

The Mediating Role of Conscientiousness and Openness to Experience in the Relationship of Pain Self-Efficacy, Pain Management Strategies, and Resilience with Pain Perception in Chronic Pain Patients

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Quantitative Study

Abstract

Background: Personality variables play an important and pivotal role in the multifaceted biopsychosocial model of chronic pain. The present study was performed with the aim to examine the mediating role of conscientiousness and openness to experience in the relationship of pain self-efficacy, pain management strategies, and resilience with pain perception in chronic pain patients.

Methods: The research method used was correlational and the statistical population included all 2141 patients suffering from chronic pain referred to medical centers in Tehran, Iran, in 2018-2019. Using Cochran's formula and convenience sampling method 410 patients were selected as the study participants. Data were obtained using the Revised NEO Personality Inventory (Costa & McCrae, 1992), Pain Self-Efficacy Questionnaire (Nicholas, 1989), Coping Strategies Questionnaire (CSQ) (Rosenstiel & Keefe, 1983), Connor-Davidson Resilience Scale (Connor & Davidson, 2003), and the West Haven-Yale Multidimensional Pain Inventory (Kerns, Turk, & Rudy, 1985). The collected data were analyzed using structural equations with partial least squares method in SPSS and Amos software.

Results: The findings of the present study showed that conscientiousness had no mediating role in the relationship between predictor variables of self-efficacy, pain management, and resilience and the criterion variable of pain perception, but openness to experience had a mediating role in the relationship between the above predictor and criterion variables ($P < 0.001$).

Conclusion: It can be concluded that conscientiousness loses its mediating role in the presence of the variable of openness to experience, and clinically, the variable of openness to experience is effective on pain management.

Keywords: Chronic pain; Pain management; Self-efficacy; Pain perception; Personality

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Introduction

Chronic pain is very common and very difficult to treat (Gewandter et al., 2015). In addition, it is a costly public health problem with high health care costs and loss of efficiency in occupations (Knight, Schaefer, Chandran, Zlateva, Winkelmann, & Perrot, 2013). Pain is the most common health issue in society and is a major cause of long-term disability in the world (Seminowicz & Moayed, 2017). A survey in 10 developed and 7 developing countries showed that the prevalence of chronic pain among adults is 41% and 37%, respectively (Edward, Dworkin, Sullivan, Turk, & Wasan, 2016). In fact, almost all of us can easily remember painful experiences of the past, even if they happened years or decades ago (Elsenbruch & Wolf, 2015).

Chronic pain is a major problem and can be difficult to manage. When a person suffers from chronic pain for a period of time and sometimes for years, at best many different methods are used to eliminate it (Abdel, Shaheed, Maher, Williams, Day, & McLachlan, 2016). Chronic pain mostly has an emotional cause such as distress, depression, different types of fear and avoidance, and altered personalities, all of which have strange effects on interactions and changes, and may result in the loss of social relationships (Michaelis, Kristiansen, & Norredam, 2015). Furthermore, it is likely that multiple factors (biological, psychological, and social) are involved in the development of the pain process, thus necessitating an interdisciplinary management approach (Chan & Peng, 2011). Until the 1960s, researchers considered most of the individuals with chronic diseases as medical cases with specific pathophysiological bases that required physical therapies such as surgery or medication (Jensen & Turk, 2014). One of the social cognitive factors that can affect the amount of pain a person experiences is self-efficacy. Pain self-efficacy has an important role in pain intensity and accurate pain recall. People who have higher pain self-efficacy are more likely to report less pain (Ruben, Jodoin, Hall, & Blanch-Hartigan, 2018).

One of the behavioral and cognitive strategies for people with chronic pain is to try to manage pain. Studies of patients with pain have shown that the use of active coping strategies (such as trying to perform tasks despite pain, not paying attention to pain, and using muscle relaxation) has adaptive results, but the use of passive coping strategies (catastrophizing, dependence, and restricting activity) is associated with more pain, more severe physical disability, high fear, anxiety, worry, and possibility of depression (Sharma, Sandhu, & Shenoy, 2011). Another coping strategy used as an active tool and as a temporary distraction from pain is access to health care; however, this strategy increases the risk of conflict and frustration. The results of a previous study showed that severe chronic pain had negative impact on quality of life (QOL), necessary changes in daily life, and active health strategies (Cabak, Dabrowska-Zimakowska, Truszczynska, Rogala, Laprus, & Tomaszewski, 2015). Another effective factor in perceiving chronic pain is resilience. Not all people who experience stressful events are necessarily harmed (Mealer, Jones, Newman, McFann, Rothbaum, & Moss, 2012). Resilience enhances the human capacity to cope effectively with stress and the pressures of everyday challenges (Donnon, 2009). Given the potential benefits of resilience for those living with mental illness, further research on ways in which these individuals can increase their resilience is necessary (Perlman, Taylor, Molloy, Brighton, Patterson, & Moxham, 2018). Another very important factor in chronic pain disorder is the role of personality variables in chronic pain patterns, which has been neglected due to the complexity of the issue. Conscientiousness, neuroticism, extroversion, openness to experience, and agreeableness are the 5 major

