

THE IMPACT OF CHRONIC OROFACIAL PAIN ON HEALTH-RELATED QUALITY OF LIFE

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Abstract

Background and aims:

Health-related quality of life (HRQoL) assessments have been widely used in pain medicine as they are able to reflect the subjective and multidimensional nature of chronic pain. Studies have shown a consistent impairment in HRQoL in different chronic pain conditions. However, it is not known whether HRQoL is impaired in chronic orofacial pain (OFP). The generic 15D HRQoL instrument has been shown to fare as well as or better than other generic HRQoL instruments in the study of chronic pain. The aim was to investigate HRQoL in patients with chronic OFP using the generic 15D HRQoL instrument. The validity of the instrument was tested by studying the association of the 15D data with pain interference.

Methods: 151 patients (mean age 50 years, SD 15 years, 119 females) were recruited from three tertiary facial pain clinics. HRQoL data of the participants were contrasted with that of an age- and gender- standardized sample of general population by comparing the mean 15D scores and profiles. The data for the general population came from the National Health 2011 Survey representing Finnish population aged 18 years and older. Pain interference was assessed using Brief Pain Inventory. Based on pain interference distribution the participants were divided into tertiles. Statistical comparison between patient and population HRQoL values were performed using Monte-Carlo-type simulations. Statistical significance for the hypothesis of linearity was evaluated by using generalized linear models.

Results: The mean 15D score of OFP patients (0.824, SD 0.113) was statistically significantly lower than that of the age- and gender-standardized general population (0.929, SD 0.019) ($p < 0.001$). The difference between the patients and the general population was also clinically important, i.e. over the minimum clinically important difference in the 15D score. All mean 15D dimension values were significantly lower compared with the general population values ($p < 0.001$ for all dimensions). The largest differences were seen in the dimensions of discomfort and symptoms (0.418, SD 0.222 vs. 0.816, SD 0.027), sleeping (0.693, SD 0.258 vs. 0.838, SD 0.029), and vitality (0.702, SD 0.221 vs. 0.884 (SD 0.026).

There was a statistically significant linear decrease in the 15D dimension values ($p < 0.001$) with increasing pain interference. The greatest differences were found on the dimensions of discomfort and symptoms, sleeping and vitality.

Conclusion: HRQoL is significantly impaired in patients with chronic OFP. A decrease in the 15D dimension values with increasing pain interference indicated convergent validity between 15D and pain interference.

Implications: The findings suggest that 15D is an appropriate instrument for use in the assessment of HRQoL in OFP patients. By showing the usefulness of the 15D, the present study may encourage further use of generic HRQoL assessments in the study of chronic OFP, and contribute e.g. to the implementation of HRQoL as one of the core outcome measures in future treatment studies on chronic OFP.

Key words: health-related quality of life, 15D instrument, pain interference, orofacial pain, chronic pain

Introduction

Orofacial pain (OFP) can be a symptom of various disorders. The most common chronic OFP conditions are temporomandibular disorders (TMD), burning mouth syndrome (BMS), neuropathic facial pain, and persistent idiopathic facial pain (1). The prevalence of chronic OFP is in the range of 8-15% (2). It has considerable economic impact through lost workdays and direct health care costs (2,3).

Assessment of health-related quality of life (HRQoL) provides information on the subjective effects of chronic health conditions on the lives of those affected (4). The generic HRQoL instruments describe the patient's comprehensive health with a single index that reflects the health state in relation to full health and death. Generic HRQoL assessments are increasingly used as patient-reported treatment outcome measures as they provide important information on the beneficial and adverse effects of treatments from the subject's perspective. Preference-based HRQoL expand upon generic instruments by applying various methods to incorporate patient opinion concerning the value of a particular health state (5), and can be used to perform cost-utility analyses (6).

HRQoL assessments have been widely used in pain medicine, as these measures are able to reflect the subjective and multidimensional nature of chronic pain. The studies have shown a consistent impairment in HRQoL in different chronic pain conditions (5,7,8). Whether this applies to chronic OFP conditions is not fully understood as the few studies on orofacial pain utilizing generic HRQoL measures have focused on individual orofacial pain conditions. In the only previous study on a chronic OFP patient population, Durham and colleagues (9) showed that the EQ-5D-5L, one of the most widely used generic HRQoL instruments, had convergent validity with a multidimensional pain measure in quantifying the impacts of chronic OFP. Comparisons of the HRQoL of chronic OFP patients with that of the general population or patients with other chronic health conditions have not been reported.

