Pain-related guilt in low back pain

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Abstract

Objectives:

Identifying mechanisms that mediate recovery is imperative to improve outcomes in low back pain (LBP). Qualitative studies suggest that guilt may be such a mechanism, but research on this concept is scarce, and reliable instruments to measure pain-related guilt are not available.

Methods:

We addressed this gap by developing and testing a pain-related guilt scale (PGS) for people with LBP. Two samples of participants with LBP completed the scale and provided data on rates of depression, anxiety, pain intensity and disability.

Results:

Three factors were identified using exploratory factor analysis (n=137): 'Social guilt' (4 items) relating to letting down family and friends; 'Managing condition/pain guilt', (5 items) relating to failing to overcome and control pain; and 'Verification of pain guilt', (3 items) relating to the absence of objective evidence and diagnosis. This factor structure was confirmed using confirmatory factor analysis (n=288), demonstrating an adequate to good fit with the data (AGFI= 0.913, RAMSEA= 0.061). The PGS subscales positively correlated with depression, anxiety, pain intensity and disability. After controlling for depression and anxiety the majority of relationships between the PGS subscales and disability and pain intensity remained significant, suggesting that guilt shared unique variance with disability

and pain intensity independent of depression and anxiety. High levels of guilt were reported by over 40% of patients.

Discussion:

The findings suggest that pain-related guilt is common and is associated with clinical outcomes. Prospective research is needed to examine the role of guilt as a predictor, moderator and mediator of patients' outcomes.

Key words

Low back pain, pain-related guilt, reliability, questionnaire, factor analysis

Introduction

Low back pain (LBP) is a leading cause of disability worldwide[1]. Prevention of the transition to chronic states of pain depends on identifying predictors of long term disability, and intervening to change them. Research has been successful in identifying several psychological predictors of poor outcomes, notably depression [2,3] . Despite the robust evidence for an association between depression and poor outcomes in LBP, the focus of depression in the context of pain remains poorly understood [4-6]. A neglected aspect of pain-related depression, which is prominent in the conceptualisation of clinical depression, is guilt [7]; its role in LBP pain has not been specifically and systematically studied.

The lack of conceptual clarity and measurement in reference to guilt has been highlighted in a systematic review of research on the role of guilt in the general psychopathology[8], which suggests that guilt is conceptually different from concepts such as anger, shame and blame. We decided that our approach to studying pain-related guilt should be pragmatic, and as such it focuses on people's individual understanding of guilt as a psychological process, rather than an examination of guilt as studied and understood within non-psychological domains, such as theological, philosophical and sociological. As a psychological process, guilt is postulated to include both affective and cognitive aspects [9], including "a feeling of negative self-regard" [10](p. 359), and a "painful affect arising from the belief that one has hurt another" [11] (p. 74). In depression, guilt is conceptualised as a perception of oneself as harmful to others, which results in attempts to minimize contact with others, or in

becoming submissive to others' needs above one's own[12]. Although we have linked our inquiry of guilt to depression, it appears that guilt in chronic pain extends beyond depression. Qualitative studies in groups with individuals suffering from LBP[13,14] suggest that guilt is an important factor that contributes to suffering. The focus of guilt in groups with pain appears to be different from that of clinically depressed groups, for instance, guilt has been found to exacerbate the effects of chronic pain on job dissatisfaction and tension [15], and it has been linked to poor participation in social and family life [14]. But overall, the role of guilt in patients' social relationships is poorly researched and the aim of this study is to understand how prevalent this type of guilt is and whether it is related to other outcomes in LBP, such as pain intensity and disability. Crucially, patients associate guilt with their inability to provide evidence and a convincing diagnosis to justify their pain [14]. There is evidence[16] that clear explanations predict outcomes in primary care; therefore examining if the lack of clear evidence contributes to patients feeling guilty, and furthermore, examining the impact of such guilt on poor coping is of primary importance. However, the relationship between guilt, other known obstacles to effective coping, and long term outcomes in LBP remains unknown, and the investigation of predictive, moderating and mediating mechanisms is hindered by the absence of reliable and valid measures of pain-related guilt.

