

### Systematic reviews of determinants/correlates of obesity related dietary and physical activity behaviours in young children (preschool 0-6yrs): evidence mapping and syntheses

1.	<b>Project reference:</b>	<b>Final report date:</b>	
	SPHR-CAM-PH1-PSO	May 2014	
2.	<b>Project title:</b>		
	Systematic reviews of determinants/correlates of obesity related dietary and physical activity behaviours in young children (preschool 0-6yrs): evidence mapping and syntheses  <a href="http://sphr.nihr.ac.uk/wp-content/uploads/2017/03/Brief-SPHR-CAM-PH1-PSO.pdf#view=Fit">http://sphr.nihr.ac.uk/wp-content/uploads/2017/03/Brief-SPHR-CAM-PH1-PSO.pdf#view=Fit</a>		
3.	<b>Lead investigators on project:</b>		
	<b>Rajalakshmi Lakshman &amp; Simon Griffin</b> MRC Epidemiology Unit, University of Cambridge UKCRC Centre for Diet and Activity Research (CEDAR), University of Cambridge		
	<b>Other NIHR School collaborators (name, School for Primary Care/Social Care Research) on project:</b>		
	N/A		
	<b>Names and roles of others involved in project (e.g. include fixed term contract researchers and external collaborators / partners):</b>		
<b>Carolyn Summerbell, Helen Moore &amp; Claire O'Malley</b> Obesity Related Behaviours Research Group, Durham University & FUSE			
<b>Ken Ong &amp; Esther Van Sluijs</b> MRC Epidemiology Unit, University of Cambridge & UKCRC Centre for Diet and Activity Research (CEDAR), University of Cambridge			
<b>Kathryn Hesketh</b> UKCRC Centre for Diet and Activity Research (CEDAR), University of Cambridge			
<b>Veena Mazarello Paes</b> Cambridge Institute of Public Health, University of Cambridge			
4.	<b>Project start date:</b>	<b>Project end date:</b>	<b>Duration:</b>
	1 <sup>st</sup> April 2012	31 <sup>st</sup> March 2014	24 months
5.	<b>Project objectives originally outlined in proposal:</b>		
	<b>Aim:</b> To systematically map and review the quantitative and qualitative literature on the determinants/correlates of 1) Fruit and vegetable intake 2) Sugar sweetened beverage and other unhealthy diet intake and		

3) Physical activity and sedentary behaviours in young children.  
With the aim of informing interventions to change these behaviours in this age group.

**Search Strategy:**

- Searches conducted in eight electronic databases (Medline, Embase, Cinhal, Psychinfo, Web of Knowledge, BNI, ASSIA and Sociological Abstracts) using a refined search strategy.
- This will be supplemented by checking references, citation tracking and contacting authors of included studies.

**Inclusion criteria:**

- Quantitative (prospective & intervention) and Qualitative studies in developed countries that examine the factors associated with these behaviours in children aged 0-6 years (at baseline) will be included.
- No language or period restrictions will be applied

**Review stages:**

Stage 1: Studies will be mapped descriptively

Stage 2: Refining of inclusion criteria for study selection, in-depth data extraction and synthesis

Stage 3: Integration of qualitative studies with quantitative evidence to provide a deeper understanding of effective strategies to influence these energy balance related behaviours.

**Data Analyses:**

Data from quantitative non-intervention studies will be summarised using forest plots and/or harvest plots and narrative synthesis, intervention studies using forest plots (where no significant heterogeneity is found) and qualitative studies using thematic analysis.

**6. Briefly describe and explain the reason(s) for any changes to the project originally outlined in proposal:**

**1. Cross-sectional studies:** Initially the plan was to include cross-sectional studies but as this could potentially involve inclusion of over 2000 papers, which would make the project unfeasible, these studies will not be included in the detailed data extraction but will be used for the descriptive mapping.

**2. PhD theses:** To minimise procurement costs, it has been decided that relevant papers published from PhD research work would be ordered if required rather than procuring PhD theses.

**3. Papers in foreign languages:** To minimise translation costs, it has been decided to seek help from colleagues at Cambridge and Durham Universities to help identify studies that meet our inclusion criteria, so a further pragmatic solution could be arranged if any of these studies are to be included in the review.

**4.** Prospective quantitative evidence is very poor on behaviours related to sugar sweetened beverage and other unhealthy diet intake. It has therefore been decided that cross sectional studies will be included only for these behaviours.