Until lately, none of the many HRQoL instruments had been validated in chronic pain (10). We have recently shown that the 15D, a generic, preference-based HRQoL instrument with good reliability, validity and discriminative power (11-13), was more strongly associated with commonly-used measures of chronic pain severity than the EQ-5D-3L, indicating better validity. The 15D also showed better discriminatory power, especially, for patients with good health (14). A previous study using the 15D in a large population of chronic pain patients indicated that the impact

of pain (i.e., how much pain interfered with usual activities) was strongly associated with the 15D score (8).

In general, measuring interference of pain is considered to provide a global overview of daily function and psychosocial impact of a pain condition (15). Pain interference is a widely used and thoroughly studied assessment method in chronic OFP: it has been shown that patients reporting most severe pain interference report highest levels of psychological distress (16-19), and report their general health as poorer compared with those with lower disability (16, 18-20). Based on the previous findings, it can be hypothesized that patients with chronic OFP have impaired HRQoL, and that the interference caused by the pain strongly associates with the HRQoL.

The aim of the present study was to assess, using the 15D instrument, the impact of chronic OFP on HRQoL by comparing the HRQoL of the patients with that of an age- and gender-standardized sample of the general population. Further, as the 15D has not earlier been used to study orofacial pain, we wanted to test its validity and discriminatory power by studying the association of the 15D data with pain interference.

Methods

Subjects

This cross-sectional, observational study is part of the multi-center study KROKIETA, Chronic Pain, Life Style Factors and Quality of Life, study in Finland. The study patients were recruited from facial pain clinics at three hospitals in Finland (Turku and Kuopio University Hospitals and Central-Finland Central Hospital) between November 2013 and November 2016. Consecutive patients aged 18-75 years referred to pain management in tertiary care because of chronic OFP were invited to participate in the study and were provided with written information about the study protocol (n = 164). Headache patients were not included. Neither were patients with cancer-related pain nor patients unable to answer the study questionnaire independently. The Ethics Committee of the Helsinki University Hospital approved the study (decision no. 29/13/03/00/2012), and each hospital gave permission for the study.

Four patients refused to participate. Nine patients from the remaining sample of 160 patients did not return questionnaires or answered them incompletely. The final number of patients included in the study was 151 (119 females, mean age 50 years, SD 15 years). All participants gave written informed consent.

Measures

15D - the 15-dimensional health-related quality of life measure

The 15D is a generic, preference-based, self-administered standardized instrument for the measurement of HRQoL with proven reliability, validity, discriminatory power and responsiveness to change (11-13, 21, 22). It consists of 15 questions describing various dimensions of health: mobility, vision, hearing, breathing, sleeping, eating, speech, excretion, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity. Each of the dimensions has five levels of severity from which the patient chooses the one best describing his or her situation at that moment. The 15D can be used both as a profile and a single index score measure. The single index 15D score, representing the overall HRQoL on a 0 to 1 scale (1 = full health, 0 = being dead), and the dimension level values, reflecting the goodness of the levels relative to “no problems” (= 1) and to “being dead” (= 0), are calculated from the health state descriptive system by using a set of population-based preference weights. These weights have been elicited from representative population samples by using magnitude estimation in a 3-stage valuation process based on the multi-attribute utility theory (12). The scores thus reflect the population’s preferences of a certain health state over death and full health. The minimum important change (MIC) in the 15D score has been established to be 0.015 (23).

In the current study, the Finnish language version of the 15D was used. For the English language version, see Supplemental file.

The Brief Pain Inventory (BPI)

The Brief Pain Inventory (24) is a commonly used method to assess the intensity and interference of pain. Pain intensity during the last week is assessed by four questions (worst, least, average and right now) on a numerical rating scale (NRS) from 0 (no pain) to 10 (worst imaginable pain). Pain interference is assessed with seven questions about the interference of pain with different daily activities (general activity, walking, work, mood, enjoyment of life, relations with others and sleep),

on NRS from 0 (no interference) to 10 (interferes completely). The intensity and interference scores are commonly presented on a scale from 0 to 10, obtained by calculating the mean of the sum total of the respective NRS scores.

The Pain Anxiety Severity Scale (PASS-20)

The 20-item version of the Pain Anxiety Severity Scale measures negative beliefs, avoidance behavior, fears and anxiety related to pain (25). The measure is based on the fear-avoidance model of chronic pain. Participants rate the frequency of occurrence of each of the behaviors on a 6-point scale from 0 (never) to 5 (always).

