Niamh at 9 months

Niamh at 3 years

Niamh at 5 years

The use of a Dietary Quality Score as a predictor of childhood overweight and obesity

Catherine Perry, Eimear Keane, Anthony P. Fitzgerald, Richard Layte, Ivan J. Perry, Janas M. Harrington
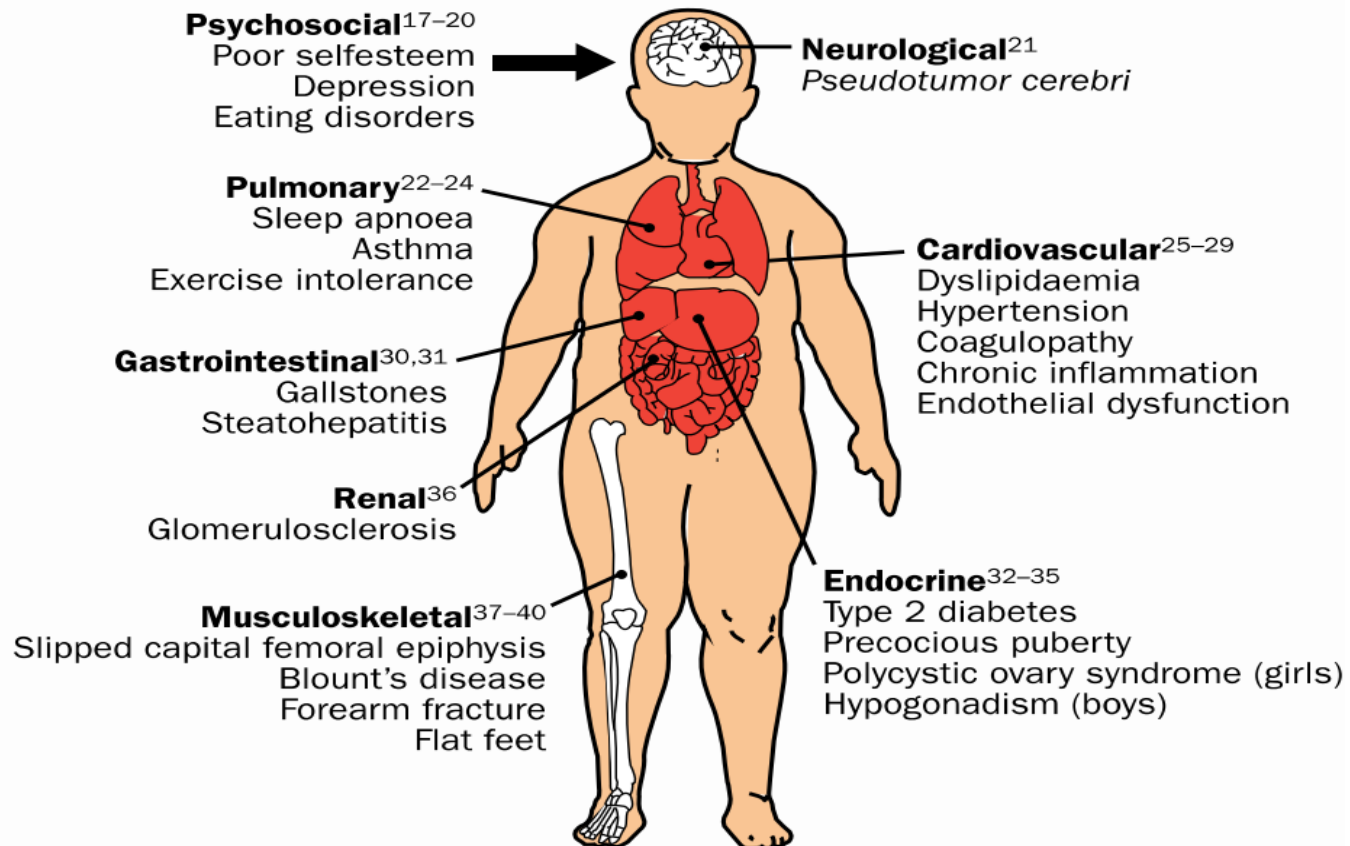
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Growing Up in Ireland
National Longitudinal Study of Children

More than
1 in 4 children

Are an unhealthy weight

Multiple Co-morbidities childhood

Psychosocial[17–20]
Poor selfesteem
Depression
Eating disorders

Neurological[21]
Pseudotumor cerebri

Pulmonary[22–24]
Sleep apnoea
Asthma
Exercise intolerance

Cardiovascular[25–29]
Dyslipidaemia
Hypertension
Coagulopathy
Chronic inflammation
Endothelial dysfunction

