



# **Physical activity and obesity in children and adolescents: evidence, myths and misconceptions**

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# Physical activity & obesity in children & adolescents: evidence; myths; misconceptions

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# Overview-some myths about child physical activity & obesity in Scotland

- Physical activity= PE or sport
- Physical activity declines at adolescence
- Physical activity varies by socio-economic status
- Physical activity is prevented by the physical environment
- A minority of Scottish children & adolescents are obese

# Definitions and Terms

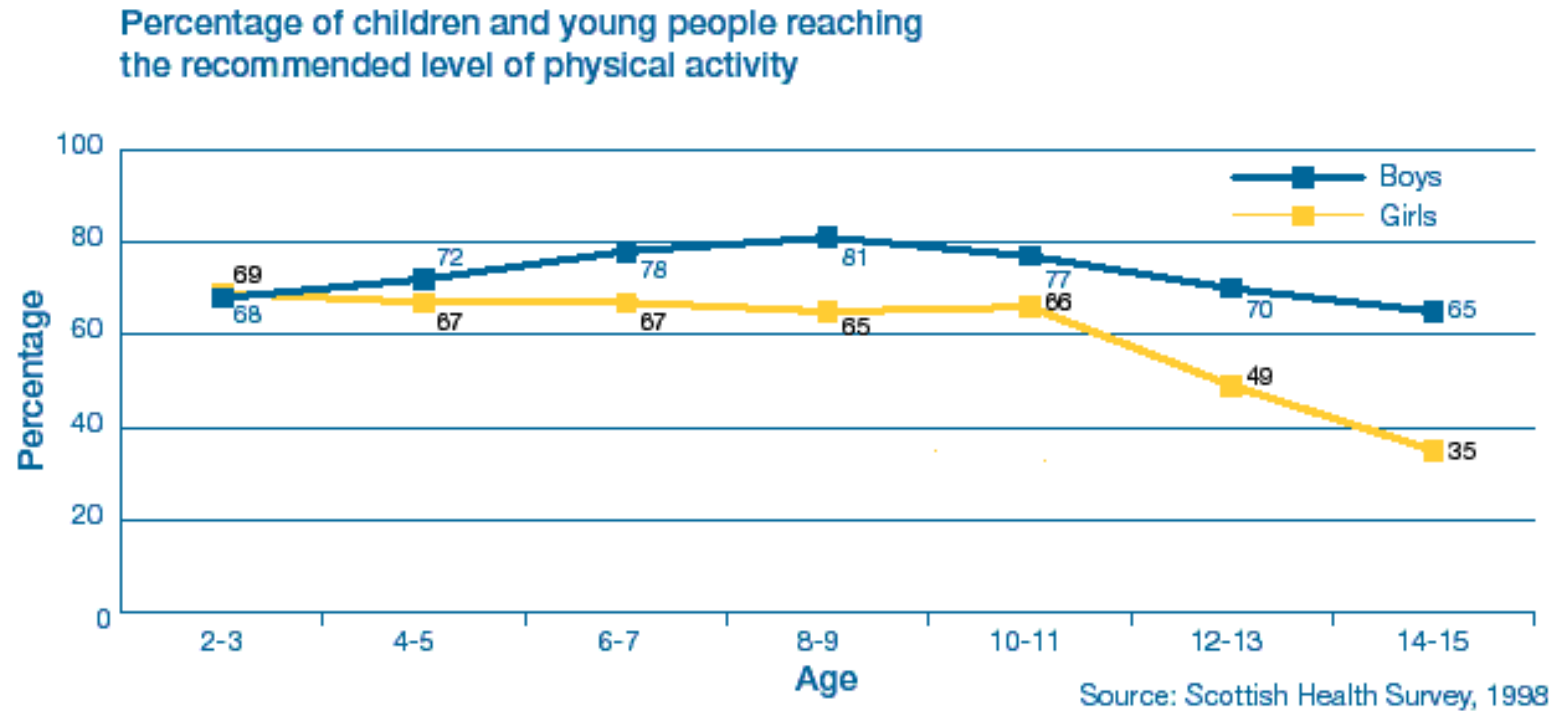
- **Physical activity**
  - All movement, **Sum of domains**
    - Play
    - PE
    - Sport
    - Commuting
    - ‘Recess’
    - ‘Incidental’,
- Recommended minimum of 60 minutes **MVPA** , every day (school-age)
- **Obesity**= excess fatness;
  - a high BMI for age (>95<sup>th</sup> centile from UK 1990)