The Beck Depression Inventory II (BDI II)

The BDI II is one of the most frequently used measures to investigate depressive symptoms (26). It contains 21 questions, each answer scored on a scale from 0 to 3, where higher scores indicate more severe depressive symptoms.

The Basic Nordic Sleep Questionnaire

Sleep and sleep disturbances were assessed with the Basic Nordic Sleep Questionnaire (BNSQ) (27). Five multiple-choice questions of BNSQ were chosen to be analyzed in this study. The questions concerned the severity of difficulty in falling asleep, waking up during the night, use of sleep medication, and tiredness in the evening and in the morning. The individual questions were scored from 0 to 4 to indicate increasing severity and the sum score of the five questions was used as a single index value.

Occurrence of pain in other areas

The study participants were asked to mark all sites where they had pain on a whole-body pain drawing. The drawings were analyzed and the information obtained was divided as follows: pain only in the head region (score = 0) or pain in other body areas as well (score = 1).

Duration of facial pain

The duration of pain was asked for and participants were divided into three groups: pain duration less than 1 year, from 1 to 2 years and more than 2 years.

Socioeconomic factors

Questions measuring socioeconomic background variables were based on FINRISK-survey, a Finnish national health survey (28). For the present study, information on years of education, marital status, employment, smoking status, use of alcohol, and leisure time activities were extracted.

Information on working status was divided into three classes: still actively working, retired, unemployed. Information on marital status was divided into two classes: cohabiting with someone or living alone. Smoking habit was divided into current smoking and non-smoking. Use of alcohol was assessed using Alcohol Use Disorders Identification Test (AUDIT), a 10-question test with a 0 – 4 scale where larger numbers indicate more severe alcohol abuse behaviors.

Leisure time physical activity was inquired about as follows: “How often do you practice leisure time exercise for at least 20 minutes so that you feel slightly breathless and sweaty?” The information was divided into three classes: less than once a week (low activity), 1 to 3 times a week (moderate activity) and more than 3 times a week (high activity).

Study design

All the study participants were asked to fill in the above-mentioned questionnaires before or during their first visit to the facial pain clinic.

The HRQoL of the patients was contrasted with that of the general population by comparing their mean 15D scores and profiles with those of a representative sample of the general population. The data for the general population came from the National Health 2011 Survey representing Finnish population aged 18 years and older (29). Because age and gender are important determinants of HRQoL, a subsample (n = 1306) of individuals who were in the age range of the participants was chosen and weighted to reflect the age and gender distribution of the participants.

To study the association of HRQoL with pain interference, BPI/interference subscore was calculated by obtaining the mean of the seven individual NRS questions on pain interference. Based on pain interference distribution the participants were divided into tertiles: Class I BPI interference < 2.5 (n = 50), class II 2.5 - 5.6 (n = 50) and class III 5.7 - 10 (n = 51). Further, to examine the validity and discriminatory power of the interference division, the psychosocial characteristics of the participants in different interference tertiles were described and analyzed.

Statistical methods

Descriptive statistics include means and SDs for continuous variables and numbers and percentages for categorical (ordinal) variables. Statistical significances for the unadjusted hypothesis of linearity across tertiles of pain interference were calculated by using the Cochran-Armitage test for trend and analysis of variance (ANOVA) with an appropriate contrast (orthogonal polynomial). Adjusted hypotheses of linearity across tertiles of pain interference and the 15D dimensions were evaluated by using bootstrap-type (5 000 replications) analysis of covariance (ANCOVA). Models included age and years of education as covariates. Statistical comparisons between the participants' and the age- and gender-standardized population sample's 15D scores were done using Monte-Carlo-type simulations (30). Correlations are expressed with Spearman's correlation coefficients with bootstrapped 95% confidence intervals. The normality of the variables was evaluated graphically and using the Shapiro–Wilk W test. All statistical analyses were carried out with Stata, version 15.0 (StataCorp, College Station, TX).

Results

The sociodemographic and pain-related psychosocial characteristics are presented in Table 1. Mapping of these characteristics in different pain interference tertiles displayed differences especially in the psychosocial characteristics of the patients. With increasing pain interference a statistically significant increase was noted in pain intensity, pain chronicity, presence of pain in other areas, depressive symptoms, anxiety and sleep disturbances, whereas a decrease was noted in leisure time physical activity (Table 1).

