Data Insight

BMI and immunisation uptake by different levels of engagement with Flying Start in Swansea

Authors: Silvia Colonna and Kathryn Helliwell

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This Data Insight explores the body mass index (BMI) and immunisation uptake across different levels of engagement with the health visiting component of Flying Start programme, in the City and County of Swansea.

This analysis compared health outcomes by different levels of engagement with Swansea Flying Start health visiting programme, rather than comparing outcomes for recipients and non-recipients of the health visitor elements of the Swansea Flying Start. This is because it is difficult to find an appropriate comparator group for Flying Start, given the programme is primarily targeted at children living in deprived areas.

This study represents the first analytical investigation into the health visiting service component of the Swansea Flying Start programme and its impact on health outcomes, specifically focusing on BMI thresholds and immunisation uptake.

This Data Insight has been produced by the ADR Wales Early Years team and forms part of the ongoing ADR Wales programme of work.

What we did

This research linked the health visitor data from the Flying Start dataset for the City and County of Swansea with the NCCH Child Measurement Programme and immunisation datasets, available within the Secure Anonymised Information Linkage (SAIL) Databank (Lyons, et al., 2009). Information considered in each of these individual-level, de-identified datasets is provided in Figure 1.

Background

Flying Start is the Welsh Government's flagship early years programme for families with children under four years of age who live in some of the most disadvantaged areas of Wales. The programme aims to make a decisive difference to the life chances of children by mitigating the impact of poverty, which is linked to poor life outcomes in early childhood, including health outcomes.

Flying Start is composed of different elements and while previous linked data analysis investigated the impact of Swansea Flying Start as a whole (ADR Wales, 2019) and Swansea Flying Start childcare specifically (ADR Wales, 2021; ADR Wales, 2019), to date, no analysis has explored the health visiting element of the programme. Additionally, while there is existing evidence on foundation phase on-entry baseline assessments, primary school attendance, A&E and hospital admissions (ADR Wales, 2019; ADR Wales, 2019; ADR Wales, 2021), health outcomes have yet to be looked at.

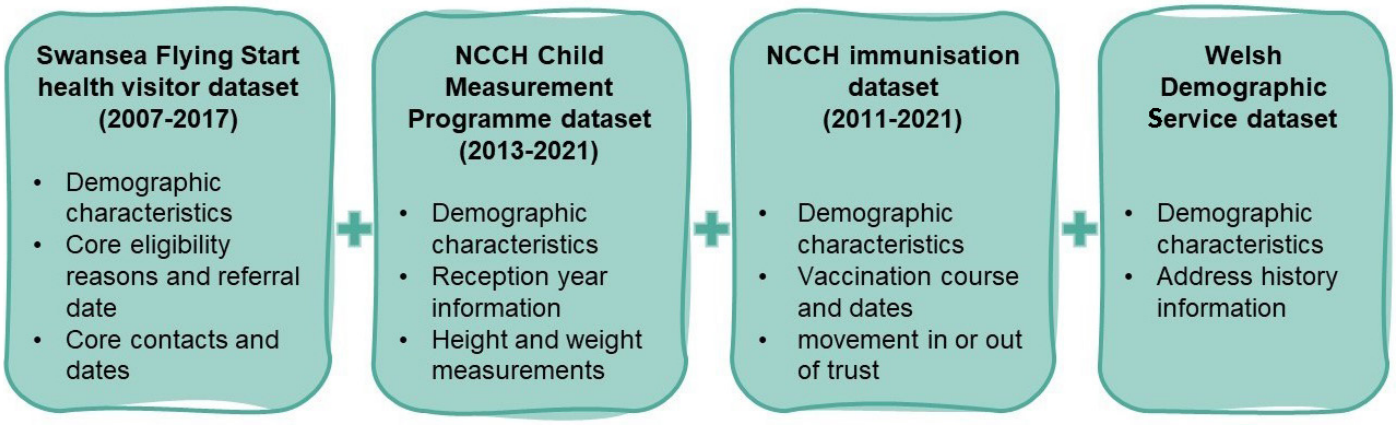
Following the need for a standardised approach across Wales to routinely measure pupils, the Child Measurement Programme (CMP) for Wales was established.

CMP takes the height and weight measurement of children in reception year (aged four to five) starting with the academic year 2011/2012. These measurements are then used to monitor the BMI (Child Measurement Programme, 2013).

