

Vulnerability, Resilience and Pain Associated Symptoms in Two Groups of Patients with Chronic Pain - a Pilot Study

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Abstract

Objective: To compare pain and pain associated symptoms, vulnerability factors and factors of resilience in two groups with chronic pain.

Design: An explorative and hypothesis generating pilot study.

Setting: Consulting psychiatry and occupational health care

Participants: 30 consecutive patients in consulting psychiatry with chronic pain, who had not responded to conventional pain treatment, and 42 consecutive patients with chronic pain in occupational health care.

Interventions: All patients referred to consulting psychiatry were offered treatment with cognitive therapy (CT). The patients in occupational health care were offered patient-centered treatment and follow-up.

Main Outcome Measures: Patient reported outcome measures (PROM) were administered at baseline and at follow-up after 8 - 11 months. PROM included Relationship Scales Questionnaire (RSQ) for attachment pattern, Sense of coherence (SOC), Multidimensional Pain Inventory (MPI) for pain and dysfunction, Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Pines' scale for burnout and Short-Form 36 (SF-36). Statistical tests were conducted at a 5% significance level. Subgroup identification was accomplished by means of Multivariate data analysis (MVDA).

Results: Both patient groups had vulnerability factors in terms of insecure attachment (RSQ), a low SOC and dysfunctional subgroups according to MPI. The occupational health care group reported higher SOC ($p = 0.02$) and less anxiety ($p = 0.002$), depression ($p = 0.01$) and burnout ($p < 0.001$) than the psychiatry group. These findings were further interpreted by using multivariate analyses. Hereby an overlapping between the two patient groups was obtained, indicating that there were patients within the occupational health care group with higher vulnerability than expected. The results of this study also indicated that a strong SOC per se did not seem to protect against chronic pain but may have a positive impact on HRQoL and the ability to handle pain.

Conclusion: The impact of vulnerability factors on pain management and rehabilitation in patients with chronic pain in primary care might be underestimated. Thus SOC as well as MPI and RSQ could be important tools for assessing vulnerability and resilience in chronic pain. The role of SOC as well as attachment pattern. in chronic pain could be an aim of further research .

Strengths and Limitations of the Study:

- This study is a small hypothesis generating pilot study and the results need to be validated in further studies of vulnerability and resilience in new groups of patients with chronic pain
- In order to compensate for many variables and a limited number of observations explorative modellings with MVDA were performed.
- The same therapist/physician (BP) treated both patient groups.

Keywords: Anxiety; Attachment; Chronic Pain; Depression; Multidimensional Pain Inventory (MPI); Multivariate Data Analysis; Sense of Coherence (SOC); Vulnerability Factors

Abbreviations

AC: Adaptive Coping; act: General Activity; ad: Affective Distress; BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory; BP: Bodily Pain; ch: Change; dism: Dismissing Attachment; distr: Distracting Responses; dys: Dysfunctional; fear: Fearful Attachment; id: Interpersonal Distress; lc: Life control; MH: Mental health; MPI: Multidimensional Pain Inventory; Pbs: Performance Based Scale; PF: Physical Function; pi: Pain Interference; pin: Pines' Burnout Measure; pre: Preoccupied Attachment; ps: Pain Severity; pu: Punishing Responses; RE: Role Emotional; RP: Role Physical; RSQ: Relationship Scales Questionnaire; SF-36: Short Form-36; SF: Social Function; sec: Secure Attachment

Introduction

The prevalence of moderate to severe chronic musculoskeletal pain in the Swedish adult population is about 20% and many of the individuals find it difficult to cope with their pain [1]. Chronic pain syndromes are not homogeneous groups of patients even if they have identical medical diagnoses [2]. Hence, it is not likely that all patients in a group will benefit equally from psychological and medical treatment. The main objective of traditional rehabilitation programs is to help patients assume responsibility for self-management of their condition. The relapse rates are often high for these patients and efforts to identify those prone to non-compliance and relapse would be useful [3]. It would be equally useful to be able to identify those individuals who are likely to benefit from conventional pain treatment. Hereby the patients' total situation must be taken into account [4,5]. In the bio-psychosocial model of chronic pain the illness is seen as a biological, psychological and socio cultural interaction that shapes the individual response to pain [6]. In the Gate theory Melzack and Wall [7] defined pain as "A perceptual experience whose quality and intensity are influenced by the unique past history of the individual, by the meaning he or she gives to the pain-producing situation and by his or her state of mind at the moment". Thus, there is a modulation of inputs of stimulus in the dorsal horn of the spinal cord where psychological processes in the brain can have inhibitory or excitatory influences. In psychological approaches to pain management Turk and Gatchel [5,8] have presented a diathesis-stress model of chronic pain where the stress of coping with chronic pain may result in an activation of premorbid diathesis (vulnerability) with possible exacerbation of depression and anxiety [9]. This conceptual model also proposes a superimposed "deconditioning syndrome", with a significant decrease in physical capacity with further negative effect on emotional well-being and self-esteem and thereby further impairment of a health related quality of life (HRQoL). The prevalence of psychological trauma is increased in chronic widespread pain and in whiplash trauma and might contribute to persisting pain and other somatic and psychological symptoms as anxiety, depression and avoidance [10,11]. However this diathesis-stress model does not propose that there is a pre-existing "pain prone personality" as suggested by Engel [12] in a review from 1959. Engel associated psychological factors with the primary origin of pain both in the presence and absence of peripheral lesions. This psycho social view of chronic pain has later become a part of the bio-psycho social approach to pain, linking personality factors with the gate control theory and the attachment theory. According to Bowlby's model of attachment [13], early attachment pattern between the child and its mother plays an important role also in adult life activated in the face of danger and affecting the view of self and others [14]. Pain and illness may activate attachment behaviour [15] allowing for identification of subgroups of patients with chronic pain. Ciechanovsky, *et al.* [16] has shown that attachment style is significantly associated with symptom reporting and health care utilization. In a review of the evidence of linking adult attachment theory and chronic pain Meredith, *et al.* [17] have proposed a stress-diathesis model where adult insecure attachment pattern both represents a vulnerability factor for developing chronic pain and a for poor outcome. There is also an association between insecure attachment and psychopathology [18].

The Sense of Coherence (SOC) can just like the attachment pattern also be seen as a relatively stable measure or trait [19,20]. The concept of SOC was developed by Antonovsky to describe health promoting resources. The three components of this concept are: comprehensibility, manageability and meaningfulness [21]. In contrast to a view of disease focused on pathology this salutogenic model focuses on the patient's experience of illness as well as her/his total situation of life. Individuals with a strong SOC are likely to perceive stressors as predictable and explicable and they have confidence in their ability to overcome stressors. SOC has similarities with other theories of stress resistance such as locus of control, self-efficacy and hardiness but is a broader concept than each of these including individual and social dimensions of meaningfulness [19,22]. In previous research the evaluation of the role of a weak SOC as a predictor of vulnerability in chronic pain is sparse as well as if there is a correlation with insecure attachment patterns [23].

Aim of the Study

The aim of the present hypothesis generating pilot study was to compare two groups of patients with chronic musculoskeletal pain, one with psychiatric co-morbidity and the other with chronic pain in occupational health care, according to pain and pain associated symptoms, vulnerability factors and factors of resilience. The hypothesis was that patients in the psychiatric setting, who had not benefited from traditional pain treatment, would have a lower SOC and a more insecure attachment pattern compared with patients with chronic pain in primary care.

Materials and Methods

Subjects

Patients with chronic pain referred for psychiatric consultation

Patients with chronic non-malignant pain were referred for psychiatric assessment within the context of a project of chronic pain and vulnerability. These patients had not benefited from conventional pain treatment. During a period from 2005 to 2007 all consecutive patients were included [24].

Patients with chronic pain in occupational health care

All consecutive patients with chronic non-malignant pain assessed by the same physician at an occupational health care center in a small town in the western part of Sweden were included during a period of three months [25]. All patients had been on sick leave for three months or more, full time or less. A patient-centered approach was applied [26].

Assessment of vulnerability and resilience

The following questionnaires, valid and reliable, were administered to the patients in occupational health care and in psychiatry in order to assess vulnerability, resilience as well as signs of anxiety, depression, burnout and health related quality of life (HRQoL): Relationship Scales Questionnaire (RSQ), Sense of Coherence (SOC), Multidimensional Pain Inventory (MPI), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Pine's burnout scale and Short Form-36 (SF-36). Patients in the psychiatric setting filled in the questionnaires at baseline and at follow-up after on average 11 months and patients in occupational health care filled in their questionnaires at baseline and after 8 months [24,26].

The Relationship Scales Questionnaire (RSQ) is a self-assessment instrument developed by Griffin and Bartholomew [27] for the assessment of attachment patterns according to Bowlby's Attachment theory. A four category model is obtained from either positive or negative view of self and others resulting in one secure and three insecure attachment patterns: dismissing, fearful and preoccupied. In a secure attachment pattern the individual has a positive view of self and others and in the fearful pattern the view is negative. A dismissive pattern has a positive view of self and a negative of others while in the preoccupied pattern the view of self is negative and of others positive. The RSQ yields scores of all subscales of attachment. Participants can then be described as having varying degrees of each attachment style. The subscale with the highest value can be assigned as the main attachment pattern.

The Multidimensional Pain Inventory (MPI) was developed by Turk and Rudy [28,29]. The factor structure and psychometric properties have been replicated in numerous studies in several countries to assess chronic pain from a cognitive behavioural perspective [30].

A subgroup classification on the basis of significant differences of responses to 9 of the scales of the MPI is possible to obtain by means of cluster analysis in a specific computer program [31]. These profiles or subgroups are labelled: Adaptive Copier (AC), Anomalous (ANOM), Interpersonally Distressed (ID), Hybrid and Dysfunctional (Dys). Health Related Quality of Life (HRQL) was assessed using the Short-Form 36 (SF-36). The 36 items in the questionnaire are grouped into eight subscale scores: Physical functioning (PF), Role limitations caused by physical problems (RP), Bodily pain (BP), General Health (GH), Energy/vitality (VT), Social functioning (SF), Role limitations caused by emotional problems (RE) and Mental health (MH). All questionnaires have a good reliability and validity. A detailed description of the questionnaires can be found in Supplemental Information.

Statistical analysis

Comparisons between groups were performed with the non-parametric Mann-Whitney U-test in SPSS 12.0.1. All tests were two-tailed and conducted at a 5% significance level. Non-parametric tests were performed due to a skewed distribution.

