Towards meeting the evidence needs of public health decision-makers: Synthesising evidence using Whole Outcomes and Whole Systems Evidence for Childhood Health

SUBMITTED PROTOCOL

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Abstract

Despite substantial investment, levels of childhood overweight and obesity in England had broadly stabilised in pre-pandemic years. Given that public health policy actions appear to have been successful in stabilising but not improving the number of children overweight/obese prior to the pandemic, and that the pandemic has led to a steep increase in overweight/obesity subsequently, new approaches to conceptualising and improving child health may be needed. Childhood overweight and obesity is a complex health challenge driven by multiple factors interacting at different ecological levels. This is in some ways matched by a complex decision-making landscape, and while many of the policy directions may be devised at a national level, decisions about which child health interventions should be commissioned, for whom, and where, are made at a local level. Evidence that both reflects the complexity of the condition and that is salient at the local level is required to support decision-making.

Our recent earlier work has identified discordance between the way in which evidence is produced and its intended application including:

(i)   a mismatch between the focus of policymakers and researchers on more clinical measures of obesity/overweight (namely a focus on BMI) in contrast to the need perceived by practitioners and those with lived experience for a greater focus on broader markers of child health around Healthy Eating, Physical Activity, and Mental Health;

(ii)   a mismatch between the questions addressed within a typical systematic review, which are narrow and often focus on a single factor, and the complexity of child health;

(iii)   a tendency for theoretical models, such as systems-based logic models, to be absent of decision-making, limiting their application in decision-making;

(iv)   and a need for further development of new approaches to estimating the effectiveness of a given intervention in a local setting using new statistical approaches.

In this study, we aim to take a 'whole outcome and whole system' (WOWS) approach to child obesity to address these issues. Firstly, we will co-produce an understanding of the 'whole outcome whole system' as applied to child health through building on an existing systems-based logic model and identifying key pathways of interest. Secondly, we will further develop the existing model through evidencing the impact that putative pathways have on child health through secondary data analyses of existing data sources that hold data on child health. Thirdly, we will use systematic mapping techniques to identify interventions that can enhance health promoting pathways and disrupt health inhibiting pathways. In addition, methodologically novel recalibration and simulation techniques will be applied to systematic review-level evidence to explore where interventions are better suited to some UK contexts than others. Finally, we will evaluate the utility of our approaches to create whole system whole outcome evidence.

Background

Despite substantial investment, levels of childhood overweight and obesity in England had broadly stabilised in pre-pandemic years, with almost a quarter of children aged 4-5 years categorised as being overweight or obese (23.0%) in 2019 and over a third of children aged 10-11 years (35.1%) (NHS Digital 2020), representing little change over recent years. The COVID-19 pandemic has heightened concern around the health of children who have experienced substantial and prolonged disruption to their daily lives. Data collected after the first year of the pandemic in 2020/21 are suggestive of a marked increase in levels of overweight and obesity, with over a quarter of children aged 4-5 overweight or obese (27.7%) and two-fifths of children aged 10-11 years overweight or obese (40.9%) (NHS Digital 2021). Given that public health policy actions appear to have been successful in stabilising but not improving the number of children overweight/obese prior to the pandemic (van Jaarsveld and Gulliford 2015), and that the pandemic has led to a steep increase in overweight/obesity subsequently, new approaches to conceptualising and improving child health may be needed.

Childhood overweight and obesity is a complex health challenge driven by multiple factors interacting at different ecological levels (PHE 2019). This is in some ways matched by a complex decision-making landscape, and while many of the policy directions may be devised at a national level, decisions about which interventions should be commissioned, for whom, and where, are made at a local level (Kneale et al. 2017). Evidence that both reflects the complexity of the condition and that is salient at the local level is required to support decision-making. Systematic review evidence, while recognised as methodologically robust in many ways, has been critiqued as (i) being devoid of context (for example (Cornish 2015)) and; (ii) able to only provide the 'big facts' but not nuanced and complex evidence (Glass 2000).

