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Data Insight

European Union Settled Status (EUSS) Data Linkage Project (Wales): Preliminary findings for mental health relating to depression, mixed anxiety and depression, and anxiety

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Summary of Findings

- Initial findings indicate statistically significant differences in reported mental health events between Welsh-born individuals and individuals born in EU14 and EU8 countries, along with differences between EU14-born and EU8-born individuals.
- Individuals born in EU countries reported a greater number of depression and mixed anxiety events compared to Welsh-born individuals.
- EU14-born individuals were younger at first depression event when compared with EU8-born individuals. Welsh-born individuals were younger at first depression event when compared to EU14-born individuals. EU8-born individuals were younger at first anxiety event when compared with Welsh-born individuals.
- Compared to Wales, only EU8 countries are at a greater risk of a depression, mixed anxiety and depression, and anxiety event within the study period. Individuals from EU8 countries were also at greater risk compared to those from EU14 countries.

Background

This Data Insight provides a preliminary analysis of general practice (GP) data relating to individuals born in the European Union (EU) living in Wales, and individuals born in Wales living in Wales. The focus is on reported mental health events (i.e. an event being classified as a GP visit). This analysis forms part of the EU Settled Status (EUSS) Data Linkage Project. EUSS aims to link EU citizen data (i.e. European nationality on the 2011 Census for Wales) with other data already held within the Secure Anonymised Information Linkage (SAIL) Databank, based at Swansea University. It focuses on mental health, education, and employment. Using a range of de-identified data in the SAIL Databank, Welsh-born individuals living in Wales were compared to EU born individuals living in Wales to determine whether the:

- number of reported mental health events
- age at first mental health events
- risk of depression, mixed anxiety and depression, and anxiety

were different across groups. The research used the 2011 Census to provide a spine to identify country of birth.

The project examined the differences between Welsh-born individuals and EU14-born and EU8-born individuals, in relation to mental health events recorded in the Welsh Longitudinal General Practitioner dataset linked to 2011 Census data. EU14 countries include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Republic of Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and Sweden. EU8 countries include Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. Due to small numbers, it has not been possible to undertake any analysis separately for the remainder of countries in EU27[1] which are not part of EU14 or EU8.

1. EU27 countries which are not EU14 or EU8 countries are: Bulgaria, Croatia, Cyprus, Malta, Romania.

Our existing literature review of EU-born individuals' experiences in the UK found evidence suggesting negative mental health (Lloyd-Williams et al. 2022, EU Settlement Scheme (EUSS): a review of the Literature | GOV.WALES). Maciagowska and Hanley's (2017) systematic review of Polish migrants post European Union accession identified positives including freedom, new opportunities, coping mechanisms (including optimism), social capital, and culture. However, negative effects on mental health were also found including frustration, multiple stresses, discrimination and isolation, unfamiliarity with the culture, and cultural stigma. Furthermore, negative mental health appeared to be prevalent prior to the UK's 2016 referendum on EU membership amongst EU-born individuals living in the UK. This related to integration and connectedness due to discrimination, isolation, and unfamiliarity with culture. After the referendum, feelings of insecurity within the UK had been exacerbated, due to perceived uncertainty about the future and feelings of rejection (Rzepnikowska 2019; Teodorowski 2020; Teodorowski 2021).

What we did

Data Source
In the first instance, Welsh Longitudinal General Practitioner (WLGP) data was linked to 2011 Census data for the period 2014 to 2019. From the Census 2011 dataset, data on country of birth, age at Census, sex, week of birth, date of arrival in the UK, and socio-economic status was obtained. The WLGP dataset was used to obtain data on GP practice ID, diagnosis code, event date, and event year.

Previously validated code lists were used to identify mental health diagnosis, publicly available via the DATAMIND/HDR UK phenotype library (Concept Library | Phenotype: Depression- Phenotype (saildatabank.com)); concept numbers depression (C2915), mixed anxiety and depression (C3219) and anxiety (C2921).

Good quality Anonymised Linking Fields (ALF) for both the Census and the WLGP datasets were retained. ALFs in both datasets were then used to link them in SQL – a programming language used for managing data.

Population
It is important to note that for all data presented here, there were differences in the number of individuals included in the analysis, with EU- born individuals being a much smaller sample size than Welsh- born individuals. The final sample size was composed of 331,775 individuals, of which 13,070 had a mental health diagnosis of either depression, mixed anxiety and depression, or anxiety. There were 1,410 individuals from EU14 countries and 3% (N=45) of them had a diagnosis. There were 1,760 individuals from EU8 countries and 3% (N=45) had a diagnosis. The majority of the sample consisted of individuals from Wales (328,600), of which 4% (N=12,980) had a diagnosis.