In a next step Multivariate data analyses (MVDA) using Principal Component Analysis (PCA) [32] and Two Way Orthogonal Partial Least Squares Analysis (O2PLS) [33,34] were performed as an explorative method in order to confirm the results and to discover possible correlations and patterns of variables in the patient group. MVDA is a factor method used to uncover the latent structures or dimensions when a set of relevant data, variables, are analyzed together, for interpretation based on the yielded correlation, translated to variables and reducing "noise", i.e. uncorrelated data. Further description of MVDA is found in supplemental information.

Ethical approval

The studies were carried out in accordance with the Declaration of Helsinki. The ethics committee of Gothenburg University approved the study (032-06). After receiving written information about the study, all participants gave their informed consent to participate in the study.

Results

Characteristics of patients

Patients with chronic pain referred for psychiatric assessment: In total 30 consecutive patients, 24 females and 6 males were included in the study. In this group, 28 patients were on full-time sick leave and 2 on part-time. The average age in the group was 41 years and 97% had psychiatric co-morbidity. A total of 40% of the patients suffered from fibromyalgia. Other recorded pain diagnoses were chronic widespread pain (20%), chronic regional pain (10%), whiplash trauma (20%) and lumbago (10%) [35]. The most common psychiatric diagnoses according to DSM-IV were anxiety disorders, mixed states of anxiety and depression and maladaptive stress reaction. Twenty of the 30 patients accepted treatment with cognitive therapy and 13 patients, the therapy group, completed therapy [35]. Three patients in the psychiatric group did not fill out SF-36 at baseline due to administrative reasons.

Patients from the occupational health care: A total of 45 consecutive patients were identified, and 35 women and 7 men agreed to participate in the study. Three patients were not eligible due to language difficulties. In the remaining group (n = 42), 50% (n = 21) were on full-time sick leave and 50% on part-time sick leave. The average age was 44 years. In total 35.5% of the subjects suffered from fibromyalgia. Other pain diagnoses were chronic widespread pain (19%), chronic regional pain (33,1%), whiplash trauma (2,4%) and lumbago (10%) [25].

Patient reported outcomes

Attachment pattern and trauma

There was no significant difference in the attachment profile between patients with chronic pain in psychiatry and occupational health care at baseline assessed with the RSQ. In both groups a dismissing attachment was the dominant pattern (Table 1). However a sub grouping of the patients according to the dominant attachment pattern in RSQ revealed a prevalence of 27% fearful attachment in the psychiatric patients versus 5% in company health care (Figure 1A and 1B). Totally 60% of the patients with chronic pain in psychiatry had traumatic experiences in childhood and/or as adults [35].

	Psychiatry (n = 30) Mean (SD) Range	Occupational health care (n = 42) Mean (SD) Range	P value (Psychiatry versus Company health care)
Attachment Fearful	4.1 (0.9) 1.0 - 6.75	3.9 (1.0) 1.75 - 6.0	0.43
Attachment Dismissing	4.8 (1.1) 2.4 - 7.0	4.6 (1.1) 1.0 - 6.25	0.39
Attachment Secure	3.8 (0.9) 2.2 - 5.6	3.8 (0.9) 2.0 - 5.5	0.97
Attachment Preoccupied	3.8 (1.0) 1.75 - 6.25	3.7 (0.8) 1.75 - 5.5	0.59
SOC	106.9 (28.3) 63.0 - 163.0	124.9 (27.7) 57.0 - 174.0	0.02
BAI	25.6 (12.1) 7 - 51	16.4 (10.4) 2 - 38	0.002
BDI	24.8 (9.9) 9 - 47	18.6 (9.3) 0 - 49	0.01
Burnout Pines scale	4.7 (1.0) 2.86 - 6.52	3.7 (1.0) 1.67 - 6.48	0.00

Table 1: RSQ (Relationship Scales Questionnaire), SOC (Sense of coherence), BAI (Beck Anxiety Inventory), BDI (Beck Depression Inventory) and Pines scale for burnout, at Baseline in patients with chronic pain in the psychiatry group and in the occupational health care group.

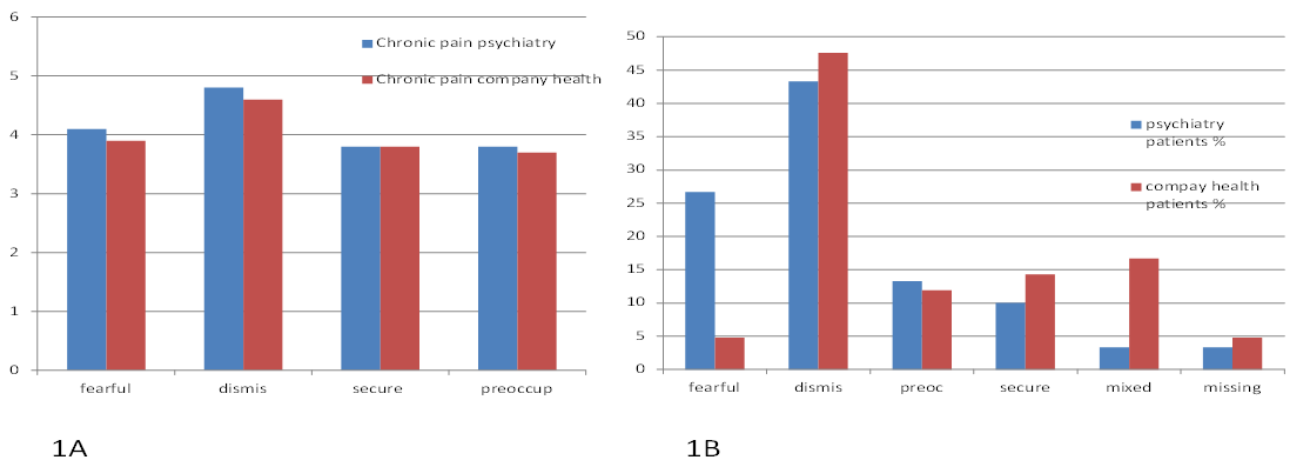


Figure 1A: Attachment pattern according to RSQ (fearful, dismissing, preoccupied, secure). Patients with chronic pain in psychiatry (blue) and in occupational health care (red). No significant difference in profile between groups.

Figure 1B: Frequency in % of the dominant attachment pattern in RSQ among patients with chronic pain in psychiatry (blue) and in occupational health care (red).

Sense of coherence

At baseline patients in company health care reported a significant higher SOC ($p = 0.02$) with a mean value of 125 compared with 107 for patients in the psychiatry group (Table 1). In both groups there were patients with very low SOC below 100, 13 patients (43%) in the psychiatry group and 7 patients (17%) in the occupational health care group (Figure 1C).

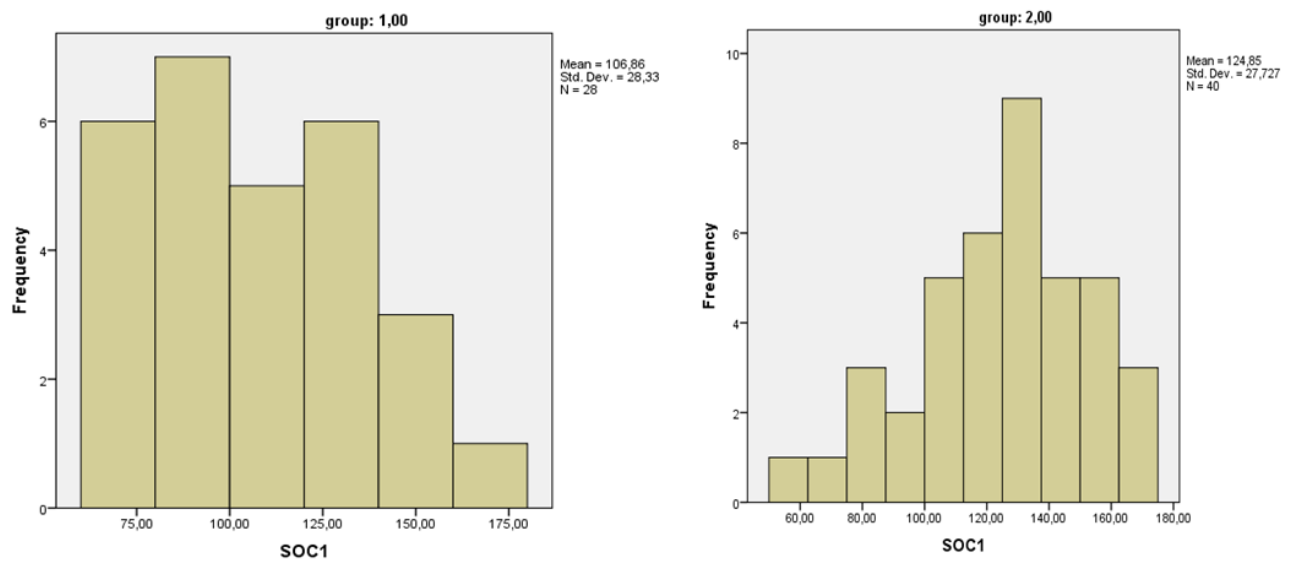


Figure 1C: Patients with chronic pain in psychiatry (group 1) and occupational health care (group 2). Distribution of values in SOC. 13 (43%) of the patients in psychiatry and 7 (16.7%) of the patients in occupational health care had a SOC <100.

Multidimensional pain inventory

At baseline there was no significant difference between patients with chronic pain in psychiatry and occupational health care with regard to MPI (Table 2). In both groups there was a dominance of the dysfunctional subgroups Dys and ID. The prevalence of Adaptive coper (AC) was low, 2 patients in the psychiatric group and 4 in the company health group (Figure 1D).

	Psychiatry (n = 30) Mean (SD) Range	Occupational health care (n = 42) Mean (SD) Range	P value Psychiatry versus Occupational health care
Pain Severity	71.7 (17.4) 44.0 - 100.0	69.3 (1.0) 37.0 - 100.0	0.77
Pain Interference	72.3 (15.4) 49.0 - 100.0	66.4 (14.1) 39.0 - 100.0	0.12
Life Control	37.4 (15.2) 0.0 - 62.0	42.6 (12.6) 0.0 - 64.0	0.11
Affective Distress	62.2 (14.9) 30.0 - 100.0	58.3 (17.1) 30.0 - 100.0	0.13
General Activity	51.7 (8.6) 34.0 - 68.0	54.4 (5.3) 46.0 - 68.0	0.17
Dysfunction	62.6 (11.1) 43.0 - 89.0	58.4 (10.9) 26.0 - 86.0	0.18
Interpersonal Distress	41.4 (12.1) 23.0 - 67.0	38.3 (11.5) 13.0 - 60.0	0.38

Table 2: MPI (Multidimensional Pain Inventory) at Baseline in patients with chronic pain in the psychiatry group and occupational health care group.

