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Life events, anxiety, social support, personality, and alexithymia in female patients with chronic pain: A path analysis

Fanmin Zeng[1] PhD, Xueli Sun[1] MD, Bangxiang Yang[2] PhD & Xiaoqian Fu[3] MD

1 Department of Psychiatry, West China Hospital, Sichuan University, Chengdu, Sichuan, China
2 Department of Pain Management, West China Hospital, Sichuan University, Chengdu, Sichuan, China
3 Department of Psychiatry, Suzhou Psychiatry Hospital, Suzhou, China

Abstract

Introduction: This study sought to identify a model that explains the relationship between psychosocial factors and chronic pain in female patients, and to explore all of these constructs in a single study and provide a more holistic examination of the overall psychosocial factors that female patients with chronic pain encounter.

Methods: Female patients with chronic pain ($n = 147$), aged 20–65 (M = 34.9 years, SD = 11.25), from an outpatient pain clinic completed a cross-sectional self-report questionnaire on anxiety, life events, personality, social support, and alexithymia. Data were analyzed by means of path analysis.

Results: The direct effect of anxiety on female patients with chronic pain was greatest among all the paths. Personality and alexithymia led to chronic pain in female patients only indirectly, mediated by life events. The personality factors of neuroticism and extraversion were associated positively with social support, which had an indirect effect on the influence of life events on chronic pain. However, alexithymia was associated negatively with social support, which had an indirect effect on the influence of life events on chronic pain.

Discussion: Our findings provide evidence that life events are a mediator in the relationship between personality, social support, alexithymia, and chronic pain in female patients.

Introduction

Chronic pain is experienced by millions of people on a daily basis, a phenomenon which results in overwhelming costs, such as medical bills, loss of work, and disability. The International Association for the Study of Pain defines chronic pain as pain that has persisted beyond the normal tissue-healing time, usually 3 months (International Association for the Study of Pain, 1986). This definition has been used widely in research and clinical work, but has also been considered to be too narrow, and assessments consisting of functional and psychobiological factors are recommended (Loeser and Melzack, 1999; Flor and Turk,

2011). Advanced neurobiological knowledge of the involvement of the central nervous system in chronic pain has changed the focus of medical scrutiny on pain from the body region to the brain. Previous studies have shown that the development and persistence of chronic pain are complex phenomena where lifelong experiences, stress responses, learning, memory, and emotions modify the perceived pain (Apkarian et al., 2011).

Because the fact that chronic pain results from the interaction between biological, psychological, and social factors has now been recognized, the current trend is to view chronic pain as a biopsychosocial experience (Harlan and Lavallee, 2003). Furthermore,

it is widely believed that chronic pain varies with gender. A growing number of studies have begun to investigate sex differences in perceived pain, and experimental studies on this issue overwhelmingly indicate that women experience pain more intensely than do men (Goffaux *et al.*, 2011). Compared with men, women consistently exhibit lower thresholds and tolerance to a wide range of noxious stimuli (Akabas *et al.*, 2012) and report more pain experience and more negative responses to pain [8]. Women are more likely than men to experience chronic pain, reporting greater pain intensity, frequency, and duration (Unruh, 1996).

It is now clear that social and psychological factors are important in explaining chronic pain in patients. The psychosocial context reflects components of anxiety (i.e., an uncomfortable feeling of nervousness or worry about something that is happening or that may happen in the future) that may be measured by pain-coping strategies, previous pain history, personality traits, and stressful life events (Cook *et al.*, 2006). Alexithymia has been found to be associated with chronic pain problems (Lumley *et al.*, 1997). The empirical studies have shown that personal characteristics act as differential variables that determine how chronic pain patients experience pain and how they adjust to it (Asghar and Nicholas, 2006). A study of gender differences in chronic pain showed that women show greater overall anxiety sensitivity than men, resulting in greater catastrophic cognitions, greater baseline physiological arousal, and the endorsement of greater anxiety symptoms (Straube *et al.*, 2009). However, the exact nature of this relationship is not clearly understood. In this study, integrating life events, anxiety, social support, alexithymia, and personality into our understanding of chronic pain may elucidate the mechanisms.

Method

Design

A cross-sectional study was completed using a sample of female patients with chronic pain from the West China Hospital of Sichuan University, Chengdu, China. The study was approved by the Chinese Clinical Trial Registry Board, and written informed consent was obtained from all the participants. The registration number is ChiCTR-OCS-14004632.