Analysis
We performed statistical analysis using the R statistical package and appropriate statistical techniques (including Chi Squared tests, one-way ANOVA and Cox proportional hazard regressions). To test whether the country groups were statistically equivalent, we used Chi-square and one-way ANOVA respectively on sex and socio-economic status. In particular, differences in sex across EU14, EU8, and Wales were tested using Chi-square prop. test function. This function allows to test whether proportions across different groups are the same or different. One-way ANOVAs were performed to compare group differences on socioeconomic status. One-way ANOVA was also used to address the aim of this study and thus to explore group differences in age at first events and number of events across different EU groupings (EU14 and EU8) and Wales. Due to the difference in country group sample sizes, the effect of covariates was not considered to avoid reducing the sample variance further. However, ANCOVAs were performed as sensitivity analysis in case of significant results. In particular, group differences on age at first events were adjusted for sex and socio-economic status, whereas number of first events were also adjusted for age at first events. Bonferroni was applied to correct multiple comparisons.

Individuals in this study also differed on time-to-event (i.e. the length of time to the occurrence of a diagnosis of depression, mixed anxiety and depression, or anxiety). In particular, the time to report depression, mixed anxiety and depression, and anxiety differed based on participant's age during the study period and the

EU citizen's arrival date in the UK. This different time-to-event biases the results as it is unclear if group differences in number of events for instance are attributable to different age, arrival date, and/or country of birth. To account for this, Cox proportional hazards regressions were performed for all reported mental health events under consideration (depression, mixed anxiety and depression, anxiety), separately. Censoring was applied (i.e. when information on time to outcome event for an individual is not available during the study period), considering whether there was a start date at a non-Welsh address, end date at last GP practice, and date of death within the study period (see Appendix A for number of individuals). Time-to-event in days was used as the outcome variable and country group was used as predictor, whilst controlling for sex and socio-economic status. Cox proportional hazard regressions allow an estimation of the effect of multiple categorical and continuous predictors on the rate of a particular event (i.e., mental health diagnosis) occurring within the study period. The results are in the form of hazard ratios (HR). A HR value of 0 indicates no effect, a HR value above 1 indicated a predictor positively associated with the event probability, and vice-versa for a HR value less than 1.

Numbers have been rounded to the nearest 5 and percentages rounded to the nearest whole number to avoid disclosure.

What we found

Table 1 - Number of individuals in each EU country group of interest, by sex (2014 to 2019)

	EU 14 Countries	EU 8 Countries	Wales	Totals
Males	10	15	4,355	4,380
Females	35	30	8,625	8,695
Totals	45	45	12,980	13,070

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Table 1 shows the number of individuals in each EU country group of interest, by sex. Results showed that the proportion of males and females across countries were the same.

Table 2 - Number of reported mental health events by event type by country of birth, 2014 to 2019

Country of Birth	Number of depression events	Depression events as a percentage of total events	Number of mixed anxiety and depression events	Mixed anxiety and depression events as a percentage of total events	Number of anxiety events	Anxiety events as a percentage of total events	Number of total events
EU Countries	20	15%	35	26%	75	59%	130
Wales	2,920	16%	2,525	14%	12,590	70%	18,035

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Note: Individuals may have more than one mental health event, Table 2 reports the number of reported mental health events

Table 2 shows the number of each event types by country group for individuals diagnosed with depression, mixed depression and anxiety, and anxiety. The total number of individuals in each EU country group is also expressed as a percentage. The number for EU14- and EU8-born individuals have been merged as the numbers were too small to present separately. Comparisons of the mean number of different event types

across different country were not statistically significant, with the exception of mixed diagnosis ($p<0.001$), with individuals born in EU countries reporting more depression and mixed anxiety events compared to Welsh-born individuals.

Table 3a - Age of first depression diagnosis by country of birth, 2014 to 2019

Country of Birth	Age range at first depression diagnosis	Mean age at first depression diagnosis	Standard Deviation of first depression diagnosis
EU Countries [Note 1]	3-17	14.4	3.38
Wales	3-18	15.8	1.52

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset
[Note 1] EU14 and EU8 countries have been merged for earliest age at first depression event to account for low numbers.