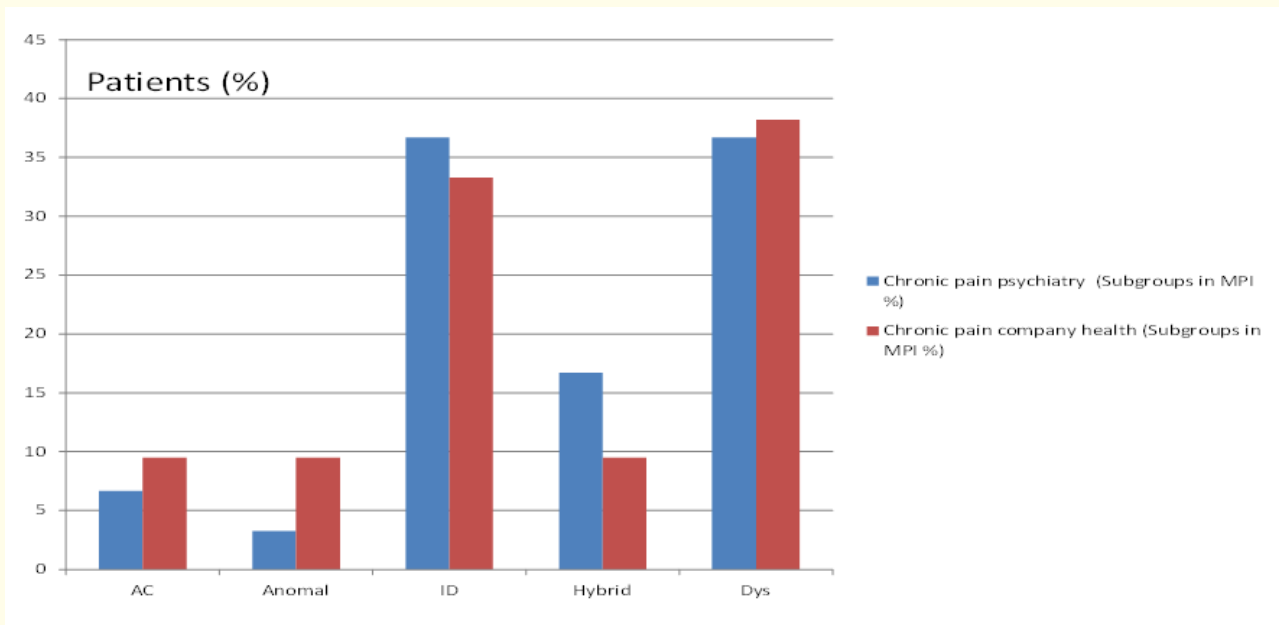


Figure 1D: Patients with chronic pain in psychiatry (blue) and occupational health care (red). Distribution of subgroups of MPI: Adaptive coper (AC), Anomalous, Interpersonal distressed (ID), Hybrid, Dysfunctional (Dys) in %.

Anxiety, depression and signs of burnout

At baseline patients in the psychiatry group scored significantly higher on the BAI for anxiety ($p = 0.002$) and on BDI for depression ($p = 0.01$) compared with patients with chronic pain in occupational health care (Table 1). The psychiatry group scored above the cut off-value 4.0 on the Pines' burnout measure at baseline (4.68) and the patients in occupational health care scored below the cut-off value for burnout both at baseline (3.72). The difference between the two group was significant ($p < 0.001$) (Table 1).

Health related quality of life

At baseline patients in occupational health care reported significantly higher HRQL with regard to Social function ($p = 0.01$), Role emotional ($p = 0.02$) and Mental health ($p = 0.02$) in SF-36 compared with the psychiatry group (Table 3). Both groups reported significantly ($p < 0.001$) impaired HRQoL in all dimensions of the SF-36, compared to their corresponding age and gender-matched normative populations [25].

	Psychiatry (n = 30) Mean (SD) Range	Occupational health care (n = 42) Mean (SD) Range	P value Psychiatry versus Occupational health care
Physical Function	45.1 (22.9) 15.0 - 85.0	52.1 (20.7) 5.0 - 87.0	0.20
Role Physical	8.3 (20.8) 0.0 - 75.0	12.5 (25.9) 0.0 - 100.0	0.51
Bodily pain	19.6 (15.3) 0.0 - 41.0	23.3 (14.2) 0.0 - 52.0	0.31
General Health	30.6 (14.6) 0.0 - 60.0	38.2 (18.0) 10.0 - 82.0	0.10
Vitality	17.6 (15.9) 0.0 - 55.0	23.8 (18.3) 0.0 - 73.3	0.12
Social Function	35.2 (23.3) 0.0 - 87.5	53.4 (27.2) 0.0 - 100.0	0.01
Role Emotional	38.3 (44.1) 0.0 - 100.0	63.4 (42.0) 0.0 - 100.0	0.02
Mental Health	42.7 (21.9) 4.0 - 80.0	57.1 (24.2) 0.0 - 100.0	0.02

Table 3: Short - Form 36 (SF - 36. At Baseline in patients with chronic pain in the psychiatry group and occupational health care group.

Correlations assessed with multivariate analyses in PCA and O2PLS

In order to further investigate correlations and subgroups, multivariate analyses by PCA and O2PLS were performed. At first all data baseline and at follow-up were used to generate a PCA in order to get an orientation of how objects and variables were correlated. The three principal components of the PCA model of the patient group with chronic pain in psychiatry and company health (n = 72) explained 37% of the variation of the data ($R^2X = 0.36$) with a prediction $Q^2X = 0.23$ (Figure 2A-2D).

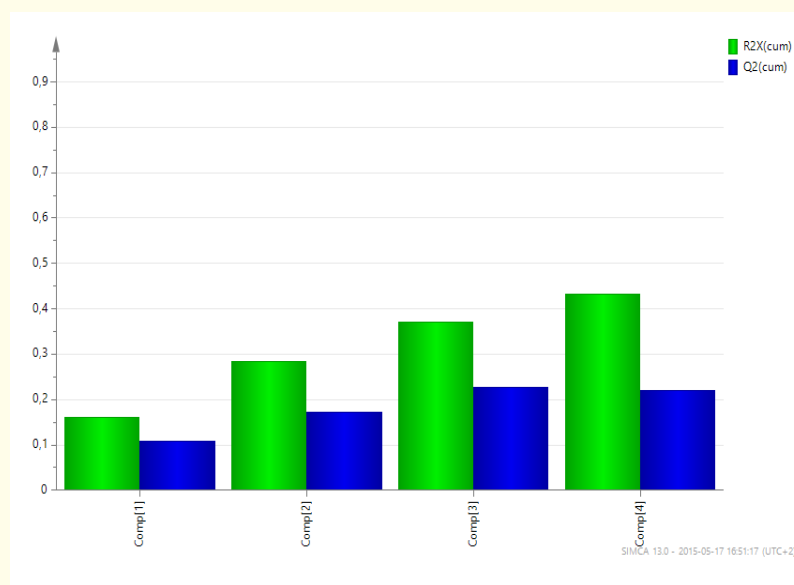


Figure 2A: PCA Patients with chronic pain in psychiatry and in occupational health care. The explained variance R2X was 0.36 with a prediction Q2 X of 0.23.

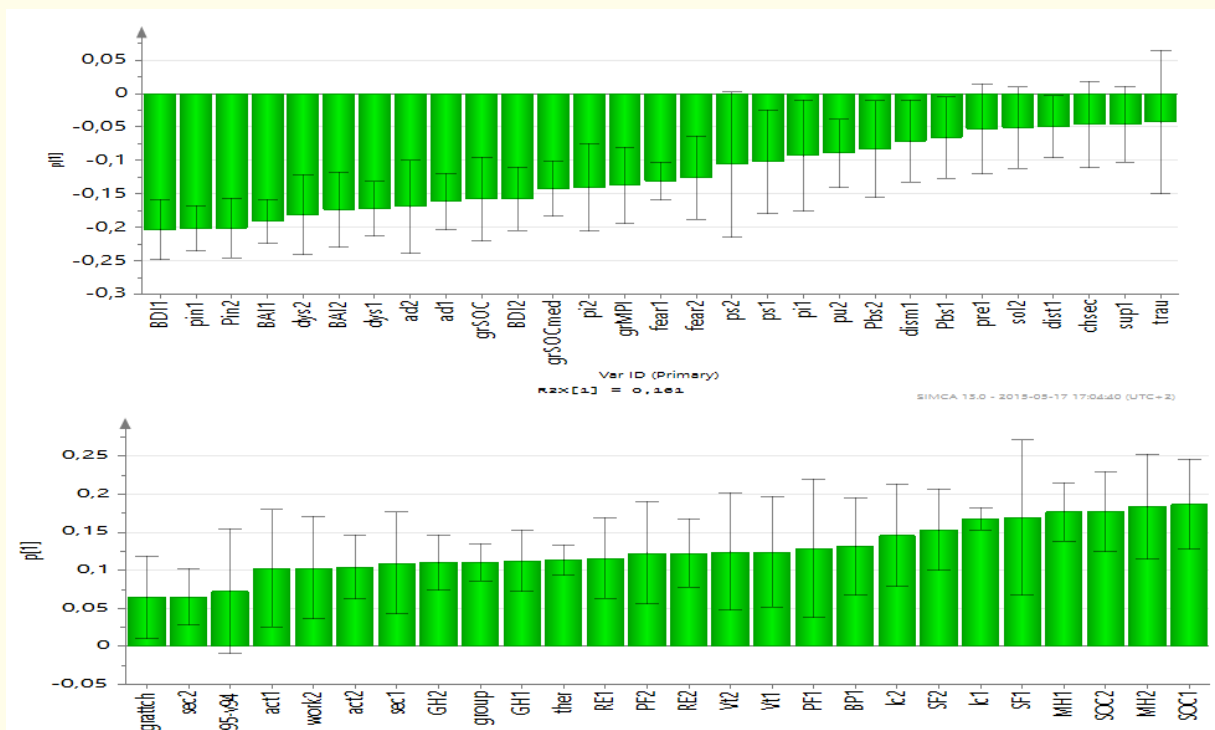


Figure 2B: PCA. Column plot component p. Patients in occupational health care (group 2) correlated with work at follow-up (work2), higher values of HRQoL in SF-36 (GH1, GH2, PF1, Vt1, Vt2, BP1, SF1, SF2, MH1, MH2), life control (l1, l2) and activity (act1, act2) in MPI, Secure attachment (sec1, sec2) in RSQ, and SOC1, SOC2 at baseline and follow-up. There was inverse correlation with depression (BDI1, BDI2), burnout (pin1, pin2), anxiety (BAI1, BAI2), fearful (fear1, fear2) and dismissing (dism1) attachment in RSQ and Dysfunction (dys1, dys2), Affective distress (ad1, ad2), Pain severity (ps1, ps2), and Pain interference (pi1, pi2) in MPI.