Participants

A total of 147 female patients with chronic pain were recruited. Inclusion criteria were: (i) being 18–65

Table 1. Demographics

Characteristics	Patients (*n* = 147)
Age	34.9 (11.25)
Education	11.77 (0.98)
6 years	17 (11.6%)
9 years	42 (28.6%)
12 years	42 (28.6%)
16 years	25 (17.0%)
More than 16 years	21 (14.2%)
Marital status	
Single	15 (10.2%)
Married	118 (80.3%)
Divorced	11 (7.5%)
Widow	3 (2.0%)
Family income	
< $5,000	7 (4.76%)
$5,000–8,500	10 (6.80%)
$8.500–16,000	62 (42.18)
> $16,000	68 (46.26%)
Social function effect	
A little	11 (7.5%)
General	70 (47.6%)
Terrible	66 (44.9%)

years of age; (ii) having at least one diagnosis consistent with chronic pain (due to any cause that was nonmalignant); (iii) comprehending and cooperating with the investigators; and (iv) volunteering to participate in the study. Study exclusion criteria included the following: (i) having human immunodeficient virus-related pain and cancer pain, as these are associated with malignant disease; (ii) having significant cognitive impairment; (ii) being pregnant or breastfeeding; and (iv) having a present diagnosis of schizophrenia, bipolar affective disorder, seizure disorder, or substance abuse. Demographics were obtained during the interview.

All participants received an explanation of the study and signed an informed consent form prior to participation. The demographic data of the participants are presented in Table 1.

Instruments

Self-Rating Depression Scale, Self-Rating Anxiety Scale

Zung's Self-Rating Depression Scale (SDS) (Liu *et al.*, 1994) is a 20-item questionnaire that assesses the cognitive, affective, and somatic symptoms of depression. It demonstrates well-established reliability and validity. The scale is based on statements rated by the respondent from 1 (*little or no time*) to 4 (*for the most part or all of the time*), according to the frequency each

symptom was experienced during the past week (Zung *et al.*, 1965). Ten items are reverse-scored. The Chinese version demonstrates good reliability and validity (Liu *et al.*, 1994).

The Chinese version (Wang, 1984) of the Self-Rating Anxiety Scale (SAS) was based on the English version (Zung, 1971) and is a 20-item questionnaire used to assess degree of anxiety. It has a total score ranging from 20 to 80, after correcting for the five items that are reverse scored, with higher scores indicating greater anxiety. The Chinese version demonstrates good reliability and validity (Liu *et al.*, 1997).

Personality scale The NEO-Five Factor Inventory (FFI; Costa and McCrae, 1992) was used to assess participants on five personality factors: neuroticism (N: tendency toward negative emotions and worrying), extraversion (E: experiencing positive emotions and being sociable), openness-to-experience (O: having a receptive mind that attracts new experiences), agreeableness (A: the tendency to be altruistic, warm, and trustworthy), and conscientiousness (C: to be organized and have a high level of self-discipline). The NEO-FFI has 60 items, or 12 per factor. Participants indicated their responses on a Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The validity and reliability of the NEO-FFI are good. It has been used in a variety of settings and countries (McCrae and Costa, 2004).

Social support scale

Social support refers to the assistance and protection given to others, and especially to individuals (Shumaker and Bronwell, 1984). This is often provided through government and nongovernment sectors (including volunteers and other NGOs), and is measured using the Social Support Rating Scale (SSRS), which is proven to have high reliability and validity on a wide range of the Chinese population (Xei *et al.*, 2009). The SSRS includes 10 items that measure three types of social support: Subjective Support (SS, four items), Objective Support (OS, three items), and Support Availability (SA, three items). The 2-month test–retest reliability of the SSRS has exceeded 0.92 in past research (Xiao, 1999). Higher scores indicated greater social support. The Cronbach's alpha coefficient for social support was 0.91.

Life events scale

The instrument assesses the frequency, character, duration, and self-rated level of distress associated

with the occurrence of life events relating to family life, occupational and academic life, social networking, and other similar events in recent history (Wang *et al.*, 1999). Participants responding to the questionnaire first indicated whether the event had occurred (e.g., yes or no). Then, for "yes" responses, they rated how frequently the event occurred (1 = *half a year for once*; 2 = *twice in a year*), and rated the valence of the event was (1 = *good event*; −1 = *bad event*), and how upsetting the event was (0 = *not at all upsetting*; 1 = *a little upsetting*; 2 = *somewhat upsetting*; 3 = *very upsetting*; or 4 = *extremely upsetting*). Participants also rated how long the event lasted (1 = *three months*; 2 = *six months*; 3 = *a year*; 4 = *over a year*). The tallied score (i.e., the product of the frequency, the duration, and the level of stress) provides a cumulative measure of events experienced by participant. The score reflects the level of stress caused by the event experienced.

