Prevention of Obesity in Preschool Children

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Preschool Obesity

• Prevalence in under 5’s
  • ~9% classed as obese by 2020 (WHO)
• The UK is already nearly there
  • >1/5 overweight
  • ~1/10 obese
AIMS

Childhood Obesity

• Causes and Consequences
• What can be done
• Interventions using TrimTots as an example
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Obesity Causes

Energy intake > expenditure

Genes

Environment
Genes vs Environment

Higher risk if parents are overweight

Strongest evidence for maternal obesity

(Whitaker, NEJM 1997, (Perez-Pastor et al. 2009)
Genes or Environment?

• >100 genetic markers strongly associated with BMI (FTO, MC4R)
• The overall effect on BMI is small
• Genes identified so far account for only ~2.5% of the genetic variation in BMI

*Locke et al, Nature, 2015*
Obesity determined by the time a child is five

By Daniel Martin

CHLDD obesity is determined before the age of five, ministers were told yesterday.

A majority of obese children in England are overweight, and around 11 per cent are classed as obese — so fat that their health is in danger.

Experts blame diets rich in fast, sugar-laden and processed foods, and say first bad dietary examples set by their parents could also be to blame.

The findings, published in the journal Pediatrics, come from the

Early study of 522 children from birth to puberty which were presented to ministers yesterday. Although the weight of a five-year-old has no relation to his or her weight at birth, it closely predicted will have at puberty. Boys will have an extra 76 per cent.

Lead researcher Professor Terry

Don’t mention the O-word

The word 'obese' was banned from letters to parents of fat children because focus groups did not like it, England’s chief medical officer said yesterday.

Professor Liam Donaldson revealed that the term was replaced by 'very overweight' over fears it would upset and stigmatise fat children.

Writing on the BBC News website he said: 'Obesity has become the new cancer. A word that is taboo... in effect it has become an 'O' word.' The Department of Health said in August that parents would be told if their child was found to be clinically overweight.

The planning stage, a 'stumbling block' was the word of the feedback letter.

He said: 'When the letter was tested with focus groups there was a message that the term "obese" was unpopular. Parents felt they were being blamed for their children's health, and that their child would be "labelled for life".'

A letter sent to parents of children aged four and five in England are overweight, and around 11 per cent are classified as obese — so fat that their health is in danger.

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Gardner, 2008, Cunningham, 2014
Energy intake > expenditure

Environment

Diet

Exercise
Early-life Determinants

• Maternal Factors
  • Overweight
  • Gest’I weight gain
  • Smoking
  • Gestational Diabetes
  • Socioeconomic factors

Early-life Determinants

- Infant Factors
  - High Birthweight
  - Rapid Growth/High weight in infancy
  - High weight in toddlers & PSC

Messiah, 2012; Woo Baidal, 2016
Breastfeeding

Evidence from Systematic Reviews supporting breastfeeding as protective against obesity:

- Arenz 2004
- Owen 2005
- Harder 2005
- Yan 2014
- Horta 2015
Breastfeeding Duration and risk of overweight/obesity

Strongest association with a longer duration or breastfeeding

Arenz, 2004; Harder, 2005; Yan, 2014
Slower growth pattern (as seen in breast-fed infants) decreases the risk of obesity

Singhal & Lucas, Lancet 2004
Programming (Nutritional)

Permanent effect on structure and function

Stimulus or Insult

Critical Window
Growth Acceleration
Growth and Obesity

Faster growth in infancy

Later obesity

(Baird, Monteiro, Ong)
Potential Mechanism

Early infancy is a critical window for programming of appetite via neuroendocrine systems.
Nutrition or Growth?

- Nutrition and growth are very closely linked.
- Relationships between nutrition, growth and appetite are unclear.
Assessing Appetite

• Infant feeding behaviours
• Baby Eating Behaviour Questionnaire (BEBQ)
  • Parent-reports used to measure infant appetite traits
  • Exclusive milk-feeding

(Llewellyn, 2013)
Appetite traits linked to obesity

Food Responsiveness

Satiety Responsiveness

Slowness in Eating

(Carnell and Wardle, 2008, Jaarsveld et al., 2014, Fogel et al., 2017)
Appetite in infancy is associated with obesity

- Faster/more vigorous sucking
  - Agras, 1990, Stunkard, 2004

- Infant bottle emptying
  - Li, 2008 & 2010
Are other points in infancy and early childhood also critical?
Complementary Feeding

• When?
  – Early < 4 months
  – Higher risk for Formula fed
• What?
  – Protein is the nutrient most strongly linked to obesity
• How?
  – Few studies – no link to obesity

• Critical period for the development of dietary and behavioural habits
Dietary Risk Factors

- Dietary Habits:
  - Established early
  - Track through childhood
  - Carried into adult life
  - Adverse impact on health
  - Obesity
  - Related diseases
Dietary intake: tracks from infancy through complementary feeding and toddlerhood

Energy dense, nutrient poor diets or nutrient rich diets including fruit and veg, dairy, eggs, fish tracked between 9 and 18 months of age

(Lioret et al, 2013)
Dietary patterns: emerge during early childhood and show distinct social patterning ALSPAC study

(North & Emmett, 2000)
Dietary Risk Factors

• Nutrients
  • Energy sources
    • Protein, Fat, Carbohydrate
• Foods and Beverages
  • Processed Foods (HFSS)
  • Sugar sweetened beverages
Physical Activity

Energy intake > expenditure

Diet

Activity
Physical Activity

- UK guidelines for preschool children
  - 3 hours of PA daily
- Evidence review:
  - Preschoolers increasingly sedentary

(Reilly, 2008)
Sedentary Lifestyles

- Sedentary Lifestyles
  - Television viewing
    - Screen time
      - Too Much
      - Too Soon
    - Shorter sleep duration

Te Velde, 2012; Monasta, 2010, Simonato, 2018
Screen Time

• TV watching linked to:
  • Higher consumption of snacks and sweetened beverages
  • Tots who watch lots of TV eat less healthily as teenagers
  • 8% increase for each extra hour

(De Craemer, 2012; te Velde, 2012)
(Simonato, 2018)
AIMS

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Why is it important?