Preliminary work to this study consisted of the identification of relevant themes from transcripts of semi structured interviews with LBP patients [14]. The extracted themes were used to derive items for the Pain-related Guilt Scale (PGS). The aim of the current study was to develop and test a questionnaire with a sound, parsimonious, and interpretable factor structure for use in the assessment of pain-related guilt of LBP.

Materials and Methods

Participants

Two samples of participants with LBP provided data; participants in sample 1 (n=170) were recruited online and were members of three self-help groups for back pain. The use of online data is relatively common in pain research[17,18]. Participants in sample 2 (n=322) were presenting for assessment and/or treatment in an osteopathic clinic (n=224) or were recruited at an annual Back Pain Exhibition (n=98). Inclusion criteria were that participants be over the age of 18 years and have musculoskeletal back pain. No limit was imposed on pain duration and current pain intensity. Participants with back pain due to ankylosing spondylitis, osteoporosis, cancer and inflammatory conditions such as rheumatoid arthritis were excluded. Participants in sample 1 were invited to take part in the study through three self-help groups for back pain which hosted a link to the questionnaire, which was presented using an online survey tool (SelectSurveyASP Advanced v8.6.4). It recorded the computer ID that each participant used to access the survey, and it did not allow completion of the questionnaire from the same computer more than once. The study received ethical approval from the university research ethics committee and a college of osteopathy in London.

Measures

Demographics and pain details - Participants were asked to supply details about age, gender, duration of their back pain, and other health-related problems.

Pain-related guilt **-** The PGS was the primary measure under investigation. Items in the PGS were informed by a preliminary qualitative study with 20 LBP patients [14]. Transcripts were analysed using a grounded theory method, and resulted in three themes: 'Feeling guilty towards other people', 'Feeling guilty towards yourself' and 'Feeling guilty for not getting better'. In line with recommendation for methodological assessment [19,20], we applied the following criteria. We ensured there were no overly sensitive and double-barrelled items (items addressing more than one issue)[20]. The scale was checked for face validity and appropriate wording by four people with LBP. The process of the scale construction was monitored by two independent expert health psychologists. To address known limitations of measures of guilt [8] we ensured that all items focused specifically on guilt, rather than other constructs, such as anger, shame and blame, and that all aspects of guilt were clearly related to experiencing pain, rather than guilt in general [21]. We also decided that each item should include an explicit reference to guilt, to distinguish our inquiry from other concepts such as feeling bad, frustrated and ashamed, which are different from guilt [8]. Our qualitative work and piloting of the initial PGS showed that this explicit distinction was necessary.

The initial scale consisted of 24 items and it was later reduced to 12 items. It was headed by the phrase "Because of my back pain I have experienced feelings of guilt". As this structure did not accommodate the use of negative items, all items were positively worded. Responses were on a Likert-type rating scale, ranging from 1 ('never') - 5 ('always').

Pain intensity **-** Pain intensity was measured using a numeric scale of 0 ('no pain') to 10 ('pain as bad as you can imagine') [22] .

Anxiety and Depression **-** The Hospital Anxiety and Depression Scale (HADS) [23] consists of 14 items which evaluate the severity of anxiety and depression. The HADS has been widely used in studies of depression and anxiety in medical populations. The use of the HADS in a web sample has been shown to provide valid data [24].

Disability **-** Roland Disability Questionnaire (RDQ)[25] was used to measure back pain related disability. This is a widely used and reliable measure of low back disability [26].

Data Analytic Procedure

Data preparation and preliminary analysis **-** Participants who were missing more than 10% of responses [27,28] on the PGS were excluded (19 from sample 1 and 15 from sample 2). In sample 1 missing data below 10% was replaced with the sample mean for that item [29]. Pairwise and listwise deletion methods were compared [29]; all three methods yielded similar results in the exploratory factor analysis (EFA). Sample 2 included no participants with missing data below 10%. Participants who reported suffering from non-musculoskeletal back pain (osteoporosis, back pain due to cancer and inflammatory conditions such as rheumatoid arthritis and ankylosing spondylitis) were also excluded (14 from sample 1 and

15 from sample 2). Scores for 4 participants in sample 2 were multivariate outliers, indicating that these participants had extreme scores on multiple variables[30]; these participants were also excluded. Thus, the final sample 1 and sample 2 included 137 and 288 participants respectively.