Gastrointestinal[30,31]
Gallstones
Steatohepatitis

Renal[36]
Glomerulosclerosis

Endocrine[32–35]
Type 2 diabetes
Precocious puberty
Polycystic ovary syndrome (girls)
Hypogonadism (boys)

Musculoskeletal[37–40]
Slipped capital femoral epiphysis
Blount's disease
Forearm fracture
Flat feet

- ➢ Food in or diet is where our research interest lies

- ➢ No consensus

- ➢ Lack of evidence

- ➢ A-priori versus a-posteriori

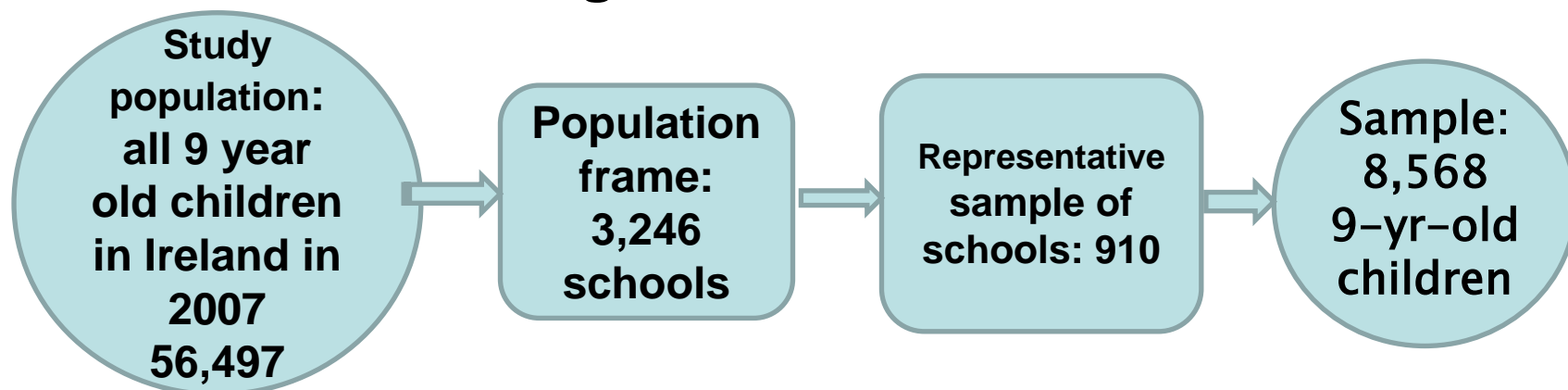 - ➢ DQS-One of many methods

Food   Activity
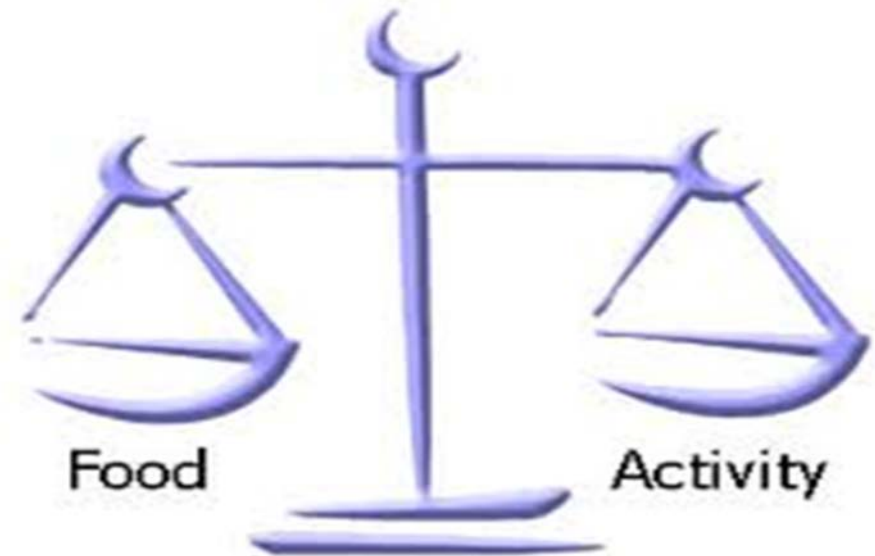
Aim

To examine the association between diet quality, measured by a simple Diet Quality Score (DQS) and childhood overweight or obesity.

