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(i) The path to capacity: Resilience and Spinal Chronic Pain

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Structured Abstract and Key Words.

Study Design. A cross-sectional study.

Objective. To analyse the relationship between resilience, acceptance, coping and adjustment to spinal chronic pain.

Summary of Background Data. Several studies have concluded that resilience is relevant in predicting pain and physical functioning among chronic pain patients. Although resilience may have a role in preventing or living with chronic pain, there is little research on the effects of resilience on adjustment among chronic pain patients.

Methods. Multivariate multiple regression by Structural Equation Modelling was performed to simultaneously determine the influence of all the predictor variables on all the dependent variables. The sample was composed of 299 patients (138 men and 161 women) suffering from chronic spinal pain.

Results. Higher levels of resilience were associated with higher levels of pain acceptance and active coping strategies. Active coping and acceptance were associated with higher levels of adjustment to pain.

Conclusion. Positive personality characteristics could play a crucial role in patient adjustment and thus clinicians should take into account the positive path to capacity to better understand the chronic pain experience.

Keywords: Resilience; Spinal chronic pain; acceptance; coping; anxiety; depression; daily functioning; functional impairment.

Higher levels of resilience were associated with higher levels of pain acceptance, active coping strategies and adjustment to pain. Resilience could play a crucial role in patient

adjustment and thus clinicians should take into account the positive path to capacity to better understand the chronic pain experience.

- Adjustment to chronic pain is mainly explained by psychological variables such as resilience, pain acceptance and coping, and not length of time in pain.
- Resilience prevents spinal chronic pain patients from suffering emotional distress, since higher levels of resilience are associated with lower levels of depression and anxiety.
- This study shows that resilience is an important resource for recovery from distress for individuals with spinal chronic pain.
- Positive personality characteristics could play a crucial role in patient adjustment and thus clinicians should take into account the positive path to capacity to better understand the chronic pain experience.

Introduction

Since the first operant approaches to chronic pain, a great number of alternative models have been developed that incorporate psychological and behavioural factors to explain the pain experience. Most of them postulate two opposite responses to pain: avoidance and active coping [1,2,3,4]. However, these models pay little attention to the influence of psychosocial variables, prior to the pain experience that could be considered as vulnerability factors and a source of individual differences. Several empirical studies have shown that personal characteristics act as differential variables which determine how pain is experienced and the way chronic pain patients cope [5,6,7,8,9].

Positive Psychology has highlighted the importance of personal resources in adapting to stressful situations. In this context, resilience has been defined as the ability to adapt to stressful circumstances and has been strongly associated with decreased perceptions of stress [10]. Some authors have defined resilience as a multidimensional construct comprised of constitutional variables such as temperament and personality accompanied by specific skills (i.e., problem-solving skills) [11]. Davydov, Stewart, Ritchie and Chaudieu [12] have referred to a range of studies that suggest that resilience can be seen as synonymous with reduced vulnerability [13], with the ability to adapt to adversity [14], or coping [15,16]. Generally, resilience is associated with less depression, and greater well-being and mental health [17,12,11]. Resilience was associated with the ability to become habituated to painful stimuli in an experimental pain context [10]. Some studies have concluded that resilience is relevant in predicting pain and physical functioning among chronic pain patients [18,19,20]. As Smith and colleagues suggest [10], resilience may have an important role in preventing or living with chronic pain; however, there is little research on the effects of resilience on adjustment among chronic pain patients [21].

It was hypothesised that resilient patients could influence active coping (defined as handling pain or carrying on functioning despite pain) through pain acceptance thereby achieving better adjustment to chronic pain. Thus, the aim of the present study was to analyse the relationship between resilience, acceptance, coping and adaptation. Multivariate multiple regression by Structural Equation Modelling (SEM) was performed to simultaneously determine the influence of all the predictor variables on all the dependent variables.

Materials and Methods

Participants

The participants were 299 chronic spinal pain patients (138 men and 161 women) attending several health centres in X (X). Individuals were considered eligible for the study if they had experienced pain for at least 3 months, and were not being treated for a terminal illness. Table 1 shows the characteristics of the sample.

