Physical Fitness & Quality of Life in Children

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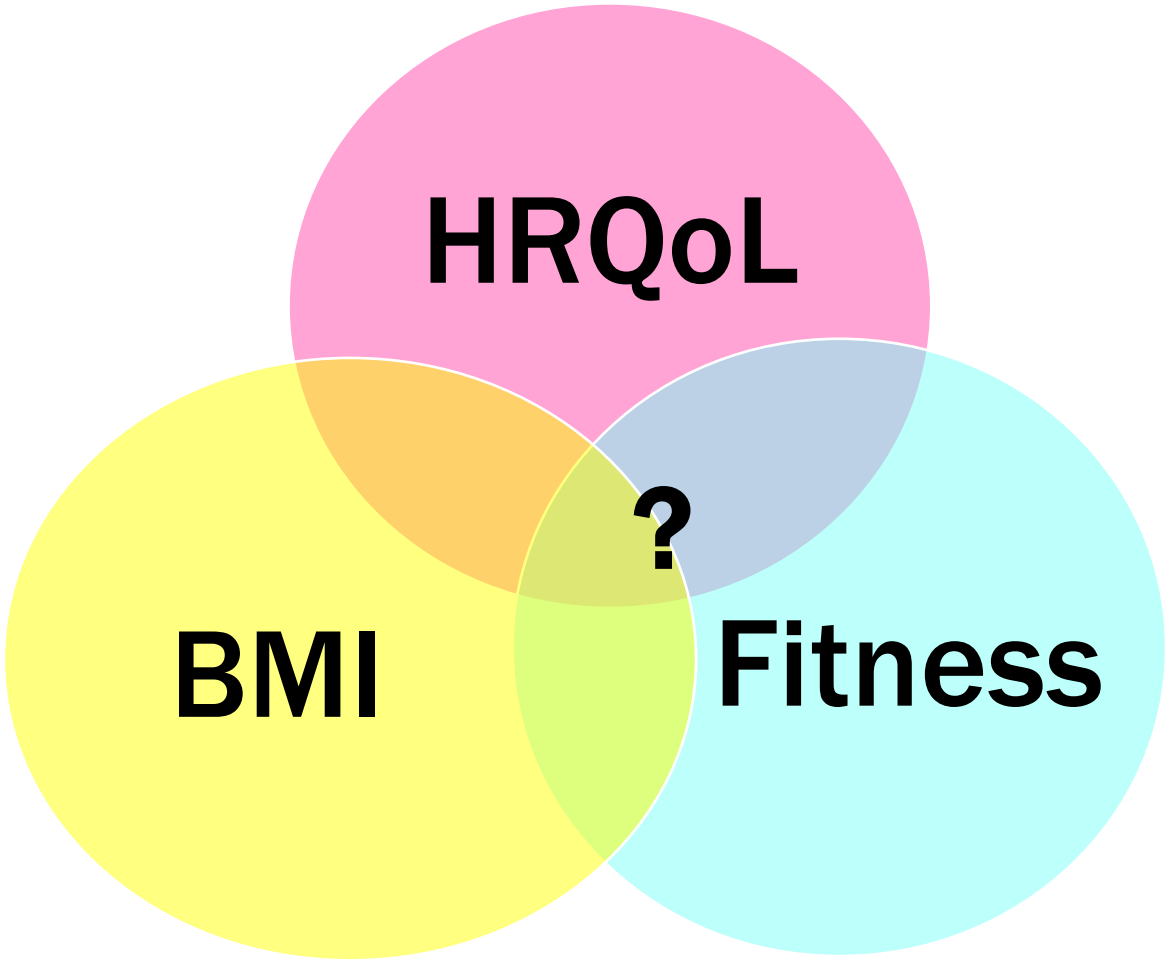
Background

- **Physical fitness** Includes cardiorespiratory, musculoskeletal (strength, power)
- Strongly associated with mortality and cancer, *independently* of obesity and PA
- Children's fitness worldwide is decreasing
- Little information on fitness in UK children

- **Health-Related Quality of Life (HRQoL)** Subjective perception of the impact of health status on physical, mental and social wellbeing
- Use child's view wherever possible
- Important for identifying those at risk of health problems, determine burden of disease or disability
- Mental health problems in children are increasing

- **Deprivation** has negative health effects, inc obesity, but also on mental health – will children from a deprived part of a deprived region rate their HRQoL lower?