**5. Inclusion of a mapping stage:** due to the large number of studies identified.

**7. Brief summary of methods, findings against objectives, and conclusions (2-4 pages max):**

**Methods:** Following an iterative scoping stage, a combined search strategy with terms related to population (preschool children aged 0-6 years), exposure (observational, intervention, qualitative studies and review articles) and outcome (1. physical activity (PA) and sedentary behaviours (Sed), 2. fruit and vegetable intake (F&V), 3. sugar sweetened beverage (SSB) and other obesogenic diet (OD) intake was used to identify papers from eight

electronic databases (Medline, Embase (via OVID), Cinhal, Psychinfo (via Ebsco), Web of Knowledge (via Thomson Reuters), British Nursing Index (BNI), Applied Social Sciences Index and Abstracts (ASSIA) and Sociological Abstracts (via Proquest)). No language or period restrictions were applied. Titles and abstracts of 37,686 retrieved articles were screened by three reviewers. Full texts of articles appearing to meet the inclusion criteria were retrieved for further review and their status recorded in a pre-piloted IN/OUT spread sheet, along with specific study details and reasons for exclusion (for excluded studies). Studies in clinical populations, in children over the age of 6 years at baseline, and laboratory-based studies were excluded. Study inclusion, quality assessment, and data extraction were independently validated by two researchers. Quantitative data were synthesised in harvest plots or tables to demonstrate strength and direction of association and quality of study. Thematic analysis was used for qualitative studies.

The reviews for 1) PA and Sed behaviour and 2) F&V intake followed a similar methodology and synthesised evidence from intervention, prospective and qualitative studies. The reviews for 3) SSB and Obesogenic diet intake synthesised the quantitative (intervention, prospective and cross-sectional) and qualitative evidence separately.

**Overall Conclusions:** Multi-level interventions, including parental modelling of healthy behaviours, show promise in changing EBRBs in young children. However, few conclusions could be drawn regarding other specific modifiable determinants. Furthermore, qualitative evidence indicates that future interventions should also target the barriers to behaviour change. Long-term sustainability, impact on inequalities and potential for implementation in routine practice of interventions should be considered.

Further conclusions will be drawn following consideration of findings of updated searches and from the critical revision of arising full scientific reports.

Main further conclusions are that parental modelling and environmental factors are important modifiable intervention targets; however parental modelling has not been included in previous interventions.

#### **The detailed findings are available in the following publications**

Hesketh, K., Lakshman, R., & Van Sluijs, E. Barriers and Facilitators to Young Children's Physical Activity and Sedentary Behaviour: A Systematic Review and Synthesis of Qualitative Literature. *Obesity Reviews* <https://doi.org/10.17863/CAM.8786> <https://goo.gl/oN1GBZ>

Hesketh, K. R., O'Malley, C., Paes, V. M., Moore, H., Summerbell, C., Ong, K. K., Lakshman, R., van Sluijs, E. M. F. (2016). Determinants of Change in Physical Activity in Children 0-6 years of Age: A Systematic Review of Quantitative Literature.. *Sports Med*. doi:10.1007/s40279-016-0656-0 <https://goo.gl/inT9Wq>

Mazarello Paes, V., Hesketh, K., O'Malley, C., Moore, H., Summerbell, C., Griffin, S., Lakshman, R. (2015). Determinants of sugar-sweetened beverage consumption in young children: a systematic review.. *Obes Rev*, 16(11), 903-913. doi:10.1111/obr.12310 <https://goo.gl/jCLaVD>

Mazarello Paes, V., Ong, K. K., & Lakshman, R. (2015). Factors influencing obesogenic dietary intake in young children (0-6 years): systematic review of qualitative evidence.. *BMJ Open*, 5(9), e007396. doi:10.1136/bmjopen-2014-007396 <https://goo.gl/ZT3nHG>

Lakshman, R., Mazarello Paes, V., Hesketh, K., O'Malley, C., Moore, H., Ong, K., Summerbell, C. (2013). Protocol for systematic reviews of determinants/correlates of obesity-related dietary and physical activity behaviors in young children (preschool 0 to 6 years): evidence mapping and syntheses.. *Syst Rev*, 2, 28. doi:10.1186/2046-4053-2-28 <https://goo.gl/tmm2RV>

8. **Plain English Summary (400 words max)**  
**Please provide a summary of the project, including background, findings and conclusions:**

The aim of this project is to inform the design and content of interventions to reduce obesity in young children. Over the past few years the focus of obesity prevention has shifted to preschool children because of the high prevalence of obesity at school entry and recognition that habits formed in early life often persist into later life. In order to develop effective interventions and change behaviour, it is important to understand the factors that are associated with those behaviours. The energy-balance related behaviours (EBRB) associated with obesity are 1) intake of sugary drinks 2) intake of high calorie foods 3) less fruit and vegetable intake and 4) sedentary behaviour and low levels of physical activity.

We searched through almost 40,000 papers and identified studies describing interventions to change the four behaviours we were interested in, studies that describe which factors are associated with these behaviours and studies that asked children and caregivers their opinions on changing these behaviours.