Comparisons between the two samples were carried out using t tests and Mann Whitney tests. Because these preliminary analyses included measures besides the PGS (such as depression, anxiety, disability and pain intensity), participants with missing data were excluded on an analysis-by-analysis basis, which resulted in some variations in total sample sizes in these analyses.

Factor analysis - The two samples were analysed separately with data from sample 1 used in the EFA of the PGS and data from sample 2 in the confirmatory factor analysis (CFA) for validation purposes [31].

Exploratory factor analysis - One rule of thumb for adequate sample size is that if there are sufficient high loadings (above .8) then a high sample size is not necessary, and a sample of approximately 150 should be sufficient [29]. It is recommended [32] that a minimum sample of 100 is used, or to have at least five times as many participants as variables. The guilt scale had 24 items, thus requiring a minimum sample size of 120 participants' data sets.

EFA (using SPSS 19 [33]) was carried out using direct oblimin rotation (because we expected factors to correlate) and principal components extraction methods. The selection of the number of components to be rotated was based on the Kaiser criterion and examination of the scree test of eigenvalues plotted against factors [31]. In addition, we excluded items that loaded <.4 [34] on all factors and items that loaded across two factors with a difference <.3 between the items [35].

Confirmatory factor analysis - CFA (using AMOS 19, [36]) was conducted to test the adequacy of the derived EFA model, using the maximum likelihood estimation method. Most published studies reporting similar analyses have a sample size of around 200 [30], and for a simple model, 200 cases are considered adequate [30,37].

CFA models were evaluated using a number of recommended goodness-of-fit indices. There are no set rules as to which indices should be reported [37]. First, the chi-square statistic ($\chi 2$) was evaluated as the initial indicator of model fit. Because the $\chi 2$ has a tendency to indicate significant differences, model fit was assessed by determining whether the observed chi square value was less than two times the model degrees of freedom ($\chi 2$ /df) [29]. We also used the Goodness of Fit Index (GFI > 0.95 close fit; GFI > 0.90 good fit), Adjusted goodness-of-fit index, which adjusts for degrees of freedom (AGFI> 0.80 good fit), Comparative fit index (CFI > 0.95 close fit; CFI> 0.90 adequate fit), and Root Mean Square Error Approximation (RMSEA < 0.05 good, < 0.08 acceptable, > 10 poor) [30]. When a model fit was poor, modification indices were inspected to indicate potential misspecified parameters [37].

They were used only where it was theoretically plausible, such as error correlation within factors [38].

Reliability analysis **-** Analyses of Internal Consistency (Cronbach's alpha) were performed on both samples.

Descriptive statistics for the PGS **-** We reported calculated descriptive statistics for the final subscales of the PGS. We reported percentages for pain-related guilt rates across the two samples in the following five categories: participants with the mean score in the range of 1 - 1.9, 2 – 2.9, 3 – 3.9, 4 – 4.9 and the final category was the mean score of 5 (meaning that a participant scored 5 on all subscale items).

Correlations between PGS subscales and depression, anxiety, disability and pain **-** To examine the validity of the PGS, Pearson or Spearman tests (depending on violation of assumptions for parametric statistics for each pair of variables) were planned after conducting the CFA. First, we conducted zero-order correlations between the PGS subscales and disability, pain intensity, depression and anxiety to explore the degree of association between these variables. However, as guilt is theoretically linked to anxiety and depression [7] we also conducted partial correlations to determine the degree of association between the PGS subscales and disability and pain intensity when impacts of depression and anxiety were removed. We also report R^2 for all significant correlations, which show the amount of shared variability between each pair of variables [31].