Alexithymia scale

Alexithymia was measured using the 20-item Toronto Alexithymia Scale (TAS-20). Its internal consistency, test–retest reliability, as well as convergent, discriminant, and concurrent validity have been demonstrated to be good (Taylor *et al.*, 2003). The items of TAS-20 are divided into three subscales (factors), each assessing different features of the concept of alexithymia: difficulties with identifying feelings (eight items), difficulties with describing feelings (five items), and externally oriented thinking (eight items).

Procedure

The medical staff gave the identified individuals a brief study description, and those interested were asked to consent to telephone contact by our study staff. Participants who satisfied initial entry criteria and were interested in participating were then scheduled for a 60 to 75-minute face-to-face interview, during which informed consent was obtained and the brief demographic questionnaire was administered. During the interview, the participants read all the items and recorded their responses.

Data analysis

SPSS version 19.0 (SPSS Inc., Chicago, IL, USA) was used to analyze the data from the self-report measures and demographic variables. Pearson product-moment correlations were used to determine bivariate relations among pain-related variables. We used SAS 9.1.3 to perform the path analysis, and to investigate the

Table 2. Result of unconditional logistic regression analysis

Risk factor	B	Wald	*P*	OR	95% CI for Logistic regression analysis OR	
					Lower	Upper
Social support	0.131	3.975	0.046	1.140	1.002	1.298
Life event	0.015	6.522	0.011	1.015	1.003	1.026
Alexithymia	−0.317	5.388	0.020	0.728	0.557	0.952
Personality Nervousness	0.148	8.413	0.004	1.159	1.049	1.281
Extraversion	−0.084	3.693	0.050	0.919	0.844	1.002
Anxiety	0.015	6.522	0.011	1.015	1.003	1.026

CI, confidence interval.
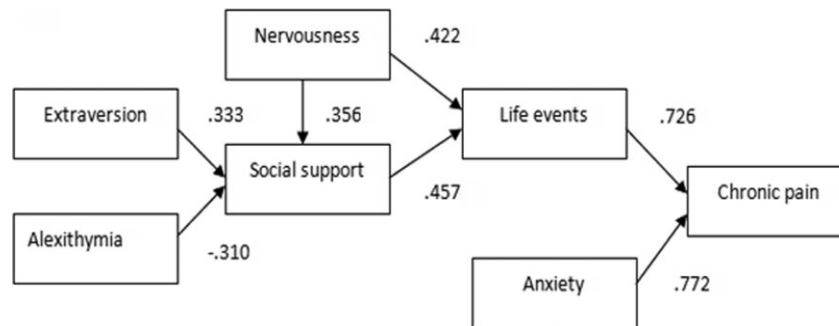
Figure 1. Path graph.

Results

Multifactor unconditional logistic regression analysis

Based on the literature and our theoretical hypothesis, we selected risk factors including: age, depression, anxiety, life events, social support, alexithymia, and personality to explore the factors that influence chronic pain in female patients. The study found that age and depression had no remarkable influence on chronic pain (see Table 2).

Path analysis

The proposed path analysis model containing anxiety, depression, life events, social support, personality, alexithymia, and chronic pain was tested in a Structural Equation Modeling Program using the maximum-likelihood method of parameter estimation. This method allows for simultaneous examination of multiple direct and indirect predicted paths and provides global indices of the fit between the theoreti-

cal model and the data (Holmbeck, 1997). The following variables were included in the model: anxiety, life events, social support, personality (i.e., extraversion, neuroticism), alexithymia, and chronic pain. However, depression had not entered the model.

The revised model (see Figure 1) provided a good and acceptable fit: χ^2 (136, $n = 147$) = 1050.9, comparative fit index (CFI) = 1.000, norm fit index (NFI) = 1.000, root mean square error of approximation (RMSEA) = 0.0001.

Table 3 provides an overview of the bivariate correlations between the variables in the path model. All predicted relationships between the variables were observed.

This model shows that life events have a direct, as well as an indirect, effect on chronic pain. Neuroticism had a direct effect on the influence of life events on chronic pain. In contrast, social support had an indirect effect on the influence of life events on chronic pain through alexithymia and extraversion. Anxiety had only a direct effect on chronic pain. In this model, overall, anxiety was a more important determinant of chronic pain than were life events.

Discussion

Path analysis showed that anxiety directly influences chronic pain in female patients. Furthermore, chronic

mediating role of life events between the variables of chronic pain, social support, and personality. Because of the variability of age in the sample, all analyses were conducted controlling for age.

