

uMotif eCOA/ePRO platform helps researchers decode connection between pain and weather.

uMotif platform supports nationwide, direct-to-consumer (DTC) study that combined patient-reported outcome, symptom, GPS, and weather data to explore the connection between pain and weather.



Wanted: Answers to an age-old question

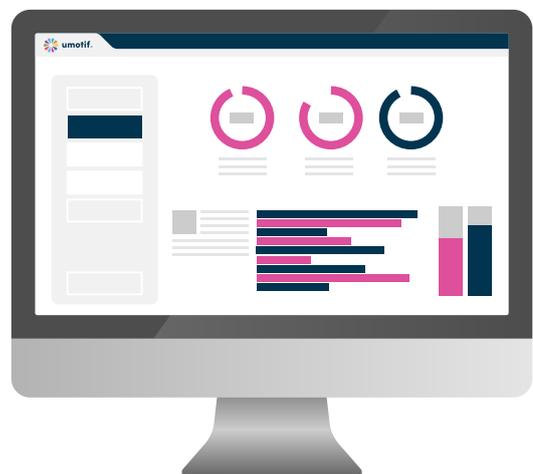
We've all heard the adage that rain means pain. In fact, **approximately three-quarters** of people living with arthritis believe that the weather affects their pain.

In a quest to drive better outcomes, researchers have long sought to confirm and understand a connection between weather and chronic pain. Since we can forecast the weather, understanding the relationship could open the door for pain forecasts that enable patients to take greater control of their lives. It might also contribute to the development of new therapies and interventions.

Researchers from the University of Manchester and their collaborators tackled this age-old question through the Cloudy with a Chance of Pain study. This national United Kingdom smartphone-based study set out to collect a large dataset and examine the potential relationship between local weather and daily

pain in people living with chronic pain.

This ground-breaking study – which featured fully remote or decentralized data collection using uMotif's eCOA/ePRO platform – demonstrates how patients themselves can collect large volumes of data to build real-world data sets which address long-standing health questions.





Challenges: Data volume and correlation, extended participant engagement

Historically, researchers faced several challenges when investigating a potential connection between weather and pain. These included engaging a large enough set of study participants over a long period of time to deliver the volume and depth of symptom and weather data required to identify a correlation. Researchers also needed an effective way to capture and correlate pain, hyper-local weather, and geolocation data.

The ubiquitous use of cell phones changes the equation. Smartphones enable study participants to enter data frequently regardless of location. In addition, embedded technologies, such as Global Positioning System (GPS), can link data collection to

specific locations and the weather conditions in those locations at any specific time.

Even with these enabling technologies, the success of a study hinges on the quality and quantity of subjective self-reported data captured from participants. For the Cloudy with a Chance of Pain study, researchers required an eCOA/ePRO platform that would enable and encourage study participants to enter data daily and keep them engaged over a long period of time – at least 6 months. The tool also had to allow participants to capture multiple factors potentially linked to daily pain variation and weather, such as mood and amount of physical activity.

Why uMotif?

The uMotif eCOA/ePRO platform empowered participants to engage easily and effectively track symptoms via their smartphones – ensuring the capture of high-quantity time-series data. As important, the technology platform enabled researchers to use the GPS on participants' phones to link to local weather data.

The flexible and easy-to-configure uMotif application equipped researchers to mobilize the study rapidly and capture a diverse range of symptom, pain, fatigue, sleep, and other variables. Further, it delivered the scale required to support a nationwide study, with thousands of participants entering millions of data points.



Our ground-breaking study required high-quality symptom and weather data from a large number of individuals over an extended time. We were asking participants to report on a number of variables every day for six months, which required a smooth and enjoyable experience for our users. The uMotif eCOA/ePRO platform delivered on these requirements and more, including rapid scaling to support thousands of users.

Will Dixon, Professor of Digital Epidemiology at the University of Manchester, and Principal Investigator





How it worked: Rapid recruitment and continued engagement

Researchers recruited participants through local and national media and social media. Launching on the popular BBC Breakfast show, the study recruited over 6,000 participants in the first week.

Individuals checked eligibility and downloaded the uMotif app via the study recruitment website. Then, they used the app to complete an electronic consent form and a baseline questionnaire.

Patients reported symptoms for six months or longer, tracking pain severity, fatigue, morning stiffness, impact, sleep quality, time spent outside, waking up feeling tired, physical activity, mood, and well-being. To help boost engagement, the app reminded participants each evening to complete their input.

Patients could connect their activity monitors (i.e., Fitbit) to contribute their activity data, and their devices automatically captured the local weather. To make the experience even more valuable, participants could review their own data and share it with their healthcare providers, expanding engagement in and control over their own care.

To support continued engagement in the study, participants received regular study updates. This information helped build a community of highly engaged participants eager to continue to contribute their valuable data. To reinforce their contribution, participants also received a unique feedback report using their data at the end of the study.



Impact: Connection proven between pain and weather; demonstrates potential of large-scale DCT studies

The ground-breaking virtual and decentralized (DCT) study design enabled collection of daily symptoms and high-quality weather data, equipping researchers to examine the relationship between weather and pain. The study, **published in Nature**, found significant relationships between relative humidity, pressure, wind speed, and pain. It also demonstrated how consumer technology can successfully support and advance health research.



Recruitment

- Over 13,000 participants throughout the United Kingdom
- Over 6,000 recruited in first week



Engagement

- 65% retention for first seven days, compared to 10% in other large smartphone studies
- Over 5 million data points captured from participants



Ease of use

- 94% said the app was easy to use
- 71% entered more data as they could monitor own symptoms
- 86% would recommend uMotif



Published Research

How the weather affects the pain of citizen scientists using a smartphone app. Source: *Nature*

Find out more about how uMotif can help drive unparalleled patient engagement and data capture in your next study.

Contact us