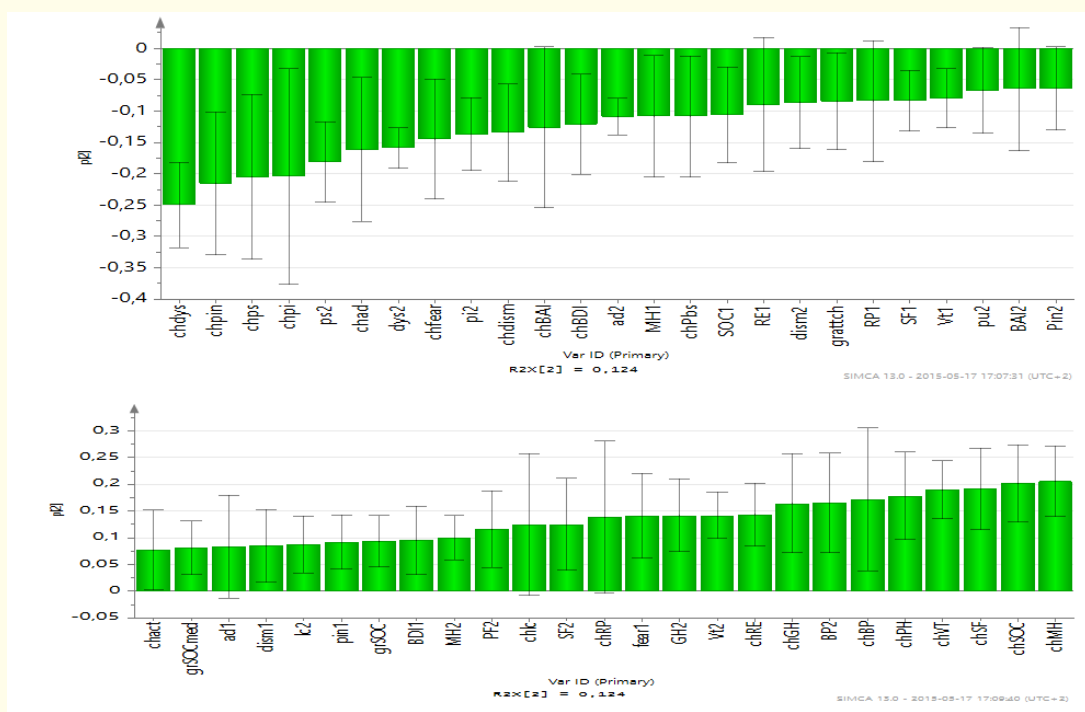


Figure 2C: PCA. Column plot, component p2. Patients with chronic pain in psychiatry and occupational health care. Negative change in Pain severity (ps), Dysfunction (dys), Pain interference, Affective distress in MPI, depression (BDI), anxiety (BAI), fearful and dismissing attachment in RSQ was inversely correlated with positive change in SF-36 (RE, GH, PF, BP, SF, Vt, MH) and SOC.

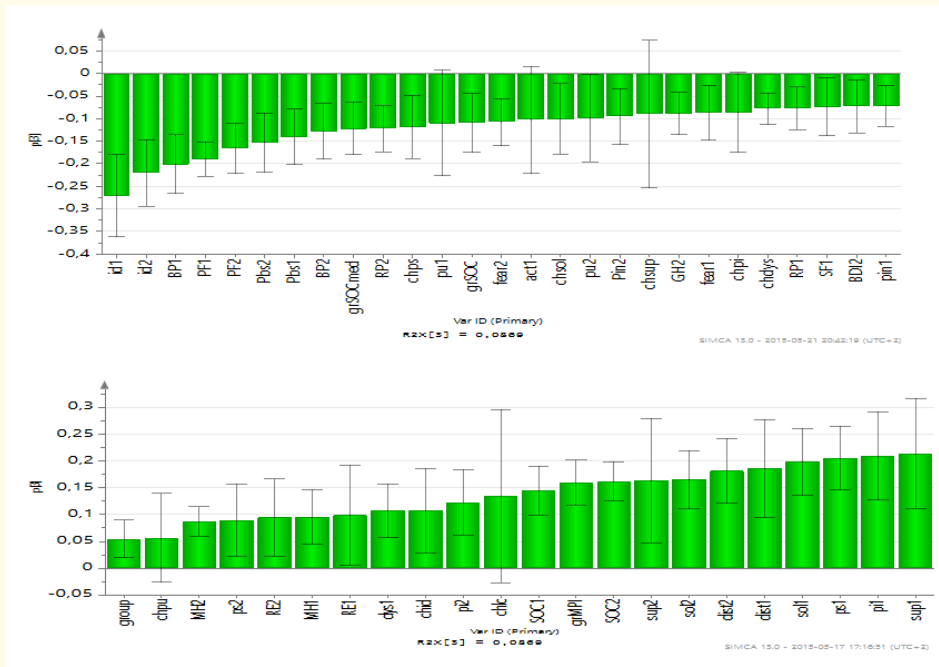


Figure 2D: PCA. Column plot component p3. Patients with chronic pain psychiatry and occupational health care. Interpersonal distress (*id*) in MPI was inversely correlated with responses from significant others (*sup*, *distr*, *sol*), Pain severity (*ps*), Pain interference (*pi*) and Dysfunctional (*dys*) in MPI, Mental health (*MH*), Role emotional (*RE*) in SF-36 and SOC.

The loading structure from the entire patient group in the first principal component Figure 2B indicated that higher values of SOC, HRQoL assessed with SF-36, life control in MPI and secure attachment in RSQ were inversely correlated with burnout assessed with the Pines’ Burnout measure, Dysfunction and Affective distress in MPI, anxiety and depression assessed with BAI and BDI and insecure fearful attachment in RSQ . Patients with chronic pain in occupational health care (group 2) correlated with higher values in SOC and secure attachment indicating that these patients had more factors of resilience than the patients in the psychiatry group (group 1).

However, the distribution of the patients in a score plot showed that there was an overlapping between the two patient groups (Figure 3). Hence, there were also patients within the occupational health care group with high vulnerability in terms of insecure attachment and a low SOC as well as high values of depression and burn out.

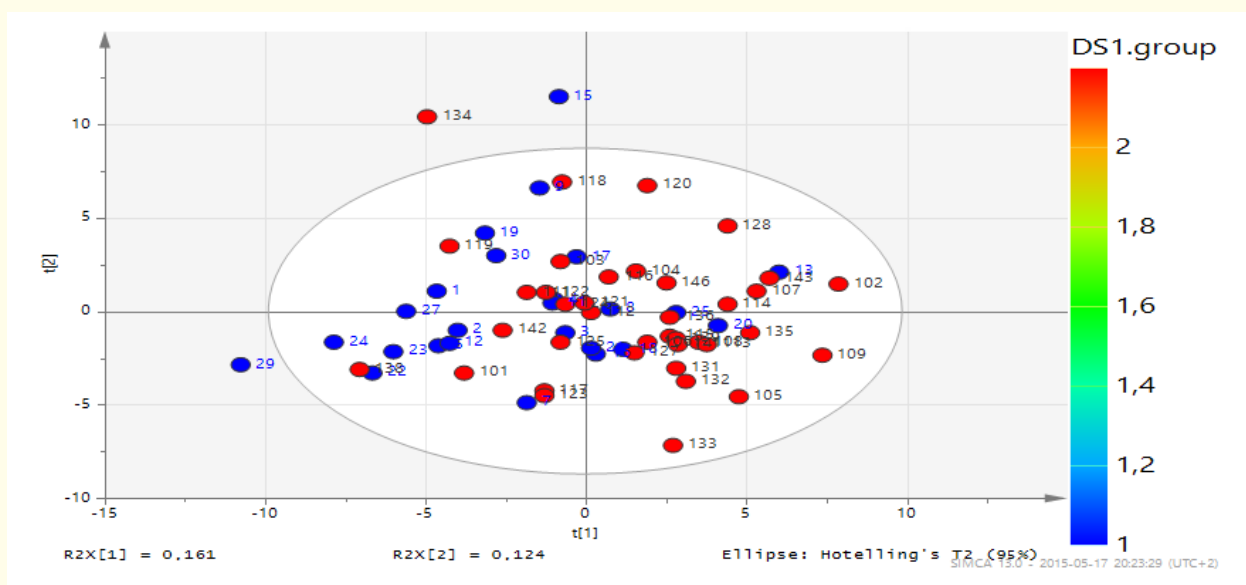


Figure 3: PCA. Scores scatter plot. Patients with chronic pain in psychiatry and occupational health care. Colored according to group. Group 1 (blue) psychiatry, group 2 (red) company health care. The two groups have a heterogeneous distribution.

In order to further investigate the influence of variables measuring vulnerability and resilience, values of SOC, and attachment pattern in RSQ at baseline were chosen as response variables in O2PLS together with variables measuring HRQoL, anxiety, depression, burnout, pain and dysfunction assessed with SF-36, BAI, BDI, Pines' burnout measure and MPI at baseline. An O2PLS vulnerability model (model 1) was obtained with the chosen variables as Y-matrix and the remaining variables including change variables as X-matrix. The model comprised three predictive and two orthogonal components. The explained variance R^2Y was 0.62 with a prediction Q^2Y of 0.47 (Figure 4A). In the actual model all response variables had a reasonably high impact on the model (Figure 4A).

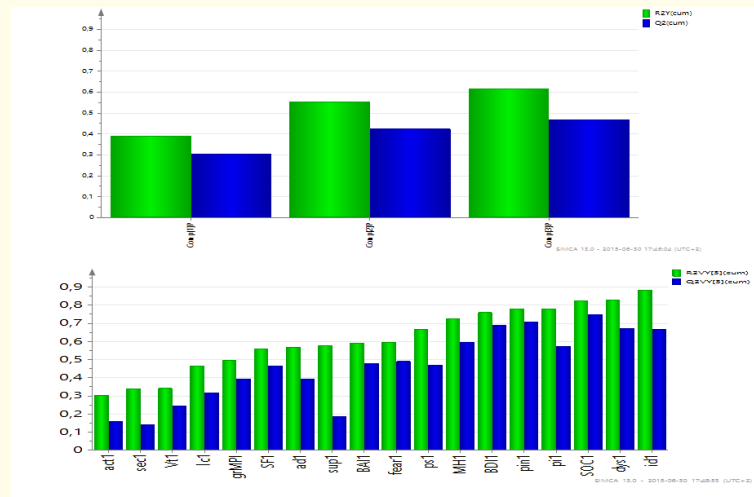


Figure 4A: O2PLS (vulnerability model1). Patients with chronic, pain in psychiatry and occupational health care. The model comprised three predictive and two orthogonal components. The explained variance R^2Y was 0.62 with a prediction Q^2Y of 0.47 The explained variance and prediction of the 18 response variables are shown below: secure and fearful attachment (secure1, fear1), Vitality(Vt1), Social function (SF1), Mental health (MH1) in SF-36, activity (act), life control (lc1), affective distress (ad1), support (sup1) pain severity (ps1), pain interference (pi1, interpersonal distress (id1) and dysfunction (dys1) I MPI, anxiety and depression (BAI1, BDI1), SOC, burnout (pin1).

