Learned helplessness predicts functional disability, pain and fatigue in patients with recent-onset inflammatory polyarthritis

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Abstract

Objectives. Cross-sectional studies have found that learned helplessness (LH) is associated with disease outcome in patients with RA. However, little is known about the longitudinal impact of LH. The aim of this study was to investigate whether LH is associated with future disease outcome (disability, pain and fatigue) and to investigate whether LH changes over time in patients with recent-onset inflammatory polyarthritis (IP), the broader group of conditions of which RA is the major constituent.

Methods. Patients included in this investigation had been recruited to the Norfolk Arthritis Register, a primary-care-based inception cohort. LH was measured at baseline as patients’ total score on the Rheumatology Attitudes Index (RAI). A total of 443 patients completed the HAQ and visual analogue scales of pain and fatigue at baseline and after 2 years of follow-up.

Results. Greater feelings of LH at baseline were associated with higher HAQ scores at follow-up [difference in HAQ score per 1-point increase in RAI score (β-coefficient) 0.02; 95% CI 0.01, 0.04]. Greater baseline LH was also associated with more pain (β-coefficient 1.0; 95% CI 0.4, 1.5) and more fatigue (β-coefficient 1.0; 95% CI 0.2, 1.4) at follow-up. LH was highly changeable during follow-up, with 87% of patients showing any change and 50% improving.

Conclusion. Baseline LH independently predicted disability, pain and fatigue at follow-up. Half of patients reported fewer feelings of helplessness after 2 years of follow-up, suggesting that LH may potentially be a modifiable risk factor for disease outcome in IP and a target for intervention.

Key words: inflammatory polyarthritis, rheumatoid arthritis, learned helplessness, functional disability, pain, fatigue.

Introduction

There is a growing body of literature focusing on the psychological factors affecting patients with RA. Learned helplessness (LH) has been described as an attributional style [1] whereby an individual feels that they have little control over the events in their life and so responds passively to the problems that they encounter. This behaviour extends to health-related problems and so LH may be associated with poorer health outcomes [2].

The 15-item Arthritis Helplessness Index (AHI) and the subsequent 5-item Rheumatology Attitudes Index (RAI) were developed to assess psychological difficulty (in the form of LH) among RA patients [3, 4]. Correlates of LH in RA patients include depressed mood [5], higher 5-year mortality [6] and high HAQ score, pain, fatigue and stiffness [1]. Greater LH has also been found to be associated with greater functional limitation, cross-sectionally, in patients with AS [7].

Previous investigations of how LH changes over time have reported mixed results. One study reported that LH
decreased by an average of 1 point over 1 year [3], whereas a cohort of RA patients who were followed for 2 years, during which time their LH was measured every 6 months, generally tended to remain at the same level of LH (high, normal or low) over time [8]. LH was also found to be relatively stable over time in a 4-year prospective study of 72 patients with established RA [5].

The benefits of early treatment in patients with RA are widely accepted and highlight the importance of studying patients from shortly after symptom onset in order to discover factors that influence early disease outcome. It is difficult to differentiate the patients who will go on to develop RA from those who will develop one of the less common conditions included within the broader group of diseases classified as inflammatory polyarthritis (IP). We have previously shown, in a cross-sectional analysis, that high LH was associated with worse functional disability and disease activity in a cohort of patients with recent-onset IP [9]. However, longitudinal analysis of data from a large cohort of patients is needed to establish how LH is associated with subsequent disease outcome. It was the aim of the present study to address this. Further to this, we aimed to determine whether LH is generally dynamic or static over time in this cohort, and hence attempt to establish whether it is a potentially modifiable predictor of disease outcome in IP.

**Patients and methods**

**Setting**

Patients living in the geographical area covered by the former Norwich Health Authority are invited to join the Norfolk Arthritis Register (NOAR) when they present to either a primary care physician or rheumatologist with recent-onset IP, defined as ≥2 swollen joints that have persisted for ≥4 weeks. A detailed description of the register has been published elsewhere [10]. The Norfolk Arthritis Register was conducted with the approval of the Norwich (UK) research ethics committee.

**Patients**

A total of 569 IP patients with a symptom duration of ≤2 years joined the NOAR during 2004–2007. Written consent was obtained from all participants.

