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Latent Class Analysis of the Short and Long Forms of the Chronic Pain Acceptance Questionnaire: Further Examination of Patient Subgroups

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Abstract: **A substantial literature indicates that pain acceptance is a useful behavioral process in chronic pain rehabilitation. Pain acceptance consists of willingness to experience pain and to engage in important activities even in the presence of pain and is often measured using the Chronic Pain Acceptance Questionnaire (CPAQ). Previous traditional cluster analyses of the 20-item CPAQ identified 3 patient clusters that differed across measures of patient functioning in meaningful ways. The aims of this study were to replicate the previous study in a new sample, using the more robust method of latent class analysis (LCA), and to compare the cluster structure of the CPAQ and the shorter CPAQ-8. In total, 914 patients with chronic pain completed the CPAQ and a range of measures of psychological and physical function. Patient clusters identified via LCA were then used to compare patients across functional measures. Contrary to previous research, LCA demonstrated that a 4-cluster structure was superior to a 3-cluster structure. Consistent with previous research, cluster membership based on patterns of pain willingness and activity engagement was significantly associated with specific patterns of psychological and physical function, in line with theoretical predictions. These cluster structures were similar for both CPAQ-20 and CPAQ-8 items. These results provide further evidence of the relevance of chronic pain acceptance, and a more nuanced understanding of how the components of acceptance are related to function.**

Perspective: ***Pain acceptance is important in chronic pain. The findings of the present study, which included 914 individuals with chronic pain, provide support for 4 discrete groups of patients based on levels of acceptance (low, medium, and high), as well as a group with a high level of activity engagement and low willingness to have pain. These groups appear statistically robust and differed in predictable ways across measures of functioning.***

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Key words: *Chronic Pain Acceptance Questionnaire, acceptance and commitment therapy, pain rehabilitation, latent class analysis, cluster membership, assessment.*

There is now considerable evidence that the concept of acceptance of pain is applicable to chronic pain.[32,35] Pain acceptance is associated with less avoidance, anxiety, depression, and health care visits and with increased work capacity.[27,33] Interventions that improve acceptance, such as acceptance and

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commitment therapy (ACT),[19,35] are effective in lowering psychological and physical disability and improving health, functioning, and quality of life.[5,8,30,31,62]

Chronic pain acceptance is typically measured via the Chronic Pain Acceptance Questionnaire (CPAQ).[12,36] The CPAQ is sensitive to treatment, is psychometrically robust,[45] and was developed in line with a "functional contextual" framework to reflect the particular emphasis of ACT on function and consequences of behavior. In addition to strong correlations with a number of key measures of patient functioning, the CPAQ offers an advantage of evaluating adaptive functioning, as opposed to a focus strictly on measuring maladaptive functioning (eg, pain-related distress, anxiety, catastrophizing).[29,37]

The CPAQ consists of 2 subscales, each assessing a different aspect of pain acceptance. The first of these, activity engagement (AE), assesses the degree to which respondents report being active with the continuing experience of pain. The second, pain willingness (PW), assesses the degree to which respondents report being open to the experience of pain without the need to engage in unsuccessful pain control efforts.

Using these 2 subscales, Vowles et al[59] performed hierarchical and k-means cluster analyses to investigate whether patient subgroups could be identified. These analyses indicated the presence of 3 discrete clusters of patients: high AE and PW (high acceptance), low AE and PW (low acceptance), and a mixed cluster, high in AE and low in PW. The cluster analysis performed by Vowles et al[59] has not been replicated, nor has a cluster analysis been performed using the short form of the CPAQ, the CPAQ-8.[11]

The objectives of the present analyses were to provide an updated analysis of the cluster structure of the CPAQ-20 in a new sample of patients using a more advanced and empirically sound cluster analytic approach (latent class analysis [LCA]) and to evaluate the cluster structure of the CPAQ-8 in comparison with the CPAQ-20. In addition, differences in self-reported measures of physical and emotional functioning based on cluster membership were evaluated to assess the usefulness of cluster membership.

Methods

Participants

Over a 25-month period, 1,391 patients were referred to the Pain and Rehabilitation Center at the University Hospital, Linköping, Sweden, and 914 (66%) patients had complete CPAQ data. The CPAQ was not a compulsory part of the assessment questionnaire battery at that time, which explains the discrepancy between total referrals and the current sample. Sociodemographic information and pain characteristics of the patients are summarized in Table 1.

These patients, compared with all the patients with chronic pain registered at the Swedish Registry of Pain Rehabilitation,[53] were 6 years younger and less educated (18.0% had a university education vs 25.0% reported by the Swedish Quality Registry for Pain Rehabilitation (SQRP), and 26.4% had only elementary education vs 11.0% in the SQRP). This population was otherwise similar in educational profile to populations described in epidemiological studies and national reports.[4,14,42]

Table 1. Sociodemographics and Pain Characteristics

Variable (No. of Completers)	*Mean (SD) OR %*
Age, y (907)	47.5 (14.7)
Women (907)	65.9%
Born in Sweden (907)	82.5%
Education (877)	
Elementary school	26.4%
High school education	46.6%
University education	18.0%
Other education	5.7%
Unknown	3.3%
Sickness benefit 100%	13.1%
Working/studying 100% (842)	26.9%
More than 4 medical visits in past year	60.7%
Pain severity (min 0, max 6) (829)	4.2 (1.1)
Pain duration, days (796)	3,034 (3,442)
Persistent pain duration, days (652)	2,499 (3,188)
Days since occupationally active (403)	27,407 (3,276)
Number of pain locations (0–36) (907)	12.5 (8.2)
Pain localizations (882)	
Head and face (52)	5.7%
Neck (135)	14.9%
Shoulders and upper limbs (116)	12.8%
Chest (13)	1.4%
Upper back (23)	2.5%
Lower back (140)	15.4%
Hips and lower limbs (123)	13.5%
Abdomen and sexual organs (37)	4.1%
Widespread pain (243)*	26.8%

*The pain is not localized in one area; it varies around several body regions.

Procedure

Data Collection

Along with most of pain rehabilitation clinics, the Pain and Rehabilitation Center gathers data for the SQRP,[53] which monitors the assessment and outcome of pain rehabilitation clinics in Sweden. The SQRP includes diagnoses as well as descriptive self-report variables of the patient's background, pain characteristics, and other self-report measures of domains such as depression and anxiety, quality of life, and attitudes toward pain.

Before the first assessment, all patients gave their written informed consent to be registered at the SQRP in accordance with the Declaration of Helsinki. This consent includes consenting for their data to be used in research studies such as the present one. The study was granted ethical clearance by the Regional Ethics Board in Gothenburg (approval number 815-12).

SQRP Data Used in the Present Study

Demographic data included sex, years of education, work status, and sick leave or insurance/work situation. Pain variables included current pain severity, duration,

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