Our recent NIHR Public Health Research methods development grant (Handling **C**omplexity in **E**vidence from systematic reviews and meta-analyses of **P**ublic **H**ealth **I**nterventions (CEPHI project)) sought to develop methods to overcome this challenge. This work identified several promising approaches to contextualising systematic review evidence; in particular, two approaches to reanalysing meta-analytic data may provide useful adjunct evidence to local decision-makers on the likely impacts of interventions in their areas based on selected contextual factors. The project also illuminated the way in which overweight/obesity are conceptualised by stakeholders as markers of a broader set of health challenges facing children and their parents around healthy eating, physical activity, and mental health. This was achieved through co-producing a systems-based logic model, which is a graphical representation of chains of events that can form the basis of causal pathways.

However, our current work also revealed some challenges in the focus, depth and accessibility of the evidence base, which the current proposal seeks to address. These challenges include the following.

- A mismatch between the focus of policymakers and researchers on more clinical measures of obesity/overweight (namely a focus on BMI) in contrast to the need perceived by practitioners in the area and those with lived experience for a greater focus on broader markers of child health including around Healthy Eating, Physical

Activity, and Mental Health. Within policy, while there has been a movement towards considering whole system approaches (for example (PHE 2019)), there appears to be less attention given to 'whole outcome' approaches, in which multiple outcomes are considered to understand a broader range of impacts of a condition or intervention. (Our whole outcome, whole system approach is elaborated on below.)

- A mismatch between the questions addressed within a typical systematic review, which are narrow and often focus on a single factor, and the complexity of child obesity as captured in our systems-based logic model. Child health was viewed by stakeholders in the CEPHI project as being driven by complex, multifactorial, and multilevel factors, but this is often overlooked in systematic reviews. The typical over-simplification of cause-and-effect pathways in child health research may give a misleading picture of what happens in the real world. For example, a narrow focus on a small number of outcomes may underestimate the total effects of an intervention, or it may miss potential harms. Similarly, only exploring individual-level factors (e.g., individual health behaviours) without examining factors at other levels may, at best, miss important moderating and mediating factors (e.g., cultural or family influence on individual health behaviours) or, at worst, perpetuate stigmatising beliefs that overweight is largely down to individual choices about diet and physical activity. Research approaches need to better align with the reality of the complexity of child health to ensure more accurate evaluations of causal pathways and to eradicate research that stigmatises.
- A need for conceptual models, such as our systems-based logic model, to also include empirical evidence representing the magnitude and direction of associations between factors in the logic model, for the model to be more useful to policymakers and practitioners. The model currently suggests possible pathways that could be the focus of interventions, but it does not give any indication of where best to prioritise resources.
- A need for further development of new processes for evidence-informed policymaking, from conceptualising the relevant issues using the logic model through to estimating the effectiveness of a given intervention in a local setting using new statistical approaches.

In this study, we aim to take a 'whole outcome and whole system' (WOWS) approach to child obesity; seeking to evidence the magnitude and direction of some of the putative socioecological pathways in our systems-based logic model; providing rapid review evidence for interventions that may disrupt/enhance some of these pathways; and contextualising review evidence where possible using statistical methods. Combined, this project will provide an exemplar of a new process for evidence-informed decision-making for local contexts.

This protocol outlines a project that incorporates methods development and the development of substantive insights relating to a WOWs approach to child health. The protocol is iterative in nature, underpinned by co-production, which may lead to further changes. We consider this protocol a form of 'living protocol' which will be developed through co-produced decisions.

Aims and Research Questions

Our aims are threefold:

- To develop an evidence-based 'whole outcome and whole system' (WOWS) approach to child health, which focuses on broader markers of child health around Healthy Eating, Physical Activity, and Mental Health
- To apply the WOWS approach to novel methods for synthesising research that emphasises local contexts
- To evaluate what is the additional value, as perceived by various stakeholders (practitioners, decisionmakers, researchers, and the public), of the WOWS approach to child health compared to current approaches

Our research questions below are organised across different concurrent work packages. Co-production is a spine running throughout the project, and much of the project builds on a logic model of childhood health developed as part of an earlier project (see https://sites.google.com/view/cephi-project/logic-model).

