik, 2001) and can be explained that there is a probability that the experience of pain severity in people with chronic pain be the result of the conversion of certain emotions; in other words, they stem from inefficient immature defense mechanisms (Freud, 1952; Engel, 1959). In other studies, it was suggested that patients inflicted with pain undergo a greater degree of reversal (Wilson, 1982; Mendelson, 1984; Tauschke, Merskey & Helmes,

1990), internally directed aggression (Bruehl, Chung, Burns & Biridepalli, 2003; Burns, Bruehl, Quartana, 2006; Quartana, Bounds, Yoon, Goodin & Burns, 2010), somatization and denial (Bjerke & Stiles, 1991; Havik, 1993; Monsen & Havik, 2001). Seemingly, emotional factors as well as defense mechanisms can affect the person's experience of pain (Gasma, 1994; Horn & Munafo, 1998). It seems that when a person has mature psychological defenses, they are capable of protecting themselves from harmful factors, preventing conversion into psycho-somatic illnesses such as chronic pains. But when an individual does not have adaptive psychological defenses and suffers from immature defenses, they are not able to protect themselves facing with distressing factors and conflicts. These factors emerge in altered forms in various disorders, such as psychosomatic disorders.

On the other hand, the results of this study show that depression plays a mediating role in the relationship between the immature defense style and the severity of pain perception.

According to the results, it can be concluded that depression partly influences the relationship between immature defense styles and intensity of pain in patients with chronic pain. These findings are consistent with a number of previous studies (Hermesdorf, Berger, Baune, Wellmann, Ruscheweyh & Wersching, 2016; Li, 2015; Thompson, Correll, Gallop, Vancampfort & Stubbs, 2016). When an individual has immature defenses, he is unable to protect himself from pain and, thus, perceives pain more intensely. Also, due to the ineffectiveness of the defenses, there emerges signs of depression that can lead to a more intense perception of pain. Other studies (Jamner & Schwartz, 1986; Olff, Brosschot & Godaert, 1993) suggest that people who employ effective strategies or adaptive defenses, suffer less from distress, complaints, fatigue, depression, and pain and go through a shorter recovery period. Also, people with depression have fewer adaptive

defense mechanisms than others (Flett, Besser, Hewitt, 2005; Van, Dekker, Peen, Abraham & Schoevers, 2009). These findings can explain what psychological processes can lead depressed people to perceive pain more severely. It can now be concluded that these patients are not able to protect themselves from harmful factors due to inadequate defenses and therefore, they perceive pain with more severity.

We conclude that the relationship between immature ego defenses and the perceived pain intensity is not a simple linear one, but is mediated by depression.

Acknowledgements

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