The mean 15D score of OFP patients (0.824, SD 0.113) was significantly lower than that of the age- and gender-standardized sample of the general population (0.929, SD 0.019) ($p < 0.001$). The difference between the patients and the general population was also clinically important, i.e. over the minimum clinically important difference in the 15D score of 0.015 (23).

All mean 15D dimension values were statistically significantly lower than those of the general population ($p < 0.001$ for all dimensions) (Figure 1). The largest differences were seen on the dimensions

of discomfort and symptoms (0.418, SD 0.222 vs. 0.816, SD 0.027), sleeping (0.693, SD 0.258 vs. 0.838, SD 0.029), and vitality (0.702, SD 0.221 vs. 0.884 (SD 0.026).

There was a statistically significant linear decrease in the 15D score ($p < 0.001$) and for all dimension values, except for two (vision and eating), with increasing pain interference. The greatest differences were found on the dimensions of discomfort and symptoms, sleeping and vitality (Table 2, Figure 2).

Correlation was noted between the 15D score and BPI/interference (Figure. 3).

Discussion

Main findings

The results of the study indicate that chronic OFP substantially reduces the HRQoL of these patients. The self-reported HRQoL of OFP patients (0.824) was statistically significantly and clinically importantly lower than that of an age- and gender-standardized sample of the Finnish population (0.929). From the different dimensions of health described by the 15D, discomfort and symptoms, sleep and vitality were most affected. The results also indicated convergent validity between the results of the 15D and interference in daily functioning caused by the pain by showing a statistically significant linear decrease in the 15D dimension score values and in most individual dimension values with increasing pain interference, as well as an inverse correlation ($r = -0.65$) between the 15D score and pain interference. These findings suggest that 15D is an appropriate instrument for use in the assessment of HRQoL in OFP patients.

Comparison with other chronic conditions

The impact of major chronic health conditions on HRQoL was investigated in a population-based survey in Finland using the 15D (31). Compared with the results of that study, the findings of the present study indicate that HRQoL of chronic OFP patients is poorer than that of patients suffering from many types of chronic health conditions such as cancer (0.855), depression (0.841), back (0.874) or neck (0.879) problems or osteoarthritis of the hip and knee (0.873), and comparable to that of patients with serious psychiatric conditions (0.829) or coronary heart disease (0.821). Looking at the results of 15D studies with similar study settings, the perceived burden of chronic OFP seems less than

that of patients admitted to secondary care because of depression (0.729) (32), but similar to that of secondary care rheumatoid arthritis patients (0.822) (33). That chronic OFP seems to impact HRQoL more than many serious somatic health conditions may reflect the comprehensive nature of suffering or distress often connected to chronic pain problems. Some of the lowest mean 15D scores (0.710 and 0.714) reported in outpatient populations were those found in recent studies on tertiary care chronic pain patients (8,34). The difference in the perceived burden between the tertiary care pain patients and the orofacial pain patients of the present study may be due to the more devastating effects of bodily pains on e.g. mobility and usual activities, compared with those caused by orofacial pain conditions. Having musculoskeletal pain only in the craniomandibular region impairs HRQoL less than more widespread musculoskeletal pain (35). Similarly, the impact of trigeminal neuropathic pain on HRQoL is less than that of conditions involving bodily neuropathic pains (36).

With one exception (9), earlier studies on HRQoL have focused on different, specific orofacial pain conditions. Further, they have utilized instruments other than the 15D, the SF-36 (20, 37-39) or EQ-5D (36, 40, 41). As different HRQoL instruments measure different constructs they can produce variable results in the same patient populations (13,42). Thus, direct comparisons of the present results and those of earlier studies are not feasible. However, all studies have shown that chronic orofacial pain conditions impact negatively HRQoL (9, 35-41).

HRQoL and pain interference

Statistically significant and clinically important decreases in the mean 15D score and marked, statistically significant decreases in most dimension values were noted with increasing pain interference. In particular, the dimensions discomfort and symptoms, sleeping and vitality deteriorated with increasing pain interference. These are the same dimensions on which OPF patients differed most from the general population. An impairment of most of those 15D dimensions, which are associated with psychosocial aspects of health, has also been noted in another chronic pain population in tertiary care (8).