Work package 1: Co-producing an understanding of whole outcome whole system approaches to child health

- *How can we prioritise elements and pathways within complex systems for exploration through co-production?*
- *How can we work with stakeholders to develop and enhance logic models of complex systems of child health that reflect the complexities of the social world while maintaining interpretability and application for decision-making?*

Work package 2: Evidencing whole outcome whole system theories of child health

- *How can secondary data analysis support prioritisation exercises and help to illuminate factors and pathways of significance?*
- *How can we map evidence supporting interventions that improve child health through disrupting or enhancing features of systems?*

Work package 3: Producing contextually relevant estimates to support decision-making

- *How can we recalibrate the evidence to support decision-making in different geographic areas?*
- *What value can simulation techniques such as agent-based modelling add to local public health decision-making?*
- *What is the relationship between recalibration and simulation?*

Work package 4: Evaluating the added value of a whole-outcome whole-system approach

- *What does a whole outcome approach to child health entail?*
- *What characterises a whole systems approach to child health?*

- *What insights do we gain from a logic model that represents child health as a comprehensive outcome and system?*
- *What is the potential additional value of taking a whole outcomes whole systems approach, as perceived by various stakeholders (practitioners, decisionmakers, researchers, and the public)—and can this be quantified?*

Methods

This research is iterative in nature and involves undertaking overlapping or concurrent work packages that are driven by an initial stage of co-production. There will be four work packages, each employing different methods to achieve their aims. These are: (1) priority setting through co-production, (2) secondary data analysis and systematic evidence mapping, (3) evidence synthesis using statistical recalibration, and (4) evaluation. These are elaborated on in the following sections.

Co-production

Overall approach towards co-production: We expect to work closely alongside a group of co-producers to help shape the core decisions within the project at the outset and in determining how to understand the value of the work outlined here. However, as this project involves a number of technical stages where the approaches themselves are in development, we expect that for some stages full co-production that adheres to the values of co-production will not be possible (O'Mara-Eves et al. 2022). Although we will continue to consult closely with co-producers, they may shift towards an advisory role rather than co-producers at these stages. Whilst co-production involves decision-sharing and joint responsibility for research outputs, the advisory role will be more consultative in nature (e.g., providing feedback on draft decisions or outputs). This latter type of involvement will apply to work packages 2-4.

Aim of co-production: *To work in an inclusive way with a range of stakeholders to ensure that the decisions and approaches taken in the project reflect lived and professional experiences and address evidence needs.*

The co-production builds on an existing project that was co-produced, which involved workshops with approximately 18 people and an advisory group composed of an additional 5 people, including some involved on the basis of lived experience. That work involved constructing a systems-based logic model (see Kneale et al. (2020a)) through a series of workshops that resulted in over 1,000 pieces of information on contextual influencers of childhood obesity/health being collected. The resulting model illuminated some of the complex relationships between context and health, but needed further refinement to improve its usefulness in supporting decision-making.

To refine the model, we intend to work more closely with a smaller group of co-producers in order to engage in challenging conversations about which pathways and elements of the model might be prioritised as starting points for exploration. During the process of co-producing the original model, we speculated that forming trusting relationships between a

large diverse group of people in a relatively rapid timescale was challenging, and questioned whether some perspectives may have been underrepresented. Our intention here is to work differently and to work more closely with a smaller group of people to develop a more cohesive research team.

Collaborators external to the LACES team will be core to the research team for work package 1, but may adopt more of an advisory role around some work packages. The current plan is for co-production in work-package 1, advising on work packages 2-4, and providing an overall steer to the project. We will also ensure that all team members (internal and external to the LACES team) will receive training on co-production.