(TABLE 1)

Procedure

Each participant had a semi-structured interview with a psychologist to collect relevant demographic, medical or socioeconomic data. A battery of questionnaires that included the measures described below was also completed by each participant.

The research project—of which this study is a part—was approved by the X Hospital Ethics Committee. Informed consent was obtained prior to data collection. Participants were aware that the information collected was confidential.

Measures

Demographic and pain-related variables. Each participant was interviewed and provided information on a number of demographic and pain-related variables that included the circumstances of pain onset, time in pain, medications and other medical treatments, medical consultations and surgery related to pain, and whether they were receiving economic compensation for their pain. Time in pain was included in the hypothetical model.

Resilience. A Spanish translation of the Resilience Scale (RS) was applied [22,23]. A team of a professional translators participated in the translation process to enhance the linguistic accuracy of the European Spanish version. Internal consistency reliability was

estimated using Cronbach's alpha (alpha=0.94) which is adequate for the total score. Test-retest reliability (6 months) was estimated using Pearson's correlation (r=0.90). In order to examine concurrent validity, resilience was associated with acceptance, active coping, functional impairment, anxiety and depression. These correlations are all significant (see Table 3). Thus, the European Spanish version of the Resilience Scale shows appropriate reliability and validity.

The inventory consists of 25 items that are rated on a 1 (strongly disagree) to 7 (strongly agree) scale.

The translator had the opportunity of consulting studies by Heilemann, Lee and Kury [24] and Rodríguez, Pereira, Gil, Jofré, De Bortoli and Labiano [25]. Both studies provide Spanish translations of the original English RS [22] rendered in Mexican and Argentine style.

Acceptance. The Spanish version of the Chronic Pain Acceptance Questionnaire (CPAQ) was applied [26,27]. A number of studies support the internal consistency and validity of the CPAQ as a measure of acceptance of chronic pain [28,26,27,29,30]. The inventory consists of 24 items that are rated on a 0 (never true) to 6 (always true) scale. The instrument shows adequate internal consistency ($\alpha = .83$) [26].

Pain coping strategies: active coping. The Vanderbilt Pain Management Inventory (VPMI) by Brown and Nicassio [31,32,33] was applied. This 18-item instrument asks patients to rate the frequency with which they use coping strategies when their pain reaches a moderate or greater level of intensity on a 5-point scale. The instrument consists of two scales: active and passive coping.

Following Brown and Nicassio's [31] procedure, the active and passive dimensions of coping were identified in the Spanish version and both scales showed adequate internal

consistency, α = 0.80 for active coping and α = 0.82 for passive coping [33]. The authors classified coping strategies as adaptive (active) or maladaptive (passive) based on their relationship to indices of pain and psychosocial functioning. In active coping the patients attempt to control their pain or to function despite the pain, and in passive coping the patients relinquish control of their pain to others, or allow other areas of their life to be adversely affected by pain.

Anxiety and depression. The Hospital Anxiety and Depression Scale (HADS) consists of two scales: anxiety and depression [34]. The HADS is a practical screening tool for identifying and quantifying anxiety and depression in the medical out-patient clinic for non-psychiatric patients.

The Spanish version of the scale shows appropriate reliability and validity. The internal consistency of both scales is high (α = 0.86 for anxiety; α = 0.86 for depression) [35,36]. Pincus, Fraser, and Pearce [37] strongly recommend the use of this instrument to assess anxiety and depression in chronic pain populations.

Functional status and functional impairment. The Impairment and Functioning Inventory for chronic pain (IFI) is composed of thirty items each referring to an activity related to one of the following areas: household, autonomy behaviours, leisure and social relationships [38]. First, the patients are asked if they have done an activity during the previous week and if the answer is affirmative they are asked about frequency. If the answer is negative, they are asked if they practised this activity before suffering chronic pain. This system differentiates between present "functioning" and "impairment".