Patients in the lowest interference tertile, i.e., those reporting low pain-related interference, judged their HRQoL to be as good as that of the general population sample with the exception of the dimension of discomfort and symptoms where the participants had lower values. However, patients in the highest interference tertile reported impaired HRQoL with marked deterioration on almost all

15D dimensions. An association of pain interference and HRQoL, which has also been noted in other studies on chronic pain populations (8,14) as well as in chronic orofacial pain (41), is logical as both of these measures comprehensively assess the impact of pain can, however, be an advantage given the fluctuating manner of orofacial pains, as the reference period of the BPI/interference measure and of the 15D are different (the last week vs. current). Further, IMMPACT (43) and VAPAIN (44) recommendations for core outcome domains and measures in chronic pain trials state that several outcomes should be used, including both pain interference and HRQoL measures.

As in previous studies on chronic OFP patients (16-19), significant increases in pain intensity, pain duration, presence of pain in other areas, depressive symptoms, anxiety and sleep disturbances, were noted with increasing pain interference in the present study, with a decrease in leisure time physical activity. These results support the validity and discriminative power of the interference division (tertiles) used in the present study.

Strengths and limitations

The present study is the first to compare the HRQoL of chronic orofacial pain patients with that of an age- and gender-standardized sample of the general population. The use of the generic and preference-based 15D instrument also makes the comparison of the impact of orofacial pain with that of other chronic pains or other chronic health conditions possible. The 15D instrument used in the present study has been shown to fare as well as or better than other preference-based HRQoL instruments (13,14,22,42). In addition to the single index score measure, the 15D can be used as a profile, which describes the 15 dimensions of health. An analysis of the impaired dimensions gives insight into which aspects of health are affected by a given condition and consequently relevant targets for treatment intervention. Further, with the established MIC value, the 15D is a suitable measure for intervention studies. By showing the usefulness of the 15D in the assessment of chronic OFP, the present study may contribute to the implementation of HRQoL assessment as one of the core outcome measures in future treatment studies on chronic OFP as advised by the IMMPACT recommendations (43).

Limitations of the present study are that the participants were tertiary care facial pain patients, i.e. a selected group of challenging pain patients, and thus the results may not be applicable to all chronic OFP patients. Moreover, the participants were a heterogenous group of OFP patients, not patients with specific orofacial pain diagnoses, which may impact the HRQoL differently. Furthermore, a

generic HRQoL instrument was used, which has a possible disadvantage of being less sensitive than condition-specific instruments, as it may not capture all the relevant aspects of the disease. Thus the concomitant use of generic and condition-specific instruments in HRQoL studies is recommended, albeit especially in studies focusing on responsiveness to treatment or disease progression, as these measures are able to assess in greater detail the impact of chronic pain condition on HRQoL (5). However, to our knowledge, no validated condition-specific instruments exist for chronic orofacial pain conditions.

Conclusions

The HRQoL is significantly impaired in patients with chronic orofacial pain. By showing a linear decline in HRQoL with increasing pain-related interference, the results suggest that the 15D is an appropriate instrument for use in the assessment of HRQoL in orofacial pain patients.

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Legends for figures

Figure 1. The mean (95% CI) values of different dimensions of the 15D and the 15D score. The dashed line shows the mean scores in the general Finnish population weighted to match the gender and age distribution of the study population.

Figure 2. The figure depicts the differences in the mean 15D dimension values and the 15D score between patients with orofacial pain and the Finnish general population, divided according to pain interference tertiles. Error bars show 95 per cent confidence intervals.

Figure 3. The individual participants' 15D scores compared to the individual BPI/interference scores.

Authors' statements

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Conflict of interest Harri Sintonen is the developer of the 15D, and reports royalties for the electronic versions of the 15D, outside the submitted work. Eija Kalso reports having received honoraria for advisory board membership from Orion Pharma, Gruenthal and Laboratoires Pierre Fabre. The other authors report no conflicts of interest that may have affected the work.

Informed consent Informed consent was obtained from all individuals included in this study

Ethical approval The research complies with all the relevant national regulations, institutional policies and was performed in accordance with the tenets of the Helsinki Declaration. The Ethics Committee of the Helsinki University Hospital approved the study, and each hospital gave permission for the study.

Previous presentation of the data Part of the study data has been presented as abstract in EFIC 2017 congress in Copenhagen.

A previous methodological study by our group on the validity of the 15D and another HRQoL instrument, the EQ-5D, in chronic pain (Vartiainen P, Mäntyselkä P, Heiskanen T, Hagelberg N, Mustola S, Forssell H, Kautiainen H, Kalso E. Validation of EQ-5D and 15D in the assessment of health-related quality of life in chronic pain. *Pain* 2017;158:1577-1585) used data from a large sample of patients with chronic pain (n 373), including a portion (130/151) of the present patients with orofacial pain. In the analysis of the associations of the two HRQoL measures, the data was handled in its entirety, not separating the results concerning patients with orofacial.

