GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

Factors affecting educational achievement in Wales

Systems mapping approach

Authors

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Mae'r ddogfen hon ar gael yn Gymraeg / This document is available in Welsh.

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1. Background

The wider determinants of health, such as our money and resources, our level of education and skills, access to fair work, the quality and security of our housing and our surroundings, are the building blocks to health and well-being. Research has shown that healthcare services only account for a relatively small proportion of preventable deaths and that health-related behaviours are shaped by social factors.[1]

Educational attainment[i] and the related broader concept of educational achievement, is thought to exert its effects on health through three main pathways i) work and income potential, ii) health literacy and health-related behaviours and iii) psycho-social factors.[2] In turn children's health affects their attainment (reverse causality).[3]

As part of a programme of work which aimed to identify where Public Health Wales can add value and maximise impact in relation to reducing the educational attainment socio-economic disadvantage gap, a systems mapping exercise was undertaking with stakeholders in education and health. For the purposes of the mapping activity, it was decided to keep the system of interest wide with a focus on factors influencing educational achievement rather than the narrower outcome of educational attainment or more specifically the educational attainment gap.

2. Systems mapping

Systems mapping is an approach to gaining insights into a system of interest. It is a tool which provides a purposeful simplification of an aspect of reality.[4] All types of system maps illustrate a network of connections, nodes which are factors in the system of interest and edges which are the lines and arrows which join nodes.[4]

3. Methods

3.1 Systems mapping approach

Depending on the purpose, there are a number of approaches for developing systems maps including rich pictures, causal loop diagrams, fuzzy cognitive mapping and Bayesian belief networks.[4] In line with the purpose outlined in section 3.2.1 and the need for a flexible approach, an adapted version of participatory systems mapping (PSM) was selected. PSM is a "general purpose method for developing a rich and participatory understanding of the system under question" (p.59).[5] PSM is particularly appropriate when participation is emphasised, flexibility in construction and analysis are required and when large inclusive maps are desired that illustrate a complex adaptive system.[5] Like all system mapping

[i] The level of education reached, or grades attained at specific stages of education. The broader concept of educational achievement encompasses not only subject specific knowledge and skills but also life knowledge and skills.

approaches PSM is a simplification of reality with many assumptions and judgements, but its aim is to construct maps illustrating stakeholders' perceptions of factors and causes/influences in a system. It can assist in clarifying uncertainties, showing vulnerabilities in a system and in identifying salient relationships.

A description of the features of a PSM map is illustrated in Annex One.

3.2 Phases

3.2.1 Deciding purpose and boundaries

The purpose of the work was to engage with stakeholders, acknowledging their knowledge, expertise, and experience to identify factors and the relationships between factors which affect educational achievement in Wales.

Internal discussions with the Wider Determinants of Health Unit team and the Education attainment gap and health - understanding the system Project Board defined the boundaries for the educational achievement systems map:

- Educational achievement up to the age of 16 years
- Residents of Wales

The boundary of the systems map was confirmed with stakeholders in the workshops.

3.2.2 Identification of stakeholders

Initial stakeholder mapping took place with Health Improvement Division colleagues in Public Health Wales in September 2022 to identify organisations and individuals which work in and have an inflence on the educational achievement system in Wales. For the purposes of the mapping exercise stakeholders were grouped into the following categories: education system, child and family system, infrastructure system and community system.

Using prioritisation criteria developed by the authors (see Annex Two), a list of system actors representing a range of perspectives and voices was identified to participate in the workshops. These were presented to the Project Board and further refined.

3.2.3 Educational achievement system map development

Workshop participants were invited by Public Health Wales' Interim Director of Health and Well-being to participate in one of three virtual workshops, each lasting three hours, in December 2022. In total 30 participants attended (see Annex Three for list of stakeholder organisations attending the workshops).

The specific aims of the workshops were to:

- give participants information and evidence from Public Health Wales on educational attainment, the Welsh context and the nature of the relationship between education and health
- outline the system boundaries for the purpose of the mapping exercise
- co-produce a draft systems map with the focal factor of educational achievement up until the age of 16.