Childhood obesity tracks throughout childhood and is likely to persist into adulthood.
Consequences

• Obesity Associated With
  – Increased Morbidity
    – Short Term
    – Long Term
Consequences

• **Short Term Risk**
  - Asthma
  - Sleep Apnoea
  - Reflux
  - Low self-esteem
Consequences

- Long Term Risk
  - Motility (Joints)
  - Cancer (13 linked)
  - Cardiovascular Disease
Indirect effects

• Bullying and Stigma
  • Reduced self-esteem
  • Under achievement at school
  • Increased depression

Bromfield, 2009; Sjoberg et al, 2005
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What can we do to prevent or manage overweight and Obesity in The under 5’s?
Childhood obesity is a complex problem that needs a systems approach (Foresight Report 2007; Lancet, 2011) Do what you can but do it well!
• Post natal nutrition
• Important for healthy growth and development of the infant
• Represents a window of opportunity for intervention
• Responsive (cue-based) feeding is important for all infants and young children
Managing Overweight

• Aims
  • Slow growth rate
  • Delay adiposity rebound
  • Achieve energy balance
NICE Guidelines

- Early Interventions
- Multicomponent
  - Diet
  - Physical Activity
  - Behavioural Therapy
- Family Involvement
Lifestyle Interventions

• Systematic Reviews
  • Most recent: Ling 2017
  • Meta-analysis included:
    • 42 RCTs
    • 31 Prevention Trials
    • Primary outcome BMI
    • Short Term effect size -0.19
    • Sustained effect size -0.21
Trim Tots

- Developed to meet UK NICE guidelines
- Multidisciplinary Team
- Community and home based
- Engages
  - Family
  - Wider community
Obesity Prevention Targets

- Feeding/Diet
- Physical Activity
- Behaviour
Trim Tots format

24 x 2 Hour Sessions

- Art
- Music & Movement
- Snack
- WaistWise & Funbursts
- Intro
- Exercise & Stretch
- Goodbye
Trim Town

The “good guys” who live down in The Roots

Cousin Carrot

Lucy Lettuce

Butternut Posh
Trim Town

.....or down on the farm

Dairy Daisy

Dairy Dave
Uber City

Count Calorie

Baron Von-Trans-Fat

Choc O’holic

The “bad guys” who live on Grease Street and party at Cake Towers
RCT Study Design

Time (months)

Group 1
INTERVENTION
IMMEDIATE START

Group 2
INTERVENTION
WAITING LIST CONTROL

FOLLOW UP

FOLLOW UP
Children Participating

• 90 children recruited
• 88 randomised
  – 52 boys
  – 36 girls
• Mean age 2.5 yrs
• Mean BMI 18.5
BOY'S BMI [body mass index] 1-5yrs
BMI equation: weight[kg] ÷ length/height [m²]. NB: the tinted area illustrates the range within which the majority of boys have their healthy BMI plotted. If your son has an athletic, muscular build however, his BMI may well be plotted above the tinted area even though he is not overweight.
GIRL'S BMI [body mass index] 1-5yrs

BMI equation: weight[kg] / length/height [m^2]. NB: the tinted area illustrates the range within which the majority of girls have their healthy BMI plotted. If your daughter has an athletic, muscular build however, her BMI may well be plotted above the tinted area even though she is not overweight.
TrimTots RCT 1 Results

- 64 (73%) completed programme
  - Attended 18/24 sessions
- BMI z-score lower in children after intervention compared with waiting list controls
- Mean difference:
  - 0.9, 95% CI -1.4, to -0.4; (P=0.001)
Sustained Effects

• 38/88 (43%) followed up 2 years after completion
  • BMI z-score remained lower
  • Effect size
    • -0.3 SD – ($P < 0.007$)
Trim Tots RCT 2

• All Preschool Children included
• Not limited to high risk or overweight
• 64/85 (75%) Completed Trial

(Lanigan et al., Lancet, 2013 (A))
Trim Tots RCT 2 Results

BMI z-score lower in intervention compared with controls (-0.3 z-scores)

(Lanigan et al., Lancet, 2013)
Trim Tots Roll Out

- Expanding in the UK
- London Boroughs
- Camden & Islington
- Hammersmith
  - Discussions in the South West and Northern Ireland
Trim Tots Roll Out

- International interest
- Ireland
- Canada
- South Africa
  - Healthy Tots Research Collaboration
• **Barriers**
  • Funding
    • Grants only for research
    • Cost of intervention not covered
  • Evidence based not the main consideration of commissioners
Roll Out

• **Actions**
• TrimTots Community Interest Company
  • Collaboration with UCLB
  • Investment from partners
  • NGO’s
  • Local Authorities
Learn to play, dance, create, sing & together

TrimTots

Recipes