**Data collection**

A standardized assessment was carried out by a research nurse at baseline and 2 years later. When patients were assessed at baseline, their demographic details and medical history including smoking history (current, past or never), height and weight were recorded. Socioeconomic status (SES) was defined using patient post codes to identify the area they live in and the rank assigned to that area by the nationwide Index of Multiple Deprivation (IMD) 2007 [11] (most deprived = 1; least deprived = 32 482). A blood sample was taken at baseline that was tested for RF (latex method; positive: titre ≥1:40). The 1987 ACR criteria for RA were applied at baseline [12]. At each assessment, patients were asked to report details of any DMARDs or steroids taken.

**Longitudinal disease outcome measures**

At baseline and follow-up (2 years later), patients were asked to complete the British version of the Stanford Health Assessment Questionnaire (HAQ) [13], a measure of functional disability, scored from 0 (no disability) to 3 (severe disability). Patients were also asked to indicate how much pain they had had because of their arthritis in the past week on a 0–100 visual analogue scale (VAS pain: 0 = no pain; 100 = severe pain) and similarly how much of a problem fatigue or tiredness had been in the past week (VAS fatigue: 0 = no problem; 100 = major problem). The minimal clinically important difference (MCID) is widely accepted to be approximately 0.2 for the HAQ score [14] and an MCID of 10 has been suggested for pain and fatigue as measured using a 0–100 VAS [15].

**Learned helplessness**

LH was measured as the total score attained by patients on the 5-item RAI [16]—RAI score and LH will be used interchangeably as contextually appropriate. Patients responded to each statement on the RAI regarding their beliefs about their illness on a 5-point Likert scale [strongly disagree (1 point), disagree, do not agree or disagree, agree, strongly agree (5 points)]. Total scores range from 5 (fewest feelings of LH) to 25 (greatest feelings of LH) (Table 1).

**Statistical analysis**

All analyses were carried out using STATA (version 10.1). Linear regression was used to identify relationships between characteristics of the patients at baseline and baseline LH. Linear regression was also used to determine whether baseline LH was associated with HAQ score measured 2 years later, adjusting for baseline HAQ score. Adjusting for baseline HAQ score accounts for the autocorrelation between an individual’s repeated measurements of the same variable. In this instance, it allows for the conclusion that any relationship observed between baseline LH and follow-up HAQ score is not simply explained by existing disability. Additional adjustment was then made for common confounders, age at symptom onset, symptom

**Table 1 The RAI**

| Items |  |
|-------|---|
| My condition is controlling my life. |  |
| I would feel helpless if I couldn’t rely on other people for help with my condition. |  |
| No matter what I do, or how hard I try, I just can’t seem to get relief from pain. |  |
| I am not coping effectively with my condition. |  |
| It seems as though fate and other factors beyond my control affect my condition. |  |

Adapted from [16] with permission from the Journal of Rheumatology.
duration and sex, and factors found to be associated with LH at baseline (univariate regression analysis), smoking status, BMI and whether or not patients met the 1987 criteria for RA. SES was also adjusted for, as in our previous cross-sectional analysis we reported an association between SES, LH and disease outcome [9]. RAI score is likely to be influenced by treatment received, for example, there is a statement on the RAI specifically regarding pain control, and so adjustment was also made for whether or not patients had been treated with steroids or DMARDs during follow-up. Four hundred thirty-one patients were included in the fully adjusted model, as individuals with missing data for any of the confounders were excluded. The same analyses were then carried out with pain and fatigue, in turn, as the outcome measure.

Results

Cohort characteristics

Of the initial 569 patients, a total of 126 patients were excluded: 98 were lost to follow-up (although all were still alive at the end of 2009), 16 did not complete the RAI at baseline, 4 did not complete the HAQ at baseline, 3 did not complete the VAS (pain and fatigue) and 5 did not complete a follow-up assessment at year 2 but were not lost to follow-up, as they had subsequent assessments beyond year 2. The remaining 443 patients included in these analyses had completed the RAI at baseline and the HAQ, VAS pain and VAS fatigue at both baseline and follow-up. The median age at symptom onset was 57.2 years, 63% of patients were female and the median symptom duration at baseline was 5 months. The median RAI score was 12. The cohort characteristics at baseline are summarized in Table 2.

Table 3 summarizes the relationships between each baseline characteristic and baseline LH. Older age at IP onset was associated with lower LH, whereas greater BMI, meeting the 1987 ACR criteria for RA, higher HAQ score, greater pain and greater fatigue at baseline were associated with higher LH.

Disease outcome after 2 years of follow-up

Overall, patients reported less disability (lower HAQ scores), pain and fatigue after 2 years (Table 4). There was a significant positive association between baseline LH and 2-year HAQ score, adjusted for baseline HAQ score. Greater feelings of LH were associated with higher HAQ scores. Similar positive relationships between baseline LH and both pain and fatigue reported after 2 years of follow-up were also observed. Adjustment for potential confounders had little impact on these relationships (Table 4).