HRQoL
?
BMI
Fitness

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What we've done

May 2019 - October 2019
3 primary schools in Walker, Newcastle upon Tyne
N=591, 53% male, Years 2-6 (age 6-11y)

Demographics	Anthropometry	Fitness	Questionnaires (ages 8+)
Date of birth	Height	Cardiorespiratory: 20m shuttle run	HRQoL: Kidscreen-27 • **Physical Wellbeing** • **Psychological Wellbeing** • Autonomy & Parents • Social Support & Peers • School Environment
Gender	Seated height	Upper body muscular strength: handgrip	
Ethnicity	Weight	Lower body muscular power: standing broad jump	
Home postcode	(BMI & BMI z-score derived)	Flexibility: sit and reach test	Youth sports survey

Level	Speed (km/h)	Shuttles	Total shuttles	Cumulative distance (m)
1	8.0	7	7	140
2	9.0	8	15	300
3	9.5	8	23	460
4	10.0	9	32	640
5	10.5	9	41	820
6	11.0	9	50	1000

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What we've found

IMD quintile	Frequency	%
1 (most deprived)	521	91.6
2	24	4.2
3	22	3.9
4	1	0.2
5	1	0.2

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Centile	Category	N (total=550)	%	
≤2	Underweight	3	0.5	
>2 <85	Healthy weight	331	60.2	
≥85 <95	Overweight	75	13.6	39.3
≥95<99.6	Obese	92	16.7	
≥99.6	Severely obese	49	8.9	

No differences in BMI or BMI z score by sex
41 children without height/weight due to absence or refusal