GUI methods

Cross sectional design

```
Study population:        Population          Representative        Sample:
all 9 year          →    frame:         →    sample of        →   8,568
old children             3,246               schools: 910         9–yr–old
in Ireland in            schools                                  children
2007
56,497
```

Response rate: school level 82 % individual level 57%

Primary Sampling Unit: Primary schools in Ireland

Methods

- **Height and weight for both child and parents were measured using standardised methods**

- **Physical activity in past 14 days from Primary Care Giver(PCG) questionnaire**

- **T.V. the PCG responded on study child's normal weekday viewing**

- **Dietary assessment: 20 item FFQ**

- **Simple Dietary Quality Score (DQS) constructed from the FFQ data**

- **Foods were deemed healthy or unhealthy from current Irish guidelines and guided by the Food Safety Authority of Ireland (2011) report.**

Dietary assessment: 20 item FFQ

Hot chips/French fries
eaten >once= -2
once= -1,
not at all= 0,
don't know=missing

Fresh fruit
Not eaten at all=0,
eaten once=1
>once=2 and
don't know=missing

Diet quality scores ranged from -6 (poor) to 24 (good).

		Once	More than Once	Not At All	Don't know
A.	Fresh fruit	1	2	3	4
B.	Fruit juice	1	2	3	4
C.	Meat / Chicken / Fish	1	2	3	4
D.	Eggs	1	2	3	4
E.	Cooked vegetables	1	2	3	4
F.	Raw vegetables or salad	1	2	3	4
G.	Meat pie, hamburger, hot dog, sausage or sausage roll	1	2	3	4
H.	Hot chips or French fries	1	2	3	4
I.	Crisps or savoury snacks	1	2	3	4
J.	Bread	1	2	3	4
K.	Potatoes/ Pasta/ Rice	1	2	3	4
L.	Cereals	1	2	3	4
M.	Biscuits, doughnuts, cake, pie or chocolate	1	2	3	4
N.	Cheese/yoghurt/ fromage frais	1	2	3	4
O.	Low fat Cheese/ low fat yoghurt	1	2	3	4
P.	Water (tap water / still water/ sparkling water)	1	2	3	4
Q.	Soft drinks / minerals / cordial / squash (not diet)	1	2	3	4
R.	Soft drinks / minerals / cordial / squash (diet)	1	2	3	4
S.	Full cream milk or full cream milk products	1	2	3	4
T.	Skimmed milk or skimmed milk products	1	2	3	4

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Statistical methods- variables used

▸ **Dependant variable: Measured child BMI**

▸ **Independent variables**
- ◦ DQS
- ◦ Physical activity
- ◦ Television
- ◦ Primary Care Giver (PCG) education
- ◦ PCG BMI

Statistical analyses

▸ **Survey weighted**

▸ **Missing data**

▸ **Cross Tabulations**

▸ **Multinomial logistic regression**

  ▸ Model 1: was the unadjusted model.