domains of personality (Costa & McCrae, 1992). The impact of being conscientious on various areas of life and related issues is very important (Mike, Jackson, & Oltmanns, 2014). People with high conscientiousness are more likely to be socially law-abiding and have more control over delaying unnecessary motivations (Green, O'Connor, Gartland, & Roberts, 2015). Conscientious people have a plan and are organized (Jackson, Wood, Bogg, Walton, Harms, & Roberts, 2010). Conscientiousness depends on one's hard work as well as a one's ability to persevere and strive for success. People who work conscientiously work longer hours to get a job done (Mike et al., 2014). People with low conscientiousness easily avoid or postpone work when they encounter a problem (Littlefield, Sher, & Wood, 2010). Conscientiousness is naturally associated with success in areas such as academia and occupation (Bleidorn, 2012).

Another important personality factor is openness to experience. Openness to experience is a multifunctional personality trait that significantly demonstrates a wide range of behavioral tendencies, attitudes, and benefits associated with penetration and its diversity, openness, subtle traits (such as intellect and culture), and intelligence (Woo, Chernyshenko, Longley, Zhang, Chiu, & Stark, 2014). Openness to experience (in short, openness) is most commonly recognized as one of the Big Five personality dimensions and is associated with adjectives such as 'intelligent,' 'original,' 'curious,' 'broad-minded,' 'artistically sensitive,' and 'introspective' (DeYoung, Quilty, Peterson, & Gray, 2014). Openness is a broad, multifaceted construct derived from a factor analysis of 36 existing measures of openness-related scales, which yielded 6 facets: intellectual efficiency (i.e., processing novel stimuli quickly, remembering information, being agile, knowledgeable, and intellectual), ingenuity (i.e., mental agility in manipulating ideas or concepts refining existing information, and creating something entirely new), curiosity (i.e., being inquisitive, perceptive, and desiring to learn about scientific principals and related topics), aesthetics of art and being open to aesthetic experiences, tolerance (i.e., enjoying learning about different cultures, attending cultural events, befriending people from other cultures, and immersing oneself in a foreign culture when traveling), and depth (i.e., desiring to gain insight into self/world and to self-improve, and discussing philosophy and self-improvement) (Woo et al., 2014). Openness to experience is positively related to and can be a predictor of academic success (DeYoung, Quilty, Peterson, & Gray, 2014). One feature of openness to experience is exploratory tendency in abstract, motivational, and cognitive factors, and the dopaminergic system that regulates positive reward stimuli and positive reinforcement that have openly motivational and cognitive aspects (Passamonti et al., 2015). As explained, given the importance and necessity of chronic pain disease, which, in addition to biological factors, has important psychological and social factors and is one of the most pervasive diseases of the last century, the researcher in the field of health psychology faced the question of what variables to use for this research. In the many studies in the field of chronic pain and identification of various variables, in the author's searches, personality factors, especially conscientiousness and openness to experience, have not been investigated in the past in the model of chronic pain perception. Given that thus far no research in the world and in Iran has focused on this subject, and considering the importance of a structural model that can predict pain perception in patients with chronic pain, this is an important research topic. Thus, the present study was conducted with the aim to examine the mediating role of conscientiousness and openness to experience in the relationship of pain self-efficacy, pain management strategies, and resilience with pain perception in chronic pain patients.

Methods

The present correlation and structural equation modeling study was performed in Tehran, Iran, in autumn and winter of 2018. The statistical population consisted of all people with chronic pain in medical centers under the supervision of Shahid Beheshti University of Medical Sciences, including Shohada Tajrish, Loghman Hakim, Modares, 11 Azar Clinic, and Royan Pain and Stress Clinic, Iran. The study participants included 2141 people. The sample size was determined to be 326 people using Cochran's formula with a probability of 410 people. The participants were selected from the mentioned centers using convenience sampling method. The study inclusion criteria were chronic musculoskeletal pain, migraine and non-migraine headaches, pain from injuries, fractures, etc. for at least 3 to 6 months, the ability to answer questions, willingness to participate in the research, and provision of an informed consent. The exclusion criteria were severe mental illnesses such as schizophrenia, bipolar disorder, acute depression, developmental disorders, and drug abuse.