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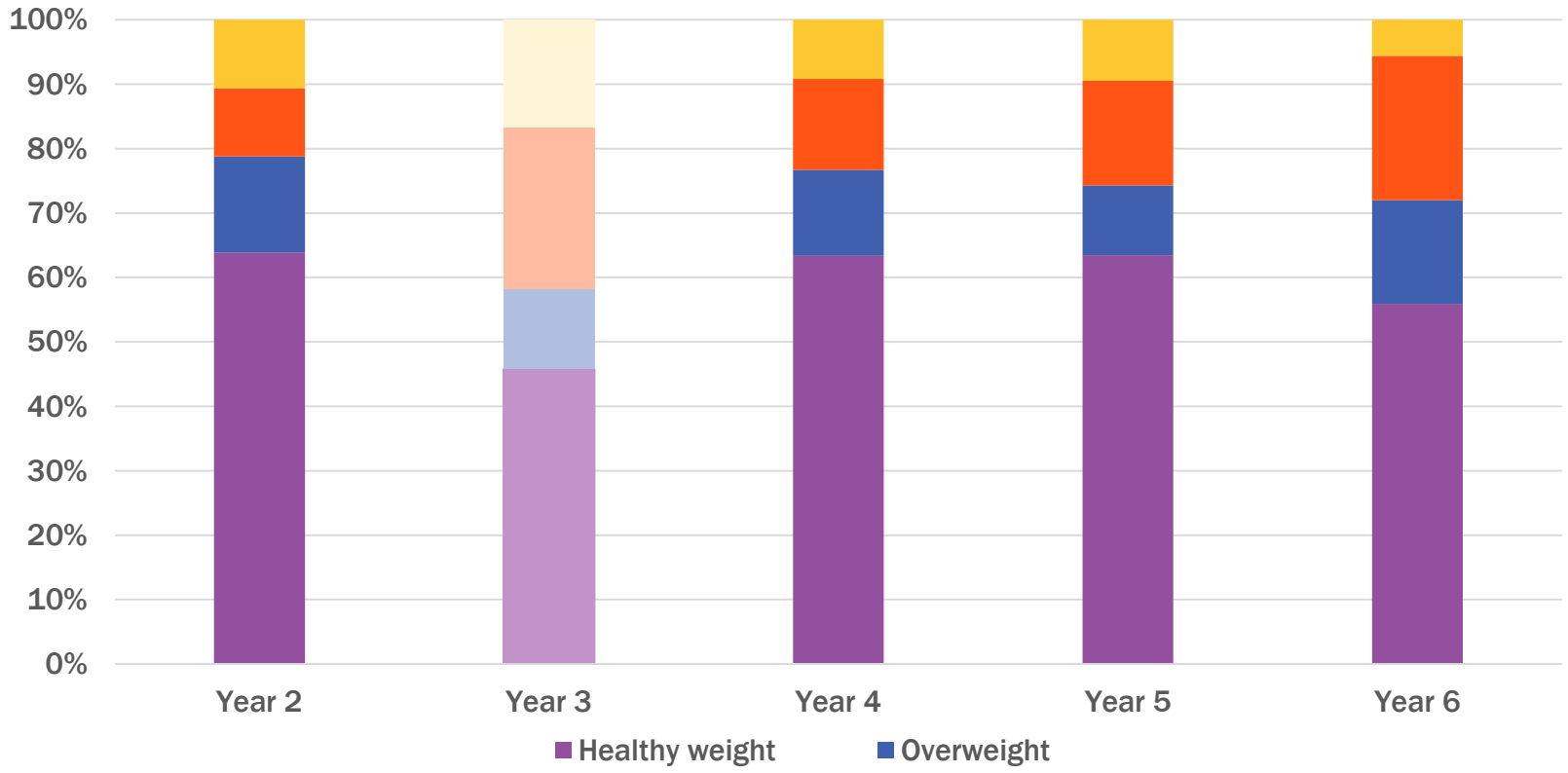
