The Southampton Women's Survey: from observational evidence to behaviour change interventions.

Hazel Inskip

MRC Lifecourse Epidemiology Unit
University of Southampton
March 14th 2014
Recommendations for practice

• There is increasing emphasis on translating observational evidence into interventions to improve health

• Quite often the move from observational epidemiological evidence to practice is made without the intermediate step of evaluating the intervention

• Results from the Southampton Women’s Survey have lead to the development of three interventions

• These need to be properly evaluated before being rolled out in practice

• The findings from the SWS and the subsequent intervention studies will be discussed, along with some of the challenges
The Southampton Women’s Survey

12,583 non-pregnant Southampton women aged 20-34 years interviewed between 1998 and 2002.

Subsequent pregnancies studied, ultrasound scans and interviews.

3159 births

Children followed-up at 6, 12, 24 & 36 months. Samples seen at 4, 6, 8 & 10-12 yrs.

Adapted from Inskip et al. Int J Epidemiol. 2006
Findings and interventions

• Maternal vitamin D and child outcomes
  • Leading to an RCT:
    • Maternal Vitamin D in Osteoporosis (MAVIDOS)

• Women’s diets before pregnancy and links with childhood dietary and health outcomes
  • Leading to three intervention studies:
    • Southampton Initiative for Health
    • Southampton PRegnancy Intervention for the Next Generation (SPRING)
    • LifeLab Southampton
Maternal serum vitamin D concentrations and fetal, infant & child outcomes

Lung function

Atopy

DXA

Fetal ultrasound

Grip strength

MRC | Medical Research Council
Relationship between maternal 25(OH)-vitamin D concentration and outcomes in the child

- Positive associations with
  - Fat mass at birth (Crozier et al. Am J Clin Nutr 2012)

- Negative association with
  - Fat mass by age 6 years (Crozier et al. Am J Clin Nutr 2012)

- No association with
  - Asthma, wheeze, lung function or atopy (Pike et al. Thorax 2012)

Systematic review concludes:
In no single disease area did the evidence base unequivocally support the use of vitamin D supplementation during pregnancy (Harvey et al. HTA Journal 2014 (in press))
Normal femur shape  - 19 weeks.

Splayed metaphyseal ends  -19 weeks.

Radiograph of child with rickets
Note the splayed femoral metaphyses.
Fetal distal femur cross-sectional area at 19 weeks, by quarters of maternal vitamin D.

Distal CSA at 19 weeks

\[ p = 0.003, \ r = -0.15, \ n = 391 \]

Maternal 25(OH)-vitamin D
(34 weeks gestation, nmol/L)

Mahon et al, JBMR 2010
Outline of MAVIDOS trial

12 weeks
Mothers recruited

Check vitamin D levels

25D <25nmol/l → Supplementation
25D 25-100nmol/l → Randomisation
25D >100nmol/l → Ineligible

Vitamin D supplementation
1000IU/day = 25µg/day

Placebo

14 weeks
Randomisation

19 weeks
Ultrasound scans

34 weeks
Ultrasound scans and vitamin D levels

Birth
Baby’s bones assessed at birth

Childhood
Bones and health assessed through early childhood

n=477 in each arm
Women’s diets before pregnancy and links with childhood dietary and health outcomes

Photographs: © Magda Segal
Median times per week food is consumed in the least and most ‘prudent’ diet quarters

<table>
<thead>
<tr>
<th>Food</th>
<th>Least prudent</th>
<th>Most prudent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>White bread</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Red meat and processed meat</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Crisps and confectionery</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Fruit and fruit juice</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Non-salad vegetables</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Salad vegetables</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>
Percentages in the lowest quarter of prudent diet score by highest educational qualification

Robinson et al Eur J Clin Nutr. 2004
Lifestyles of SWS women who did and did not become pregnant within 3 months of interview

- Not smoking
- > 5 portions fruit & vegetables per day
- Any strenuous activity in past 3 months