Table 3b - Age of first mixed depression and anxiety mental health diagnosis by country of birth, 2014 to 2019

Country of Birth	Age range at first mixed diagnosis	Mean age at first mixed diagnosis	Standard Deviation of first mixed diagnosis
EU14 Countries	13-17	15.9	1.37
EU8 Countries	15-17	16.3	0.86
Wales	3-18	15.8	1.60

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Table 3c - Age of first anxiety mental health diagnosis by country of birth, 2014 to 2019

Country of Birth	Age range at first anxiety diagnosis	Mean age at first anxiety diagnosis	Standard Deviation of first anxiety diagnosis
EU14 Countries	9-17	14.4	2.43
EU8 Countries	11-17	15.4	1.90
Wales	3-18	14.0	2.74

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Tables 3a, 3b and 3c shows the summary statistics for age of first depression, mixed anxiety and depression, and anxiety events by country of birth. There was no statistically significant difference in the individual's age at first mixed diagnosis by the country of birth ($F= 0.64$, $p= 0.53$). EU14-born individuals were statistically significantly younger at first depression event when compared with EU8-born individuals. Welsh-born individuals were statistically significantly younger at first depression event when compared to EU14-born individuals ($F= 10.02$, $p < 0.0001$). EU8-born individuals were significantly younger at first anxiety event when compared with Welsh-born individuals ($F= 3.95$, $p = 0.02$).

Table 4 - Median and mode for National Statistics Socio-economic Classification (NS-SEC), 2014 to 2019

Country of birth	Median National Statistics Socio-economic Classification	Mode National Statistics Socio-economic Classification	Number
EU14 Countries	8	4	45
EU8 Countries	12	13	45
Wales	9	4	12,980

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Table 4 shows the median and mode for Socio-Economic Status (Appendix B). Results for socio-economic status showed that there was a significant difference across groups (F= 9.15, p <0.001). In particular, EU8-born individuals were from lower socio-economic status groups compared to EU14- and Welsh-born individuals. There was no significant difference between EU14-born and Welsh-born individuals.

Sensitivity analyses adjusting for sex and socio-economic status produced the same results. Similarly, results remained significant after applying the Bonferroni correction – a statistical method used to address the problem of multiple comparisons.

Table 5 - Cox proportional hazard regression results using EU14 and EU8 as reference groups, 2014 to 2019.

Diagnosis	Group	Reference group	β Coefficient	HR	95%CI	p-value	Number
Mixed Anxiety and Depression	EU8	EU14	2.04	7.71	3.4;17.7	p < 0.001	180
Mixed Anxiety and Depression	Wales	EU14	-0.17	0.84	0.5;1.6	Not Significant	21,755
Mixed Anxiety and Depression	EU14	EU8	-2.04	0.13	0.06; 0.3	p < 0.001	200
Mixed Anxiety and Depression	Wales	EU8	-2.21	0.11	0.06; 0.2	p < 0.001	21,755
Depression	EU8	EU14	1.5	4.5	1.7; 11.7	p= 0.002	180
Depression	Wales	EU14	-0.13	0.88	0.5; 1.6	Not Significant	21,755
Depression	EU14	EU8	-1.51	0.22	0.09; 0.58	p= 0.002	200
Depression	Wales	EU8	-1.63	0.2	0.09; 0.41	p < 0.001	21,755
Anxiety	EU8	EU14	1.13	180	1.9; 5.1	p < 0.001	180
Anxiety	Wales	EU14	0.3	21,755	0.95; 1.9	Not Significant	21,755
Anxiety	EU14	EU8	-1.13	200	0.2; 0.5	p < 0.001	200
Anxiety	Wales	EU8	-0.83	21,755	0.3; 0.6	p < 0.001	21,755

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Tables 5 shows the results for the Cox proportional hazard regressions – a statistical method used to examine the effect of several variables on the time a specified event takes to occur. EU14- and EU8-born individuals are used as reference groups. The Cox regressions were performed for depression, mixed anxiety and depression, and anxiety separately. Time-to-event in days was used as the outcome variable and country group was used as predictor, whilst controlling for sex and socio-economic status. Results show that compared to Wales, only EU8 countries are at significantly greater risk of a depression, mixed anxiety and depression, and anxiety event within the study period. Individuals from EU8 countries were also at greater risk compared to those from EU14 countries.

In particular, compared to EU14 individuals, being born in an EU8 country put individuals at greatest risk of having a depression diagnosis (7.71 increased risk), whereas the risk was lowest for anxiety diagnosis (3.09 increased risk). Additionally, compared to individuals born in any EU8 country, individuals born and living in Wales were at decreased risk for depression, mixed anxiety and depression, and anxiety diagnoses ranging from an 89% (mixed diagnosis) to 56% (anxiety diagnosis) reduced risk.