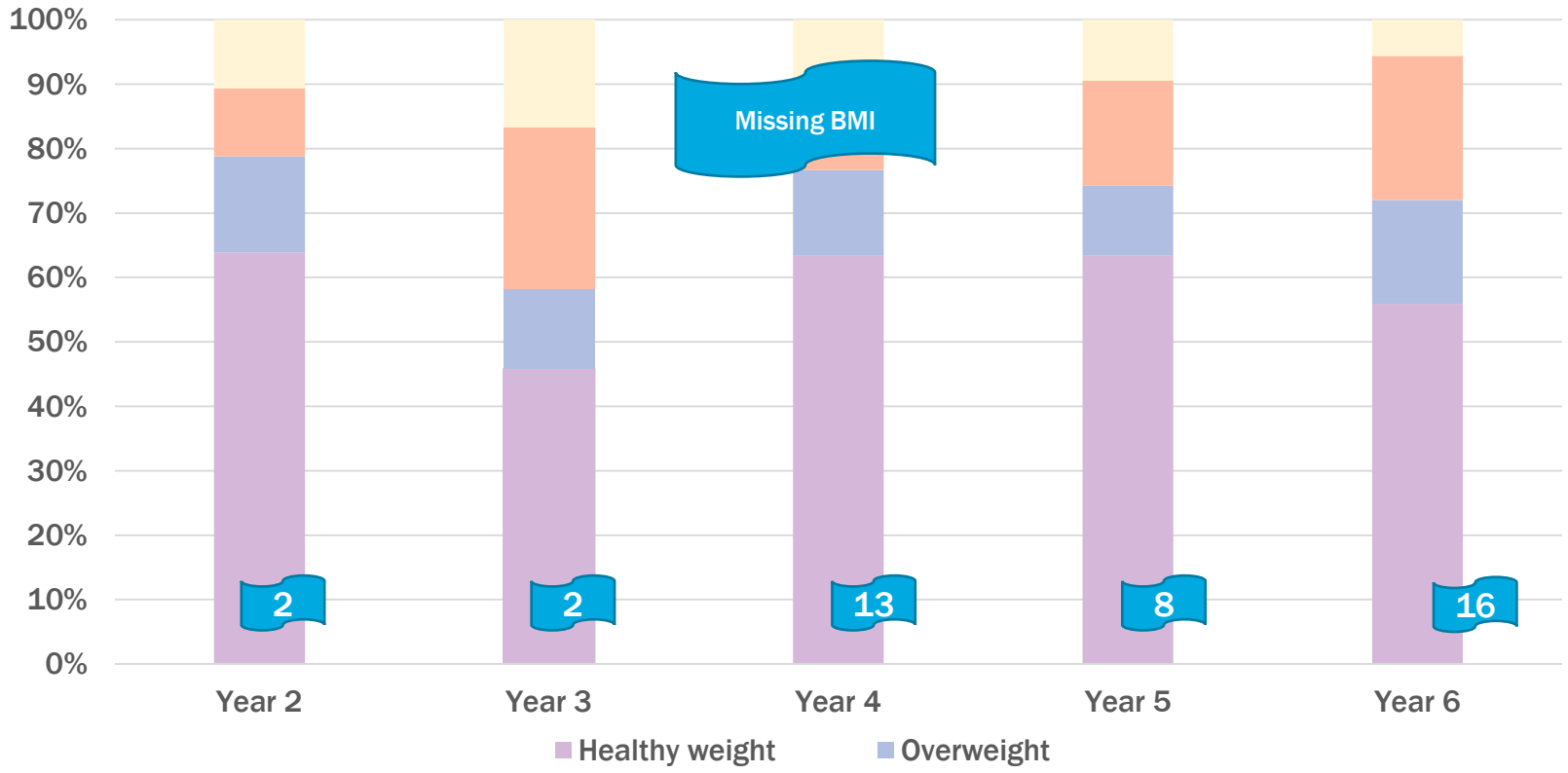
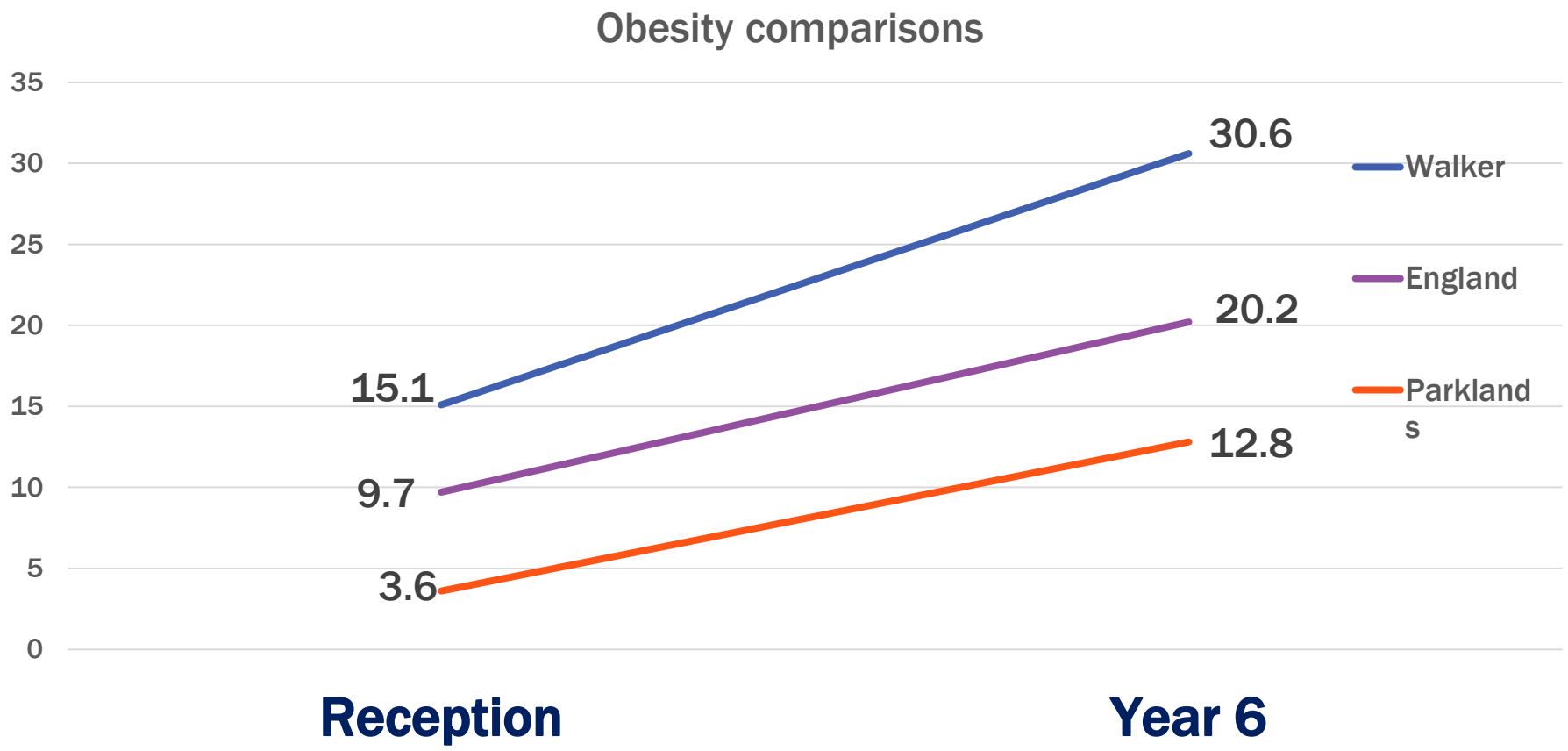
Weight categories by year group