# **Where** do children actually get their MVPA from ? Systematic Reviews of Objective Measurement Studies

- **Active Commuting** (limited-Martin et al 2016)
  - Schooldays half of all days; low prevalence of active commuting; short distances; low MVPA- maximum of 17 mins/day for half of population on half of days
- **Physical Education** (limited-Hollis et al 2016)
  - Schooldays half of all days; PE days less frequent than that; low MVPA- approx 20% of PE time
- **School 'Recess'** (limited-Reilly et al 2016)
  - Schooldays half of all days; short recess; low MVPA-maximum of 12 mins/school day
- **After-School/Home** (lack of evidence )
- **Sport** (lack of evidence ?, but probably low)



# Apparent adolescent cliff-edge declines in 'MVPA'



Basterfield et al Arch Dis Child 2008 SHeS PA questionnaire does not measure PA

# Children's physical activity starts declining at age 7, U.K. study indicates

Researchers recommend promoting exercise among boys and girls, well before adolescence

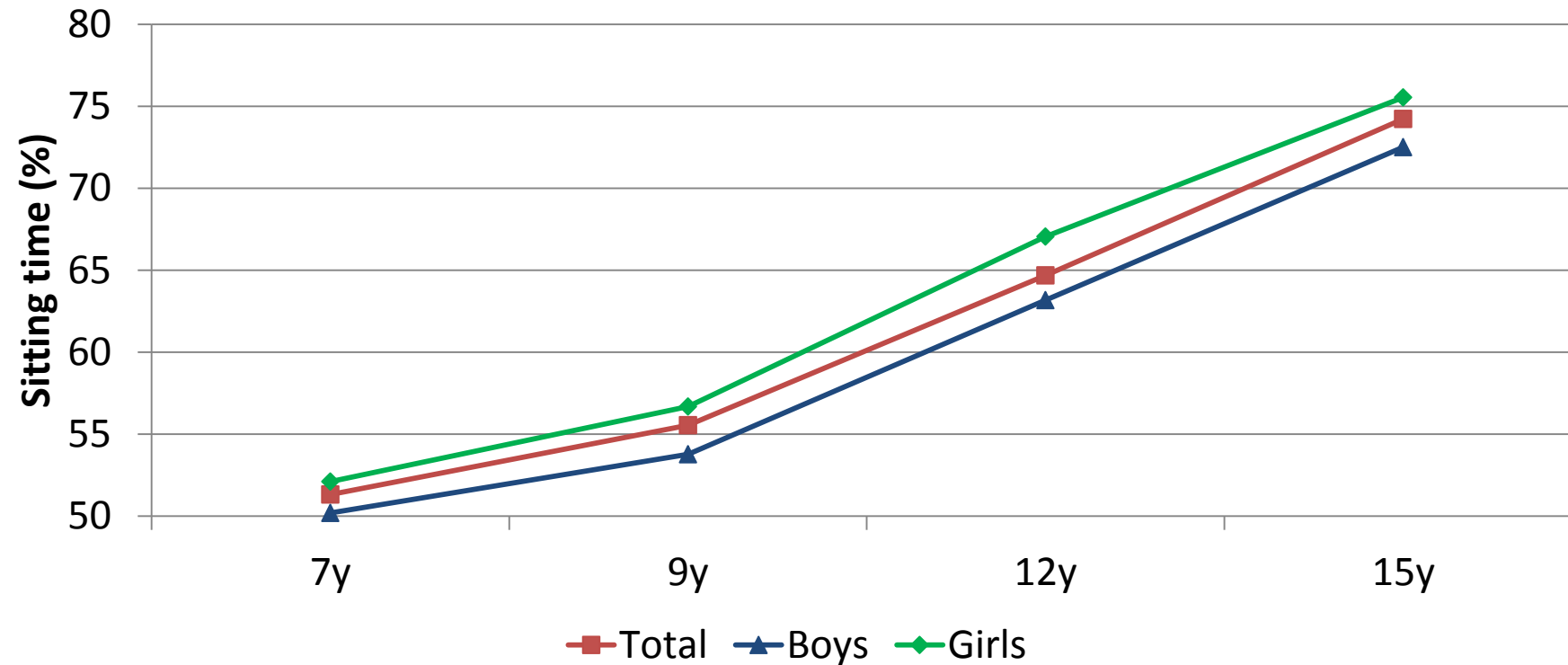


Physical activity by children declines from age seven, according to a British study that followed children for eight years. (CBC)

**Gateshead Millennium Study; Farooq et al Br J Sports Med 2017;  
Reilly 'When does it all go wrong ?' J Sport Exerc Fit 2016; 14: 1-6**



# Time spent sitting from 6 to 15 years , Gateshead Millennium Study (Janssen et al IJBNPA 2016)



- **Mean 51% of waking time at age 7 to 73% at age 15**
- **Equivalent to about 23 mins/day/year**

# Objective measurement of physical activity and sedentary behaviour: review with new data

J J Reilly,<sup>1</sup> V Penpraze,<sup>2</sup> J Hislop,<sup>3</sup> G Davies,<sup>1</sup> S Grant,<sup>2</sup> J Y Paton<sup>1</sup>

## **Established Correlates**

Age  
Gender  
Season/Day Length  
Obesity

## **Non-correlates**

Socio-economic status  
Genetics  
UK nation

[www.activehealthykidsscotland.co.uk](http://www.activehealthykidsscotland.co.uk)



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# UNPLUG & PLAY

Active Healthy Kids Scotland Report Card 2016

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# 'Well Known' Barriers to Child Physical Activity