Results

Response rates

Response rates could not be calculated from the online sample (sample 1). Response rate for sample 2 was 53.7 %; in total 322 out of 600 distributed questionnaires were completed.

Description of samples

The two samples characteristics are reported in Table 1. The two samples were compared and tested for differences using t tests and Mann Whitney tests on measures of pain intensity, depression, anxiety and disability. The online sample was found to have significantly more pain, depression, anxiety and disability than sample 2 (see Table 1). However, these rates were broadly in line with other samples of LBP patients in the UK [39,40].

Insert Table 1 about here

Exploratory Factor Analysis of the PGS

All 24 items were included in the factor analysis; direct oblimin rotation and principal components extraction methods were employed. The Kaiser-Meyer-Olkin (KMO) statistic (a measure of sampling adequacy) was 0.92, defined as excellent [31]. This indicates that the data was appropriate for factor analysis. In addition to the overall KMO statistic, the diagonal elements of the anti-image correlation matrix were examined and all of them were

between 0.85 and 0.96 (values above 0.5 are accepted [31]). Bartlett's test of sphericity, X^2 (276) = 1354.68, p< .001, indicated that correlations between items were sufficiently large and that the data was factorable. Taken together, these tests provide a minimum standard which should be passed before a factor analysis should be conducted [31].

Oblique rotation was used because factors were expected to correlate with each other, and the structure matrix showed that this indeed was the case [31]. The analysis resulted in three factors with eigenvalues greater than 1 (accounting for 64.1% of the total variance), examination of the scree plot corresponded to this outcome.

We interpreted data from both the pattern and structure matrix [31] (the latter was used to check for cross loadings). Items that loaded <.4 on any factor were excluded [34] as well as cross loadings with a difference < .3 [35]. We followed this criterion strictly in all but one case; one of the items ('I have experienced feelings of guilt about not being able to visit my family and friends') met the criteria, but was excluded because it was very similar to another item in the scale ('I have experienced feelings of guilt when I have been unable to do things with my family and friends').

The three factors (subscales) included 12 items (see Table 2). The first subscale was named 'Social guilt'; it consisted of 4 items and related to letting down family and friends. The second subscale was named 'Managing condition/pain guilt'; it consisted of 5 items and related to failing to overcome and control pain. The third subscale was named 'Verification

of pain guilt'; it consisted of 3 items and related to the absence of objective evidence and diagnosis. These subscales corresponded well with the three themes extracted from previous qualitative work [14].

Insert Table 2 about here

Analysis of Internal Consistency - Cronbach's alpha values were either good or excellent for the sub-scales of the questionnaire (.94 for 'Social guilt' scale, .86 for 'Managing condition/pain guilt' and .83 for 'Verification of pain guilt'). No items had to be removed to improve these values.

Confirmatory Factor Analysis

The derived three factor EFA model (containing 12 items) was entered into a CFA. Based on Mahalanobis distance, 4 cases were identified as multivariate outliers, $p < .001$ and were deleted from the analysis [30]. The data fulfilled criteria for univariate [30] and multivariate normality [41,42].

Table 3 shows the fit indices for the initial model. The indices indicated that the fit was good (GFI, AGFI, CFI) or just short of adequate ($\chi 2$ /df). However, the RAMSEA was poor. Table 3 also shows modification indices (in steps) which suggested that the model fit improved most (see model 4 in Table 3) when specifying the presence of a covariance for the error terms of two pairs of items on the first factor (error terms of items 4 and 3, and items 3 and 1); and for the error terms of one pair of items (6 and 5) on the second factor.

Given that each pair of items contained related content and belonged to the same factor, it was considered appropriate to adjust the model such that the error terms of these items were allowed to covary. All indicators of model fit suggested that the adjusted model had an adequate to good fit with the data. Model fit was significantly improved over the initial model, X^2difference (3) =69.13, $p < .001$. All the items had high standardized regression weights (weights > .5 are considered good [29]), ranging between .78 and .92 and which were statistically significant ($p < .001$). See Figure 1 for the final CFA model, which also displays bivariate correlations (standardized regression weights) between the three PGS subscales.