We aim to assemble a co-production team that takes on the following roles:

Co-producer background	Target number	Role on the project
Co-production experts from the co-production collective	N/A	Provide training on co-production; Support co-production in WP1
EPPI-Centre researchers	4	Provide an initial scope for the project; Co-produce WP1; lead on WP2-WP4
Co-producers with lived experience	2	Provide a steer on the overall project; Co-produce WP1; advise on WP2-WP4
Co-producers with substantive research experience	2	Provide a steer on the overall project; Co-produce WP1; advise on WP2-WP4
Co-producers with professional experience (including teachers and GPs)	2	Provide a steer on the overall project; Co-produce WP1; advise on WP2-WP4
Co-producers with policy experience (including at national and local government level)	2	Provide a steer on the overall project; Co-produce WP1; advise on WP2-WP4

This co-production begins with the recruitment of co-producers reflecting different sets of expertise and perspectives (e.g., teachers, parents, citizens, public health practitioners, clinicians etc.). This will be facilitated by the networks of the Co-Production Collective[1], who are a community of researchers, patients, carers, practitioners, students and anyone else interested in co-production (in health or more generally), with experience in co-producing research and other knowledge.

The co-production will take place through hybrid meetings and workshops and will begin with sessions on the nature of co-production (including providing training). The sessions will also help co-producers identify the purpose of the study, provide an opportunity for members to get to know each other, and help clarify expectations around ways of working and any particular needs or requirements that co-producers have that can support their involvement.

All co-producers will aim to embrace the value of co-production including in equality and being reflexive of historic and current power differentials, embracing diversity in perspective,

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[1] Co-Production Collective website: https://www.coproductioncollective.co.uk/

being open to constructive challenge, and working towards social justice through building trusting relationships. All co-production activities will be conducted where co-producers are valued, where all co-producers are invited to share professional and personal knowledge and experiences, and where decisions are made openly and collectively. We will also conduct formative and summative evaluations of the co-production work (likely following methods described in Jermutus, Howes, O'Mara-Eves et al., 2023).

Work Package 1: Co-production and crowd sourcing as a means of refining research questions/priorities

Aim: To (re-)develop a workable and interpretable systems-based logic model of child health that can also display the magnitude and direction of effects of exposures and interventions

Research questions:

- *How can we prioritise elements and pathways within complex systems for exploration through co-production?*
- *How can we work with stakeholders to develop and enhance logic models of complex systems of child health that reflect the complexities of the social world while maintaining interpretability and application for decision-making?*

Rationale: As outlined above, this project builds on an existing co-produced systems-based logic model (see here https://sites.google.com/view/cephi-project/logic-model). The model has many strengths. It includes the emphasis on a 'whole outcomes' approach to childhood health that was so important to co-producers from different backgrounds to maintain. In this model, the whole outcome is the intersection of healthy eating, physical activity, and mental health needed to sustain childhood health. This moves it beyond typical focus of research in this space on physiological measures, particularly BMI, as the main goal of intervention.

It also is a 'whole systems' model that includes considerations from different socioecological contexts, from broad cultural factors to family level factors (Dahlgren and Whitehead 1991). These are elements that need to be retained – they reflect the wishes of decision-makers and the experiences of people with lived and professional expertise.

However, while the existing model represents the views of stakeholders, it is also very large, complex, and unwieldy. The present model occupies an uneasy balance between representing some contextual factors of importance (although not all), and the model can be understood as a partial representation of the complexity of child health; at the same time the model is nuanced and complex and does not have a clear starting point for supporting decision-making. The earlier model showed the potential of working with a diverse range of co-producers to practically theorise about the contextual drivers of poor childhood health. This present work package aims to take this further and examine the potential of co-production in grappling complexity and prioritising areas for research using a logic model as a framework.