In the first predictive component, pq1 of the O2PLS (Figure 4B), higher values of anxiety, burnout, depression, fearful and dismissing attachment in RSQ, Affective distress, Pain and Dysfunction in MPI were inversely correlated with Mental health, Vitality, Social function, Role emotional and Physical function in SF-36, SOC, secure attachment in RSQ and Life control in MPI. The variables in this cluster may represent two subgroups of the MPI, Dysfunctional and Adaptive copers, inversely correlated with each other.

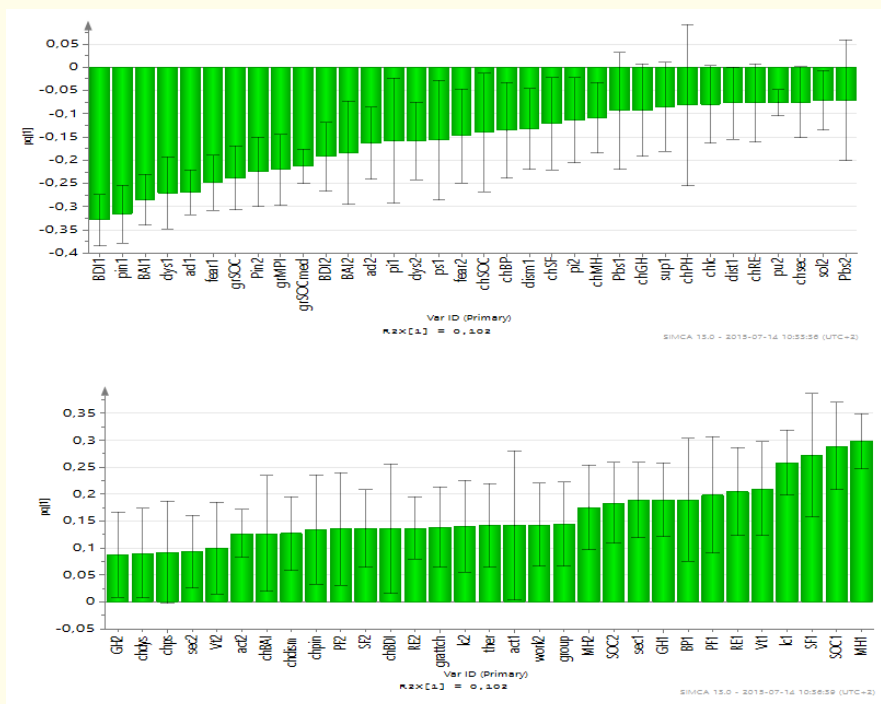


Figure 4B: O2PLS (vulnerability model 1). Column plot component pq1. Patients with chronic pain in psychiatry and occupational health care. Patients in occupational health care (group2) correlated with work at follow-up (work2), higher values of HRQoL in SF-36 (GH, PF, Vt, BP, SF, RE, MH), life control (lc) and activity (act) in MPI, Secure attachment (sec) in RSQ, and SOC. There was inverse correlation with depression (BDI), burnout (pin), anxiety (BAI), fearful (fear) and dismissing (dism) attachment in RSQ and Dysfunction (dys), Affective distress (ad), Pain severity (ps) and Pain interference (pi) in MPI at baseline and follow-up. (1 = baseline, 2 = follow-up).

Inspecting the second predictive component, pq2 in O2PLS (Figure 4C), higher values of Pain severity, Pain interference, Dysfunction and responses from significant others in MPI, Mental health, Role emotional in SF-36 and SOC were inversely correlated with Interpersonal distress, Punishing response in MPI, Physical function, Bodily pain and Vitality in SF-36, fearful attachment in RSQ and burnout. In this cluster there were indications of a second dysfunctional subgroup of the MPI with a stronger SOC and good support from significant others inversely correlated with the Interpersonal distressed subgroup ID.

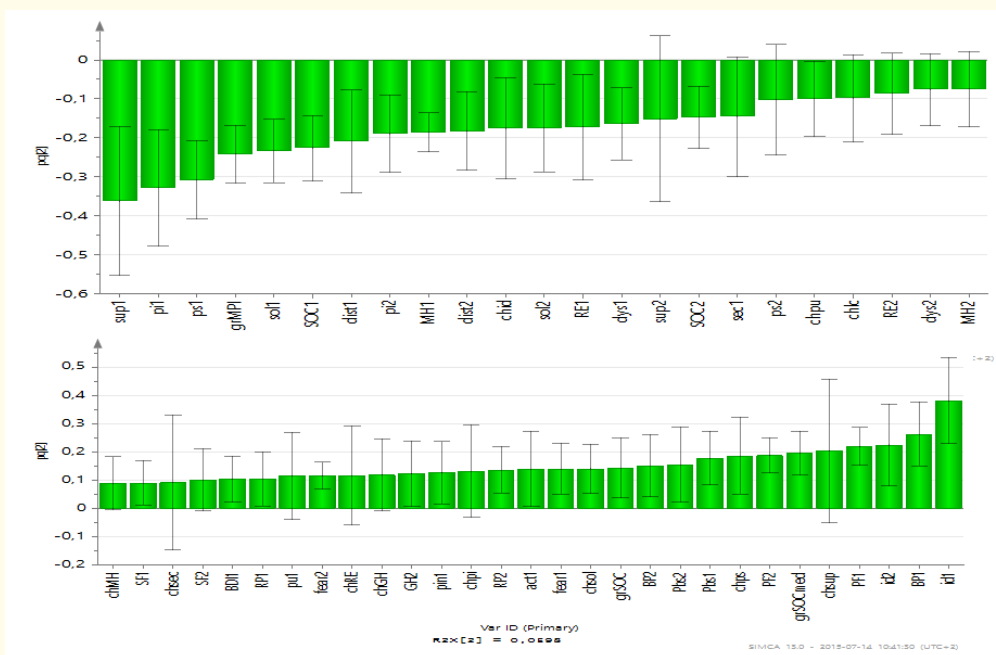


Figure 4C: O2PLS (vulnerability model1), column plot, component pq2. Patients with chronic pain in psychiatry and occupational health care. Interpersonal distress (id1, id2) was correlated with HRQoL in SF-36 (BP1, BP2, PF1, PF2, GH2, RP1, RP2, SF1.SF2), burnout (pin1), depression (BDI1), fearful attachment (fear1, fear2), and activity (act1) in MPI. Inverse correlation between interpersonal distress(id) and reactions from significant others (sup, distr, sol), Pain severity (ps1), Pain interference (pi1, pi2), and Dysfunction (dys1) in MPI, Mental health (MH1) and Role emotional(RE1) in SF-36 and SOC2, SOC2 (1 = baseline, 2 = follow-up).

In the third predictive component, pq3 of the O2PLS vulnerability model figure 5A, a mixed pattern of Interpersonal distress and Dysfunction in MPI, SOC and fearful attachment inversely correlated with preoccupied attachment in RSQ and responses from significant others in MPI (distracting, solicitous, supporting), change fear, change Dysfunction, change Pain interference, and change burnout. Hence patients with higher levels of Dysfunction and, or Interpersonal distress and fearful attachment pattern may correlate with a negative change in dysfunction, pain interference and burnout, while patients scoring high for preoccupied attachment pattern in RSQ may report an increase in dysfunction, pain and burnout at follow-up.

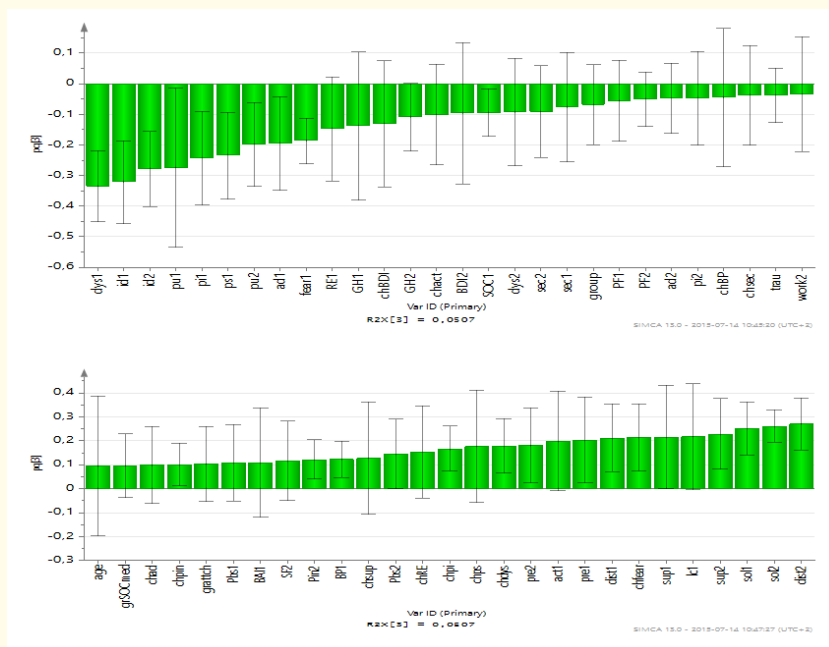


Figure 5A: O2PLS (vulnerability model 1), column plot, component pq3. Patients with chronic pain in psychiatry and occupational health care. Items in MPI (dysfunction (dys1), Interpersonal distress (id1, id2), Pain severity (ps1), Pain interference (pi1), Affective distress (ad1), punishing response (pu1,pu2)), SOC1 and fearful attachment (fear1) were inversely correlated with preoccupied attachment (pre1, pre2) and responses from significant others in MPI (distracting (distr), solicitous (sol) supporting (sup)), change fear (chfear), change Dysfunction, change Pain interference (chpi) and change burnout (chpin) (1 = baseline, 2 = follow-up).

In a loading plot pq3/pq1 (Figure 5B) this cluster in component pq3 was combined with the cluster in component pq1. AC in pq1 inversely correlated with a dysfunctional/punishing group, and ID in pq3 inversely correlated with a dysfunctional/supporting group.