- Weather
- Unsafe / unsuitable environment
  - Perceptions of safety outdoors
  - Crime; traffic
- (Mis?)Perceptions of safety indoors

POSITION STATEMENT ON ACTIVE OUTDOOR PLAY

## Position



Access to active play in nature and outdoors—with its risks—is essential for healthy child development. We recommend increasing children's opportunities for self-directed play outdoors in all settings—at home, at school, in child care, the community and nature.

## Settings and Influences on Physical Activity and Health

### Family and Peer Influence

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Conservative estimates show that 28% of adults were obese and 65% either overweight or obese in 2014, and obesity is more common among the socio-economically deprived<sup>Scottish Health Survey 2014</sup>. Only 20% of Scottish adults reported meeting the '5 a day' fruit and vegetable intake recommendation<sup>Scottish Health Survey 2014</sup>.

Child and adolescent norms are extremely high for sedentary behaviour (indicator 1) and low for moderate-vigorous-intensity physical activity (indicator 2), so peer influence is unlikely to encourage physical activity.

*Grade is the same as 2013 report card*

D-

### Community and the Built Environment

(Perceived safety, access, and availability of space for physical activity)

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89% of Scottish 13-15 year olds felt safe in their local area most or all of the time<sup>HBSC Scotland 2014</sup>

59% of Scottish 13-15 year olds felt they had good places to spend their time locally<sup>HBSC Scotland 2014</sup>

91% of households with 6-12 year olds had access to at least 1 local play area<sup>Scottish Household Survey 2014</sup>

62% of parents of 6-12 year olds felt that local playgrounds were safe for their children to play alone (lower perceived safety in more deprived areas)<sup>Scottish Household Survey 2014</sup>

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### National Policy, Strategy, and Investment (Including Schools)

Physical activity and health is given great emphasis in national policy, strategy, and investment.