We found that multi-level interventions (child, parents, school, community), including parental modelling of healthy behaviours, show promise in changing EBRBs in young children. However, few conclusions could be drawn regarding other specific modifiable factors associated with these behaviours. Furthermore, qualitative evidence indicates that future interventions should also target the barriers to behaviour change. Long-term sustainability, impact on inequalities and potential for implementation in routine practice of interventions should be considered.

The findings can be used by policy makers and researchers to develop and test interventions to prevent childhood obesity.

9.	<p><b>Keywords</b> Please provide up to 8 keywords that relate to the research undertaken in this study:</p> <p>Obesity, preschool, behaviours, determinants, correlates, intervention, quantitative, qualitative</p>
10.	<p><b>Dissemination – please detail planned or published articles in peer-reviewed journals (including web links):</b></p> <p><u>Articles and reports</u></p> <p>Hesketh KR, O'Malley C, Mazarello Paes V, Moore H, Summerbell C, Ong KK, Lakshman R, van Sluijs EMF. Determinants of Change in Physical Activity in Children 0–6 years of Age: A Systematic Review of Quantitative Literature. <i>Sports Medicine</i> (2016). DOI: 10.1007/s40279-016-0656-0 <a href="https://goo.gl/rSZJuQ">https://goo.gl/rSZJuQ</a></p> <p>Mazarello Paes V, Hesketh K, O'Malley C, Moore H, Summerbell C, Griffin S, van Sluijs EM, Ong KK, Lakshman R. <i>Determinants of sugar-sweetened beverage consumption in young children: a systematic review</i>. <i>Obesity Review</i>. 2015 Aug 7. doi: 10.1111/obr.12310. <a href="http://www.ncbi.nlm.nih.gov/pubmed/26252417">http://www.ncbi.nlm.nih.gov/pubmed/26252417</a></p> <p>Mazarello Paes V, Ong KK, Lakshman R. <i>Factors influencing obesogenic dietary intake in young children (0–6 years): systematic review of qualitative evidence</i>. <i>BMJ Open</i> 2015;5: e007396. doi:10.1136/bmjopen-2014-007396. <a href="http://bmjopen.bmj.com/content/5/9/e007396.full.pdf+htm">http://bmjopen.bmj.com/content/5/9/e007396.full.pdf+htm</a>  </p> <p>The review protocol is registered with the PROSPERO International Prospective Register of Systematic Reviews (registration number CRD42012002881).</p> <p>Lakshman R, Paes V, Hesketh K, O'Malley C, Moore H, Ong K, Griffin S, van Sluijs E, Summerbell C. (2013) <i>Protocol for systematic reviews of determinants/correlates of obesity-related dietary and physical activity behaviours in young children (preschool 0 to 6 years): evidence mapping and syntheses</i>. <i>Systematic Reviews</i> 2013 2:28. doi:10.1186/2046-4053-2-28</p>

## Conference presentations

Hesketh K, O'Malley C, Paes V, Moore H, Ong K, Summerbell C, Lakshman R, van Sluijs E. *Determinants, barriers and facilitators of change in preschool-aged children's physical activity: a systematic review of quantitative and qualitative evidence*. ISBNPA Conference, Edinburgh, 3 – 6 Jun 2015. (poster)

O'Malley C, Mazarello Paes V, Hesketh K, Moore H, Ong K, van Sluijs E, Lakshman R, Summerbell C. *Systematic Review on the determinants of Fruit and Vegetable consumption in young children (aged 06)*. ISBNPA Conference, Edinburgh, 3 – 6 Jun 2015. (poster)

O'Malley C, Mazarello Paes V, Hesketh K, Moore H, Ong K, van Sluijs E, Lakshman R, Summerbell C. *Systematic Review on the determinants of Fruit and Vegetable consumption in young children (aged 06)*. ECO Conference, Prague, 6 – 9 May 2015. (poster)

O'Malley C. *Systematic Review on the determinants of Fruit and Vegetable consumption in young children (aged 0-6)*. Wolfson Research Colloquium, Durham, 15 Apr 2015. (presentation)

Lakshman R. *Determinants of obesity related behaviours in preschool children*. SPHR @ Cambridge Stakeholder Engagement Event, Cambridge, 25 Feb 2015. (presentation)

Lakshman R, Paes V, O'Malley C, Hesketh K, Moore H, Griffin S, Van Sluijs E, Ong K, Summerbell C. *Systematic reviews of determinants of energy balance related behaviours in young children (0-6yrs): Evidence from quantitative and qualitative literature*. ASO (Association for the Study of Obesity) Symposium on Early life obesity (0-6): Interventions and determinants), Birmingham, 16 Sept 2014.

<http://www.kc-jones.co.uk/files/uploads/1411484878.pdf>

O'Malley C, , Paes V, Hesketh K, Moore H, Griffin S, Van Sluijs E, Ong K, Lakshman R, Summerbell C. *Determinants of Fruit and Vegetable intake in Pre-school Children (0-6 years)*, ASO (Association for the Study of Obesity) Symposium on Early life obesity (0-6): Interventions and determinants), Birmingham, 16 Sept 2014.