The instrument provides an index of functioning and an index of impairment. The subscales and the global scales showed high reliability (functional status α = 0.84; functional impairment, α = 0.85). Factor analytic techniques supported the hypothesized internal

structure [38].

Pain intensity. Patients were asked to rate their mildest, average and worst level of pain during the past 2 weeks, as well as current pain. They rated the intensity of current pain on a numeric scale ranging from 0 to 10, with '0' representing "no pain" and '10' representing "pain as bad as you can imagine". Jensen and colleagues [39] concluded that this is the most reliable instrument to measure pain intensity in chronic pain patients. Table 2 shows means, standard deviations, and frequency data for the variables.

(TABLE 2)

Data analysis

Bivariate Analyses

Prior to analyses, the data were examined using the Statistical Package for the Social Sciences (SPSS) software program. No problems were found regarding the shapes of frequency distributions or outliers. Table 3 shows the results of correlation analyses of resilience, acceptance, active coping, anxiety, depression, pain intensity, functional status and functional impairment.

Resilience was associated with acceptance, active coping, functional impairment, anxiety and depression. The average magnitude of the correlations was $r = 0.42$. The association with pain intensity and functional status was weaker.

(TABLE 3)

Table 3 shows that resilience was significantly and negatively correlated with pain intensity, functional impairment, depression and anxiety. Acceptance was associated with the measures of emotional distress. The average magnitude of the significant correlations was $r = 0.48$. In addition, there was a positive correlation between acceptance and active coping ($r = 0.47$), and acceptance was negatively correlated with pain intensity and

functional impairment. The measures of active coping were mainly associated with anxiety and depression with a negative average correlation of 0.43; the association of active coping with functional measures was weaker, where significant correlations had an average magnitude of 0.25.

Structural Equations Modelling

Structural Equations Modelling using LISREL 8.30 software [40] was performed to simultaneously determine the influence of all the exogenous variables on all the endogenous variables. The variables were normally distributed and the estimation method used was Maximum Likelihood. The analysis was performed on the correlation matrix calculated using the PRELIS module from the SPSS for Windows (version 6.1.3.) software program. Endogenous variables were acceptance, active coping anxiety, depression, functional status, functional impairment and pain intensity. The following exogenous variables were included: resilience and time in pain. LISREL estimates the path coefficients that indicate the magnitude of the contribution of each exogenous variable to the endogenous variable. Table 4 shows the standardised path coefficients, R^2 and χ^2 found in the initial model.

(TABLE 4)

Results

Final Model

To obtain to a parsimonious model of the relationships between time in pain, resilience, acceptance, coping and adjustment to pain, we examined the path coefficients for the initial model and eliminated all paths that were not statistically significant. As can be seen, the paths from active coping to functioning and impairment were excluded from

the model. In addition, time in pain had just two significant paths: one to pain and another to functional impairment.

Further, seven relationships suggested by the modification indexes were included in the final model. Specifically, two paths from resilience to anxiety and depression; three paths from acceptance to depression, functional impairment and functional status; one path from pain intensity to depression; and one path from depression to functional impairment. All the suggested paths are plausible and refer to relationships between variables that were not considered in the initial model.

Taking into account that both anxiety and depression were measured using the same instrument (HADS), an error covariance between depression and anxiety was included.

(FIGURE 1)

Figure 1 represents the final model. The path coefficients shown in Figure 1 are taken from the trimmed model. All path coefficients were statistically significant (p<0.05). The goodness-of-fit indexes calculated for the SEM indicate the estimated model provides a good fit to the data (χ^2 (18) = 34,02, χ^2 /dl =1.89, p = .09; root mean square error of approximation [RMSEA] = .05; standardized root mean residual [standardized RMR] = .051; goodness-of-fit index [GFI] = .97; adjusted goodness-of-fit index [AGFI] = .93; parsimony goodness-of-fit index [PGFI] = .39; comparative fit index [CFI] = .96).

As can be seen, resilience yielded four statistically significant path coefficients. The first two were to acceptance and active coping, with individuals characterized by higher levels of resilience reporting higher levels of pain acceptance and higher use of active coping. Resilience also had statistically significant effects on anxiety and depression since individuals with higher levels of resilience reported lower levels of both variables.