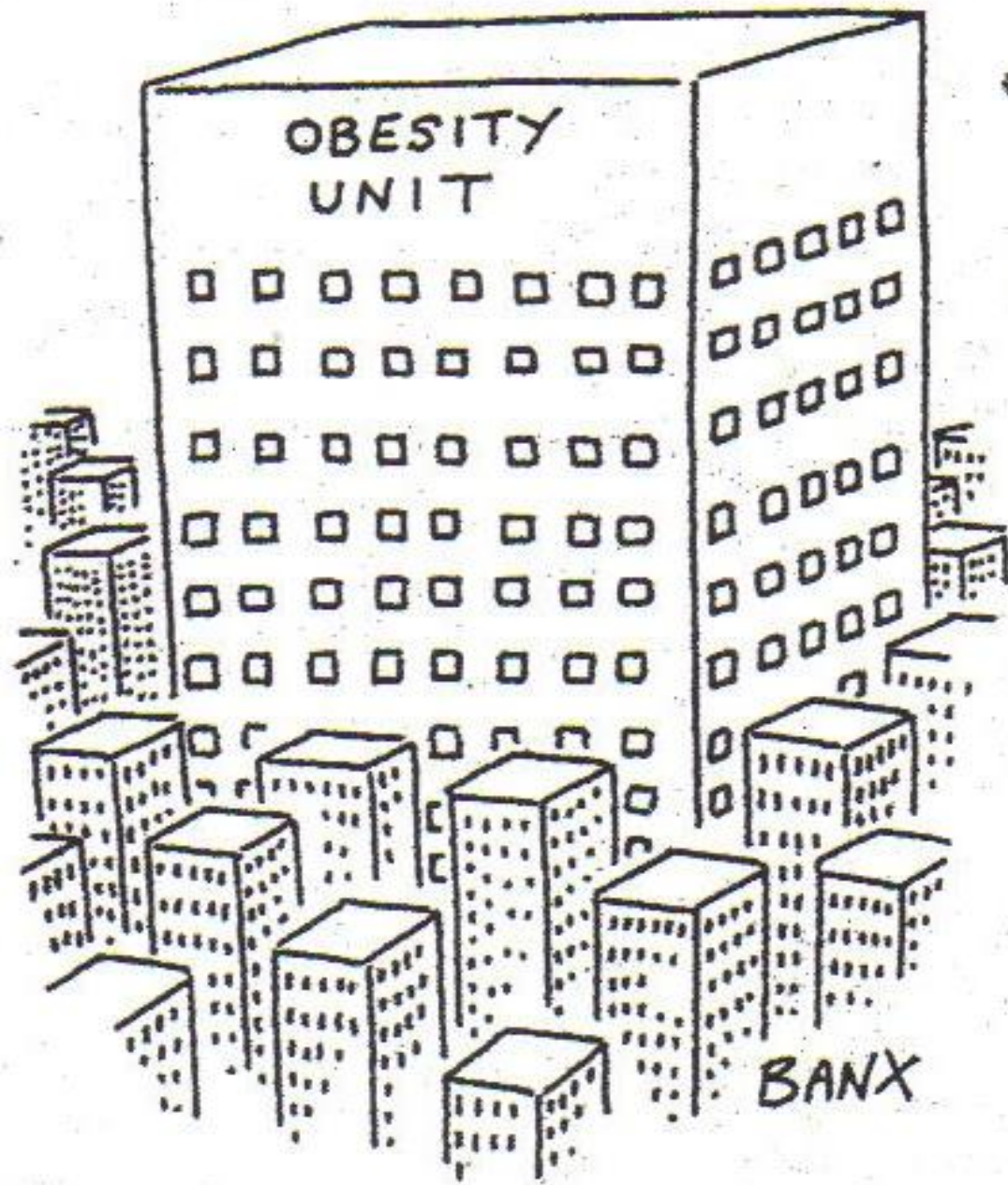
Many of the Health Behaviours and Outcomes (indicators 1-7) and the Settings & Influences on those health behaviours and outcomes (indicators 8 & 9) are the focus of national policies, investments and/or targets for improvement; there is increasing emphasis on policy implementation<sup>e.g. More Active Scotland; Active Scotland Outcome Framework; National Performance Framework</sup>.