Weight categories by year group



Obesity 25.6% (Years 2-6)



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Fitness measures

	n	Mean	Min	Max
Age (y)	591	9.4	6.7	12.1
BMI	550	18.9	13.1	32.2
BMI z-score	550	0.80	-2.33	4.07
Total shuttles (cardiorespiratory)	550	24	0	68
Max jump (cm) (lower body power)	552	122	32	200
Dominant hand max (kg) (upper body strength)	563	14.2	5.3	32.9
Max sit and reach (cm) (flexibility)	562	16.0	0.0	34.5

Sex differences for all fitness variables – boys score higher than girls in all except flexibility

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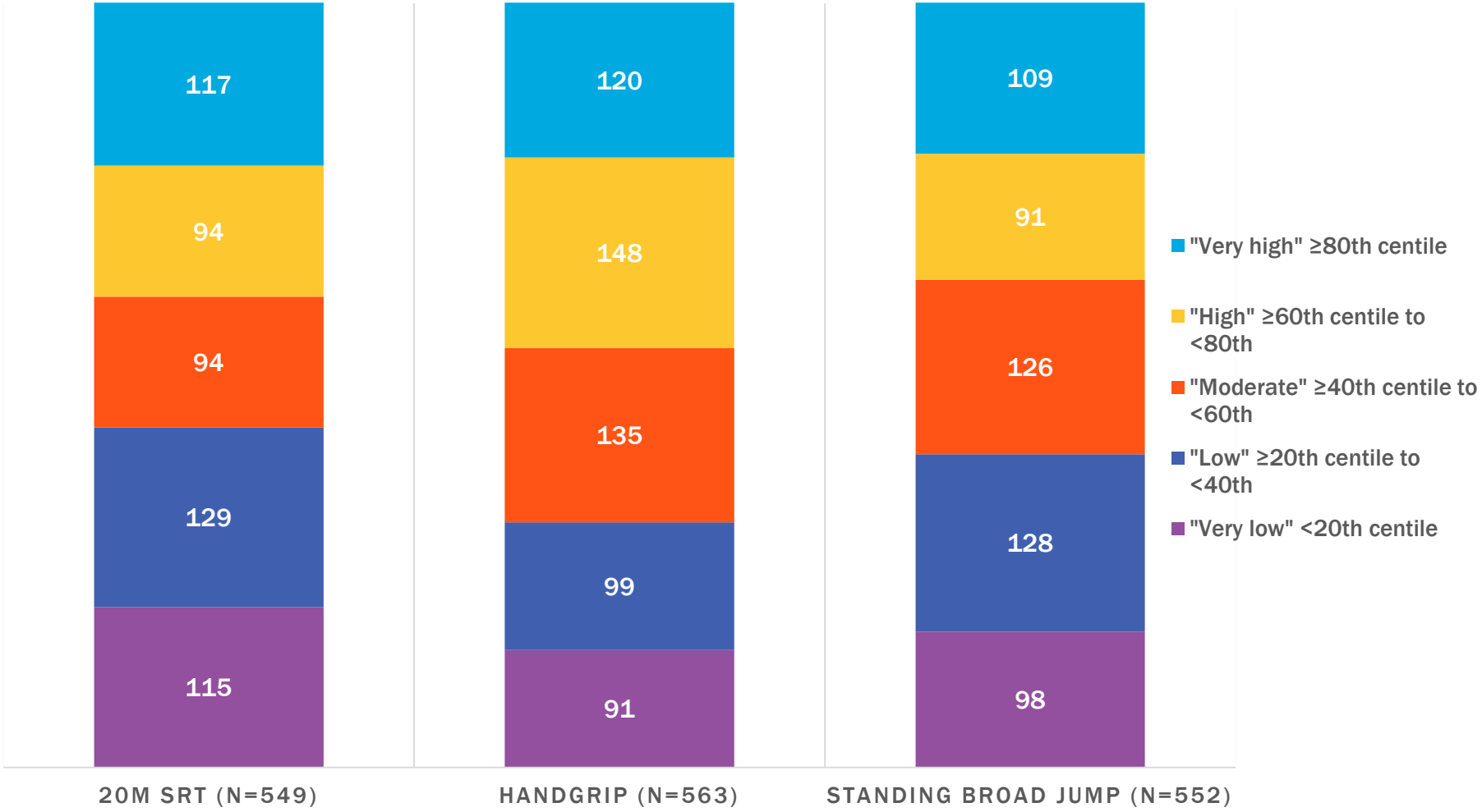
Comparisons with international and European reference data