Pain Self-Efficacy Questionnaire: The Pain Self-Efficacy Questionnaire (PSEQ) was developed by Nicholas in 1989 to assess pain self-efficacy of patients with chronic pain. The PSEQ has been standardized in Iran and its Cronbach's alpha coefficient has been reported to be 0.81. Its split-half reliability coefficient was obtained to be 0.87, and its test-retest reliability coefficient during a 9-day interval was obtained to be 0.77 (Asghari & Nicholas, 2001). In the present study, the Cronbach's alpha coefficient was calculated to be 0.93.

Coping Strategies In Chronic Pain Questionnaire: This 42-item scale was developed by Rosenstein and Kiev in 1983. The 6 coping strategies include return attention, reinterpreting pain, talking to oneself, ignoring pain, catastrophizing, and praying and hoping. Using the Cronbach's alpha method, the reliability of this test and its internal consistency coefficients were reported to be 0.82, 0.77, 0.82, 0.83, 0.80, and 0.74 for the main factors, respectively, and 0.926 for the whole questionnaire (Asghari & Golk, 2005). In the present study, the Cronbach's alpha of the factors was 0.83, 0.61, 0.85, 0.70, 0.62, and 0.77, and for the whole questionnaire was 0.95, respectively.

Connor-Davidson Resilience Scale: The Connor-Davidson Resilience Scale (CD-RISC) is a 25-item scale developed by Connor and Davidson (2003) to measure stress and threat resistance. The Cronbach's alpha coefficient of this scale was reported to be 0.87. Moreover, the construct validity of the scale through factor analysis indicated a general factor, the sampling adequacy value was 0.89, and the eigenvalue for this general factor was 6.64. This factor also explains 26% of the variance of the whole scale (Samani, Jokar, & Sahragard, 2007). In the present study, the Cronbach's alpha of the CD-RISC was 0.93.

Revised NEO Personality Inventory: The Revised NEO Personality Inventory (NEO PI-R) was developed by Costa and McCrae in 1992. The original version was designed to measure the 5-factor pattern of personality (neuroticism, extraversion, openness to experience, flexibility, and conscientiousness). The Cronbach's alpha coefficient reported by them for neuroticism, extraversion, openness to experience, flexibility, and conscientiousness, was, respectively, 0.85, 0.72, 0.68, 0.69, and 0.79. The long-term validity of the NEO PI-R has also been assessed. In Iran, in 1999, Haghshenas approved the 5-factor structure of this questionnaire in general. The internal consistency coefficients of the main factors using Cronbach's alpha method were, respectively, reported as 0.86, 0.73, 0.56, 0.68, and 0.87 (Garousi Farshi, Mehryar, & Ghazi Tabatabaei, 2001). In the present study, Cronbach's alpha for each factor was 0.72, 0.50, 0.73, 0.62, 0.74, and 0.78, and for the whole scale was 0.92.

The West Haven-Yale Multidimensional Pain Inventory: The West Haven-Yale

Multidimensional Pain Inventory (WHYMPI) was developed by Kerns, Turk, and Rudy in 1985 and in Iran, it was translated into Persian and validated by Mirzamani, Safari, Holisaz, and Sadidi (2007). The 3 parts of the inventory, comprised of 12 scales, examine the impact of pain on the patients' lives, the responses of others to the patients' communications of pain, and the extent to which patients participate in common daily activities. The first part of the scale includes intervention, support, pain intensity, life control, emotional distress, the second part includes punitive reactions, concern for others, distress, and confusion of others. This tool is useful for measuring the range of reactions of the patient's spouse and other important people in the patient's life, such as their perception of the patient's disability. The reliability coefficient of this questionnaire was obtained through test-retest method to be equal to 0.95. The reliability of the first part was reported as 0.86, the second part as 0.78, and the third part as 0.75 using Cronbach's alpha (Mirzamani et al., 2007). Using Cronbach's alpha, the reliability of the first, second, and third part was reported to be 0.86, 0.78, and 0.75 (Mirzamani et al., 2007). In the present study, Cronbach's alpha of each of the three sections was equal to 0.85, 0.83, and 0.79, respectively, the Cronbach's alpha of each of the subscales was 0.88, 0.71, 0.77, 0.45, 0.83, 0.72, 0.86, 0.79, 0.67, 0.70, and 0.65, respectively, and the Cronbach's alpha of the whole scale was 0.88.

