

For thousands of years, there has been a belief by people living with long-term pain conditions, such as arthritis, that their pain is affected by the weather. About 75% of people with chronic pain believe this to be true. Many report their pain is made worse by the cold. Others report their pain is made worse by the warmth. Still others report that damp or rainy weather aggravates their pain.

When scientists have looked into whether the weather affects pain, they have reached inconclusive or inconsistent results. Some studies have been limited by small numbers of participants, whilst others have studied people over very short durations. Others have assumed patients are always exposed to weather near their home, although we know people move around. Ideally, we would need a large group of people to report on their pain over a long period time, potentially over several seasons, and with weather data from where the person was actually situated. Also, it has been difficult to come to consensus, in part because weather is likely not the most dominant factor in people's pain: we are trying to tease out a weaker effect from other factors that are more likely to affect people's pain, such as their level of physical activity, their mood, and how well they've slept. There may also be links between these effects that are difficult to untangle. For example, if the weather is pleasant, then people's mood may improve, which may lead to less pain. A simple analysis clearly won't do to get at understanding how weather affects pain.

To understand which weather conditions most affect pain, a group of University of Manchester-based researchers and their collaborators conducted a 14-month long study with over 13,000 UK residents living with chronic pain conditions, such as arthritis. The participants would record their daily pain intensity within an app on their smartphones. The GPS location of the phone would then link to the weather data. To analyze the millions of daily reports of participants' pain levels, the researchers compared, within each individual, days they experienced a significant increase in pain from the day before to days they experienced no such increase. This large dataset made it possible for the researchers to disentangle the importance and size of the effects for the different weather variables.

The researchers found that days with higher humidity, lower pressure, and stronger winds – in that order – were more likely to be associated with high pain days, a result consistent with the beliefs of many of the participants. Because of the large size of this study, we are able to report on the relative importance of these effects. The findings also showed that whilst mood has strong associations with pain, the association between the weather and pain was not explained by its effect on either mood or physical activity.

This research validates the beliefs of the three quarters of people living with long-term pain that weather does impact pain. If you know that certain weather conditions might increase your pain, you can plan your activities around it and take greater control of your life. Finally, a better understanding of the effects of the environment on pain may allow scientists to better understand the mechanisms that cause pain in people, and therefore allow the development of new and more effective treatments for those who suffer with pain.