Moreover, time in pain had just two effects; one on pain intensity and another on functional impairment.

Acceptance yielded three statistically significant path coefficients. The first was to functional status, with individuals characterized by higher levels of acceptance reporting higher levels of functional status. Acceptance also had statistically significant effects on functional impairment, with functional impairment tending to decrease as acceptance increased. Acceptance also had statistically significant effects on depression since individuals with higher levels of acceptance reported lower levels of depression.

The three statistically significant path coefficients for active coping were to depression, anxiety and pain intensity; higher levels of active coping were associated with lower levels of these variables.

Finally, pain intensity yielded a statistically significant path coefficient to depression; individuals reporting higher levels of pain intensity also reported higher levels of depression. In addition, depression had statistically significant effects on functional impairment since individuals with higher levels of depression reported higher levels of functional impairment.

Discussion

The purpose of the present study was to compare resilience, acceptance of chronic pain and active coping in predicting adjustment to chronic pain as measured by anxiety, depression, functional status, functional impairment and reported pain intensity. It was found that acceptance of pain mainly influenced the variables related to activity, i.e., functional status and functional impairment. Furthermore, there was a negative association between acceptance and depression, although acceptance had no effect on anxiety. On the other hand, the measures of

active coping had a significant influence on measures of emotional distress and pain intensity. Esteve and colleagues report similar results [6]. Resilience also had a direct and positive effect on pain acceptance and active coping. In this regard, part of the effect of resilience on emotional distress was due to the mediating role of active coping; however, the final model suggests that the effect of resilience on depression and anxiety cannot completely account for the effects of active coping on emotional distress. Rather, resilience seems to have an independent effect on these variables irrespective of coping. It worth noting that apart from active coping, time in pain was the only variable with a significant influence on pain intensity. According to our results, the longer a person is in pain, the higher the level of pain intensity. One result was unexpected; there was a negative association between time in pain and impairment. It may be the case that when patients are in pain for a very long time, they have to resume some of activities they had previously given up. However, contrary to prediction, time in pain did not significantly influence coping, emotional distress and daily functioning. These results highlight the fact that adjustment to chronic pain is mainly explained by psychological variables such as resilience, pain acceptance and coping, and not length of time in pain. Finally, the level of pain intensity had a positive and significant influence on depression, while depression had a positive and significant association with functional impairment. Obviously, there is a reciprocal influence between measures of adjustment of chronic pain patients.

Many recent studies on chronic pain have shown that acceptance is a key factor in this context and is of clinical relevance in the management of pain [41]. Acceptance of pain includes responding to pain-related experiences without attempts at control or avoidance—particularly when these attempts limit the patient's quality of life—and engaging in valued activities and reaching personal goals regardless of these experiences [6]. Several early studies showed that acceptance was associated with better adjustment to chronic pain, although later

research revealed that the relationship between acceptance and adjustment is complex. McCracken [29] found that greater acceptance of pain was associated with reports of lower pain intensity, less pain-related anxiety and avoidance, less depression, less physical and psychosocial disability, more daily uptime, and better work status. Acceptance also predicted better adjustment independently of perceived pain intensity. McCracken, Spertus, Janeck, Sinclair, and Wetzel [42] showed that anxiety and acceptance distinguished dysfunctional patients from adaptive copers. Coping resources represent an important category of variables that may influence adaptation to chronic pain. McCracken and Eccleston [43, 44] questioned whether it was better to cope with chronic pain or accept it. Going a step further, it could be questioned whether in conceptual terms acceptance is a necessary construct and if it really contributes to predicting adjustment more than coping and pain-related cognitions. Setting the matter out as a dichotomous question may be unnecessary [6]. Acceptance does not mean substituting "control" for "no-control"; acceptance means changing the target of control from uncontrollable events (pain itself and related negative emotions) to controllable factors [45], that is, a behavioural change entailing better daily functioning despite pain [46]. From this point of view, we can "accept" having pain and at the same time "cope" with its negative consequences [6]. In this sense, other authors have expanded the original definition to emphasise that active strategies relate to the amount of effort the patient exerts in order to function, despite his/her pain by using his/her resources. This definition of "acceptance-based responding" has much in common with the definition of active coping [47].