Percentage

Not pregnant
Pregnant

P = 0.03

Inskip et al. BMJ 2009
Changes in fruit and vegetable consumption from before to during pregnancy

Fruit consumption

Vegetable consumption

Median portions per day
 Infant guidelines pattern score according to prudent diet score of the mother

Mother's prudent diet score

-1.0 to -0.5 to 0 to 0.5 to 1 > 1

Low                     Medium           High

6 month infant guidelines score

High

Medium 0

Low

Low                     Medium           High

Infant guidelines score in relation to childhood outcomes

IQ adjusted for sex, birth order, gestational age, birth weight, maternal age, IQ, social class, education and HOME score


Robinson et al JCEM 2009
Poor diet

LifeLab

Southampton Initiative for Health

Less lean mass and lower IQ at age 4

Poor infant diet

Ill-prepared for pregnancy.

Minimal changes in diet

LifeLab

Southampton Initiative for Health

Less lean mass and lower IQ at age 4

Poor infant diet

Ill-prepared for pregnancy.

Minimal changes in diet

LifeLab

Southampton Initiative for Health

Less lean mass and lower IQ at age 4

Poor infant diet

Ill-prepared for pregnancy.

Minimal changes in diet
‘Healthy conversation’ skills

To enable those working with women and children in the community or hospitals to engage in conversations with women that enable to women to take control of their actions.
Effectiveness and Efficacy

- **Effectiveness**
  - Southampton Initiative for Health
  - Before and after pragmatic trial of the effect of training staff in SureStart Children’s Centres to engage with women attending the Centres
  - Staff can be trained successfully and deliver the intervention appropriately

- **Efficacy**
  - Southampton PRegnancy Intervention for the Next Generation (SPRING)
  - Research midwives conducting health conversations with pregnant women
  - 2x2 factorial design individually randomised with vitamin D supplementation as the other treatment
LifeLab Southampton

‘Me, My Health and My Children’s Health’

Engaging 13-14 year olds in

• the importance of their diet and lifestyle:
  ➢ for their own health and
  ➢ their future children

• inspiring them to take in interest in science

• aiming to improve health, nutrition and science literacy
LifeLab evaluation – cluster randomised trial

12 Southampton and 70 Hampshire Secondary Schools.

12 Southampton schools and 12 nearby Hampshire schools approached. Further schools in Hampshire approached if required.

Random allocation of 24 schools to 3 groups.

**Intervention (LifeLab)**
- **1st year**: Group 1 (8 schools)
- **2nd year**: Group 2 (8 schools)

**Control**
- **1st year**: Group 2 (8 schools)
- **2nd year**: Group 3 (8 schools)
Summary

• Findings from the SWS are being translated into three interventions assessed in four studies

• *If successful these interventions will result in:*

  • (a) improved diets and lifestyles of young women and benefits for their children

  • (b) improved diets and lifestyles in teenage children

  • (c) stronger bones in children born to women who receive vitamin D supplementation, leading to better health when the children reach old age
Implications for practice

• The Southampton Women’s Survey points to:
  • Maternal supplementation with vitamin D in pregnancy
  • Interventions to improve health behaviours before and during pregnancy

• Practice ahead of research:
  • Vitamin D supplementation recommended in pregnancy in UK, though no trial completed yet
  • Southampton, Hampshire and Buckinghamshire in UK, and parts of New Zealand, South Africa and Canada now using the ‘Healthy conversation skills’ in their routine services
Acknowledgements

Principal investigators: Cyrus Cooper, Keith Godfrey, Siân Robinson, Mary Barker, Janis Baird, Nick Harvey, Mark Hanson, Marcus Grace

Nurses/midwives
Teachers
Research assistants
Administrative staff
Computing staff
Psychologists

Funders: MRC, NIHR, ARUK, University of Southampton, Dunhill Medical Trust, BHF, FSA, Hope, Wellcome Trust

Dietitians/nutritionists
Ultrasonographers
Clerical staff
Statisticians
Doctors
Lab staff
Radiographers

Young women and children in Southampton, GPs, midwives, SureStart staff, and schools