  ▸ Model 2: controlled for gender, PCG's education

  ▸ Model 3: gender, PCG's education and child's PA

  ▸ Model 4: gender, PCG's education, child's PA and T.V. viewing

  ▸ Model 5: gender, PCG's education, child's PA, T.V. viewing and PCG's BMI

Results

Continuous relationship between child BMI and DQS. Higher DQS=Higher Dietary quality. Shading represents 95 % CI
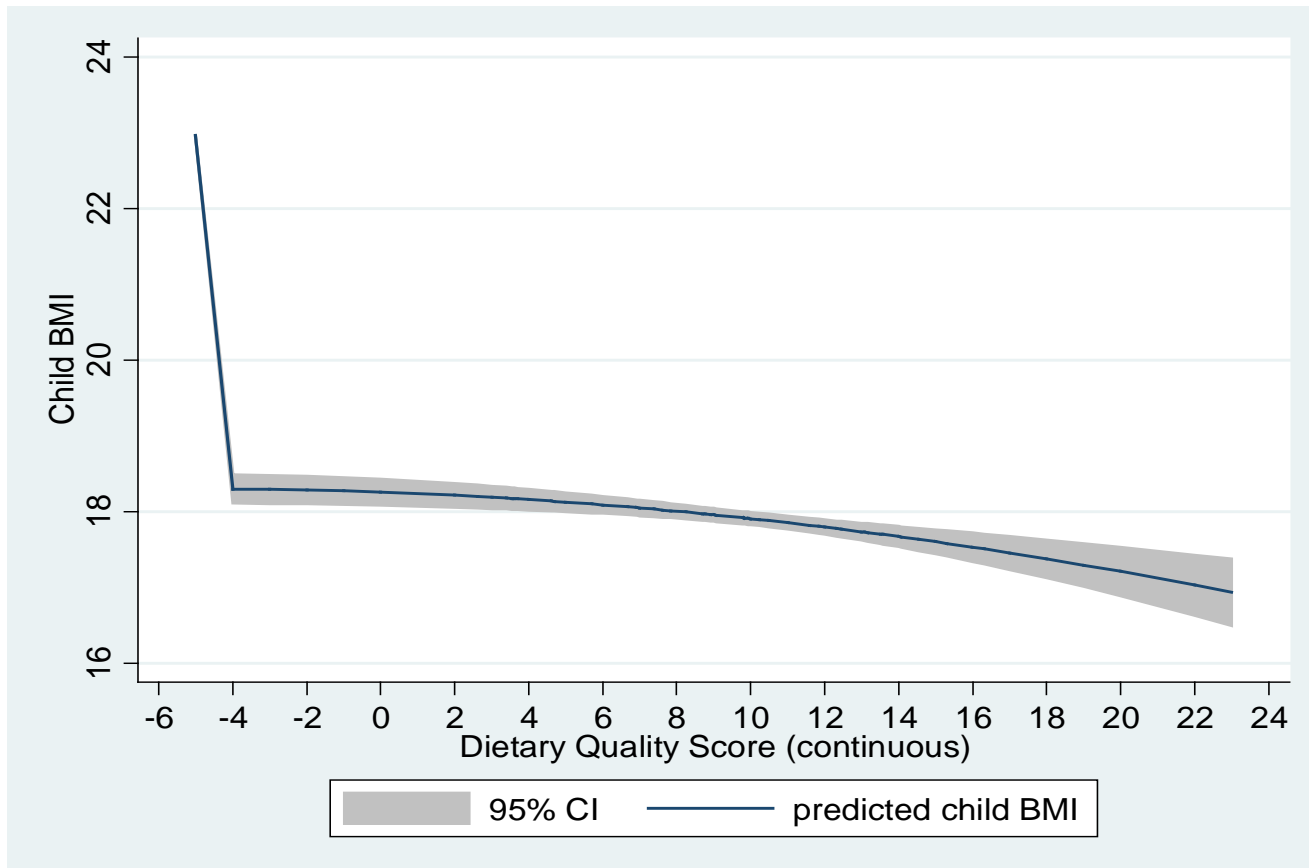
Prevalence of normal weight, overweight and obesity by DQS, leisure time activities and parental education & weight status

N (%)		Sample N=8,136	%	Normal weight 5,993 (74.1)	Overweight 1,565 (19.3)	Obese 531 (6.6)	P-value
DQS	Q1 (Highest)	1,373	16.0	994 (76.8)	246 (19.0)	55 (4.2)	
	Q2 (2nd highest)	1,257	14.7	903 (75.4)	232 (19.3)	64 (5.3)	
	Q3 (Middle)	1,686	19.7	1,171 (73.2)	324 (20.2)	105 (6.6)	0.02*
	Q4 (2nd poorest)	1,673	19.5	1,172 (74.3)	302 (19.1)	104 (6.6)	
	Q5 (Poorest)	2,578	30.1	1,754 (72.5))	462 (19.1))	204 (8.4))	
Gender	Boys	4,381	51.1	3,236 (78.0)	690 (16.6)	224 (5.4)	
	Girls	4,187	48.9	2,758 (70.0)	875 (22.2)	307 (7.8)	0.000*
Physical activity	9 days or more	4,657	45.4	3,428 (57.2)	800 (51.1)	199 (3.7)	0.000*
	6-8 days	1,658	19.4	1,166 (19.5)	300 (19.2)	101 (19.1)	
	3-5days	1,543	18.0	968 (16.2)	339 (21.7)	138 (26.0)	
	1-2 days	498	5.8	316 (5.3)	90 (5.8)	57 (10.7)	
	None	211	2.5	114 (1.9)	36.4 (2.3)	37 (6.9)	
PCG's education	Primary	2,585	30.2	1,684 (69.4)	511 (21.1)	231 (9.5)	0.000*
	Secondary	4,508	52.6	3,205 (74.8)	824 (19.2)	257 (6.0)	
	Third level	1,476	17.2	1,105 (80.1)	230 (16.7)	44 (3.2)	
T.V	Low	2,013	23.5	1,485 (24.8)	336 (21.5)	79 (14.8)	0.000*
	Moderate	5,633	65.8	3,933 (65.6)	1,021 (65.3)	370 (69.6)	
	High	922	10.8	576 (9.6)	207 (13.3)	83 (15.7)	
PCG's BMI	Normal weight	3,704	47.7	3,037 (83.2)	522 (14.3)	92 (2.5)	0.000
	Overweight	2,516	32.4	1,750 (70.6)	533 (21.5)	195 (7.9)	
	Obese	1,552	20.0	897 (59.6)	410 (27.2)	200 (13.2)	