Although McCracken and Eccleston [43] only found modest associations between acceptance and the coping measures, our results suggest that acceptance and active coping have much in common. In this study, the final adjusted model clearly highlights the relationship between acceptance and functioning as acceptance is the only variable with a

significant influence on functional status; in addition, previous studies [6] have shown that acceptance did not have an influence on reported pain intensity. This result is expected given that acceptance means 'doing with pain', that is, an individual has to continue functioning and participating in daily activities even when experiencing pain [30]. The association of acceptance with less disability is a consolidated finding [6,29,43,42,48,49] with one exception. Viane et al. [50] explained the absence of an association on the basis of the unreliability of the measure of physical functioning for chronic pain populations. Previous studies found a negative association between pain acceptance and emotional distress [29,43,42,50]. As mentioned, the present study found that acceptance has an influence on depression, functional status and functional impairment.

In contrast to previous studies which obtained ambiguous results regarding the role of active coping strategies [51], we found that when active coping is practised the levels of depression, anxiety and pain decrease. It has often been stated that acceptance does not mean resignation and that acceptance paradoxically entails an active attitude [52].

Our results support the importance of resilience as a protective variable that improves adjustment to chronic pain. Resilience also prevents patients from suffering emotional distress, since higher levels of resilience are associated with lower levels of depression and anxiety. As Sturgeon and Zautra pointed out [53], many chronic pain patients demonstrate little impairment due to the effects of chronic pain. This study shows that resilience is an important resource for recovery from distress for individuals with chronic pain. Moreover, if resilience is relevant in pain acceptance, future research could be directed at determining whether Acceptance and Commitment Therapy [52] and Contextual Cognitive-Behavioral Therapy [54] should focus on resilience in order to increase their effectiveness [10]. A common theme in both clinical and positive psychology is that

although resilience may be dispositional and trait-like, there is considerable evidence that it is also state-like and open to development (55). In this sense, improving resilient behavior could be an important target for treatment and prophylaxis, as resilient behavior appears as *the path to capacity.*

Finally, we wish to emphasize that a limitation of this study is the exclusive reliance on self-report measures. In addition, the research relied on cross-sectional measures of cognitive appraisal and pain coping, and therefore the results cannot capture the dynamic process of pain coping as has been recently pointed out by Keefe et al. [41]. The cross-sectional study design also means that causal relationships cannot be identified. Longitudinal research designed to follow resilience, acceptance and coping variables over time would help to develop causal models showing the influence of these variables on pain adjustment. Future research could also use longitudinal methods to investigate the function of resilience in the pain chronification process.

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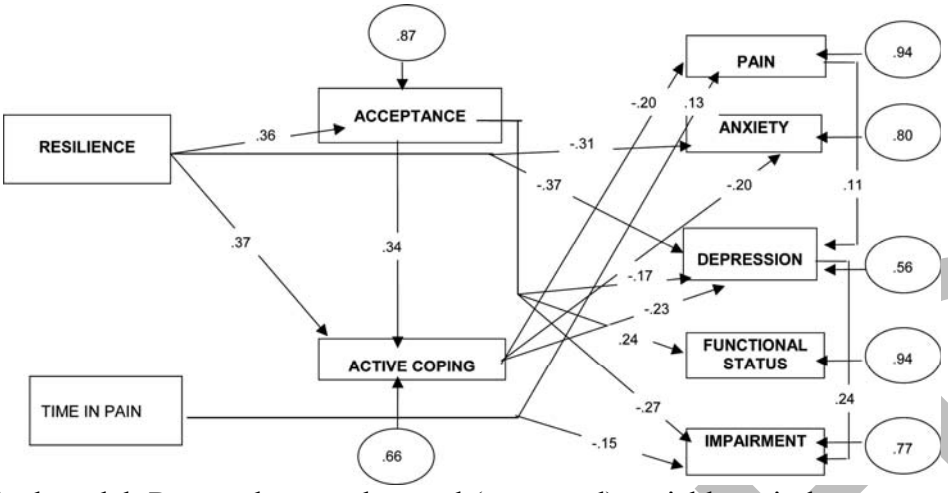