Analysis of Internal Consistency **-** Cronbach's alpha values were either good or excellent (.91 for 'Social guilt' scale, .91 for 'Managing condition/pain guilt' and .88 for 'Verification of pain guilt'). No items had to be removed to improve these values.

Insert Table 3 about here

Insert Figure 1 about here

Descriptive statistics for the PGS

Table 1 shows mean frequencies for the three PGS subscales for the combined sample 1 and 2. High levels of guilt (participants with the mean score of 3 and above) were reported by over 40% of patients on each sub-scale and on the total guilt as measured by the new questionnaire. The maximum rate (scoring 5 on all subscale items) of social guilt was

reported by 6.8% participants, managing condition/pain guilt by 4.7% and verification of pain guilt by 3.8% participants.

Correlations between the PGS subscales and pain intensity, depression, anxiety, and disability

Table 4 shows zero-order correlations between the PGS subscales and disability, pain intensity, depression and anxiety, and partial correlations between the PGS subscales and disability and pain intensity after controlling for depression and anxiety. It also shows R^2 (shared variability) for all significant correlations.

Overall, the findings show that the zero order correlations between each guilt subscale and depression, anxiety, disability and pain intensity were all significant ($p<.001$) and positive with moderate to large effect sizes. All the relationships between guilt, disability and pain remain significant independently of depression and anxiety, other than the relationship between 'Verification of pain guilt' and disability, when controlling for depression.

See Appendix 1 for the final three factor PGS scale.

Insert Table 4 about here

Discussion

Main findings

The findings provide evidence for the dimensionality, reliability and validity of the new PGS in two LBP samples. Exploratory factor analysis identified a three-factor structure consisting of social guilt, managing LBP guilt and guilt related to absence of verification of LBP. This factor structure was confirmed through CFA in a new sample of patients. Reliability was demonstrated in both samples. Correlations between the PGS subscales and disability, pain intensity, depression, and anxiety were all positive and significant. After controlling for depression and anxiety, the PGS subscales still related significantly to disability and pain intensity, although these relationships were weakened. The only exception was 'Verification of pain guilt', which no longer related significantly to disability.

Implications for patients, clinical practice and research

Clarifying specific targets for interventions in order to improve outcomes depends on reliable and valid measurement of factors that are relevant to patients[43,44]. Amongst these factors, guilt may be a risk factor for poor outcome and a promising target for interventions. Currently, the mechanism by which guilt impacts on patients' outcomes is not known. It is possible that guilt affects outcomes through changes in behaviour that increase avoidance. Guilt may also moderate patients' willingness to engage in treatment and comply with advice. Finally, reducing guilt through targeted interventions may be an important

mediating mechanism to improve outcomes. The three roles (predictor, moderator and mediator) need to be explored in future research, which should include prospective designs, and sensitive measurement to elucidate change over time. The sub-classification provided by the current study in reference to guilt may help identify specific mechanisms that operate at an individual's level. The findings confirm that all aspects of guilt are common and non-trivial.

The presence of social guilt in LBP has been reported previously, studies have found that LBP patients' social life and relationships are considerably compromised by LBP[14,45]. In addition, up to 70% of pain patients report that they feel they have become a burden on others[46]. Guilt related to verification of pain focuses on not being able to provide clear observable evidence, diagnosis and explanations to verify pain. The measurement of the impact of having no diagnosis or objective evidence to justify pain is important, because only in about 5-10% of patients precise causes of back pain can be identified[47]. The presence of high levels of verification-related guilt in more than a third of the sample highlights the difficulty that practitioners face when required to provide a clear explanation in the presence of uncertainty about aetiology and outcome. Practitioners are often under pressure to deliver a clear explanation even when one cannot be given. Similarly, patients expect to receive a diagnosis. Consultations in which uncertainty is high are therefore difficult for both practitioner and patient, who may feel that they are each in their own way failing in their role. This in turn may contribute to patients feeling guilty for being unable to provide a clear explanation to others as to what causes their pain. This is compounded by patients desiring a medical diagnosis and physical evidence that explains their symptoms, even after receiving and understanding explanations that emphasise the role of