Approach: We expect that this work package will involve working closely as a team of co-producers to overhaul the existing model, as well as engaging with a broader set of stakeholders to obtain feedback on the model.

As a group, we will develop criteria around how to prioritise elements of the logic model for exploration, while also ensuring that no part of the logic model is lost. For example, the

prioritisation may seek to ensure that a breadth of pathways is represented, or that prioritisation is conducted from the perspective of specific policy levers or actors (e.g., what are factors of importance within schools and could be influenced by schools), or from the perspective of particular groups (e.g., which of the pathways are most salient for groups known to be at higher risk of poorer health). Prioritisation may involve some desk research (e.g., examining statistical trends) to support decisions around how to prioritise. We will also work as a group to identify how prioritised factors and/or pathways can be operationalised to form questions for further exploration, for example drawing on PICO (Population, Intervention (i.e. exposure and/or experimental intervention), Comparator, Outcome) as a framework for question development.

Once criteria have been identified on how to prioritise pathways and factors, the group will then move to examining the model and selecting pathways or factors for further exploration. In addition to prioritisation, we expect conversations about child health to also mean that some new factors may be identified and need to be represented within the model, although these will be subject to the same prioritisation procedures.

Alongside decisions around prioritisation, co-producers will also be engaging in conversations about how to visualise and host an interactive model. This will include making decisions about what information needs to accompany the model. We may invite experts from elsewhere within UCL to advise on methods or principles of visualisation that would be useful to consider when deciding on how to visualise complex systems.

We anticipate this work package to take place through hybrid co-production workshops, using software such as Miro to ensure interactivity.

In addition to working with co-producers, we want to ensure that prioritisation is not at odds with the views of a wider set of perspectives. Using social media (e.g. Twitter/X, TikTok(?)) and updates to a website, we will communicate decisions to a wider audience (including undergraduate students studying public health) in order to solicit feedback on our prioritisation decisions.

It is anticipated that data on the process of co-producing the prioritisation will be collected in the form of meeting minutes and collecting reflections from all people involved after each meeting. Thematic analysis will look for convergent and divergent themes across the meetings and participants.

Output: The output of this work package will be a co-produced whole-outcome whole-system logic model of child health that is visually interpretable and that is used to identify areas for further exploration in Work Packages 2 and 3. We will also document the process to provide an exemplar for future exercises in this area.

Work package 2: Evidencing whole outcome whole system theories of child health

Aim: To provide evidence around (i) pathways and factors that increase/decrease the risk of poor child health represented within the logic model and (ii) interventions that help to disrupt or facilitate these factors and pathways

Research questions:

- *How can secondary data analysis support prioritisation exercises and help to illuminate factors and pathways of significance?*
- *How can we map evidence supporting interventions that improve child health through disrupting or enhancing features of systems?*

Rationale: This work package involves evidencing the factors and pathways represented within the logic model that were prioritised through co-production. Factors might represent broad constructs such as 'peer group influences', and pathways might involve exploring causal chains such as the influence of peer group factors in shaping poor decisions about diet that could in turn lead to poorer child health. The prioritisation exercise will also have shaped these prioritised elements into research questions for further exploration.

However, the logic model is a working theory, and this work package aims to examine whether evidence exists that supports the theory that a given factor or pathway is an important determinant of childhood health (maintaining a whole outcome approach). Context factors that are theorised to be important may actually play only a moderate role in population health and/or may only apply to subgroups of the population (making it important to know about when considering commissioning decisions). This work will be conducted through secondary data analysis of existing datasets which may identify that some of the putative pathways prioritised as important do not have a large influence (and do not require investment in interventions).

In addition, for those factors and pathways found to be important, we will continue to theorise with co-producers from work package 1 (who may take more of an advisory role in this work package) around interventions that may be important in disrupting detrimental pathways/factors and seek evidence supporting these.

Approach:

Secondary data analysis: We anticipate starting with 5-8 core pathways or 10-20 core factors being identified/prioritised through work package 1.