Trial register number: ClinicalTrials.gov. ID: NCT03028051

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Table 1. Sociodemographic and pain-related psychosocial characteristics of all participants and for participants divided into tertiles according to pain interference

	All	Pain interference tertiles			P-value*
		I (<2.5) N=50	II (2.5–5.6) N=50	III (≥5.7) N=51	
Number of females, (%)	119 (79)	37 (74)	41 (82)	41 (80)	0.44
Age, mean (SD)	50 (15)	48 (16)	49 (15)	52 (13)	0.23
Education years, mean (SD)	13.7 (3.7)	13.9 (4.0)	13.8 (3.5)	13.3 (3.7)	0.45
Working status, n (%)					0.33
Working	52 (34)	16 (32)	14 (28)	22 (43)	
Unemployed	83 (55)	30 (60)	31 (62)	22 (43)	
Retired	16 (11)	4 (8)	5 (10)	7 (14)	
Cohabiting, n (%)	104 (69)	34 (68)	38 (76)	32 (73)	0.56
Smoking, n (%)	25 (17)	11 (22)	8 (16)	6 (12)	0.17
AUDIT, mean (SD)	2.5 (2.7)	2.1 (2.1)	2.8 (2.9)	2.7 (3.1)	0.29
Leisure time physical activity, n (%)					0.016
Low	46 (30)	10 (20)	15 (30)	21 (41)	
Moderate	67 (44)	26 (52)	18 (36)	23 (45)	
High	38 (25)	14 (28)	17 (34)	7 (14)	
Sleep score, mean (SD)	9.0 (4.5)	6.4 (3.1)	8.9 (3.7)	11.8 (4.7)	<0.001
BDI, mean (SD)	9.7 (8.3)	4.3 (4.3)	9.6 (7.0)	14.9 (9.3)	<0.001
PASS, mean (SD)	38 (19)	26 (18)	37 (16)	49 (17)	<0.001
Pain intensity, mean (SD)	4.87 (1.97)	3.10 (1.52)	5.06 (1.45)	6.42 (1.29)	<0.001
Pain in other areas, n (%)	127 (84)	39 (78)	40 (80)	48 (94)	0.027
Duration of pain, n (%)					0.048
<1 year	26 (17)	11 (22)	7 (14)	8 (16)	
1-2 years	20 (13)	10 (20)	7 (14)	3 (6)	
>2 years	105 (70)	29 (58)	36 (72)	40 (78)	

* p for linearity across tertiles of pain interference.

Table 2. The values (mean, SD) of 15D dimensions according to pain interference tertiles in patients with chronic orofacial pain.

	Pain interference tertiles			P-value*
	I (<2.5)	II (2.5-5.6)	III (≥5.7)	
Mobility	0.977 (0.079)	0.899 (0.156)	0.870 (0.183)	<0.001
Vision	0.945 (0.159)	0.956 (0.120)	0.880 (0.198)	0.16
Hearing	0.969 (0.100)	0.949 (0.116)	0.869 (0.168)	<0.001
Breathing	0.929 (0.138)	0.926 (0.156)	0.803 (0.223)	0.001
Sleeping	0.782 (0.240)	0.751 (0.204)	0.550 (0.265)	<0.001
Eating	0.986 (0.070)	0.958 (0.116)	0.951 (0.123)	0.078
Speech	0.964 (0.097)	0.964 (0.097)	0.901(0.173)	0.035
Excretion	0.887 (0.174)	0.862 (0.179)	0.739 (0.240)	<0.001
Usual activities	0.932 (0.135)	0.811 (0.216)	0.659 (0.276)	<0.001
Mental function	0.943 (0.132)	0.859 (0.186)	0.750 (0.233)	<0.001
Discomfort and symptoms	0.576 (0.223)	0.391 (0.181)	0.291 (0.157)	<0.001
Depression	0.953 (0.107)	0.860 (0.170)	0.776 (0.199)	<0.001
Distress	0.886 (0.163)	0.804 (0.206)	0.782 (0.236)	0.001
Vitality	0.846 (0.156)	0.702 (0.170)	0.563 (0.232)	<0.001
Sexual activity	0.931 (0.137)	0.813 (0.229)	0.635 (0.98)	<0.001
15D score	0.901 (0.062)	0.835 (0.086)	0.738 (0.117)	<0.001

*p for linearity adjusted for gender, age, education and duration of pain.