Similarly, the National Community Child Health (NCCH) Database provides routine vaccination history data which is used to monitor the uptake of childhood immunisation.

BMI and immunisation serve as crucial indicators for a healthy development and provide essential opportunities to thrive. Therefore, it is of policy interest to explore whether early years programmes have any impact on these factors, as they aim to narrow the health gap between children from deprived and non-deprived backgrounds.

Figure 1 - Information contained in each dataset used.



NCCH = National Child Community Health

Flying Start

Engagement levels were determined using the Health Visitor Schedule which consists of a combination of home visits from community nursery nurses and health visitors.

Over time there have been changes to this schedule. In particular prior to 2016, the visiting system was different with just the birth visit (within two weeks of birth) as mandatory and the remaining visits at six months, two years and three years of age were decided upon health visitors' professional judgement. The number of visits within, and across, each contact point was used to determine normal as opposed to under-engagement at different ages, taking into account the differences in pre and post 2016 schedules. The Welsh Demographics Service dataset was used to remove children whose engagement level could not be properly evaluated due to death or change of address occurring within the first four years of life.

Child Measurement Programme

Data cleaning and BMI calculation were undertaken in line with methods used by Public Health Wales (Child Measurement Programme , 2013).

Briefly, after selecting children within reception year, only height and weight measures taken in school settings were considered and children with extremely high or low height, weight or BMI scores were removed. This is because extreme scores can lead to inaccurate results. BMI was calculated as weight in kilograms/height in metres squared (kg/m2) and BMI thresholds as in underweight, healthy weight, overweight and obese were calculated according to standard convention.

Immunisation

Immunisation data was cleaned, and immunisation status calculated, loosely following the methods used in the annual Public Health Wales cover reports (Public Health Wales, 2022).

Children who received all the expected doses of the Measles, mumps and rubella (MMR), Hib/meningitis C and "4 in 1" vaccines by four years of age (end of the year) were considered as fully immunised (see table below for more details)

Table 1 - Criteria used to determine immunisation status by four years of age.

Immunisation type	Immunised against	Vaccine type	Doses
MMR	Measles, mumps and rubella	All MMR combined vaccine	2
Hib / Meningitis C	Haemophilus influenzae type B (Hib), meningitis C	All Hib and/or Meningitis C containing vaccines	1 for the combined vaccine or 2 if administered separately (1 for Hib and 1 for meningitis C)
4 in 1	Diphtheria, polio, tetanus and pertussis	All pertussis containing vaccines. Pertussis used as a proxy for all four of them	4

Children who moved into the health board after eight weeks of age (when the first round of vaccinations was scheduled) and/or moved out before four years of age were removed to avoid underestimating immunisation status.

Sex and week of birth inconsistencies within and across each dataset have been addressed by using the most consistent information across all of them.

Descriptive statistics and statistical analysis were all conducted to provide an overview of the linked data and to explore the impact of different levels of engagement with the health visiting element of Swansea Flying Start on BMI and immunisation uptake separately. The association between Swansea Flying Start levels of engagement and BMI thresholds was tested, as well as Swansea Flying Start levels of engagement with immunisation uptake. Mean BMI differences were also explored comparing those who engaged normally as opposed to those who under-engaged with the health visiting element of the Swansea Flying Start programme.

What we found

BMI

Linking the Child Measurement Programme and the Swansea Flying Start health visitor datasets resulted in 3,212 children (47% females and 53% males) with complete data.

Due to little data available, the BMI underweight threshold was removed. Notably, the proportions of each BMI threshold are overall in line with those presented in the most recent CMP for Wales reports (Child Measurement Programme 2022/23; Child Measurement Programme 2021-2022), with only marginal differences.

Table 2 - Prevalence of BMI thresholds in children aged 4-5 in the Swansea Flying Start cohort, engaging with heath visiting elements of the programme from birth to 3.5 years of age.