Next, data sources will be searched for on the UK Data Archive and prioritised on the basis of breadth and coverage/inclusion of children/families. Dependent on the priorities identified in work package 1, we may consider undertaking family-level and child-level analysis. In this case, a family-level analysis might involve examining parts of causal pathways among families with dependent children; for example, examining the social determinants of a family that doesn't eat meals together regularly or more rudimentary analyses of the social determinants of families living in properties with no access to green space. Meanwhile, child-level analysis, which is expected to be the core analysis, will involve greater emphasis on 'whole outcomes' of interest around physical activity, healthy eating and mental wellbeing.

Potential data sources for child and/or family-level analyses include the Millennium Cohort Study (MCS), Understanding Society, Growing Up in Scotland, Health Survey for England (and Northern Irish equivalent). Some of these data sources also have linked neighbourhood level data that can include features of interest (for example the MCS has the density of fast food restaurants in children's neighbourhoods available through safeguarded access). A more systematic search of the UK Data Archive and other sources is likely to reveal a large number of additional studies that could be utilised (see Kneale et al. (2020b) for previous example).

While the methods to be used will be determined by the priorities identified and the nature and structure of the data, we expect that the most complex modelling could involve multilevel structural equation modelling (Rabe-Hesketh et al. 2007) to account for the multivariate outcome and longitudinal nature of the data under consideration. Other more complex techniques that could be employed include forms of multilevel analysis (Marsh et al. 2009), mediation analysis, and latent profile or latent class analysis (Kneale and Bécares 2023). However, we expect that more straightforward approaches such as linear and logistic regression may provide sufficient evidence to substantiate or discount elements of the logic model prioritised for exploration.

The results will be displayed visually on the 'living' logic model to highlight where the evidence suggests that further interventions are needed.

Evidence mapping: Where a pathway or factor has been identified as important, we will seek advice from our co-production group about potential interventions that could help to ameliorate or disrupt pathways of interest. We will start by conducting searches for high quality reviews of reviews, as they are likely to encompass the largest range of sources. A possible risk is that we may not identify relevant reviews of reviews. To mitigate this, we would work down our hierarchy of evidence starting with the identification of relevant systematic reviews, followed by rapid reviews, or finally, high quality randomised controlled trials. We will conduct a formal critical appraisal of any evidence included in the map.

The results will also be displayed visually on the 'living' logic model to highlight where there is evidence of effective or ineffective interventions.

Output: The output from this work package will be a write up of the secondary data analyses and evidence mapping. A crucial output from this work will be a logic model that shows what was theorised, what was explored, and what the evidence suggests in terms of risks and effective interventions. We will draw on our experience from the CEPHI project (Kneale et al., 2022) regarding what did and did not work in communicating the complex models and results to different audiences.

Work package 3: Producing contextually relevant estimates to support decision-making

Aim: To provide contextually relevant evidence to support decision-making

Research questions:

- _How can we recalibrate the evidence to support decision-making in different geographic areas?_
- _What value can simulation techniques such as agent-based modelling add to local public health decision-making?_
- _What is the relationship between recalibration and simulation?_

Rationale: The contextual salience of evidence is a key determinant of its use and non-use (Kneale et al. 2017).

At this point of the project, we will have a visually engaging logic model that includes some pathways/factors that are particularly emphasised as being important routes to child health/ill-health. These pathways/factors will have been evidenced through secondary data

analysis and interventions identified that may be promising in ameliorating or disrupting the pathways displayed. However, the evidence contained within the model may still not be deemed useful for supporting decision-making due to the absence of contextually salience estimates of intervention impacts to support decision-making.