<http://www.kc-jones.co.uk/files/uploads/1411484890.pdf>

Hesketh K, Paes V, O'Malley C, Moore H, Griffin S, Ong K, Summerbell C, Lakshman R, Van Sluijs E. *Determinants of Change in Activity in Children 0-6 years: A quantitative and qualitative synthesis* ASO (Association for the Study of Obesity) Symposium on Early life obesity (0-6): Interventions and determinants), Birmingham, 16 Sept 2014.

<http://www.kc-jones.co.uk/files/uploads/1411484866.pdf>

Mazarello Paes V, K. Hesketh, C. O'Malley, H. Moore, K. Ong, S. Griffin, E. M.F. van Sluijs, C. Summerbell, R. Lakshman. *Determinants of unhealthy dietary behaviours (excluding sugar sweetened beverage intake) in young children: Systematic review of quantitative evidence*. Public Health@Cambridge Showcase Event. Jul 2014. (poster)

Mazarello Paes V, Ong K, O'Malley C, Hesketh K, Moore H, Griffin S, Summerbell C, van Sluijs E, Lakshman R. *Determinants and correlates of sugar-sweetened beverage consumption in preschool children: Systematic review of quantitative evidence*. Public Health@Cambridge Showcase Event. Jul 2014. (poster)

V. Mazarello Paes, K. Hesketh, C. O'Malley, H. Moore, K. Ong, S. Griffin, E. M.F. van Sluijs, C. Summerbell, R. Lakshman. *Determinants of unhealthy dietary behaviours (excluding sugar sweetened beverage intake) in young children: Systematic review of quantitative evidence*. Faculty of Public Health Annual Public Health Conference: Glo-cal Health - Making a World of Difference. Manchester, 2 – 3 Jul 2014. (poster)

	<p>Mazarello Paes V, Ong K, O'Malley C, Hesketh K, Moore H, Griffin S, Summerbell C, van Sluijs E, Lakshman R. <i>Determinants and correlates of sugar-sweetened beverage consumption in preschool children: Systematic review of quantitative evidence</i>. Faculty of Public Health Annual Public Health Conference: Glo-cal Health - Making a World of Difference. Manchester, 2 – 3 Jul 2014. (poster)</p> <p>Mazzarello Paes V, Summerbell C, Hesketh K, O'Malley C, Moore H, van Sluijs E, Ong K, Griffin S, Lakshman R. <i>Systematic review of quantitative evidence on the determinants / correlates of sugar sweetened beverage intake in pre-school aged (0-6yrs) children</i>. The Centre for Diet and Activity Research (CEDAR), Research and policy meeting: What shall we do about diet and physical activity? Cambridge, 9 Oct 2013. (poster)</p> <p>Mazzarello Paes V, Summerbell C, Hesketh K, O'Malley C, Moore H, van Sluijs E, Ong K, Griffin S, Lakshman R. <i>Systematic review of quantitative evidence on the determinants / correlates of sugar sweetened beverage intake in pre-school aged (0-6yrs) children</i>. NIHR SPHR Annual Scientific Meeting, London, 8 Oct 2013. (poster)</p> <p>Lakshman R, Hesketh K, O'Malley C, Paes V, Moore H, Van Sluijs E, Ong K, Griffin S, Summerbell C. <i>Systematic reviews of determinants of obesity related dietary and physical activity behaviours in young children (0-6 yrs): Evidence mapping and syntheses</i>. NIHR SPHR Annual Scientific Meeting, Sheffield, 10 Oct 2012.</p>
<p><b>11.</b></p>	<p><b>Public and participant involvement</b>  <b>Please provide comment on your experiences, any changes made and lessons drawn:</b></p> <p>Results of the systematic reviews were presented at the SPHR @Cambridge stakeholder event held on 25<sup>th</sup> February 2015. The event was attended by policy makers, academics, Cambridgeshire County Council Public Health Directorate team and members of the public. Evidence briefs will be produced when the final results are ready.</p>
<p><b>12.</b></p>	<p><b>What impact has the research already achieved or what might it achieve? (i.e. policy, practice, academic):</b></p> <p>The reviews will guide intervention and policy development to prevent childhood obesity. It will also inform future research in this area. We have provided a summary of findings to Cambridgeshire County Obesity Group and Public Health Directorate. The 'Early Years Nutrition in Pre-school settings' is now a priority for the Cambridgeshire County Council where Rajalakshmi Lakshman works as a Public Health Medicine consultant lead for Children.</p> <p>A summary of findings has also been provided to the NIHR's Public Health Research Programme and the Director of Obesity at Public Health England.</p>

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**Department of Health Disclaimer:**

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