Table 3. Correlation matrix for variables used in the path analysis (*n* = 147)

Variables	Anxiety	Life event	Social support	Personality traits	Alexithymia	Pain degrees
Anxiety	1.000	0.7092	−0.2448	0.6925	0.5520	0.7177
Life event	0.4621	1.000	−0.2128	0.5399	0.3061	0.3055
Social support	−0.2448	−0.2128	1.000	0.3943	−0.4018	−0.1154
Personality Traits	0.6925	0.5399	0.3943	1.000	0.6017	0.4252
Alexithymia	0.5520	0.3061	−0.4018	0.6017	1.000	0.4066
Painful degrees	0.7177	0.3055	−0.1154	0.4252	0.4066	1.000

All correlations are significant at $P < 0.001$.

pain was not influenced directly by life events; however, it was indirectly mediated by social support and personality. Social support did not influence life events directly; however, the relationship between these two variables was mediated by personality and alexithymia.

In our study, anxiety was an important predictor of chronic pain in female patients. Previous research has identified psychosocial factors as key elements in how people cope with pain (Keefe *et al.*, 2004). This finding was consistent for chronic pain (McBeth *et al.*, 2001) studies found high rates of health anxiety, as well as a relationship between hypochondriacal attitudes and pain sensitivity, among patients with chronic pain. Anxiety and its effects on information processing may also link past traumas to pain chronicity (Casey *et al.*, 2008).

In previous studies, compared with men, women with chronic pain were more likely to report depression (Haley *et al.*, 1985). In our study, the primary aim was to explore the psychosocial variables that mediate pain-variable relationships. Depression had no remarkable association with chronic pain in female patients. This difference in results may be due to the differences in study methodology and design and sample characteristics.

Social support is a multidimensional construct comprising the psychological and material resources available to individuals through their interpersonal relationships, and it enhances an individual's ability to cope with stressful life events (Cohen, 2004) and their general health and well-being (Uchino, 2006), by influencing cognitions, emotions, behaviors, and biological responses (Cohen *et al.*, 2000). The results indicated that social support had a significant positive association with life events. These findings are consistent with previous studies that have found that social support enhances an individual's ability to cope with stressful life events (Cohen, 2004).

As expected, we also found that life events have a significant positive association with chronic pain in female patients, which is consistent with previous studies that have found people who report more life events also report a higher degree of pain. Both major life events and minor daily hassles have been found to affect health practices adversely (Johnson-Kozlow *et al.*, 2004). Furthermore, there is evidence that stressful life events influence pain reporting and pain unpleasantness. In a study by Zelman *et al.* (1991), reading elative statements improved mood and pain tolerance, whereas reading depressive statements worsened mood and reduced pain tolerance. Pain intensity rating, which reflects the sensory aspect of pain, was not affected by mood, a result that implies that emotional manipulations by the intensity of life stressors alter pain unpleasantness more than they do pain sensation, while attention alters both pain sensation and unpleasantness.

In our study, we used NEO to explore the personality traits of female patients with chronic pain. Neuroticism showed a direct effect on life events that were associated with chronic pain in female patients; however, extraversion had an indirect effect on life events associated with chronic pain in female patients, mediated by social support. This finding was consistent with the study by Costa and McCrae (Costa and McCrae, 1987), in which both neuroticism and extraversion seem to be the most plausible traits to be linked to vigilance to pain. In particular, neuroticism, which is the trait-like tendency to experience a broad range of negative feelings, such as distress, worry, and anxiety, was associated with a heightened experience of bodily sensations (Geisser *et al.*, 2000). According to Watson and Pennebaker (1989), persons scoring high on neuroticism are more likely to notice and attend to internal physical sensations and minor aches because their attentional scanning of both the external and internal environment is fraught with anxiety and uncertainty. In addition, the personality dimension of introversion–extraversion may affect selective attention to pain (Eysenck, 1967).

In several studies, alexithymia was found to be associated with chronic pain problems (Lumley *et al.*, 1997). The patients may have interpreted their

somatically felt emotional states as physical symptoms or disorders (Saariaho *et al.*, 2013). In this study, alexithymia has an indirect effect on chronic pain, mediated by social support and life events. The results indicated that alexithymia was associated negatively with social support. For this reason, the results suggest that, in female patients with chronic pain, an increase in the ability to describe and identify feelings is necessary.

Conclusions

The present study provides support for the exploratory model of chronic pain in female patients by confirming the significant associations between anxiety, life events, social support, personality, and alexithymia. The findings highlight important implications for clinic professionals in the development and provision of appropriate treatment and intervention for female patients. Interventions should provide female patients with opportunities to interact with a psychotherapist, thereby fostering mental health support and the development of effective coping strategies, such as learning how to describe and identify feelings. Learned coping skills allow women to cope better with stress. Such skills may include the techniques of cognitive restructuring, problem solving, and efficacy enhancement.

Acknowledgments

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