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*Grade is the same as 2013 report card*

B





# Obesity crisis 'even worse than thought'

Underestimation of obesity (excessive body fatness) from BMI

in **adults**, Shah & Braverman et al PLoS ONE 2012.

26% obese by BMI, 64% by fatness;

misclassification much greater in women than men



## Overall Physical Activity and Health Behaviours and Outcomes

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### Active and Outdoor Play

63% of Scottish 2-15 year olds participated in 'active play indoors or outdoors' for at least 30 minutes at least 5 days a week<sup>Scottish Health Survey 2014</sup>. With no specific measure of active outdoor play, in the absence of a recommendation for active play, and given the F grades for sedentary behaviour and overall physical activity, this indicator is difficult to grade.

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INC

5

### Organised Sport Participation

This indicator could not be graded because no survey measured participation in sport specifically.

*Grade is the same as 2013 report card*

INC

6

### Diet

Only 10%<sup>National Diet & Nutrition Survey 2014</sup> to 14%<sup>Scottish Health Survey 2014</sup> of children and adolescents met the '5 a day' recommendation for fruit and vegetables; intakes are lowest among the most socio-economically deprived<sup>National Diet & Nutrition Survey 2014</sup>.

Average sugar intake exceeded recommendations sub-stantially<sup>National Diet & Nutrition Survey 2014; Active Healthy Kids Scotland 2013</sup>.

Average intake of saturated fat (13%) exceeded the 11% of energy intake recommended<sup>National Diet & Nutrition Survey 2014</sup>.

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D-

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### Obesity

Multiple data sources suggest that levels of obesity among children and adolescents are higher than at any time in our history. Conservative estimates show that at least 17% of 2-15 year olds were obese (BMI at or above the 95th centile derived from UK data in 1990) in 2014, and obesity is much more common among children and adolescents who are more socio-economically deprived<sup>Scottish Health Survey 2014</sup>.

Prevalence of overweight and obesity among toddlers and pre-school children is particularly high<sup>National Diet and Nutrition Survey 2014</sup>.

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F-

# BOYS BMI CHART

(BIRTH - 20 YEARS): United Kingdom cross-sectional reference: 2002/1

Name.....

D.O.B. (DDMMYY)  /  /

NHS No.

### Body Mass Index (BMI)

BMI is used in growth monitoring to assess fitness. Although highly correlated with fatness, BMI is not a direct measure of body fat. It should therefore be interpreted with caution. Rapid changes in BMI can occur during normal childhood growth. Intervention or referral should not be based on the BMI alone. [see overleaf].

This chart shows the standard 9 centile lines for BMI derived from UK data. The International Obesity Task Force (IOTF) has proposed paediatric cut-offs for obesity and overweight that correspond to the adult cut-offs at age 18, of BMI ≥30 for obesity and BMI ≥25 for overweight (shown as green dotted lines).