Why it matters

Being able to analyse the different mental health events reported by individuals born in EU14 and EU8 countries living in Wales, and comparing with Welsh-born individuals living in Wales, enables us to inform policy makers within Welsh Government of the potential needs of this population. Our findings suggest that individuals born in EU8 countries living in Wales are at greater risk of mental health events than both EU14-born, and Welsh-born individuals living in Wales. In particular, our findings indicate EU8-born individuals tend to be from lower socioeconomic status SES groups compared to EU14- and Welsh-born individuals, suggesting they may live in more deprived areas which could be related to poorer mental health (Greene et al. 2020; Mills 2021).

Although this Data Insight provides important findings relating to the mental health of EU- born individuals living in Wales, it does have the following limitations:

1. It is unknown whether individuals from EU countries had previous anxiety, depression, or mixed anxiety and depression diagnosis in their home country prior to arrival in the UK.
2. Many statistical assumptions or conditions for the tests involved have been violated thus these results should be interpreted with caution.
3. Routinely collected data has limitations for research purposes, and the quality and completeness of data vary across datasets. We have attempted to minimise the impact of this by only including GPs that meet standards for data quality. Depression/anxiety not resulting in presentation to services, or where this is discussed but not recorded, will not be captured here. This is a common feature of all studies using routine data. This data is a reflection of contacts with the healthcare system, not of rates of depression/anxiety in the community.
4. The far greater number of censored individuals ((i.e. when information on time to outcome event for an individual is not available during the study period) in EU14 and EU8 groups compared to those un-censored might impact the power to detect differences in mental health risk across each group.

What next

The findings presented here are based upon Census 2011 data. We will be updating our findings using Census 2021 for Wales data. Census 2021 data will potentially enable inclusion of EU2 countries, Bulgaria and Romania, which will provide more up to date findings relating to EU-born individuals living in Wales.

The EUSS Data Linkage Project is also looking at primary and secondary educational attendance and attainment, higher education, and employment for EU14- and EU8-born individuals compared to Wales born individuals.

Acknowledgements

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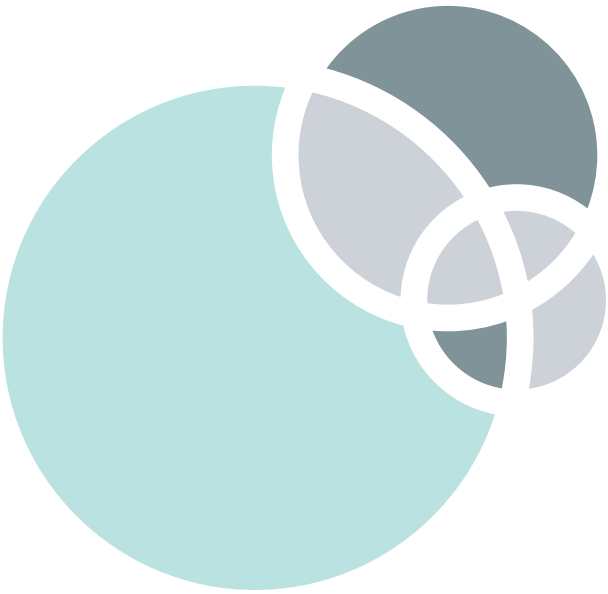

Appendix A: Number of people by country of birth and censored status, 2014 to 2019

	EU14 Countries	EU8 Countries	Wales	Totals
Censored	155	135	8,775	9,065
Un-censored	45	45	12,980	13,070
Totals	200	180	21,755	22,135

Source: Linked dataset consisting of Census 2011 and Welsh Longitudinal General Practitioner (WLGP) dataset

Appendix B: National Statistics Socio-economic Classification (NS-SeC)

National Statistics Socio-economic Classification (NS-SeC)
L1, L2 and L3: Higher managerial, administrative and professional occupations
L4, L5 and L6: Lower managerial, administrative and professional occupations
L7: Intermediate occupations
L8 and L9: Small employers and own account workers
L10 and L11: Lower supervisory and technical occupations
L12: Semi-routine occupations
L13: Routine occupations
L14.1 and L14.2: Never worked and long-term unemployed
L15: Full-time students

Source: England and Wales Census 2021 - TS062: NS-SeC - Dataset - UK Data Service CKAN

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ADR Wales unites specialists from Swansea University Medical School and the Wales Institute of Social and Economic Research and Data (WISERD) at Cardiff University with statisticians, data scientists and social researchers from the Welsh Government. The cutting-edge data analysis techniques and research excellence developed, along with the world-renowned SAIL Databank – which is an accredited processor under the 2017 Digital Economy Act (DEA) – allow the delivery of robust, secure and informative research that can inform future policy decisions in Wales. The ADR Wales programme of work is aligned to the priority themes as identified in the Welsh Government's Programme for Government.
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