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N (%)		Sample N=8,136	%	Normal weight 5,993 (74.1)	Overweight 1,565 (19.3)	Obese 531 (6.6)	P-value
DQS	Q1 (Highest)	1,373	16.0	994 (76.8)	246 (19.0)	55 (4.2) ←	
	Q2 (2nd highest)	1,257	14.7	903 (75.4)	232 (19.3)	64 (5.3)	
	Q3 (Middle)	1,686	19.7	1,171 (73.2)	324 (20.2)	105 (6.6)	0.02*
	Q4 (2nd poorest)	1,673	19.5	1,172 (74.3)	302 (19.1)	104 (6.6)	
	Q5 (Poorest)	2,578	30.1	1,754 (72.5))	462 (19.1))	204 (8.4)) ←	

Twice as many obese children have the poorest diet compared to highest diet quality

N (%)		Sample N=8,136	%	Normal weight 5,993 (74.1)	Overweight 1,565 (19.3)	Obese 531 (6.6)	P-value
Physical activity	9 days or more	4,657	45.4	3,428 (57.2)	800 (51.1)	199 (3.7)	0.000*
	6-8 days	1,658	19.4	1,166 (19.5)	300 (19.2)	101 (19.1)	
	3-5days	1,543	18.0	968 (16.2)	339 (21.7)	138 (26.0)	
	1-2 days	498	5.8	316 (5.3)	90 (5.8)	57 (10.7)	
	None	211	2.5	114 (1.9)	36.4 (2.3)	37 (6.9)	

There is 3 and a half times more obese children doing no PA compared to normal weight children

N (%)		Sample N=8,136	%	Normal weight 5,993 (74.1)	Overweight 1,565 (19.3)	Obese 531 (6.6)	P-value
T.V	Low	2,013	23.5	1,485 (24.8)	336 (21.5)	79 (14.8)	0.000*
	Moderate	5,633	65.8	3,933 (65.6)	1,021 (65.3)	370 (69.6)	
	High	922	10.8	576 (9.6)	207 (13.3)	83 (15.7)	

There was more obese children watching greater than 3 hours of TV compared to normal and overweight children

N (%)		Sample N=8,136	%	Normal weight 5,993 (74.1)	Overweight 1,565 (19.3)	Obese 531 (6.6)	P-value
PCG's BMI	Normal weight	3,704	47.7	3,037 (83.2)	522 (14.3)	92 (2.5)	0.000
	Overweight	2,516	32.4	1,750 (70.6)	533 (21.5)	195 (7.9)	
	Obese	1,552	20.0	897 (59.6)	410 (27.2)	200 (13.2)	

There was over 50% of children living in household where the PCG was either overweight or obese

Prevalence odds ratios for obesity associated with DQS and potential confounders

Adjusted for child's gender and PA and PCG's education

OR (95 % CI) Model 3		obese	P-value
DQS	**Q1 (Highest)**	1.00	-
	Q2 (2nd Highest)	1.18 (0.73 1.89)	0.495
	Q3 (Middle)	1.48 (0.94 2.33)	0.091
	Q4 (2nd Poorest)	1.37 (0.90 2.08)	0.147
	Q5 (Poorest)	1.60 (1.06 2.41)	0.025*

Adjusted for child's gender and PA, viewing and PCG's education, T.V. and PCG's BMI

Model 5 (Fully adjusted)		obese	P-value
DQS	**Q1 (Highest)**	1.00	-
	Q2 (2nd Highest)	1.03 (0.62 1.69)	0.919
	Q3 (Middle)	1.08 (0.68 1.74)	0.737
	Q4 (2nd Poorest)	1.19 (0.76 1.86)	0.438
	Q5 (Poorest)	1.22 (0.79 1.87)	0.367

Strengths	Limitations
Large national study using sampling weights	Cross sectional study
Simplicity of the DQS	Dietary assessment -Recall bias
Measured child and parental height and weight	Un-weighted DQS

- **A simple DQS based on a short 20 item FFQ is significantly associated with childhood obesity but not overweight**

- **Diet quality may be significant**

- **The association between DQS and child BMI is attenuated following adjustment for primary care giver TV & BMI.**

Eliminate choice
Restrict choice
Guide choice by disincentives
Guide choice by incentives
Guide choice by changing the default policy
Enable choice
Provide information
Do nothing

Nuffield council of bioethics-ladder of intervention

Acknowledgements

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Questions