For further information on growth and growth monitoring see:

[www.heightmatters.org.uk](http://www.heightmatters.org.uk)

[www.healthforallchildren.co.uk](http://www.healthforallchildren.co.uk)

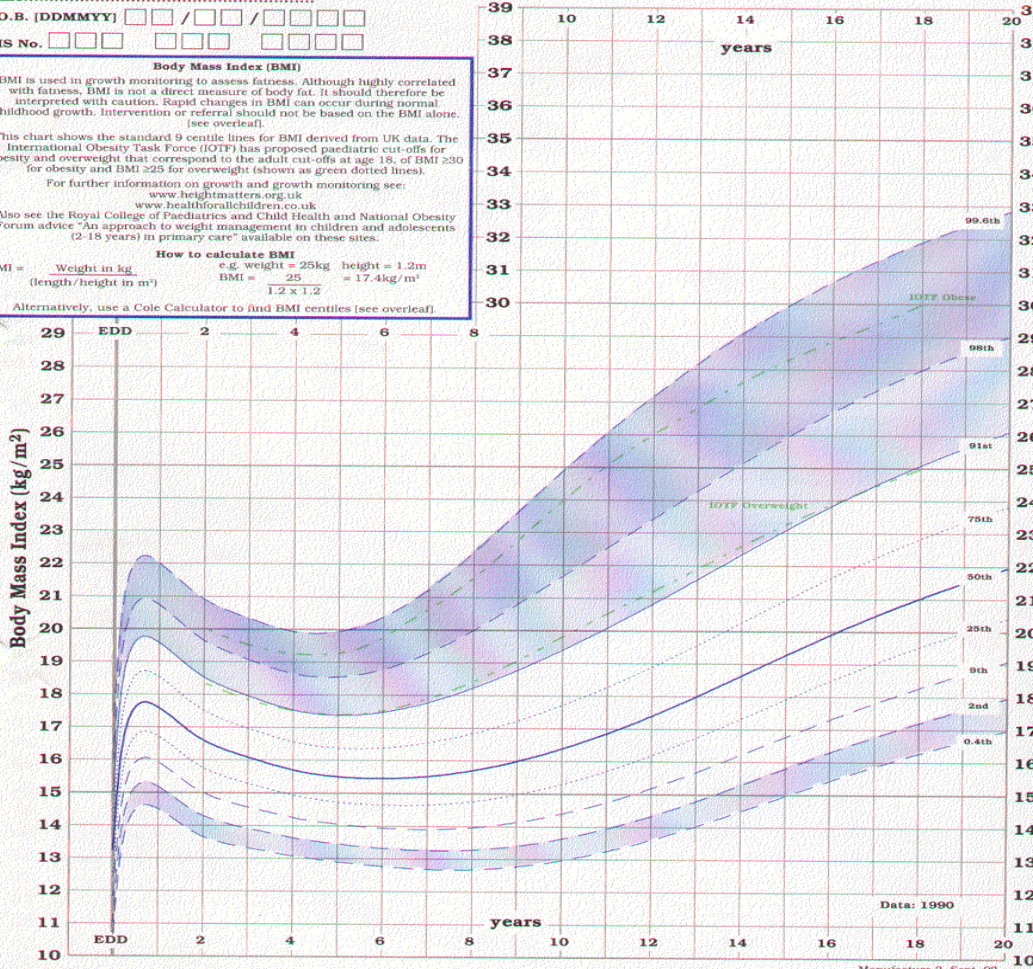
Also see the Royal College of Paediatrics and Child Health and National Obesity Forum advice "An approach to weight management in children and adolescents (2-18 years) in primary care" available on these sites.

### How to calculate BMI

BMI =  $\frac{\text{Weight in kg}}{(\text{length/height in m})^2}$

e.g. weight = 25kg height = 1.2m  
 BMI =  $\frac{25}{1.2 \times 1.2} = 17.4 \text{ kg/m}^2$

Alternatively, use a Cole Calculator to find BMI centiles [see overleaf].



