

CLOUDY



WITH A CHANCE OF PAIN

Cloudy with a Chance of Pain is a national smartphone study exploring the relationship between the weather and chronic pain. Advances in technology, with many people owning their own smartphone, means we are now able to investigate this relationship in detail for the very first time. Participants with long-term pain are asked to track their daily symptoms on an app, whilst the local weather conditions are automatically collected using the smartphone's GPS every hour. Nearly 9000 people have taken part in the study in the first six months. Many have entered data nearly every day for the whole six months, generating around 2.5 million pieces of symptom data.

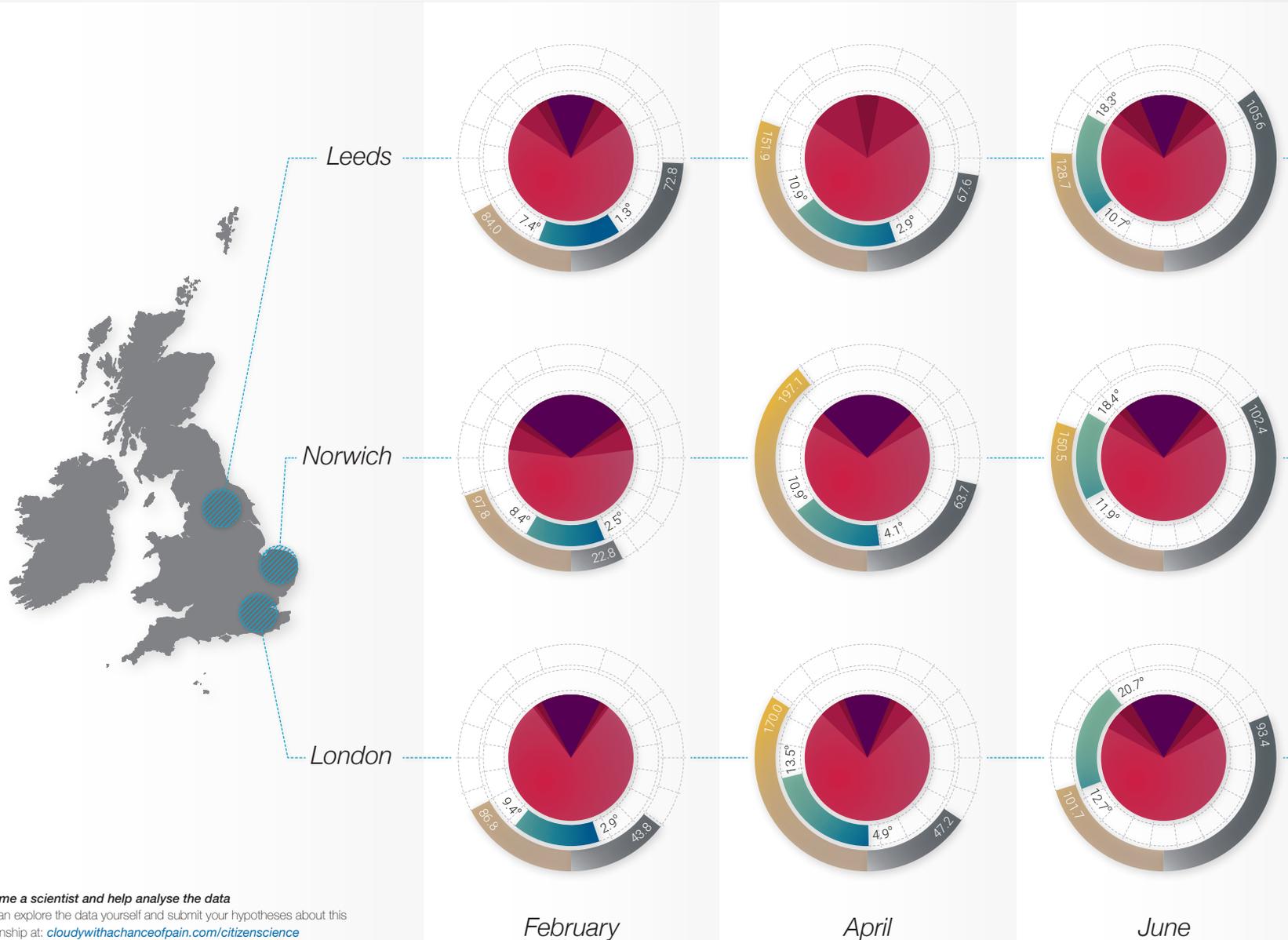
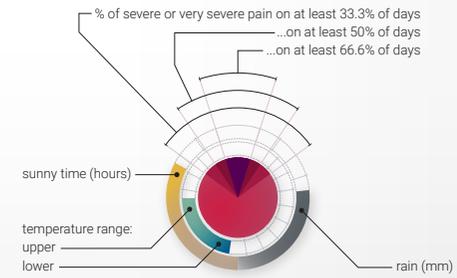
How to interpret the images

The images below show the first preliminary results of how pain changes over the seasons from winter to summer. Each of the nine images summarises the monthly pain and weather data for people living in Leeds, Norwich or London during the months of February, April and June in 2016. The core of each circle, in red, represents pain. The graphic shows how many people per region have experienced severe or very severe pain for different proportions of time that month. The

outer arcs of the circles represent the weather, namely minimum and maximum temperature levels, number of sunny hours and the amount of rainfall.

Preliminary results

Several interesting trends can be seen. As the number of sunny days increased from February to April, participants across all three regions experienced a reduction in the amount of time they spent in severe pain. However, as we moved into summer, participants spent more time in pain again. Compared to April, fewer hours of sunshine were experienced in June, but it was also warmer and wetter. We are looking forward to delving deeper into the data, examining how weather is associated with pain within individuals and how this might differ between different causes of chronic pain. We will be collecting data throughout 2016 as the seasons move back into winter. We need as many people as possible to sign up and provide consistent daily symptom tracking throughout the next 6 months. We think there's something there, but we need your help to get to the bottom of it!



Participants in Leeds spent fewer days in severe pain in April when compared to February. In fact, none of the participants in Leeds reported experiencing severe pain for two thirds or more of the month in April, which may be associated with there being twice as much sunshine for that month when compared to February. In June, despite higher temperatures and a similar number of sunny days to April, the amount of time spent in severe pain returned to February levels. The high levels of rainfall over this month may have influenced the recurrence of pain.

Participants in Norwich spent the greatest amount of time in severe pain in February when temperatures were lowest and there were the fewest sunny days. The number of days spent in severe pain reduced slightly in April when there were a greater number of sunny days but only a modest increase in temperature. Severe pain levels were largely the same from April to June when, despite a significant temperature increase, there was also high rainfall.

Participants in London spent less time in severe pain in April than they did in February as temperature levels rose and the number of sunny days increased. In June, this trend reversed with an increase in the number of people reporting severe pain. In fact, people reported severe pain more frequently in June than they did in either February or April. London in June was the hottest of the three regions in any of the three months, but it was also wet and had fewer hours of sunshine than any of the regions in April.

Become a scientist and help analyse the data
 You can explore the data yourself and submit your hypotheses about this relationship at: cloudywithachanceofpain.com/citizen-science