Weather and chronic pain have long been thought to be related, with Hippocrates describing a connection in 400 BC. Weather is now reliably forecast and conveniently available on mobile platforms. If a relationship between weather and chronic pain exists, it may be possible to predict chronic pain changes to optimize pain control. These relationships may also inform travel and geographic preferences by people with chronic pain. Moreover, an understanding of the interplay between weather and chronic pain may advance scientific understanding and lead to novel therapeutic approaches.

Contemporary studies have evaluated the relationship between weather and various forms of chronic pain. A consistent finding is that people with chronic pain believe that weather influences their pain. By contrast, objective studies have been mixed. Some identified meaningful statistical and clinical associations, whereas others did not. One explanation for these discrepancies is that self-reported weather sensitivity is a manifestation of confirmation bias; namely the tendency to attribute worsening chronic pain to certain weather patterns while ignoring contradictory observations. Alternatively, scientific studies may have failed to uncover objective associations between weather and chronic pain for reasons such as small sample sizes, insensitive outcome measures, complex relationships, and incorrect quantification of the weather exposure.

The objective of this study was to compare chronic pain characteristics in those with and without self-reported weather sensitivity. The presence of substantial differences may indicate that confirmation bias, which is a ubiquitous psychological phenomenon, may not entirely explain the high prevalence of weather sensitivity.

**RESULTS**

A total of 4979 device users met the inclusion criteria. Table 1 provides the demographic and pain characteristics of the study subjects. In general, the subjects were older adults with moderate to severe, multi-site pain of long-standing duration. Most subjects had several painful health conditions, with arthritis identified by over half of subjects (58.1%). Table 2 summarizes self-reported weather sensitivity. About one-half of subjects (50.2%) were weather sensitive with the remaining subjects approximately evenly split between weather insensitive (27.4%) and unsure (23.3%). Subsequent analyses excluded unsure subjects, leaving 3811 subjects.

Table 3 shows the results of the multivariate logistic regression. There were 11 statistically significant independent variables that predicted weather sensitivity with $R^2=0.23$. For subjects that self-reported as weather insensitive (left) and sensitive (right). Horizontal red line is median. Box shows intraquartile range (IQR) and whiskers indicate 1.5 IQR below and above the 1st and 3rd quartiles. Outliers shown as ‘+’.

**CONCLUSIONS**

The multivariate logistic regression model in this study classified weather sensitivity in a large heterogeneous dataset with moderate accuracy. These results demonstrate that subjects with self-reported weather sensitivity express a different chronic pain phenotype than those who report weather insensitivity. This challenge remains to quantitatively identify these associations, which are likely to be dynamic and complex.