The process for developing the systems map is illustrated in Annex Four. During the workshops, facilitators used a digital collaboration tool (Miro) with participants to:

i) record salient factors (task 1)
ii) refine factor wording and remove duplicate factors (task 2)
iii) group factors and add relationships between factors (task 3)
iv) explore similarities and differences between draft maps (task 4)

In the first workshop task 1 was undertaken in small breakout groups and task 2 as a whole group. In workshops 2 and 3, participants were shown the list of factors drawn up by the previous workshop participants. These were then further refined. In each workshop, the mapping activity task 3 was undertaken by splitting the participants into two breakout groups. In the last workshop, due to technical difficulties with the breakout function in Microsoft Teams, only one map was produced.

From the five draft maps developed during the workshops and feedback on similarities and differences between the maps (task 4), the authors (CHE and CW) synthesised the maps into a single draft map for the verification workshop (task 5). The process for synthesising the five draft maps is illustrated in Annex Five. The single draft map was developed using Kumu systems mapping software.

3.2.4 System maps verification workshop

Following drafting a single map, a sample of participants from the workshops was invited to participate in a 1.5 hour hybrid system map verification workshop. The aims of the verification workshop were to:

i) Review the process through which a single map was developed
ii) Add to or modify the draft system map
iii) Consider how stakeholders could use the maps in their work and the best approach for communicating the map outputs

3.2.5 Children and young people's workshops

To obtain additional insights and sense check the single draft map, three additional workshops were undertaken with young people aged between 10-16 years. Following discussions with the Welsh Local Government Association's Lifelong Learning Policy Officer (Youth) it was decided that using existing youth networks would be the best way of recruiting participants and youth workers would be

placed to run the workshops in person. Youth workers from Conwy County Borough Council and Torfaen County Borough Council volunteered to undertake the workshops.

All facilitation material was provided by Public Health Wales and a virtual training session was held with youth workers leading the workshops. Prior to starting each workshop, youth workers outlined the aims of the workshop, gave the participants an opportunity to ask any questions and obtained consent.

As a method of engagement and to stimulate conversation, young people were initially asked to draw a rich picture of factors which affect educational achievement. Rich pictures are a picture or drawing of a system or 'situation'.[ii] They provide a representation of an aspect of reality and usually involve minimal words. Following completion of the rich pictures, the children and young people were then presented with a list of factors from the single draft map and were asked to indicate, from their experience, which factors were most important.

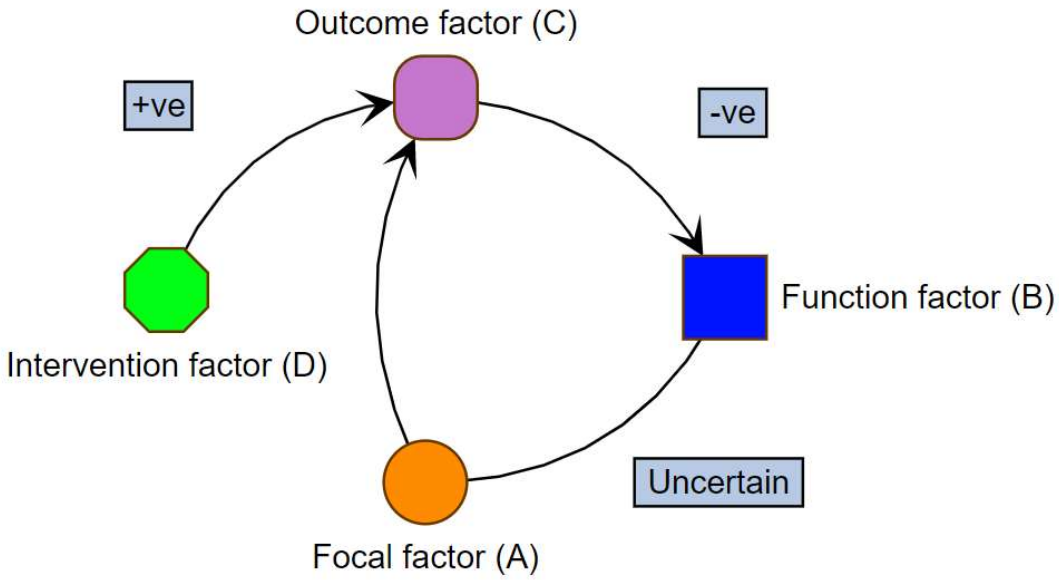
3.2.6 Further refinements of synthesised draft systems map