BMI thresholds	All		Females		Males	
	%	95% CI	%	95% CI	%	95% CI
Healthy weight	69%	(67%, 71%)	69%	(66%, 72%)	68%	(65%, 71%)
Overweight	14%	(11%, 17%)	14%	(9%, 19%)	14%	(10%, 18%)
Obese	17%	(14%, 20%)	16%	(11%, 21%)	18%	(14%, 22%)

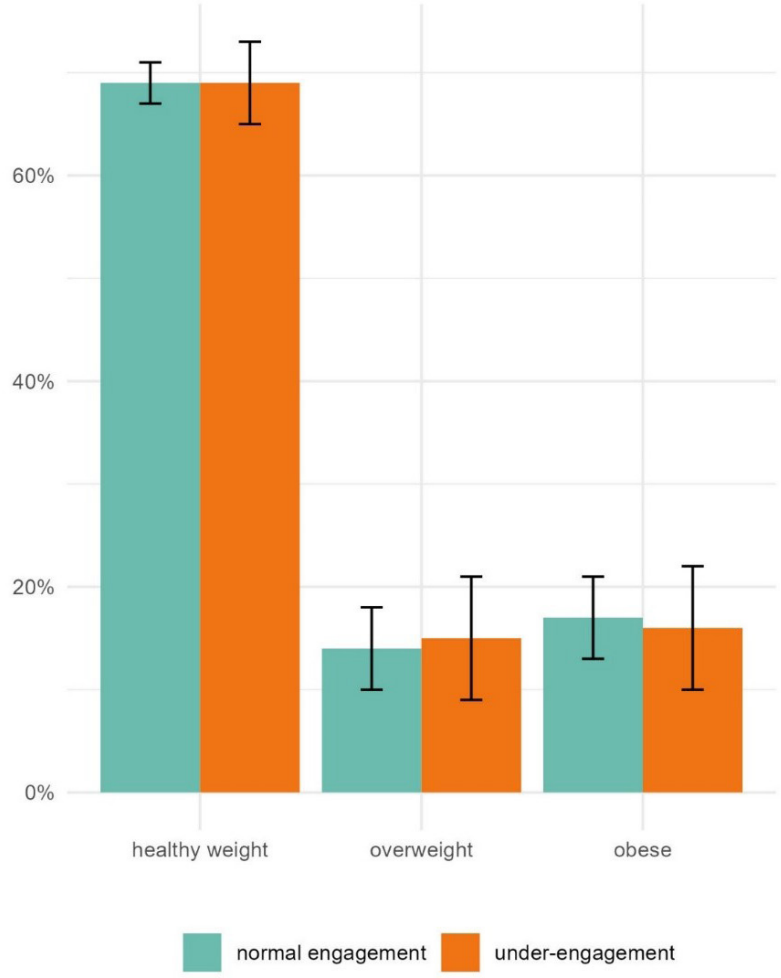
CI = Confidence Intervals

Table 3 - Prevalence of the different levels of engagement with the health visiting elements of the Flying Start programme in the Swansea Flying Start cohort (from birth to 3.5 years of age).

Engagement level	All		Females		Males	
	%	95% CI	%	95% CI	%	95% CI
Normal engagement	71%	(69%, 73%)	69%	(66%, 72%)	72%	(69%, 75%)
Under-engagement	29%	(26%, 32%)	31%	(27%, 35%)	28%	(24%, 32%)

CI = Confidence Intervals

Figure 2 - BMI thresholds of Flying Start children at age 4 and 5 by levels of engagement with the health visiting element of the Flying Start programme, engaging children from birth to 3.5 years.



The analysis showed that there was no significant relationship between levels of engagement with the health visitor element of the Swansea Flying Start programme and BMI thresholds[1].

1. Results of the Chi-square used to test the association between Swansea Flying Start levels of engagement and BMI thresholds: X2(2, n= 3,213) = 0.58, p = 0.75.

Similarly, mean BMI did not differ between normal (mean = 16.7, standard deviation = 2.13) and under engagement (mean = 16.6, standard deviation = 2.14) groups in the Swansea Flying Start cohort[2].

Immunisation uptake

Linking the Immunisation and the Swansea Flying Start health visitor datasets resulted in 3,648 children (47% females and 53% males) with complete data.

Overall, 95% of children who engaged with the health visitor programme and lived in Swansea Flying Start areas were fully immunised by their fourth birthday.

The highest uptake was for the Hib/Meningitis c vaccine (over 99%), followed by the MMR vaccine (96%) and the "4 in 1" vaccine (96%).

Notably, these estimates are higher than those reported in the PHW 2022 Cover annual report (Public Health Wales, 2022) whereby 86.5% of children living in Swansea were up to date with immunisations by age four (83.6% in those living in deprived areas in Swansea health board).

