

PL9239 Data Science

*Presentation to the Welsh Government on*

# The relationship between mental health and access to green spaces in Wales

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# What are the objectives of our investigation?

## Research Question

*What is the impact of access to green spaces on mental health?*

## Context

Throughout the pandemic, many people in Wales and around the world have found solace in exploring their local area and making the most of green spaces. We wanted to see whether access to green space improves mental health, or whether other factors are more prevalent.

## Hypothesis

We expected to find that there is a negative correlation between the level of access to green spaces and the prevalence of mental health issues in Welsh communities, ie. more green spaces leads to fewer mental health issues.

# What did our dataset look like?

Our dataset consisted of three sets of variables, with each set accounting for different factors that could affect the rate of mental health issues. The sample consisted of data on 1,909 LSOAs across Wales, areas with populations averaging 1,500 people. The data is from the Welsh Index of Multiple Deprivation.

## Socioeconomic Factors

Our dataset contained two variables pertaining to socio-economic conditions, with data for levels of income and employment deprivation given in percentage terms. This facilitates analysis of the extent to which employment and income levels can influence rates of mental health issues in Welsh communities, as well as allowing us to analyse for confounding effects.

Mean level of Income Deprivation: **16.01 %**

Mean level of Employment Deprivation: **10.52%**

## Health Related Factors

Our dataset included a series of health related variables that were essential to our research aims. The mental health rate data was our output variable. Data was also supplied on levels of long-term and chronic health conditions as control variables.

Mean Mental Health Issues Rate: **23.3 p/ 100**

Mean Chronic Condition Rate: **14.6 p/ 100**

Mean long-term illness rate: **23.1 p/100**

## Location Related Factors

Our dataset included a range of variables that indicate levels of geographic remoteness. Additionally, a dummy variable existed to differentiate between Wales' two biggest cities and elsewhere. Furthermore, data illustrating travel times to post offices and grocery stores were used for indicators of remoteness. There is also our explanatory variable, the access to green space as a percentage of households.

Percentage with access to green spaces: **77%**

Mean return travel time (post office): **3.73 min**

Mean return travel time (grocery shop): **5.56 min**

# Initial Analysis - Regressions

## Bivariate Regression

In our preliminary analysis, we ran a simple regression of mental health rates and access to green spaces.

### Regression Results:

**Intercept: 18.43**

**Estimate: 0.064**

The estimate infers that for every 1% increase in the number of households with access to green spaces, we would expect an increase of mental health cases of 0.064, from a base level of 18.43 per 100.

## Multivariate Analysis

In search for the impact of alternative factors on mental wellbeing, we added the health and socioeconomic variables to the regression as control. This analysis yielded different results to our initial modelling.

Results of this regression suggested that it is employment levels and rates of chronic illness that have the highest impact on mental health, leading us to analyse the relationship with these variables more thoroughly.

Still it would appear that statistically speaking, access to green spaces has only a very minor impact on mental health.

# 25%

**Of Welsh citizens with full access to green spaces still experience mental health issues**

Green space may be good for one's well being, yet it does not prevent more complex socioeconomic and health issues from being the driving causes of mental health issues in Wales.

Using a multivariate regression model that accounts for socioeconomic and health related variables, we found estimates for the effects of these conditions upon mental health rates:

- Employment Deprivation - 0.35
- Chronic Illness - 0.61
- Access to green Space - 0.01

These figures portray the increase in mental health rates per unit increase of the specified variable.