The conceptual model of the research is presented in figure 1. In this study, descriptive statistics were used to categorize the demographic characteristics of the subjects in order to calculate the frequency, percentage, and mean and standard deviation. In addition, Amos (version 22; Amos Development Corporation, Meadville, PA, USA) was used for inferential statistics in this study. Kolmogorov-Smirnov test was used to determine the normality of the data, and Pearson correlation coefficient and structural equation model were used. The collected data were analyzed in SPSS (version 22; IBM Corp., Armonk, NY, USA) and Amos.

Results

Of the respondents who specified their gender, 202 (59.4%) were men and 137 (40.3%) were women; 1 person (0.3%) did not specify his/her gender. Among these, 207 (60.9%) were married, 115 (33.8%) were single, 5 (1.5%) were divorced, and 4 (1.2%) were widowed; 9 people (2.6%) did not specify their marital status. In the studied sample, 243 people (71.5%) were currently employed and 86 people (25.3%) were unemployed (retired, unemployed, etc.); 11 people (3.2%) did not specify their employment status. Among the respondents who specified the most important person in their life, the highest number (167 persons, 49.1%) and lowest number (6 people, 1.8%) considered the most important person in their life to be their spouse, and their neighbor, respectively; 22 people (6.5%) did not specify the most important person in their life. Descriptive statistics and results of Kolmogorov-Smirnov test are presented in table 1.

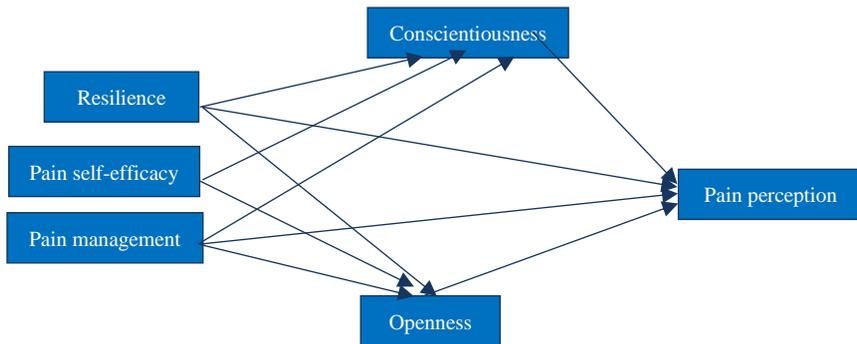


Figure 1. Conceptual model of research

Table 1. Descriptive statistics and results of Kolmogorov-Smirnov test

Variables	Mean ± SD	Z-value	P-value
Openness to experience	106.34 ± 22.75	2.93	0.001
Conscientiousness	114.55 ± 25.93	2.38	0.001
Pain self-efficacy	33.75 ± 13.47	0.83	0.496
Resilience	63.27 ± 17.06	0.90	0.390
Pain management	3.15 ± 0.80	1.22	0.103
Perception of pain	3.11 ± 0.61	0.96	0.312

SD: Standard deviation

The results of presented in table 2 show that the variable of conscientiousness does not have a mediating role in the relationship between the predictor variables of self-efficacy, pain management, and resilience, and the criterion variable of pain perception; but the variable of openness to experience has a mediating role in the relationship between the above predictor and criterion variables and can affect the relationship between these variables and pain perception. Moreover, according to VIF results, the strongest mediating role is the mediating role of openness to experience in the relationship between self-efficacy and pain perception.

Table 3 results show that the goodness-of-fit indices supported the optimal fit of the model with the collected data. Fitted conceptual model of the studied variables is presented in figure 2.

Discussion

The results of the present study showed that conscientiousness and openness to experience are both mediators between self-efficacy, pain management, and resilience and chronic pain perception. However conscientiousness has no mediating role when combined with openness to experience in this model. In explaining the findings, it can be said that people with more openness to experience seek knowledge and the experience of new events at any time, wider vision, morecreativity, more intelligence, and higher exploratory, cognitive, and emotional processing, and havemore motivation and less physical changes (Heart rate, blood pressure, arousal, etc.), which act against stress (Shi, Dai, & Lu, 2016; Christensen, Cotter, & Silvia, 2019; Woo et al., 2014; Connelly, Ones, Davies, & Birkland, 2014; Chan & Consedine, 2014; DeYoung et al., 2014; Mike et al., 2014). This research is in line with the researches by O'Suilleabhain, Howard, and Hughes, (2018), Magyar et al. (2017), Niess and Zacher (2015), Sibille et al. (2012), DeYoung et al (2014), Williams (2011), and Saroglou and Muñoz-García (2008).

