

Original Report

Validity of the Visual Trajectories Questionnaire for Pain

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Abstract: Researchers have identified trajectories of pain derived using statistical techniques on longitudinal data. These trajectories have potential to be of use clinically but the repeated data collection required is currently impractical for such situations. Our aim was to investigate the validity of a self-report (Visual Trajectories Questionnaire-Pain) for pain. Analysis included participants from 2 prospective cohorts of people seeking primary health care for back pain (n = 622). A question was developed asking people to classify their pain experience into one of a number of trajectories using visual and word descriptions. Overall 98% of participants completed the question; criterion validity was established by comparing self-report trajectories and trajectories derived using longitudinal latent class analysis, and construct validity was established by comparing responses to the questionnaire against an existing model of back pain stages. As expected variables such as pain intensity and widespreadness, other symptoms, and psychological distress showed an increasing trend of severity across trajectory categories in line with the hypothesized model. In conclusion, the self-report single-item Visual Trajectories Questionnaire-Pain is acceptable to patients and supported by evidence of face, criterion, and construct validity. Further research is needed to investigate the clinical usefulness of the question. **Perspective:** This study provides a new questionnaire (Visual Trajectories Questionnaire-Pain) that captures the longitudinal state of a patient's pain experience. The Visual Trajectories Questionnaire-Pain has shown aspects of face, criterion, and construct validity, and has the potential to be clinically useful.

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Over the past few years, a number of studies have identified trajectories of back pain.^{1,7,14,17,22} These studies have provided new insights into the course of pain, and indicate that people with back pain can be classified into discrete trajectories with distinct characteristics that have potential clinical usefulness.^{2,13} However, the studies have all used repeated measures collected during prospective longitudinal studies, often with complex analytical techniques, to identify the

trajectories and classify the patients. These methods are time-consuming and not always feasible, and indicate that the trajectories currently have limited clinical usefulness, because few clinical situations allow for the collection of longitudinal data to categorize patients.

One solution is to ask patients themselves which trajectory best represents the course of their back pain, and this has been suggested in a recent review of research on back pain trajectories.¹³ Such a question would then allow researchers and clinicians to allocate people with back pain into trajectory groups without having to collect large amounts of data. However, it is not known whether patients can identify their own trajectory, and whether their responses are valid.

There are a number of stages needed to test the validity of such a question. The first element of this is face validity; whether patients can understand the question and assign themselves to a trajectory.³ The second component is criterion validity; how well a question compares with an independent external objective criterion or gold standard.^{3,18} For pain trajectories, the external criterion

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would be the empirical trajectories derived using longitudinal data. The third part would be construct validity, or the extent to which a measure is related to criteria derived from an established theory.^{3,18} One model of pain against which it is useful to make this comparison is the stages of pain model.²⁰ This model not only understands chronicity by the temporal experience of pain over time but also incorporates a multidimensional consideration of other types of pain, various bodily complaints, and cognitive and emotional impairments. Evidence shows these conditions are common in those with back pain, are linked to severity, and play a significant role in prognosis.¹¹ Testing construct validity using this model would require investigating whether 'worsening' trajectories of pain show parallels with different stages of pain and their associated characteristics.

The aim of this study was therefore to investigate the validity of a self-report question (called the Visual Trajectories Questionnaire-Pain, or VTQ-Pain) asking patients to identify the trajectory that best represents their pain experience.

Methods

This study was nested in 2 cohorts of people seeking primary health care for their back pain (Back Pain Research in North Staffordshire [BaRNS] Study and Beliefs about Back Pain [BeBack] Study). Study participants were consecutive patients visiting their general practitioner about back pain during 2001 and 2002 (BaRNS) or 2004 through 2006 (BeBack); all were invited to take part in a prospective cohort study using questionnaires and followed for up to a year. Further details are published elsewhere.^{6,7,9} The cohorts were followed-up again 7 years (BaRNS) or 5 years (BeBack) later (called the second study period in this report).^{4,5} The second study period consisted of a baseline questionnaire, short monthly questionnaires, and a final questionnaire at 12 months. All phases of both studies were independently approved by the North Staffordshire, South Staffordshire, and North West Cheshire research ethics committees.

A draft question asking patients to classify their back pain experience into a trajectory was developed on the basis of trajectories previously derived through statistical modeling. Four trajectories were developed directly from typical individual trajectories identified within previously published work on the basis of regular reporting of back pain intensity.⁷ The trajectories reported (from 342 consulters) were: persistent mild ($n = 122$) for patients who had stable low levels of persistent mild pain, recovering ($n = 104$) for patients who had mild pain to no pain, severe chronic ($n = 71$) for patients who had permanent high levels of pain, and fluctuating ($n = 45$) for patients who had pain that moved between mild and high pain over the time period. Three further trajectories were developed using more general information about the course of back pain such as pain that has gradually become worse, having a single episode, and pain that has gradually become better.¹⁶ These 7 trajectories were thought to capture the range of experience of pain through time and be appropriate for studies in which

participants are known to have had a back pain episode within the recall period. An additional item representing no pain was developed for studies in which participants may not have had pain during the recall period. The final question was comprised of 8 pictures of the individual trajectories of pain, with corresponding brief descriptions of each trajectory. The question will be referred to as the VTQ-Pain and was assessed at the 12-month follow-up point of the second study period.

Initial assessments of acceptability and components of face validity were carried out with a small group of patients with experience of musculoskeletal pain—the Research User Group (RUG) at the Research Institute for Primary Care & Health Sciences, Keele University. The RUG has approximately 100 members and many have conditions such as back pain, osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, mental health conditions, and long-term health conditions. The age range is from 33 to 87 years, and there is an even representation from male and female members. RUG members are involved in most aspects of the research process and take part in advisory groups, steering groups, research meetings, coapplicants, and implementation meetings. The group involved in the VTQ-Pain development consisted of 8 members, all with musculoskeletal problems (approximately half with back pain). These RUG members were sent the VTQ-Pain in advance and then invited to a meeting, and asked whether they understood the question, and whether they could suggest any improvements.

After amendments on the basis of RUG feedback (see Results section), the VTQ-Pain was included in the baseline and 12-month second study period questionnaires for the BaRNS and BeBack Study cohorts. The 7-item version was included in the baseline questionnaire, referring to the period since the start of the study (7 years or 5 years previously); the 8-item version (including the no pain trajectory used in this current analysis) was included in the 12-month follow-up questionnaires referring to the previous year. Components of face validity were tested by the views of the RUG feedback, as detailed previously, and also determining the proportion of patients who were able to answer the question in the baseline second study period questionnaires using response/completion rates as an indicator.

Criterion validity was explored by comparing self-report trajectory responses in the 12-month follow-up questionnaire with statistically derived trajectories. These trajectories were derived using longitudinal latent class analysis (LLCA) in both cohorts, using the first 6 months of data from the second study period phase. Monthly reported back pain intensity scores were used to derive trajectories using LLCA; each participant was allocated to a trajectory on the basis of their largest probability. Briefly, pain intensity was measured on a monthly basis using the mean of three 0 to 10 numerical rating scales. These values were trichotomized into no pain (scoring <1), mild-moderate pain, and high pain (score of ≥ 5) for each month. LLCA was then used to group participants into clusters on the basis of these pain measurements over 6 months. Derived posterior probabilities indicated the

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