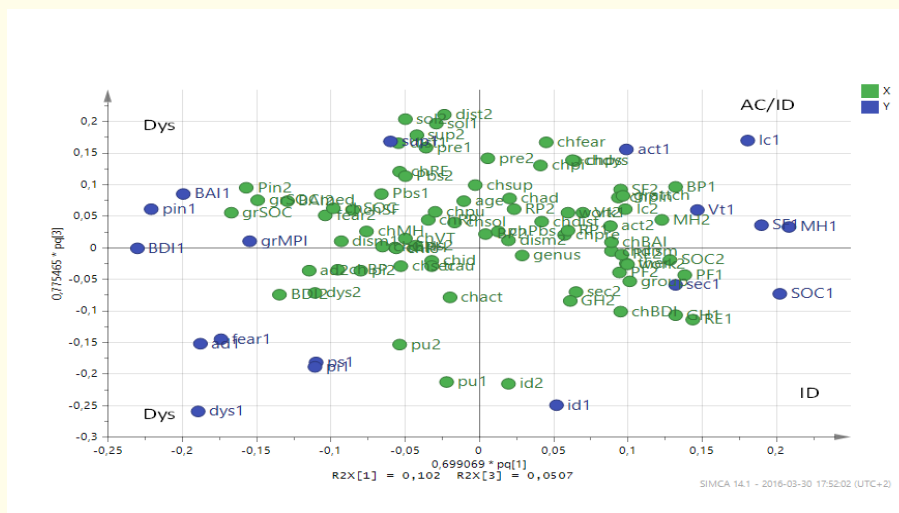


Figure 5B: O2PLS (vulnerability model1), loading plot pq1/pq3. Patients with chronic pain in psychiatry and occupational health care. Patients clustered in the left half of the plot were Dysfunctional (Dys). Adaptive coper (AC) was clustered in the upper right quadrant and Interpersonal distressed (ID) in the lower right quadrant.

In figure 5C the score plot t1/t3 was colored according to groups in MPI, SOC, Pain severity (ps1), and MH. Patients with high scores in SOC, and MH were clustered in the right part of the plots corresponding to subgroup AC and ID in MPI. Patients with high scores in pain severity were found in the lower half of the plot corresponding both to Dysfunctional and Interpersonal distressed sub groups in MPI in Figure 5B. Thus the cluster with a stronger SOC in the right part of the plot in figure 5C overlapped the cluster in the lower half of the plot with higher pain severity. Hence patients with a strong SOC can either have a high or a low Pain severity.

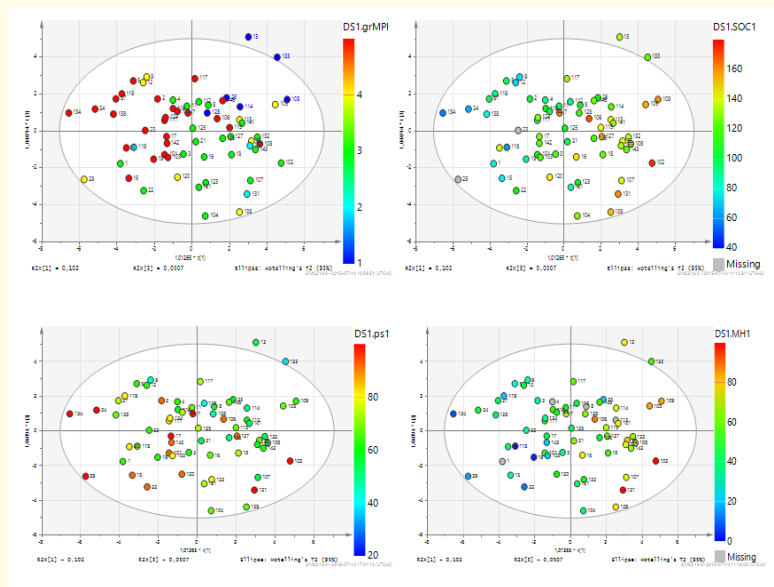


Figure 5C: O2PLS (vulnerability model1), score plot t1/t3. Corresponding to the loading plot in figure 5B. Patients with chronic pain in psychiatry and occupational health, Patients colored according to subgroup in MPI. SOC1, Pain severity (ps1) and Mental health (MH1). Patients clustered in the left half of the plot were Dysfunctional (Dys). Adaptive coper (AC) was clustered in the upper right quadrant and Interpersonal distressed (ID) in the lower right quadrant. Higher levels of SOC and MH correlated with AC and ID. Pain severity could be either higher or lower when SOC and MH were high (in the right part of the plot) (dark blue = Adaptive Coper (AC), light blue = Anomalous, green = Interpersonal Distressed (ID), yellow = Hybrid, red = Dysfunctional).

In figure 5D the score plot is colored according to attachment pattern.

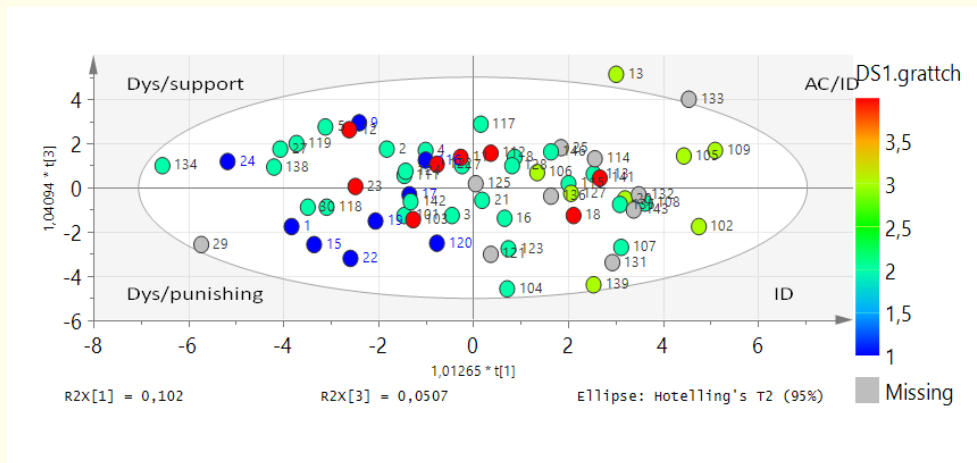


Figure 5D: O2PLS (vulnerability model1), Score plot t1/t3, patients with chronic pain in psychiatry and occupational health. Corresponding to the loading plot in figure 5B, Patients colored according to attachment pattern (dark blue = fearful, light blue = dismissing, green = secure, red = preoccupied).

In order to further investigate the role of attachment pattern all items in RSQ (fearful, dismissing, secure and preoccupied at baseline) were used as response variables together with SOC and items in SF-36 at baseline in a new O2PLS. This resulted in an attachment model (model 2) with 3 valid components and one orthogonal component explaining 43% of the variation with a prediction of 0.33 (Figure 6A). All response variables had a reasonably high impact on the model with exception for Role physical in SF-36 and dismissing attachment in RSQ (Figure 6A).

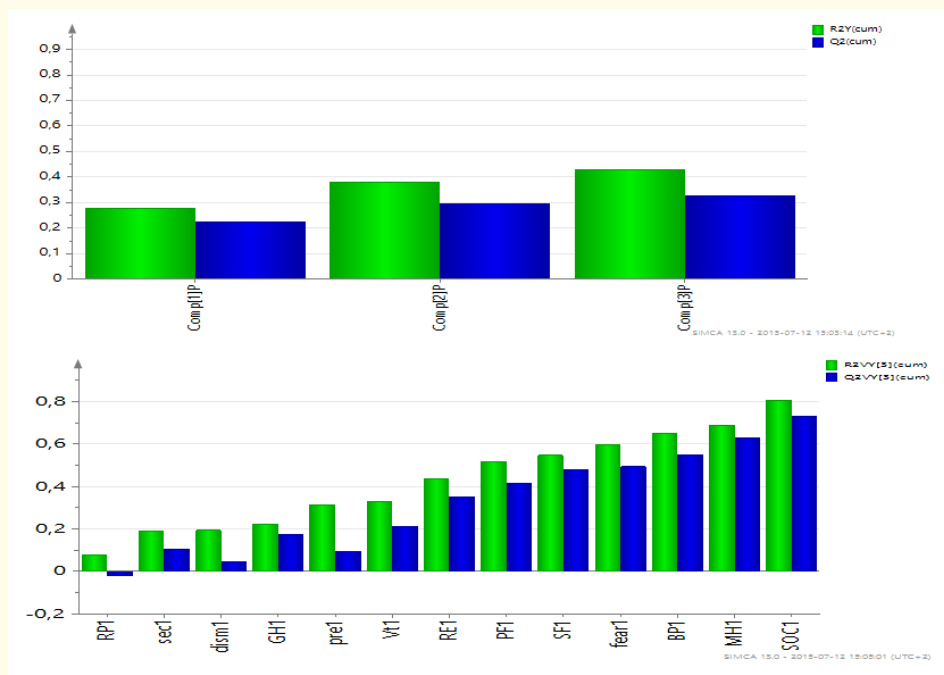


Figure 6A: O2PLS (attachment model 2). Patients with chronic, pain in psychiatry and occupational health care. The model comprised three predictive and one orthogonal component. The explained variance R2Y was 0.43 with a prediction Q2 Y of 0.33. In lower plot the explained variance and prediction of the 13 response variables are shown: Attachment pattern, RSQ (fearful, dismissing, secure, preoccupied), HRQoL, SF-36 (Mental health, Bodily pain, Social function, Physical function Role emotional, Vitality, General health, and Role physical, and SOC). The variables had a reasonably high explained variance and prediction with the lowest prediction of the variables for Role physical and dismissing attachment (mod316).

In the first component fearful and dismissing attachment were inversely correlated with secure attachment (Figure 6B). In this component patients belonging to group 2 (occupational health care) and the therapy group in psychiatry correlated with secure attachment pattern, higher MH, SF, Vitality, RE.