# Deep Dive

## Urban Green Space vs Rural Green Space

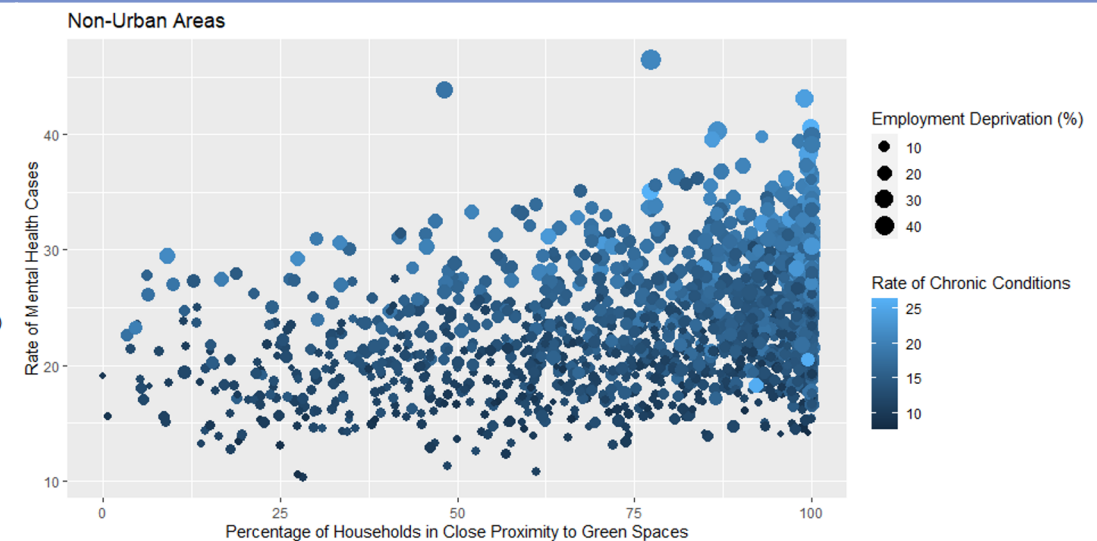
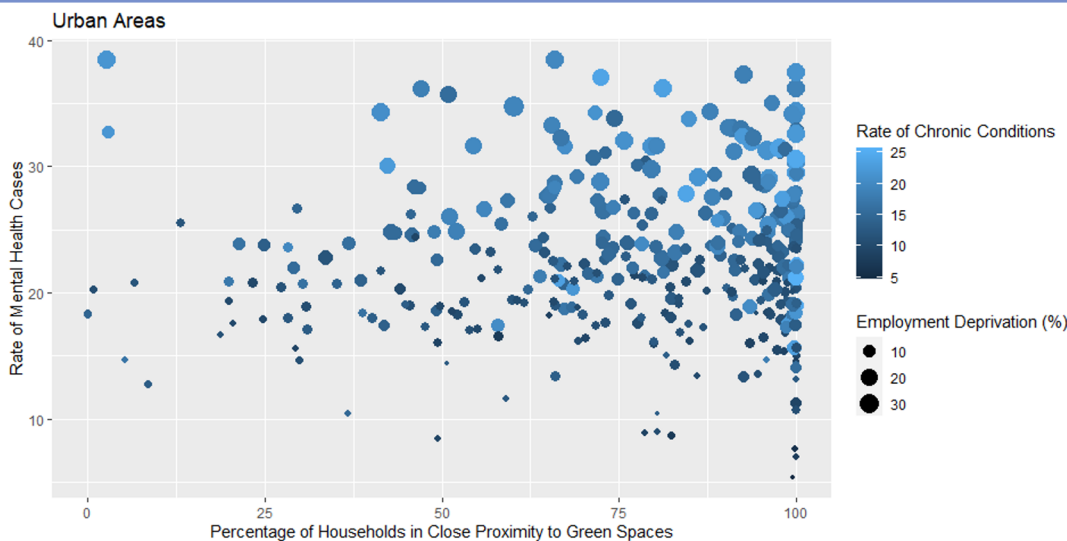
### The impact of green space in urban areas on mental health is more positive than green space in rural areas

If we return to our initial data analysis, we can see that in the average LSOA 77% of households were proximal to green space. As Wales is largely rural, many of these LSOAs will contain green space that is not tailored to civilian use, eg. farmer's fields and forests. In areas such as Cardiff and Swansea, residents may be less likely to take green space for granted, and the green spaces will be public parks which are highly accessible and better maintained, for granted hence the more positive impact on their mental health.

Different indicators performed in unexpected ways - living in Cardiff and Swansea was the most negative variable on mental health, however, outside of the cities, mental health is better in less rural areas.

Living in the cities also saw a confounding effect on the impact of economic deprivation, with an additional estimate of 0.44. However it almost totally eliminated the impact of chronic conditions, with a confound estimate of -0.74, perhaps because of the greater accessibility of urban areas.

We not only found interest confounding effects of living in cities through a multivariate regression, but also by separating data sets, as visualised below - this revealed the beneficial nature of green spaces in Cardiff and Swansea compared to elsewhere.



# Conclusions

- We found that the effects of green space on mental health largely depend on outside factors, such as geographic location.
- We found that other factors, such as health conditions and employment deprivation, had a much greater role correlation with the rate mental health cases than access to green spaces.
- We found that access to green space has a more positive impact on mental health for city dwellers than it does for those living in rural areas.

# Policy Outlook

- We recommend that the Welsh Government works with local authorities in Wales to ensure green space is preserved in urban areas.
  - The metro region of Ontario, Canada is surrounded by a 'green belt' that is excluded from development - this may be a model for local authorities to follow.
- We recommend that the Welsh Government investigate further the links between mental health and socio-economic deprivation and geographic location.
  - For example, further research could focus on green spaces in inner-city and suburban areas.

Diolch am  
wrando ar ein  
cyflwyniad ni

**Thanks for listening to our  
presentation**

We're happy to take any questions  
you may have about the data

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