Approach: The logic model will contain evidence from systematic reviews on the most effective interventions to improve child health. Drawing on an existing systematic review that includes a meta-analysis, we will conduct a relatively new form of adjunct meta-analysis involving recalibration techniques. To enhance the salience of the evidence to Local Authority decision-makers, who may want further insight into the likely impacts of interventions in their local areas, we will recalibrate meta-analytic review evidence that we identify above to consider potential impacts of interventions in different Local Authority areas. The recalibration approach involves taking a standard meta-analysis, which reflects evidence from many different settings, and producing an alternative estimate of effect alongside the standard pooled estimate of effect adjusted to the characteristics of a particular setting (Kneale et al. 2019).

In addition, we will attempt to examine the potential of agent-based modelling (ABM) as a form of social simulation that draws on existing data and theory to explore social processes (in this case exposures and interventions) and the interactions between micro individual processes and structural or policy factors (such as an intervention). This would involve returning to the secondary analyses in WP2 and hypothesising the impact of introducing an intervention. This approach is exploratory and further checks on the feasibility and a more detailed protocol will be prepared once the parameters are clearer from the co-production stages.

Output: The output from this work package will be a write up/production of a database representing the estimates of intervention effectiveness across different areas. We will also provide an output describing the progress in ABM and its potential to illustrate potential intervention effects across different families/areas/populations.

Work package 4: Evaluating the results

Aim: To understand the potential? added value of the approaches outlined in taking a whole outcome whole system approach

Proposed research questions:

- *What does a whole outcome approach to child health entail?*
- *What characterises a whole systems approach to child health?*
- *What insights do we gain from a logic model that represents child health as a comprehensive outcome and system?*
- *What is the potential? additional value of taking a whole outcomes whole systems approach, as perceived by various stakeholders (practitioners, decisionmakers, researchers, and the public)—and can this be quantified?*

Approach: Our main approaches include: (i) reviewing alternative models; (ii) reflective approaches and (iii) stakeholder engagement.

Reviewing alternative models: The first two research questions explore the outcomes and the system factors separately. We will compare differences and similarities between the final prioritised model developed in WOWS, with both the original model from the CEPHI project and other models looking at childhood obesity and overweight (e.g., Foresight Obesity System Map[2]). We will be looking to see where areas of overlap or distinction occur in terms of the outcomes examined and the factors that are proposed. We will also consider what pathways are proposed in the different models. We will also examine any documentation relating to the development of the models to consider the defining characteristics of the different ways of conceiving child health.

Reflective approach: The third research question looks at the final model as a whole and what insights can be gained from a holistic model. This will partly be explored in WP3, by applying the model to a specific case study. Reflections of the research team on that process will feed into the answer to this research question. A reflective diary study, in which the team answers a series of questions at regular intervals about their experience from the beginning to end of the project will be used here.

Stakeholder engagement: Using our contacts with Local Authority public health decision-makers, we will develop a dissemination event targeting a small number of public health practitioners (8-10) where we present on the approaches taken during the project. We will also aim to then collect responses from attendees who consent to take part in a focus group to elicit feedback on the merits and drawbacks of the model and methods utilised including: clarity, coherence, comprehensiveness, usability, and credibility of the evidence. We will consider potential harms of using the WOWS approach (e.g., added time taken to engage with the complexity, missing data for parts of the WOWS model, or reduced understandability).

A more efficient flow of evidence can improve transparency in decision-making, increase opportunities for the more effective use of resources, and improve the certainty around the likelihood of success of implementing different options. The evaluation in WP4 will assess the extent to which these outcomes/objectives are realised.

Ethical considerations

This research will be conducted following the Economic and Social Research Council's research ethics framework. Ethical approval will be sought from the UCL Institute of Education Research Ethics Committee. Although we do not anticipate substantial ethical issues, particularly as we will not be collecting data directly from children and young people, issues around voluntary participation and informed consent, particularly around co-production will be explored and addressed in the research. In addition, we will adhere to guidance supporting secondary data analysis and working with datasets including considerations around anonymity and safe storage.

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/296290/obesity-map-full-hi-res.pdf

Organisational affiliation of the project and funding

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Conflict of interests

No conflict of interest has been declared by the authors of this protocol.

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