 Tompkinson et al. Br J Sports Med 2017, Tompkinson et al. Br J Sports Med 2018, de Miguel—Etayo et al., In J Obesity 2014, Sandercock, UK Data Service #7456 2014

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How BMI and fitness are associated

Fitness variable	Association with BMI z-score	Children with a higher BMI z-score
Cardiorespiratory	Strong negative	Run fewer shuttles
Upper body strength	Strong positive	Have a stronger handgrip
Lower body power	Moderate negative	Jump less far
Flexibility	No association	-

HRQoL

Physical Wellbeing

1. In general, how would you say your health is?

- ☐ excellent
- ☐ very good
- ☐ good
- ☐ fair
- ☐ poor

Thinking about the last week...

	not at all	slightly	moderately	very	extremely
2. Have you felt fit and well?	☐	☐	☐	☐	☐
3. Have you been physically active (e. g. running, climbing, biking)?	☐	☐	☐	☐	☐
4. Have you been able to run well?	☐	☐	☐	☐	☐

Thinking about the last week...

	never	seldom	quite often	very often	always
5. Have you felt full of energy?	☐	☐	☐	☐	☐

Psychological Wellbeing

Thinking about the last week...

	not at all	slightly	moderately	very	extremely
1. Has your life been enjoyable?	☐	☐	☐	☐	☐

Thinking about the last week...

	never	seldom	quite often	very often	always
2. Have you been in a good mood?	☐	☐	☐	☐	☐
3. Have you had fun?	☐	☐	☐	☐	☐
4. Have you felt sad?	☐	☐	☐	☐	☐
5. Have you felt so bad that you didn't want to do anything?	☐	☐	☐	☐	☐
6. Have you felt lonely?	☐	☐	☐	☐	☐
7. Have you been happy with the way you are?	☐	☐	☐	☐	☐

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HRQoL – general findings

- Boys score higher for Physical Wellbeing, no other sex differences
- Group means for each domain similar to those of the reference population, but skewed by a few children with very high scores

  Assess the number of children scoring below the lower cut-off = poor HRQoL

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How HRQoL and BMI are associated

Domain	Association with BMI z-score	Children with a higher BMI z-score report:
Physical Wellbeing	Moderate negative	Lower quality of life
Psychological Wellbeing	Moderate negative	Lower quality of life
Social Support & Peers	No association	-
Autonomy & Parent relationship	No association	-
School Environment	No association	-