Table 2. Results of examining the mediating role of the variables of conscientiousness and openness to experience

Paths	Direct effect		Indirect effect		Total effect		VIF
	Beta	P	Beta	P	Beta	P	
Self-efficacy→ Conscientiousness	0.263	0.001	-	-	0.263	0.001	-
Self-efficacy→ Pain perception	0.058	0.300	0.096	0.001	0.154	0.005	-
Conscientiousness→ Pain perception	0.125	0.104	-	-	0.125	0.104	-
Self-efficacy→ Openness to experience	0.319	0.001	-	-	0.319	0.001	0.523
Openness to experience→ Pain perception	0.199	0.008	-	-	0.199	0.008	-
Pain management→ Conscientiousness	0.134	0.034	-	-	0.134	0.034	-
Pain management→ Pain perception	0.265	0.001	0.052	0.016	0.317	0.001	-
Pain management→ openness to experience	0.179	0.008	-	-	0.179	0.008	0.118
Resilience→ Conscientiousness	0.396	0.001	-	-	0.396	0.001	-
Resilience→ Pain perception	0.220	0.001	0.095	0.001	0.315	0.001	-
Resilience→ Openness to experience	0.227	0.001	-	-	0.227	0.001	0.170

Table 3. Goodness of fit indices for a fitted conceptual model

Fitness Indices	χ^2/df	Root mean square error of approximation (RMSEA)	Adjusted goodness of fit index (AGFI)	Goodness of fit index (GFI)	Comparative fit index (CFI)
Structural model	2.46	0.057	0.91	0.95	0.93

What was obtained from this study is that, when the variable of conscientiousness is placed next to the variable of openness to experience, it loses its mediating role. Openness to experience in this model has a greater mediating role than conscientiousness. Therefore, openness to experience mediates pain self-efficacy, pain management strategies, and resilience as predictors of chronic pain perception in people with chronic pain. Clinically, openness to experience is effective in controlling pain. Thus, training programs that include openness can be implemented among individuals with chronic pain.

The Biopsychosocial model has achieved the practical scientific-professional characteristics of chronic pain (Gatchel, McGeary, McGeary, & Lippe, 2014). Briefly speaking, the biopsychosocial approach considers pain and disability as a multidimensional interaction between physiological, psychological, and social factors, the affect they have on each other results in chronic and complex pain syndromes (Jensen & Turk, 2014). Studies on people with chronic pain have provided evidences that psychological variables play an important role in determining the risk of pain, shaping long-term pain modification, and modulating pain outcomes of treatment (Edward et al., 2016). The experience of pain is not a merely biological experience, but the perceptual experience of pain is a complex multifaceted phenomenon (Linton & Shaw, 2011). In the perceptual experience of pain, from the moment of sensory transfer of the painful stimulus from the peripheral nervous system to the central nervous system, the psychological processes of attention, interpretation, coping strategies, and pain behavior are involved. Each of these psychological processes, influenced by previous learning, cognitions, emotions, environmental factors, positive and negative outcomes, culture, and family, lead to different pain processing and behaviors (Boersma, Carstens-Söderstrand, & Linton, 2014).

Conclusion

It can be concluded that conscientiousness loses its mediating role in the presence of the variable of openness to experience, and clinically, the variable of openness to experience is effective on controlling pain.

Conflict of Interests

Authors have no conflict of interests.

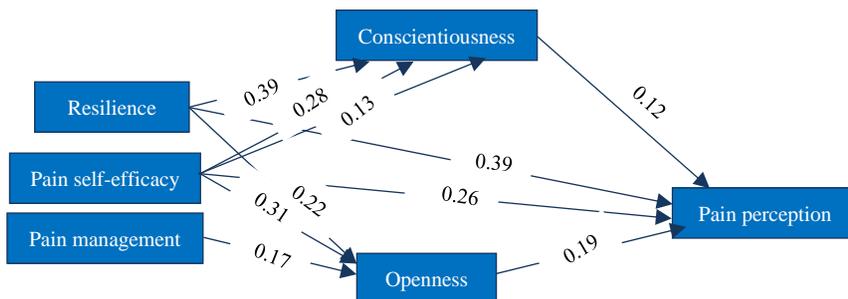


Figure 2. Fitted conceptual model of the studied variables in standard mode

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