2-year change in RAI score

The median change in RAI score was a decrease of 1. As there was no predefined level of meaningful change in RAI score, the proportion of patients reaching three thresholds of change, in each direction, is summarized in Table 5. Half of all patients had lower RAI scores at follow-up than baseline, with 20% decreasing by 5 points or more, equivalent to a 1-point drop on each item of the RAI. Thirty-seven per cent of patients

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**Table 2** Cohort characteristics at baseline (n=443)

| Characteristic                      | Value       |
|-------------------------------------|-------------|
| Age at IP onset, median (IQR), years | 57.2 (46.6-68.0) |
| Female sex, n/N (%)                 | 279/443 (63.0) |
| Symptom duration, median (IQR), months | 5 (3-10)   |
| Current smoker, n/N (%)             | 93/442 (21.0) |
| Past smoker, n/N (%)                | 177/442 (40.1) |
| Non-smoker, n/N (%)                 | 172/442 (39.9) |
| BMI (kg/m²) (n=432), median (IQR)   | 27 (24-30)  |
| Met 1987 ACR criteria for RA, n/N (%) | 206/443 (46.5) |
| Positive for RF, n/N (%)            | 201/423 (47.5) |
| HAQ score (0-3) (n=443), median (IQR) | 0.88 (0.38-1.50) |
| Pain (0-100 VAS) (n=443), median (IQR) | 40 (20-60)  |
| Fatigue (0-100 VAS) (n=443), median (IQR) | 50 (20-70)  |
| RAI score (5-25) (n=443), median (IQR) | 12 (9-16)   |

**Table 3** Univariate relationships between cohort characteristics and LH (RAI score) at baseline

| Characteristic | β-coefficient for association with RAI score | P-value |
|----------------|---------------------------------------------|---------|
| Age at IP onset, per decade | -0.61 | <0.001 |
| Female vs male | 0.50 | 0.28 |
| Symptom duration, per month | 0.05 | 0.26 |
| Past vs current smoker | -0.99 | 0.10 |
| Non-smoker vs current smoker | -1.08 | 0.07 |
| BMI, per kg/m² | 0.12 | 0.004 |
| Met vs did not meet 1987 ACR criteria for RA | 1.86 | <0.001 |
| Positive vs negative for RF | 0.23 | 0.61 |
| HAQ score, per unit | 3.79 | <0.001 |
| Pain, per 10 points | 1 | <0.001 |
| Fatigue, per 10 points | 1 | <0.001 |

Coefficients correspond to the impact of each characteristic on RAI score at baseline. For example, per decade older at IP onset, the mean RAI score is 0.61 lower or compared with current smokers, the mean baseline RAI score for non-smokers is 0.99 lower.
showed any increase in RAI score, and just 13% recorded the same score at both time points.

**Discussion**

In this cohort of patients with recent-onset IP, greater feelings of LH at baseline were associated with younger age at IP onset and higher BMI. Patients who met the 1987 ACR criteria for RA at baseline had greater LH than those who did not and, as expected, greater disability, pain and fatigue at baseline were also associated with greater LH. Baseline LH was also robustly associated with change in functional disability, pain and fatigue over the subsequent 2 years; higher LH was associated with a less favourable outcome.

This is the first study to investigate the longitudinal relationship between LH and disease outcome in patients with recent-onset IP. The results reported here suggest that LH can predict subsequent disease outcome. It may be the case that patients with high LH at baseline had a poor underlying prognosis; however, the analyses presented here were statistically significant despite adjustment for baseline disease severity, therefore this is unlikely to completely explain the relationship observed.

Two previous studies reported that the majority of patients tended to remain at the same level of LH over time [5, 8], whereas here LH was shown to be dynamic over time. The median change in RAI score of 1 point over 2 years was more modest than the 1 point per year reported by a previous study [3]. This may reflect differences in the cohort included in that study and the present one, for example, patients with established RA compared with patients with recent-onset IP or patients in the USA compared with the UK. Here, it was observed that the majority of patients (50%) showed some improvement in RAI score between baseline and follow-up, with 20% showing an improvement of 5 points or more (equivalent to a 1-point improvement on each RAI statement). In Table 4, the impact of a 1-point increase in baseline RAI score on each outcome measure is shown. Upon multiplying the respective coefficients for HAQ score, pain and fatigue by 10 (i.e. equivalent to the impact of a 10-point increase in baseline RAI score), the MCID for each measure is reached (e.g. HAQ score 0.02 multiplied by 10 equals 0.2). Just 4% of patients in this cohort showed a decrease in RAI score of ≥10; however, this still highlights the potential clinical relevance of the findings reported here. It may be possible to capitalize upon this potential for improvement in LH and translate it into benefits for patients through the introduction of targeted interventions.