Fig. 1. Final model. Rectangles are observed (measured) variables, circles are standardized error variances, values are standardized path coefficients, and straight lines with arrows are presumed c

Table 1
Demographic data
Variables (*N*=299)

	Mean	SD
Age (years)	44.18	12.17
	N	%
Sex		
Male	*138*	46.2
Female	*161*	53.8
Marital status		
Single	*54*	18.1
Married	*184*	61.5
Unmarried couple	*29*	9.7
Divorced	*13*	4.3
Separated	*10*	3.3
Widowed	*9*	3.0
Education		
Reading and writing	*24*	8.1

Primary school	*105*	35.1
High school	*111*	37.1
University education	*59*	19.7
Work Status		
Housewife	*45*	15.1
Working	*174*	58.2
Studying	*4*	1.3
Unemployed	*41*	13.7
Retired	*35*	11.7

Table 2 Clinical Data

Variables (*N*=299)	Mean (*N)*	SD (%)
Site of Pain		
Cervical	*157*	(52.50)
Thoracic	*96*	(32.10)
Lumbar	*265*	(88.63)
Sacral	*172*	(57.50)
Leg below knee	*85*	(28.40)
Time in Pain	25.21	22.22
3 – 9 months	*51*	(17.05)
9 – 15 months	*78*	(26.09)
15 – 21 months	*71*	(23.75)
21 – 27 months	*32*	(10.70)
27-98 months	*67*	(22.41)
Pain Medication		
Analgesics	*99*	(33.10)
Opioids	*22*	(7.40)
NSAIDs	*123*	(41.10)
Anxiolytics	*42*	(14.05)
Antidepressants	*26*	(8.70)
Muscle Relaxants	*80*	(26.80)

Neuroleptics	*1*	(0.30)
Anticonvulsants	*2*	(0.70)
Antiparkinson Drugs	*1*	(0.30)
Antimigraine Drugs	*1*	(0.30)
Variables included in the model	*127.84*	18.42
Resilience (RS)	*106.56*	13.57
Pain Acceptance (CPAQ)	*17.97*	4.22
Active coping (VPMI)	*5.25*	1.96
Pain intensity	*13.06*	4.71
Depression (HADS)	*17.35*	4.01
Anxiety (HADS)	*42.70*	10.70
Functional Status (IDF)	*3.05*	2.99
Impairment (IDF)		

Table 3 Correlation matrix

	Resilience	Acceptance	Active coping	Pain Intensity	Functional Status	Functional Impairment	Anxiety	Depression
Resilience	1							
Acceptance	.36**	1						
Active coping	.49**	.47**	1					
Pain Intensity	-.12*	-.21**	-.21**	1				
Functional Status	.16**	.24**	.19**	-.02	1			
Functional Impairment	-.28**	-.40**	-.31**	.12*	-.38**	1		
Anxiety	-.41**	-.24**	-.35**	.08	-.19**	.16**	1	
Depression	-.56**	-.45**	-.52**	.24**	-.24**	.38**	.51**	1

Note. $P < .05$*; $P < .01$**.

Table 4.

Initial Model. Standardised path coefficients, square multiple correlations and X^2.

Standardised path coefficients							
Initial Model	*Endogenous variables*						
	Acceptance	Active coping	Anxiety	Depression	Functional status	Functional impairment	Pain intensity
Exogenous variables							
Resilience	.36	.37					
Time in pain	.11	-.01	.09	.09	-.003	.012	.13
Endogenous variables							
Acceptance		.34					
Active Coping			-.35	-.49	.19	-.30	-.20
R^2	.14	.34	.13	.30	.04	.10	.05
			X^2= 137.50	df = 17	p= .000		