The methodological differences between this study and the PHW annual cover report could explain these different results, as the methods employed are not directly comparable. For instance, the PHW report focused on a specific cohort, such as children reaching their fourth birthday between 01/04/2021 and 31/03/2022. However, this analysis focused on the immunisation status at age four of children who received Flying Start health visits in the City and County of Swansea between 2011 and 2021, so it was not limited to an annual cohort. This explains why the sample size used in this analysis was larger than that reported for City and County of Swansea in the PHW report, despite being restricted to children who received Flying Start health visits.

Table 4 - Prevalence of fully immunised and not fully immunised children in Swansea Flying Start by age 4 engaging with health visiting element of the programme between birth and 3.5 years of age.

Immunisation status	All		Females		Males	
	%	95% CI	%	95% CI	%	95% CI
Fully immunised	95%	(94%, 96%)	96%	(95%, 97%)	94%	(93%, 95%)
Not fully immunised	5%	(2%, 8%)	4%	(0%, 8%)	6%	(2%, 10%)

CI = Confidence Intervals

Table 5 - Prevalence of engagement levels with the health visiting element of Flying Start in the Swansea cohort linked with immunisation data (from birth to 3.5 years of age).

Engagement level	All		Females		Males	
	%	95% CI	%	95% CI	%	95% CI
Normal engagement	73%	(71%, 75%)	72%	(70%, 74%)	74%	(72%, 76%)
Under-engagement	27%	(24%, 30%)	28%	(24%, 32%)	26%	(22%, 30%)

CI = Confidence Intervals

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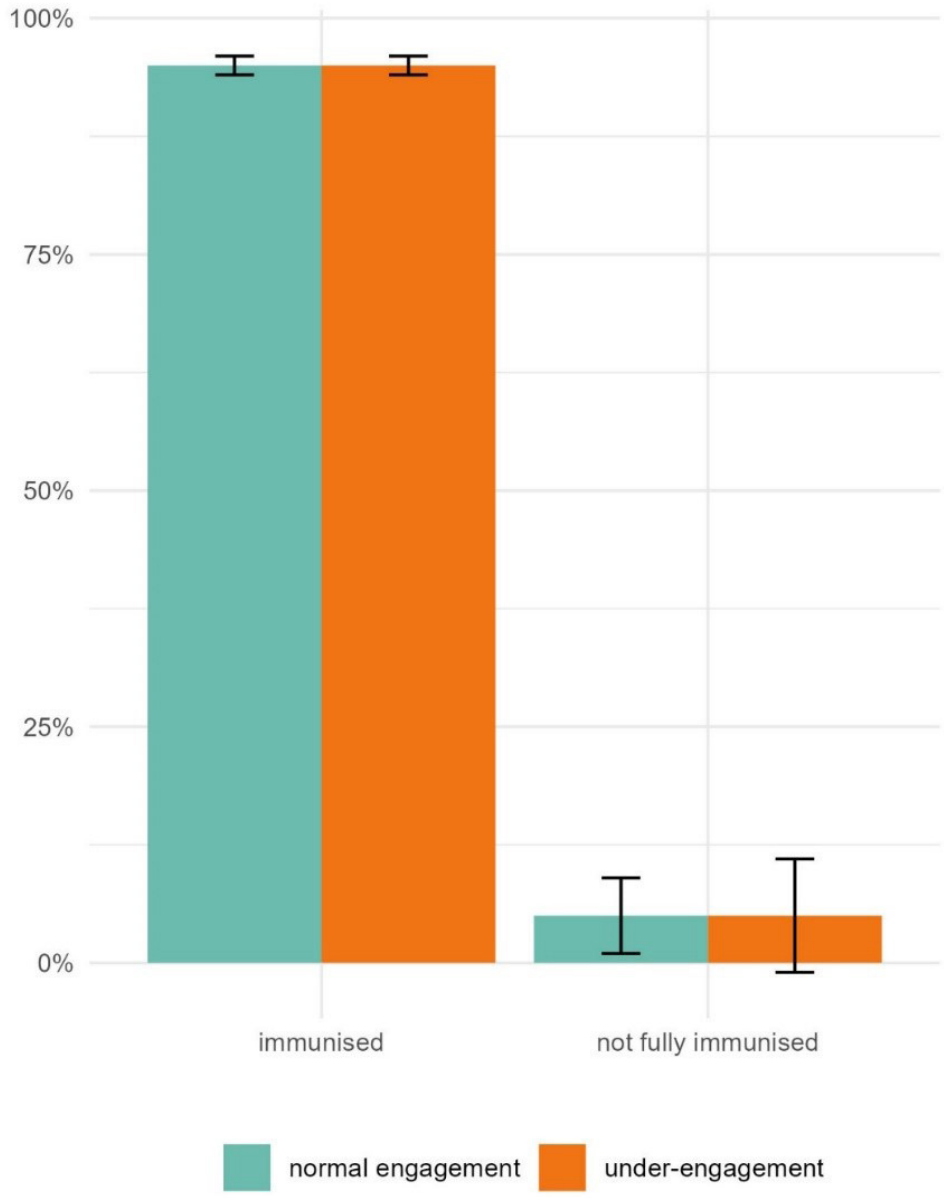
2. Results of the independent sample t-test used to explore if mean BMI differed across levels of engagement: t = 0.29, p = 0.77.