psychosocial factors in the pain experience[14,48]. Providing negative diagnostic tests as a mean of reassurance is both contrary to current guidelines [49], and may have negative, rather than positive impact by increasing guilt. A recent review [50] found that there is no robust evidence for the view that diagnostic tests reassure patients with LBP. Participants in the current study also reported feeling guilty for not being better able to manage and control their condition and for the failure of their treatments. This may be linked to increased health care utilisation, as patients search for a cure [51], thus reflecting unrealistic expectations [14,48]. These beliefs and behaviours might be addressed through education, treatment based on cognitive-behavioural principles, and interventions that aim to increase acceptance.

Partial correlations show that when controlling for depression the relationship between 'Verification of pain guilt' and disability is no longer significant. This indicates that there is a complex relationship [31] between verification of pain guilt, depression and disability. Depression appears to be an important mechanism in both factors, but the causal direction of the relationship cannot be untangled in the current study.

We note that the literature on guilt in depressed groups also includes evidence that guilt may have a positive effect, by driving people towards behaviours that make amends, thus increasing activity [52]. However, the evidence for this is conflicting[8]. In the current study, higher rates of guilt were associated with more negative clinical and psychological states: prospective research is needed to clarify how each sub-scale of guilt is related to subsequent behaviours, and ultimately to outcomes.

Strengths and limitations

This research has several strengths. The PGS was based on qualitative data extracted from interviews with people with LBP [14], and therefore it has good face validity. We followed recommendations for good methodology for item construction [19,20]. Although the PGS explores the presence of pain-related guilt in musculoskeletal LBP patients specifically, an advantage of the scale is that it could be adapted for use in other pain populations where coping with pain is a prominent aspect.

We recognise that the study also has a number of limitations. First, we acknowledge that our samples may not represent broader LBP patient populations within or outside of the UK. There is evidence [53] suggesting that guilt is culturally defined [8] and may be qualitatively different across different cultures. The survey was completed anonymously and information regarding participants' medical histories was based on self-report; we had no means of checking this information with their practitioner. The samples recruited for the current study included people subscribing to self-help groups, and those attending a LBP dedicated conference. This may indicate higher investment and involvement in their pain, and consequently rates of guilt may be elevated. Research is needed to establish levels of pain-related guilt in other populations. Our sample sizes were moderate, but satisfied sample size criteria for both EFA [32] and CFA [30]. As in all self-report measures, there is a threat of social-desirability bias [54]. In addition, the cross sectional methodology employed in the study does not allow for testing of the causal relationship between guilt and outcomes.

Finally, we note that this is an initial analysis of pain-related guilt and a work in progress; therefore further exploration of pain-related guilt is needed. Although our scale items were developed from interviews with back pain patients and have good content validity it is

possible that there are other aspects of guilt, such as work-related guilt currently missing from the scale. Past research has identified the link between work and guilt [14,15], therefore further research should target working LBP patients and analyse this relationship further.

Conclusion

This study provides initial evidence for the underlying factor structure and good reliability and validity of the PGS. Future research is needed for additional validation and clinimetric assessment of this measure in new samples. The findings from this study suggest that pain-related guilt is a common experience among people with LBP. Prospective methodology is needed to examine the relationship between guilt, prognosis and treatment outcomes.

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Legends:

Figure 1: The final confirmatory factor analysis model with standardized regression weights

Table 1: Participant characteristics and frequency of pain-related guilt in the combined sample 1 & 2

Table 2: Pattern matrix for the Pain-related Guilt Scale

Table 3: Fit indices for the confirmatory factor analysis

Table 4: Correlations and shared variability between pain-related guilt subscales and depression, anxiety, disability and pain intensity on combined sample 1 & 2

Supplemental document:

Appendix 1:

Table 1: Pain-related Guilt Scale (PGS)