Following feedback from the verification workshop, information from the children and young people's workshops and discussion with the project board, the single draft map was further refined by the authors (CW, CHE, CH) with guidance from a systems expert, Dr Natalie Savona and an education expert Professor David Egan.

Using KUMU's presentation feature the systems map was broken down into its components and a video was produced with a narration which told the story of the map. The video was sent to the verification workshop attendees and the project board members for feedback.

[ii] For an introduction to rich pictures see Barbrook-Johnson and Penn (2022).

4. Annex One: Participatory System Mapping example map and definitions of features



Mapping feature	Definition
Network	A set of boxes (factors) connected by lines
Nodes	The boxes (factors) in a network
Edges	The connections, lines or arrows between boxes
Focal factor	Focal factors are usually outcome or function factors and are the first node(s) laid down in the map
Intervention factor	Intervention factors are where we actively intervene to change the state of the system and the focal factors
Function factor	Factors which describe functions in the system
Arrows	State directionality between nodes
+ve	Where there is a positive causal relationship (e.g. intervention factor B has a positive effect on outcome factor C)
-ve	Where there is a negative causal relationship (e.g. outcome factor C has a negative effect on function factor B)
Uncertain	Where the causal relationship between nodes is uncertain or unstable (e.g. the nature of the relationship between factor A and factor B is unclear)

Definitions are adapted Barbrook-Johnson & Penn (2022).

5. Annex Two: criteria for selecting systems mapping workshop participants

The following criteria along with feedback from the project board were used to determine which stakeholders would be invited to participate in the educational attainment workshops:

- Have networks of influence relevant to reducing the educational socio-economic disadvantage attainment gap
- Affects or is affected by the system of interest (or represent those who are affected)
- Has strategic knowledge or knowledge on the ground relevant to the system of interest
- Has a high level of understanding of the Welsh context
- Has the potential to challenge established narratives