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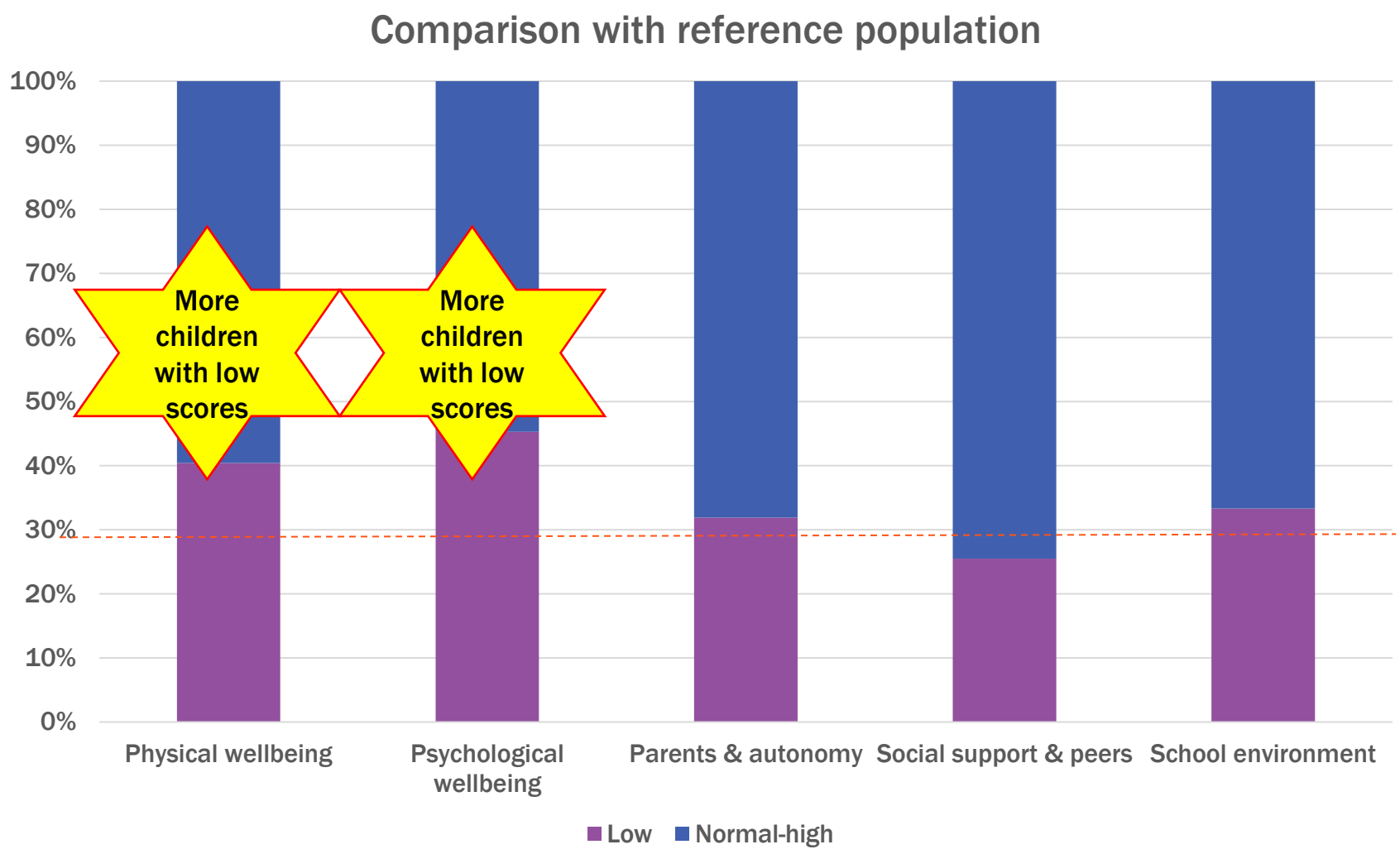
How Physical Wellbeing and fitness are associated

	B	P
Cardiorespiratory	0.29	<0.001
BMI z-score	-0.352	0.457

Explains 14% of variability in Physical Wellbeing score

	B	P
Lower body power	0.16	<0.001
BMI z-score	-0.88	0.041

Explains 15% of variability in Physical Wellbeing score


Comparison with reference population
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
More children with low scores
More children with low scores
Physical wellbeing
Psychological wellbeing
Parents & autonomy
Social support & peers
School environment
Low
Normal-high