Figure 3 - Immunisation status by 4 years of age across different levels of engagement with the health visiting element of the Flying Start programme in the Swansea cohort (birth to 3.5 years).



Results showed that there was no significant relationship between levels of engagement with the Flying Start programme when children were aged from birth to 3.5 years and immunisation status by four years of age[3].

Why it matters

This study represents the first analytical investigation into the health visiting service component of the Swansea Flying Start programme and its impact on health outcomes, specifically focusing on BMI thresholds and immunisation uptake.

The evidence from this research addresses policy priorities in early years and can inform potential adjustments to the Flying Start health visiting programme.

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3. Results of the Chi-square used to test the association between Swansea Flying Start levels of engagement and immunisation uptake: X2(1, n= 3,648) = 0.014, p = 0.91.

While we did not find a statistically significant association between levels of engagement with Flying Start and core immunisation rates at age four, it is important to note that the data demonstrates widespread immunisation uptake overall.

Likewise, this study did not find a statistically significant association between levels of engagement with Flying Start and BMI. The percentages of children estimated to be overweight or obese are consistent with the general population. Taken together these findings might suggest that some engagement with the health visiting component of the Flying Start programme in Swansea is as good as any to have BMI estimates in line with children from non-deprived areas and widespread immunisation uptakes. However, this is only preliminary evidence that should be taken cautiously in light of the limitations listed below.

Additionally, this study sheds light on data quality issues related to the Flying Start dataset within the SAIL Databank. These findings have sparked valuable discussions among early years analysts in the Welsh Government, leading to making the case for better data, resulting in planned improvements to the data collection and its robustness.

What's next

This study could be replicated using improved data from all local authorities when available within SAIL. Alternatively, future analysis could focus on the food and nutrition initiatives for parents under the Flying Start programme that might have a more direct impact on BMI.

Limitations

These results need to be considered in light of several limitations.

Specifically, data quality issues were observed in the Swansea Flying Start dataset when analysing health visits, eligibility reasons, and dates. For instance, visits at impossible dates or not at target age as per schedule. Data quality issues were also observed in the immunisation dataset in the form of inconsistent dates between vaccinations and movement in/out of health trust, or repeated doses of the same vaccine. While the CMP data was of better quality overall, there were instances of individuals with more than one height and weight measures taken within reception year. These challenges hindered the ability to clean the data thoroughly and accurately calculate derived measures such as engagement levels with the Flying Start programme.

Furthermore, due to data availability, the analysis was limited to the City and County of Swansea so results might not be generalisable to other local authorities.

Additionally, due to sample size, it was not possible to focus only on individuals who reached the end of the Flying Start health visiting schedule to calculate level of engagement. This derived measure was calculated at different ages, assuming consistencies over time which may lead to inaccurate engagement level estimates.

It is also worth noting that immunisation status was calculated using a very lenient approach which consisted of focusing broadly on antigen-containing vaccines as opposed to calculating numbers of specific doses for each vaccine type and of excluding some childhood vaccinations (e.g., rotavirus).

Finally, while BMI is widely used, it is important to note that high BMI is not necessarily an indicator of an unhealthy lifestyle (Berrigan, Troiano, & Graubard, 2016). It is also not within the focus of the Flying Start health visiting system. Different indicators might therefore be considered in the National Evaluation of Flying Start to properly measure the impact of the programme.

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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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For further information please contact
Cathrine.E.Richards@Swansea.ac.uk

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