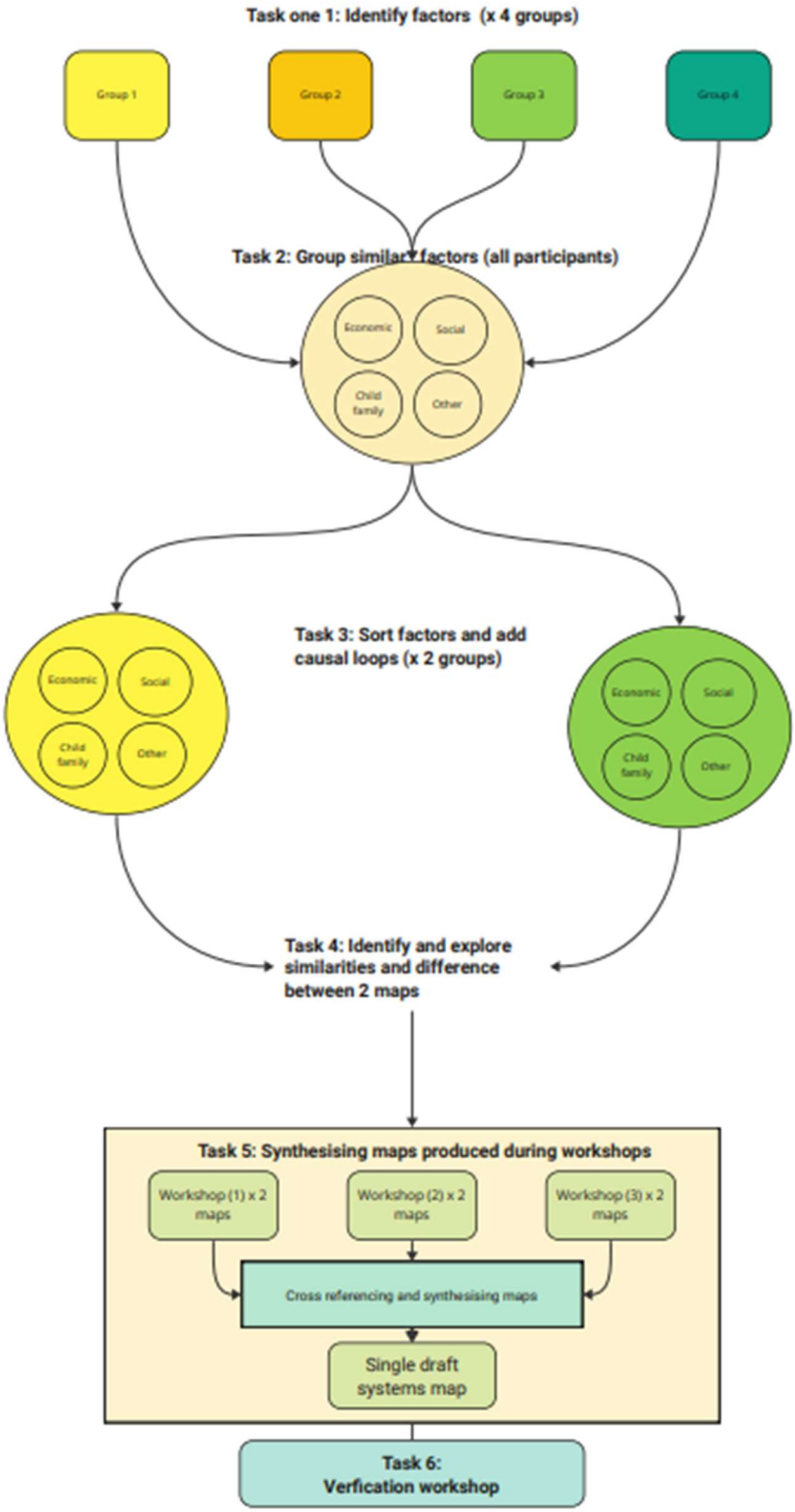
6. Annex Three – stakeholder organisations attending systems mapping workshops

Educational achievement workshops					
	Voice				
	Community	Strategic/ policy	Service provider	Academic/ Think tank	Inspectorate
Community Focused Schools – Family Support / Youth Engagements Officers			✓		
Education Endowment Fund representative				✓	
Endometriosis Patient Advocate representative	✓				
Estyn* representatives					✓
Fair Treatment for the Women of Wales voluntary representative		✓	✓		
Future Generations Commissioner's Office - education/CYP lead		✓			
Local Authority Director of Education representative		✓			
Local Authority educational psychology service representatives			✓		
Local Health Board Public Health School Nursing lead			✓		
Local Health Board Public Health Team (Healthy Schools Scheme / Healthy Preschool Scheme) representatives		✓	✓		
Local Health Board school nursing representative			✓		
Local Health Board Service Manager School Nursing & Health Visiting representative		✓	✓		
National Academy of Educational Leadership representative		✓	✓		
Princes Trust representative			✓		
Public Health Wales - Adverse Childhood		✓			