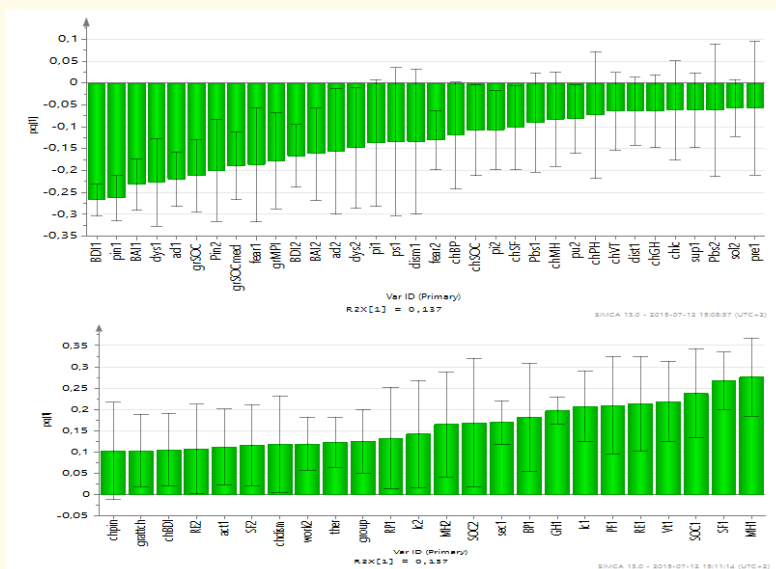


Figure 6B: O2PLS (attachment model 2). Column plot, component pq1. Patients with chronic pain in psychiatry and occupational health care. Patients in occupational health care (group2) correlated with higher values of HRQoL in SF-36 (GH1, PF1, Vt1, BP1, SF1, SF2, MH1, MH2), life control (lc1, lc2) and activity (act1) in MPI, Secure attachment (sec1) in RSQ, and SOC1, SOC2. There was inverse correlation with depression (BDI1, BDI2), anxiety (BAI1, BAI2) burnout (pin1, pin2), fearful (fear1, fear2) attachment in RSQ and Dysfunction (dys1, dys2), Affective distress (ad1, ad2), Pain severity (ps1), and Pain interference (pi1, pi2) in MPI.

In component 3 (Figure 6C) preoccupied attachment was inversely correlated with fearful and dismissing attachment, Preoccupied pattern correlated with patients with psychiatric co-morbidity, group1, the no therapy group and a positive change in Dysfunction, Pain severity and Pain interference. The Therapy group and the patients in the occupational health care group on the other hand correlated with fearful and dismissing attachment pattern, a negative change in pain and dysfunction and a positive change in HRQoL. Hence patients in Occupational health care and in the therapy group have been found in both component 1 and component 3 of this attachment model with different profiles of resilience and vulnerability.

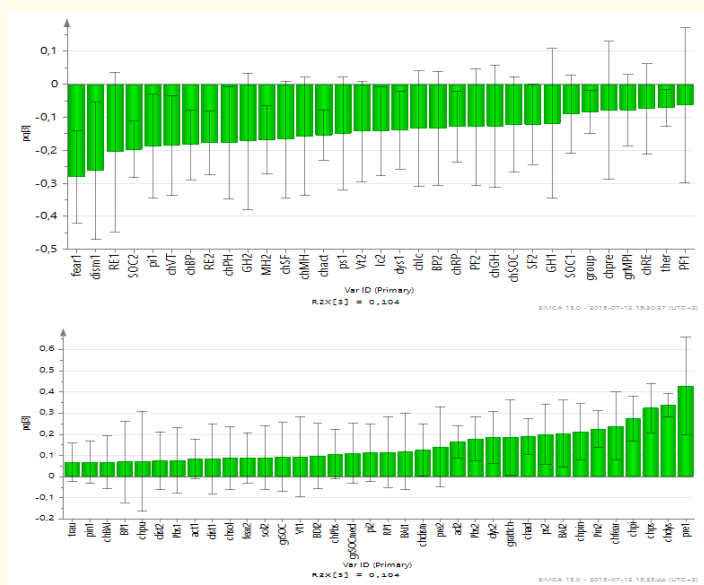


Figure 6C: O2PLS (attachment mode l2), column plot, component pq3. Patients with chronic, pain in psychiatry and occupational health care. Preoccupied attachment in RSQ (pre) was correlated with positive change in Dysfunction (chdys), pain severity (chps), pain interference (chpi), fearful and dismissing attachment (chfear, chdism), burnout (chpin). There was an inverse correlation between preoccupied attachment (pre1) and fearful and dismissing attachment (fear1, diem1), SOC2, positive change in Bodily pain (chBP). Physical function(chPF), Social function (chSF), Mental health (chMH) and General health (GH) in SF-36 and Activity (chact) in MPI. Preoccupied mainly belonged to group 1 (patients with chronic pain and psychiatric co-morbidity).

Discussion

Patients with chronic pain both in consulting psychiatry as well as in occupational health care had several vulnerability factors in terms of, insecure attachment and a low SOC and dysfunctional coping strategies. Both patient groups also reported a high level of pain and pain related symptoms in MPI and a low HRQoL in SF-36. The impact of vulnerability factors on pain management and rehabilitation of these patients in the psychiatric setting and also in occupational health care might explain at least to some extent that not all patients have benefitted from traditional rehabilitation. The main difference between the two groups in this study was a weaker SOC, lower mental HRQoL and higher levels of anxiety, depression and burnout among patients in the psychiatry group. The multivariate data analyses supported these results. However in the PCA the distribution of the patients revealed a great overlapping between the two patient groups (Figure 3B). Hence, among the patients in occupational health care there were patients with higher levels of vulnerability factors, impaired resilience and a higher level of depression, burnout and a low HRQoL.

These results are supported by previous research where patients with chronic pain have turned out to be very heterogeneous groups [2].

Attachment patterns, sense of coherence and trauma

In the current study most patients reported a dominance of dismissing attachment (Figure 1A), which is in accordance with a previous study of patients with chronic pain treated with CBT [36]. Secure attachment is normally present in approximately 55 - 60% of the population [37]. The attachment was measured as a profile with separate values for each component: fearful, dismissing, preoccupied and secure in RSQ. Moreover a grouping according to the item with the highest value in the profile was done. Hereby 10% of the patients in psychiatry and 14 % of the patients in occupational health care had secure attachment as a dominant pattern. Fearful attachment was the dominant pattern in 27% of the patients in psychiatry versus 5% in occupational health care (Figure 1B). The patients in the psychiatric setting also had a high prevalence of traumatic experiences. Assessment of traumatic experiences was done systematically in the psychiatric group by means of an Adult Attachment Interview in 13 patients and in the remaining 17 from their narrated life events [35]. In the occupational health care group there was no specific focus on trauma. Previous research [38] has shown a correlation between trauma and fearful attachment. The attachment theory allows for identification of subgroups of patients with chronic pain [15]. An increased vulnerability to stress in insecurely attached adults has been found [18]. Securely attached patients would hereby be less susceptible to stress and chronic pain. In the present study, secure attachment was associated with a higher HRQoL and a stronger SOC. Among patients with fearful and dismissing attachment pattern there was a group of patients in occupational health care and in the therapy group in psychiatric setting who had a potential to improve while patients with a dominance of preoccupied attachment pattern in the same cluster had higher levels of pain, anxiety and dysfunction at follow-up.

Previous research has indicated that patients with a mildly impaired SOC are more susceptible to further impairment of the SOC in association with loss of perceived good health and social support [39]. A mildly impaired SOC might be a vulnerability factor in association with chronic pain. Thus there are indications of that our results were in line with earlier research according to the association between a weak SOC and insecure attachment, depression, burnout and a low HRQoL. However, some patients with a higher levels of pain, dysfunction and support from significant others had a positive correlation with HRQoL and a stronger SOC (Figure 5B) indicating that a strong SOC per se does not protect from chronic pain but rather facilitates the ability handle a life with pain. These results were in line with a Swedish study of women suffering from fibromyalgia, where women with a strong SOC perceived a greater well-being than those with a weaker SOC [40]. In a cross-sectional study on Finnish, Swedish, English and Canadian populations as well as groups of patients with depression and rheumatic disease Eriksson and Lindström [41] showed a distribution of the mean of the SOC-29 in different populations ranging from 100,5 in patients with depression to 164,5 in a normal population. In the present study the proportion of patients with a very low SOC < 100 was 43% in the psychiatric group and 17% in the company health group.

Subgroups in MPI

The subgroups in MPI are characterized by different levels of pain intensity and interference, affective distress and reactions of significant others. Adaptive Copers (AC) report less pain severity and pain interference, lower levels of affective distress and higher activity and life control compared with the groups Interpersonal Distressed (ID), Hybrid and Dysfunctional (Dys) [42]. The prevalence of Adaptive Coper (AC) among the patients with chronic pain in the psychiatry group was only two patients (7%) at baseline. Among the patients in occupational health care there were four patients (10%) classified as AC at baseline (Figure 2). Compared with other studies of patients with chronic pain, the prevalence of AC was lower in this study [28,43]. In the first predictive component pq1 of a multivariate analysis by means of O2PLS (vulnerability model 1) it was possible to identify a cluster with a Dysfunctional subgroup inversely correlated with AC. The AC subgroup correlated with secure attachment, SOC, life control and activity and was inversely correlated with dysfunction. The Dys subgroup correlated with depression, anxiety, insecure attachment and burnout (Figure 4A). Patients classified as Dys or ID have been reported to have a higher psychiatric co-morbidity and an increased risk of a chronic course if not receiving appropriate treatment [43].

In the second predictive component in the O2PLS (vulnerability model), the Interpersonal distressed subgroup ID was identified with low support from significant others and higher punishing response. The ID subgroup correlated inversely with a dysfunctional subgroup with higher levels of pain, higher support from significant others and a stronger SOC. ID also correlated with fearful attachment and burnout (Figure 4B). The ID subgroup was large (37 versus 33%) in psychiatry and occupational health care (Figure 2). Thus by means of multivariate analysis in O2PLS two possible dysfunctional subgroups in MPI were identified with different patterns of vulnerability, one correlated with depression, anxiety, burnout and fearful attachment and the other with a better HRQoL, higher SOC, more secure attachment and better support from significant others (Figure 5B). Patients with a stronger SOC and more secure attachment had a better mental health and HRQoL in spite of pain and dysfunction. These patients most likely are patients with higher resilience who have adapted themselves to a life with chronic pain but might also be more motivated for rehabilitation. Further research is needed to give an answer to this question.

Depressive symptoms as outcomes measures in treatment of chronic pain

According to a consensus group, the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT), depressive symptoms as well as pain symptoms should also be considered as an outcome measure. The use of BDI was recommended by the consensus group because of its excellent psychometric properties and because it is widely used in clinical research. The BDI is also sensitive to change. Morley, *et al.* [44] found a mean BDI score of 17.6 in a sample of 2000 patients with chronic pain entering pain treatment. In the current study the mean score of BDI was 18.6 in occupational health care and 24.8 in the psychiatry group at baseline. Geisser, *et al.* [45] has recommended a score of 21 on the BDI to distinguish chronic pain patients with and without major depressive disorder. The presence of depressive symptoms was more pronounced among patients with chronic pain in the psychiatry group but was also found in the company health care. Patients who reported the highest values in BDI also had other vulnerability factors such as a very low SOC and insecure fearful attachment pattern. They also reported higher values for burnout on Pines' burnout measure and for dysfunction and pain in MPI, attachment pattern in RSQ, SOC and Mental health.