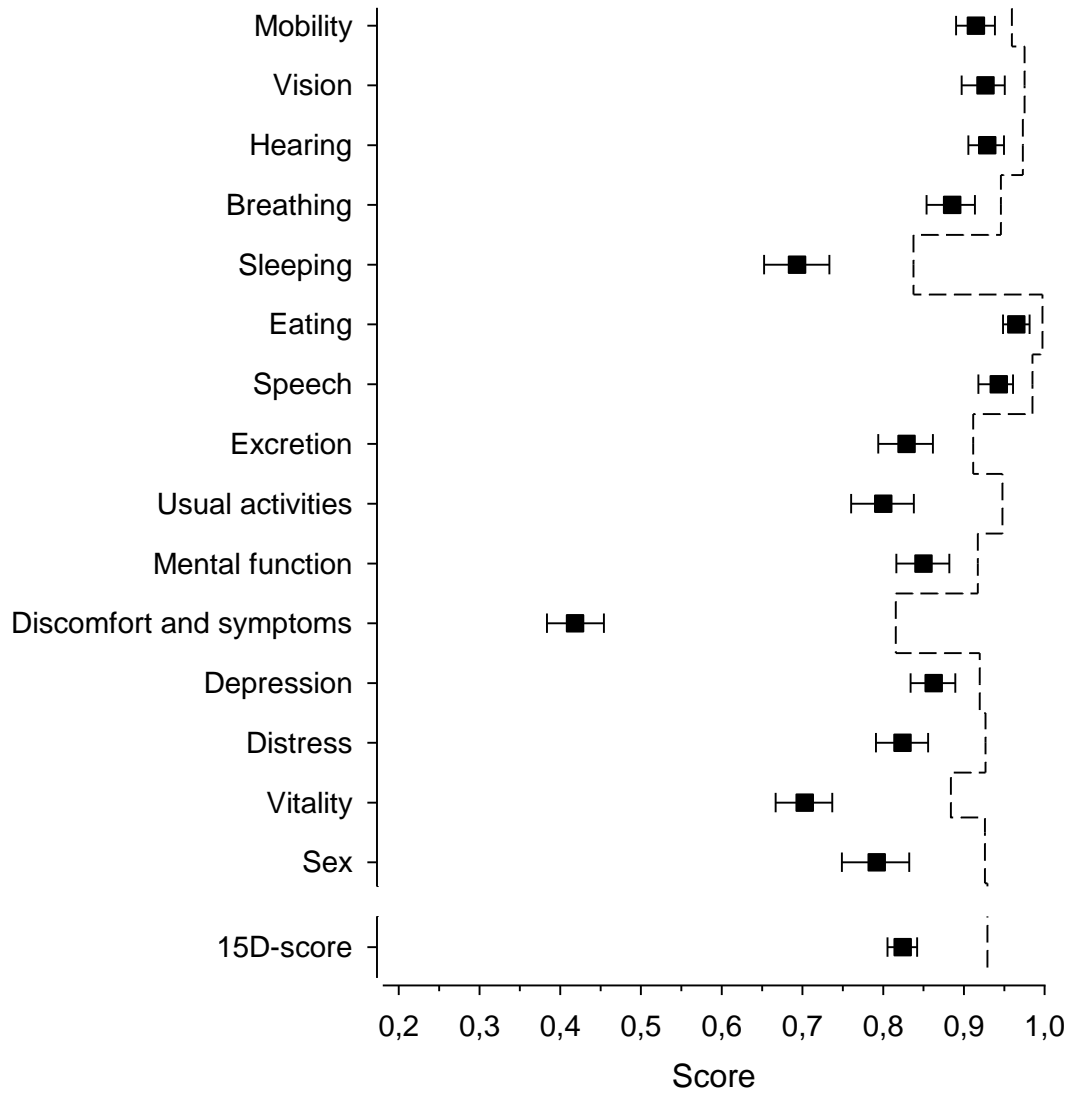


Figure 1.