A strength of this investigation is that the RAI is a validated measure of LH in arthritis patients, and its concise nature means that it is likely to have a high completion rate [16]. Also, as our patients were recruited from primary and secondary care, the cohort includes patients with a range of baseline disease severity and thus is representative of the IP population.

### Table 4
Summary of linear regression models of the relationship between RAI score and disease outcome at 2 years (n = 443)

|Change in RAI score between baseline and follow-up, n (%)| HAQ score| VAS pain| VAS fatigue|
|---|---|---|---|
|≥1| 0.88| 40| 50|
|≥5| 0.75| 30| 45|
|≥10| β-coefficient (95% CI) associated with a 1-point increase in baseline RAI score|
|Adjusted for baseline HAQ/pain/fatigue| 0.02 (0.01, 0.04)*| 1 (0.5, 1.7)*| 1 (0.5, 1.6)*|
|Fully adjusted modela| 0.02 (0.01, 0.04)*| 1 (0.4, 1.5)*| 1 (0.2, 1.4)*|

*Adjusted for age at symptom onset, symptom duration, sex, baseline value of outcome measure, smoking status, SES, BMI, 1987 ACR criteria, DMARD use and steroid use (n = 431). Coefficients correspond to the difference in each outcome measure (at 2 years) associated with a 1-point increase in baseline RAI score. For example, 0.02 is the mean difference in HAQ score at 2 years between patients with a baseline RAI score of 5 and those with a baseline RAI score of 6. *Statistically significant (P < 0.05).

### Table 5
Proportion of patients reaching various thresholds of change in RAI score between baseline and follow-up

|Change in RAI score between baseline and follow-up, n (%)| Increase (greater LH) | Decrease (less LH) | No change|
|---|---|---|---|
|≥1| 157 (36.9)| 65 (15.3)| 12 (2.8)|
|≥5| 65 (15.3)| 85 (20.0)| 18 (4.2)|

aAdjusted for age at symptom onset, symptom duration, sex, baseline value of outcome measure, smoking status, SES, BMI, 1987 ACR criteria, DMARD use and steroid use (n = 431). Coefficients correspond to the difference in each outcome measure (at 2 years) associated with a 1-point increase in baseline RAI score. For example, 0.02 is the mean difference in HAQ score at 2 years between patients with a baseline RAI score of 5 and those with a baseline RAI score of 6. *Statistically significant (P < 0.05).
of IP patients presenting to clinicians. The recruitment of patients broadly characterized as having IP, rather than RA, may be viewed as a limitation in terms of the generalizability of our findings to RA populations. Additionally, as the bulk of previous studies were conducted with RA patients, the majority of relevant studies with which the results presented here can be compared involve patients with RA rather than IP. However, 75% of NOAR patients have been shown to fulfill the 1987 ACR criteria for RA within 5 years of symptom onset [17]. Furthermore, the findings reported here support previous reports that LH is associated with poor disease outcome in patients with RA [1, 3, 8] and patients with AS [7].

A limitation of this study is that it was not possible to determine whether the impact of LH on HAQ score was driven by the level of disability experienced by patients or the level of perceived disability. The same is true for pain and fatigue, as measured here using VAS. Investigation of the relationship between LH and physician-reported measures of IP outcome would add another dimension to these findings. A further limitation of our study was that the follow-up period of 2 years was relatively short. Two years of follow-up was chosen as a trade-off between the number of eligible patients and length of follow-up, as the RAI was only introduced as part of the standard NOAR assessment in 2004. Further work is needed in order to gain a clearer picture of the relationship between LH and disease outcome over longer periods of time. Similarly, this analysis is limited by having just two data points per patient. Additional data points would allow us to model trajectories of disease outcome and gain an even clearer picture of the relationship between LH and disease outcome.

Our findings suggest that LH is a potentially modifiable factor that robustly predicts disease outcome in patients with IP. Patients’ feelings of LH should be addressed by clinicians, who may also consider providing patients with the information and support needed to overcome these feelings.

Rheumatology key messages
- LH predicts subsequent functional disability in patients with IP.
- LH appears to be changeable rather than static over time in patients with IP.
- Addressing patients’ feelings of helplessness may have a beneficial impact on IP disease outcome.

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