Clinical implications

Patients with chronic pain are heterogeneous groups with different patterns of resilience and vulnerability and a biopsychosocial view is widely accepted. As in other chronic diseases recovery in terms of a better HRQoL but no complete cure could be anticipated [2]. A patient-centered approach was applied both in the psychiatric setting and in occupational health care in order to take the patient's entire situation into account [24,26]. Moreover 20 patients in the psychiatric group participated in treatment with cognitive therapy, and 13 (the therapy group) fulfilled the treatment [35]. Not all patients could benefit from the same kind of treatment and timing and motivation may be important [35]. Subgroups of patients according to attachment pattern, SOC and subgroups in MPI have been identified. The result of the current study indicated that patients with insecure preoccupied attachment pattern had a lower rate of positive change at follow-up compared with patients with insecure dismissing and fearful attachment pattern even with cognitive therapy. Therefore it is important to further investigate these different subgroups in order to better recognize patients with different resilience and needs of treatment. The assessment of attachment patterns by means of RSQ was most valuable in therapeutic interventions but might also have a prognostic value for the choice and outcome of treatment both at pain clinics and in primary health care. The impact of vulnerability factors on pain management and rehabilitation in patients with chronic pain in primary care might be underestimated. Thus, SOC as well as MPI and RSQ and measures for assessment of anxiety, depression and burnout could be important tools for assessing vulnerability and resilience in chronic pain both at pain clinics and in primary health care.

Strength and Limitations

The results of the presents study need to be validated in further studies of vulnerability and resilience in new groups of patients with chronic pain according to attachment pattern, SOC and subgroups in MPI. In order to compensate for many variables and a limited number of observations a multivariate data analysis was performed, by which it was possible to separate and validate solid data from random variation and to handle missing data and outliers. Hereby it was also possible to identify subgroups and clusters of patients with different outcomes and vulnerability patterns.

Conclusion

Patients in this study with chronic pain in a psychiatric setting and in occupational health care were heterogeneous groups with a considerable overlapping, where vulnerability in terms of insecure attachment, a low SOC, depression, burnout and dysfunctional coping in MPI were identified in both groups. The impact of vulnerability factors on pain management and rehabilitation in patients with chronic pain in primary health care might be underestimated. Thus SOC, MPI and RSQ as well as measures for anxiety, depression and burnout could be important tools for assessing subgroups of patients with different prognostic outcome of treatment of chronic pain. In the present study the multivariate analyses by means of PCA and O2PLS indicated that there were patients with high pain intensity and yet a strong SOC. The role of SOC as well as attachment pattern in chronic pain could be an aim of further research.

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Bibliography

1. Lundberg D, *et al.* "Methods for treatment of chronic pain. A systematic literature survey". Stockholm: The Swedish Council on Technology Assessment in Health Care (SBU) (2006).
2. Turk DC and Okifuji A. "Psychological Factors in Chronic Pain: Evolution and Revolution". *Journal of Consulting and Clinical Psychology* 70.3 (2002): 678-690.
3. Turk DC and Rudy T E. "Neglected topics in the treatment of chronic pain patients- relapse, noncompliance and adherence enhancement". *Pain* 44.1 (1991): 5-28.
4. Weisberg MB and Clavel AL. "Why is chronic pain so difficult to treat? psychological considerations from simple to complex care". *Postgraduate Medicine* 106.6 (1999): 1-12.
5. Turk DC and Monarch ES. "Biopsychosocial Perspective on Chronic Pain". In: Turk DC, Gatchel RJ, editors. *Psychological Approaches to Pain Management*. New York: The Guilford Press (2002).
6. Turk CD and Floor H. "Chronic pain: A biobehavioural perspective". In: Gatchel R, Turk DC, editors. *Psychosocial factors in pain Critical perspectives* New York: Guilford Press (1999): 18-34.
7. Melzack R and Wall PD. "The Challenge of Pain". London: Penguin Books (1996).
8. Gatchel RJ. "Psychological disorders and chronic pain: Cause-and effect relationships". In: J Gatchel, Turk DC, editors. *Psychological approaches to pain management: A practitioner's handbook* New York: Guilford Press (1996): 33-52.
9. Dersh J, *et al.* "Chronic Pain and Psychopathology: Research Findings and Theoretical Considerations". *Psychosomatic Medicine* 64.5 (2002): 773-786.
10. Scaer RC. "The body bears the burden". New York: Routledge, Taylor & Francis Group (2007).
11. Diatchenko L, *et al.* "Idiopathic pain disorders- Pathways of vulnerability". *Pain* 123.3 (2006): 226-230.
12. Engel GL. "'Psychogenic' Pain and the Pain-Prone Patient". *American Journal of Medicine* 26.6 (1959): 889-918.
13. Bowlby J. "A secure base". New York: Routledge (1988).
14. McWilliams LA, *et al.* "Impact of adult attachment styles on pain and disability associated with arthritis in a nationally representative sample". *The Clinical Journal of Pain* 16.4 (2000): 360-364.
15. Mikail SF, *et al.* "An Interpersonally Based Model of Chronic Pain: An Application of Attachment Theory". *Clinical Psychology Review* 14.1 (1994): 1-16.
16. Ciechanowski PL, *et al.* "Attachment Theory: A Model for Health Care Utilization and Somatization". *Psychosomatic Medicine* 64.4 (2002): 660-667.
17. Meredith PJ, *et al.* "A review of the evidence linking adult attachment theory and chronic pain: Presenting a conceptual model". *Clinical Psychology Review* 28.3 (2008): 407-429.
18. Maunder RG and Hunter JJ. "Attachment and psychosomatic medicine: Developmental contributions to stress and disease". *Psychosomatic Medicine* 63.4 (2001): 556-567.
19. Lindström B and Eriksson M. "Salutogenesis". *Journal of Epidemiology and Community Health* 59.6 (2005): 440-442.
20. Schnyder U, *et al.* "Sense of Coherence- A Mediator between Disability and Handicap". *Psychotherapy and Psychosomatics* 68.2 (1999): 102-110.

21. Antonovsky A. "Unraveling the Mystery of Health". Jossey-Bass Inc, Publishers (1987).
22. Schnyder U., et al. "Antonovsky's sense of coherence: trait or state?" *Psychotherapy and Psychosomatics* 69.6 (2000): 296-302.
23. Flensburg Madsen T and Ventegodt S. "Sense of Coherence and Physical Health. A Review of Previous Findings". *The Scientific World Journal* 5 (2005): 665-673.
24. Peilot B., et al. "Evaluation of Treatment with Cognitive Therapy and a Patient-Centered Approach in Patients with Chronic Musculoskeletal Pain and Psychiatric Co-Morbidity - A Pilot Study". *EC Neurology* 11.8 (2019): 612-629.
25. Peilot B., et al. "Quality of life assessed with Short Form 36- A comparison between two populations with lonh-term musculoskeletal pain disorders". *Disability and Rehabilitation* 32.23 (2010): 1903-1909.
26. Peilot B., et al. "Vulnerability and Resilience in Patients with Chronic Pain in Occupational Healthcare: A Pilot Study with a Patient-Centered Approach Pain Research and Treatment". *Pain Research and Treatment* (2018): 9451313.
27. Griffin D and Bartholomew K. "Models of the self and other: Fundamental dimensions underlying measures of adult attachment". *Journal of Personality and Social Psychology* 67.3 (1994): 430-445.
28. Turk DC and Rudy TE. "Toward an Empirically Derived Taxonomy of Chronic Pain Patients: Integration of Psychological Assessment Data". *Journal of Consulting and Clinical Psychology* 56.2 (1988): 233-238.
29. Kerns RD., et al. "The West Haven-Yale Multidimensional Pain Inventory (WHYMPI)". *Pain* 23.4 (1985): 345-356.
30. Okifuji A., et al. "Improving the Rate of Classification of Patients with the Multidimensional Pain Inventory (MPI): Clarifying the Meaning of Significant Other". *The Clinical Journal pf Pain* 15.4 (1999): 290-296.
31. Rudy TE. "Multiaxial assessment of pain: Computer program users manual". Version 2.1. Pittsburgh: Pain Evaluation and Treatment Institute (1989).
32. Jackson JE. "A user's guide to principal components". New York: Willey (1991).
33. Trygg J and Wold S. "O2-PLS for Qualitative and Quantitative Analysis in Multivariate Calibration". *Journal of Chemometrics* 16.6 (2003): 283-293.
34. Trygg J and Wold S. "Orthogonal Projections to Latent Structures (OPLS)". *Journal of Chemometrics* 16.3 (2002): 119-128.
35. Peilot B., et al. "Time to gain trust and change-Experiences of attachment and mindfulness-based cognitive therapy among patients with chronic pain and psychiatric co-morbidity". *International Journal of Qualitative Studies on Health and Well-Being* 9 (2014): 24420.
36. Peilot B., et al. "Smärtpatienter-personlighet, upplevt sammanhang, kliniskt status, effekter av kognitiv terapi". *Socialmedicinsk Tidsskrift* 84.2 (2007): 133-147.
37. Waters E., et al. "Attachment Security in Infancy and Early Adulthood: A Twenty-Year Longitudinal Study". *Child Development* 71.3 (2000): 684-689.
38. Waldinger R., et al. "Mapping the Road From Childhood Trauma to Adult Somatization: The Role of Attachment". *Psychosomatic Medicine* 68.1 (2006): 129-135.
39. Nilsson B and Holmgren LGW. "Sense of coherence in different stages of health and disease in northern Sweden. Gender and psychosocial differences". *Scandinavian Journal of Primary Health Care* 18.1 (2000): 14-20.
40. Söderberg S., et al. "Living with Fibromyalgia: Sense of Coherence, Perception of Well-being, and Stress in Daily Life". *Research in Nursing and Health* 20.6 (1997): 495-503.
41. Eriksson M and Lindstrom B. "Antonovsky's sense of coherence scale and the relation with health: a systematic review". *Journal of Epidemiology and Community Health* 60.5 (2006): 376-381.
42. Turk DC. "The Potential of treatment matching for Subgroups of Patients With Chronic Pain: Lumping Versus Splitting". *Clinical Journal of Pain* 21.1 (2005): 44-55.

43. Epker J and Gatchel R. "Coping Profile Differences in the Biopsychosocial Functioning of Patients with Temporomandibular Disorder". *Psychosomatic Medicine* 62.1 (2000): 69-75.
44. Morley S., *et al.* "A confirmatory factor analysis of the Beck Depression Inventory in chronic pain". *Pain* 99.1-2 (2002): 289-298.
45. Geisser ME., *et al.* "Assessing depression among persons with chronic pain using the Center for Epidemiological Studies-Depression Scale and the Beck Depression Inventory: A comparative analysis". *The Clinical Journal of Pain* 13.2 (1997): 163-170.

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