### Reference

Body Mass Index reference curves for the UK, 1990 (TJ Cole, JV Freeman, MA Prece) *Arch Dis Child* 1995; 73: 25-29  
 Establishing a standard definition for child overweight and obesity: international survey. (Cole TJ, Bellizzi MC, Flegal KM, Dietz WH) *BMJ* 2000; 320: 1240-3



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High BMI  
 for age  
 = diagnostic  
 test for  
 obesity  
 (UK 1990  
 BMI  
 reference)

# SIGN 69 (2003) Childhood Obesity Guideline Based on evidence to end 2001

392

## REVIEW

**Obesity: diagnosis, prevention, and treatment; evidence based answers to common questions**

J J Reilly, M L Wilson, C D Summerbell, D C Wilson

748

## REVIEW

**Health consequences of obesity**

J J Reilly, E Methven, Z C McDowell, B Hacking, D Alexander, L Stewart, C J H Kelnar

## *ABC of obesity* Childhood obesity

John J Reilly, David Wilson

Obesity, an excessive body fat content with increased risk of morbidity, has become increasingly common in children and adolescents. Confusion exists, however, over basic questions such as whether paediatric obesity matters, how to diagnose it, and whether it should be treated (and if so, how best to do this). Doctors in many fields need a better understanding of these issues.

# SIGN 115 (2010)



obesity reviews

doi: 10.1111/j.1467-789X.2009.00709.x

Diagnostic in Obesity and Complications

## Accuracy of simple clinical and epidemiological definitions of childhood obesity: systematic review and evidence appraisal

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### Summary

The optimum means of defining obesity in children is unclear, creating variation in practice, and hindering obesity surveillance, prevention and treatment. This study aimed to review evidence on the use of body mass index (BMI) and waist circumference for diagnosis of high body fat content and adverse cardiometabolic risk factors in children and adolescents. A systematic literature review was carried out and evidence appraised using the Quality Assessment of Studies of Diagnostic Accuracy in Systematic Reviews method. Literature searching began following the last systematic review of this topic (end 2001) and collected evidence in MEDLINE and EMBASE in 0- to 18-year-olds that compared the accuracy of BMI vs. waist circumference and compared BMI interpreted relative to national reference data vs. BMI interpreted relative to Cole/International Obesity Task Force international reference data. Ten studies compared diagnostic accuracy of BMI vs. waist circumference; they reported no improved identification of adverse cardiometabolic risk profiles from waist circumference over that provided by high BMI. Eight studies compared BMI with national reference data vs. the international approach; 5/8 found significantly poorer accuracy (lower sensitivity) using BMI with the international approach; 3/8 found similar sensitivity; in 7/7 studies that compared specificity this was similar. In conclusion, the present review provides no compelling evidence for use of either high waist circumference or BMI interpreted using the International Obesity Task Force approach in preference to the use of national BMI percentiles for the identification of children and adolescents with excess fatness and adverse cardiometabolic risk profile.

**Keywords:** Body mass index, child, obesity diagnosis, waist circumference.

obesity reviews (2010) 11, 645-655

# Diagnostic accuracy of simple methods (BMI, Waist) for child & adolescent obesity

- **Systematic reviews**
  - Reilly et al 2002 Arch Dis Child
  - Reilly et al 2010 Obes Rev
  - Javed et al Pediatr Obes 2014
- Direct measure of fatness and/or morbidity vs simple measure
- High BMI has ***high specificity***
  - children with high BMI are too fat/ increased risk of co-morbidity
- BMI has **low sensitivity:**
  - 25-40% of children & adolescents with 'healthy' BMI are obese (i.e. too fat/at increased risk of co-morbidity)

# Conclusions-some myths about child physical activity & obesity in Scotland

- Physical activity **NOT JUST** PE or sport
- Physical activity declines **WELL BEFORE** adolescence
- Physical activity **DOES NOT** vary by socio-economic status
- Physical activity is prevented **LARGELY** by the **CULTURAL** environment
- A **MAJORITY** of Scottish adolescents are probably obese (excessively fat)





**New for 2018-2019 MSc Physical Activity  
in NCD Control & Prevention**

# **Thank You**

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