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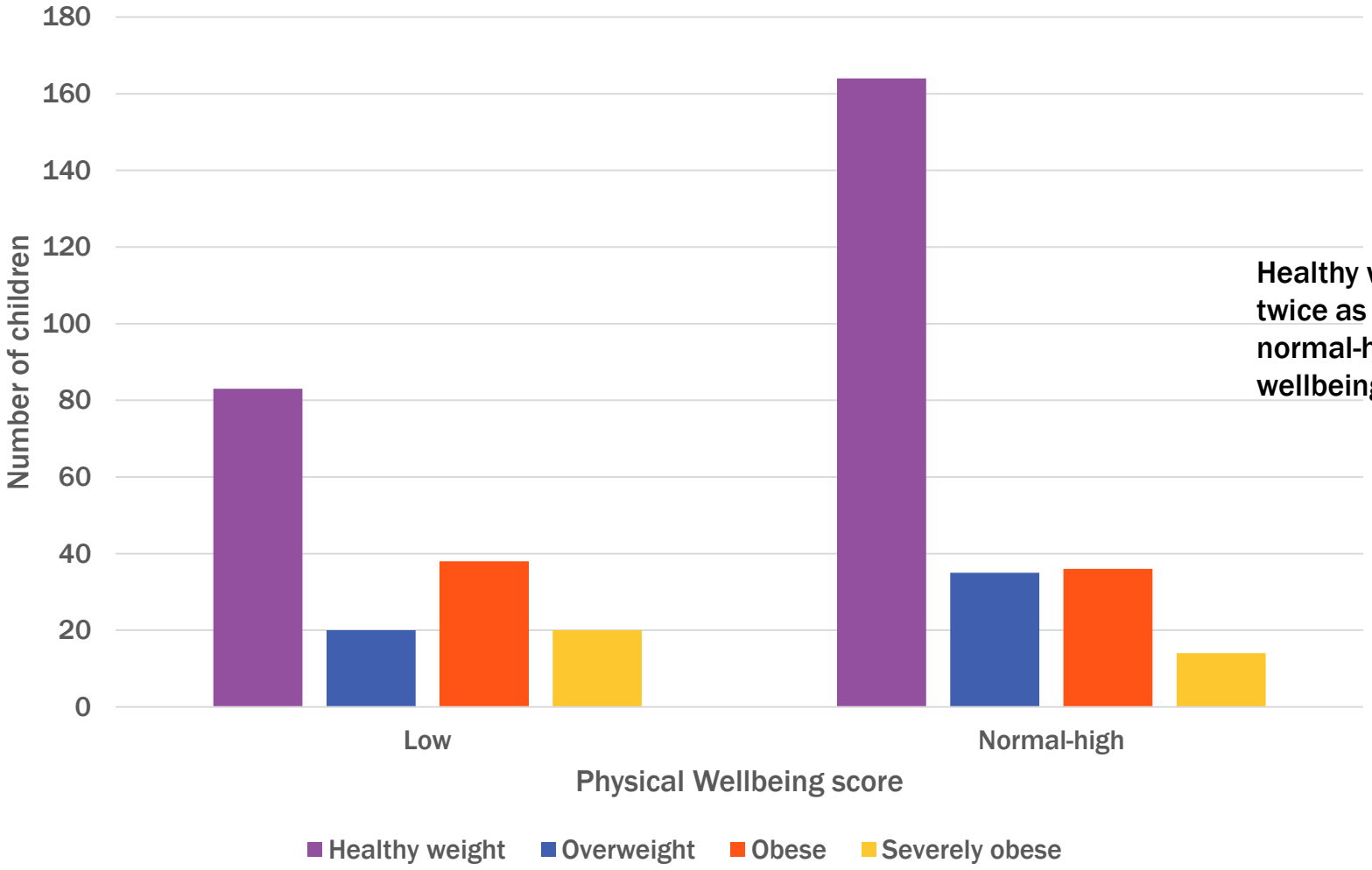

Healthy weight children twice as likely to report normal-high physical wellbeing score

Chi² is statistically significant

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How Psychological Wellbeing and fitness are associated

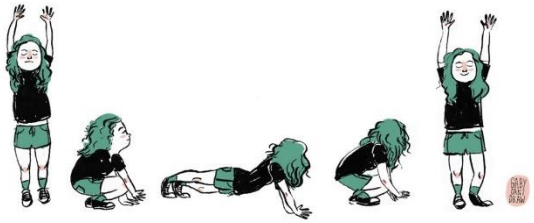
	B	P
Lower body power	**0.13**	**0.010**
BMI z-score	-0.09	0.089

Explains 3% of variability in Psychological Wellbeing score

Results similar for Social Support & Peers, and Autonomy & Parents; cardiorespiratory and lower body power positively associated

Conclusions and next steps

- Higher levels of fitness were associated with better self-reported HRQoL
- More children rated themselves of low HRQoL compared with the reference population in two domains: Physical Wellbeing and Psychological Wellbeing
  - Both of these domains were associated with fitness, independently of BMI z-score
- Indicates that improving fitness, may improve children's HRQoL, with possible knock-on effects
- Biggest effects may be seen with improvements to **cardiorespiratory fitness** and **strength** (both now included in the UK CMO Physical Activity Guidelines 2019)



- Ideally…
  - Measure children from less deprived areas to see if there is a difference
  - But this could be a relatively simply way of making life better in those populations that need it most

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