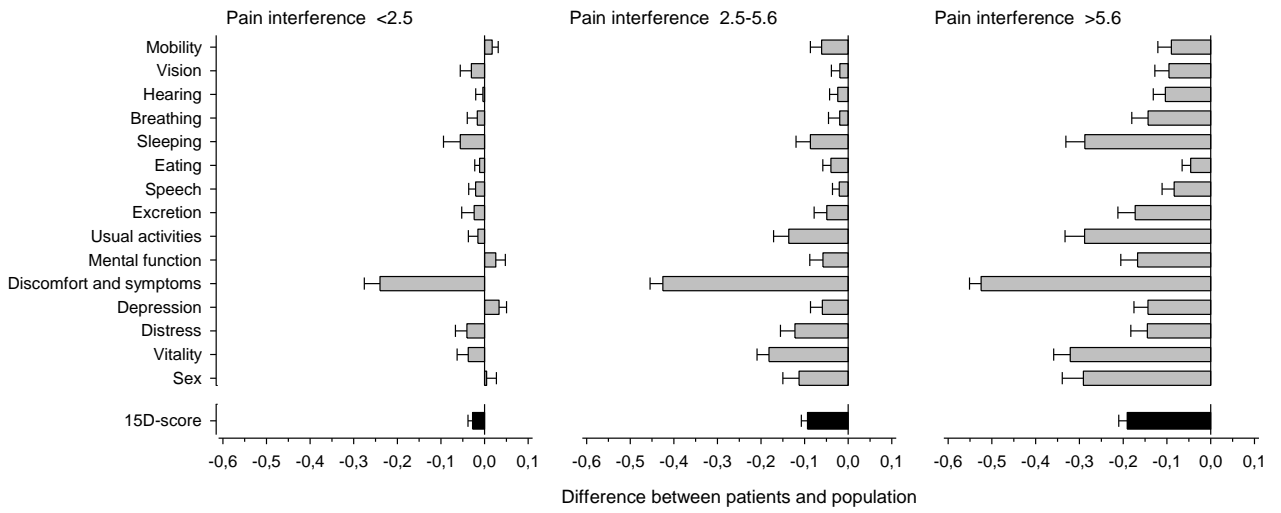


Figure 2.

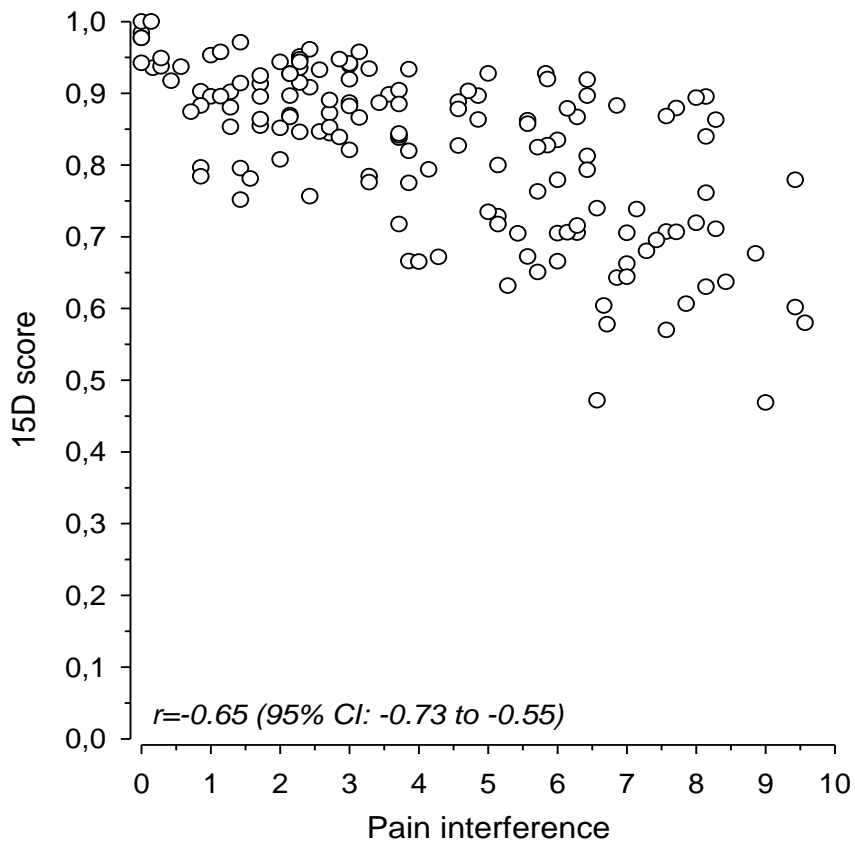


Figure 3.