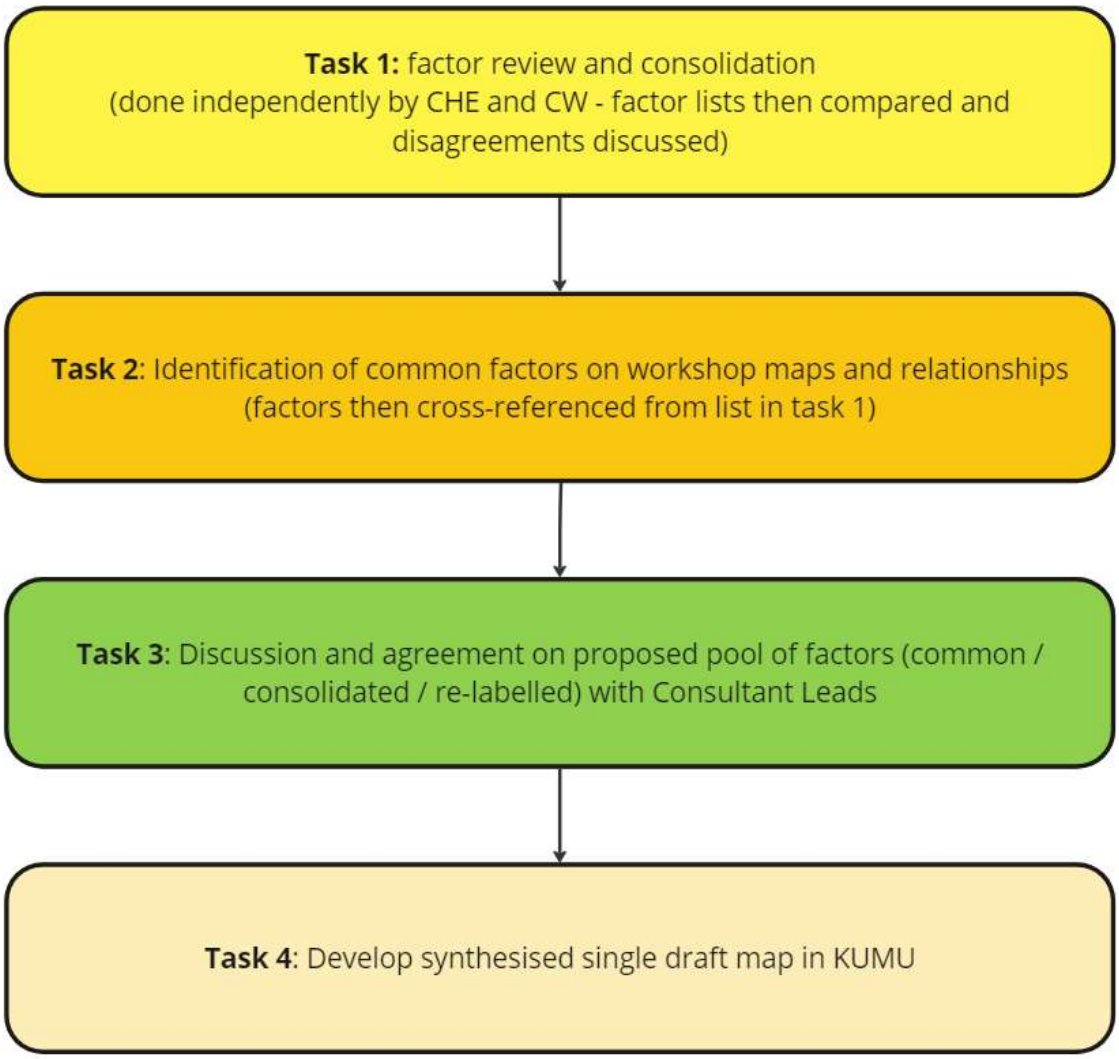
Experiences Hub representative					
Public Health Wales - First 1,000 Days representative		✓			
Public Health Wales – Healthy Schools Scheme / Healthy Preschool Scheme representatives		✓	✓		
Save the Children representative				✓	
SNAP Cymru representative			✓		
Undeb Cenedlaethol Athrawon Cymru (teaching union) representative			✓		
Wales Council for Voluntary Services – learning and work representative		✓	✓		
Welsh Council for International Affairs representative		✓			
Welsh Government - Education / CYP policy leads		✓			
Welsh Local Government Association - Education / CYP policy leads		✓			

*Estyn representatives did not participate in the system mapping workshops but attended the validation workshop.

7. Annex 4 – process for developing educational achievement systems map



8. Annex 5 – Process for synthesising draft systems maps



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[3] Winding C, Heathcote-Elliott, Christian Humphreys C. Exploring the relationship and pathways linking education to health, well-being and equity - snapshot evidence review (unpublished). 2022.

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