Childhood hearing impairment associated with adult obesity

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- Girls with minor hearing impairment have an increased risk of adult obesity
- This might be due to a 'pre-obese syndrome'
- Mechanisms are still unknown

Background

Impaired childhood neurological function such as poorer cognitive function, physical control and coordination among otherwise healthy children is associated with an increased risk to develop obesity or diabetes in adulthood, indicating a "pre-obese syndrome".

Population

We examined associations of childhood **bilateral minor hearing impairment** (as a marker of a **systemic effect on neurological function**) with adult obesity, among 3288 male and 3527 female members of a longitudinal cohort born in Great Britain in 1970.

Methods

Height and weight were measured at age 10 years and self-reported at 34 years. Audiometry was conducted at age 10 years. The dependent variable in logistic regression was minor bilateral hearing impairment. Adjustment for potential confounding factors included social class, maternal education and pubertal development at age 10 years.

Results

Among females, the adjusted odds ratios (and 95% confidence intervals) for minor bilateral hearing impairment at age 10 years were 2.33 (1.36-3.98) for overweight/obesity; and at age 34 years they were 1.71 (1.00-2.92) for overweight and 2.73 (1.58-4.71) for obesity. The associations were not explained by childhood BMI at age 10 years. There were no consistent associations among males and interaction testing revealed statistically significant effect modification by sex.

Conclusions

The dose-dependent associations among females are consistent with childhood origins for some obesity-associated impaired neurological function and the possible existence of a 'pre-obese syndrome'. Childhood exposures associated with bilateral hearing impairment are only risks for obesity in later life among females.

The accumulation of risks for poorer health among those who become obese in later life begins in childhood.

Future research

A life-course approach is necessary to identify the accumulation of multiple risks from early life onwards that influence both physical function and weight gain.

Psychosocial stress is linked with increased risk of unhealthy childhood weight gain, but further studies are needed to clarify if psychosocial stress (or/and maternal stress) explains some of the association between childhood neurological impairment and adulthood obesity risk.

Table 1. Study population characteristics by sex

	Male Number (%)	Female Number (%)
Bmi at age 10		
Underweight (BMI less then 14.64 for boys, 14.61 for girls)	330 (10.0)	393 (11.1)
Normal weight (BMI between 14.64 and 19.84 for boys, 14.61 and 19.86 for girls)	2730 (83.0)	2730 (77.4)
Overweight or obese (more then 19.84 for boys, 19.86 for girls)	228 (6.9)	404 (11.5)
Bmi at age 34		
Underweight (BMI less then 18.5)	23 (0.7)	83 (2.4)
Normal weight (BMI between 18.5 and 25)	1294 (39.4)	2025 (57.4)
Overweight (BMI between 25 and 30)	1425 (43.3)	883 (25.0)
Obese (BMI over 30)	546 (16.6)	536 (15.2)
Signs of puberty		
None	3148 (95.7)	2608 (73.9)
One	125 (3.8)	673 (19.1)
Two or more	15 (0.5)	246 (7.0)
Social class		
Higher professional occupations	231 (7.0)	220 (6.2)
Lower professional occupations	830 (25.2)	892 (25.3)
Non-manual skilled occupations	368 (11.2)	390 (11.1)
Manual skilled occupations	1295 (39.4)	1374 (39.0)
Semi skilled occupations	378 (11.5)	418 (11.9)
Unskilled occupations	115 (3.5)	129 (3.7)
Class unknown	71 (2.2)	104 (2.9)
Mothers education level		
No education	1588 (48.3)	1743 (49.4)
O level education	346 (10.5)	359 (10.2)
A level education	76 (2.3)	83 (2.4)
Holding a degree	63 (1.9)	61 (1.7)
Other education	1215 (37.0)	1281 (36.3)
Hearing problems		
None	3086 (93.8)	3306 (93.7)
Minimal bilateral	109 (3.3)	119 (3.4)
Unilateral problems	19 (0.6)	20 (0.6)
Moderate or marked bilateral problems	77 (2.3)	82 (2.3)
Total	3288 (100)	3527 (100)

Table 2. Bilateral hearing impairment at age 10 years and BMI

MALES	Hearing problems at age 10*		Unadjusted		Adjusted†		Adjusted‡	
	No (n=3083)	Yes (n=77)	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
BMI class at 34				0.041		0.051		0.049
Underweight	22 (0.7)	1 (1.3)	1.44 (0.19 10.98)	0.723	1.26 (0.16 9.80)	0.825	1.13 (0.14 9.08)	0.906
Normal (reference)	1206 (39.1)	38 (49.4)						
Overweight	1352 (43.9)	21 (27.3)	0.49 (0.29 0.84)	0.010	0.50 (0.29 0.86)	0.012	0.52 (0.30 0.90)	0.019
Obese	503 (16.3)	17 (22.1)	1.07 (0.60 1.92)	0.813	1.08 (0.60 1.95)	0.796	1.19 (0.64 2.21)	0.574
BMI class at 10				0.605		0.595		0.621
Underweight	307 (10.0)	10 (13.0)	1.33 (0.67 2.61)	0.415	1.32 (0.67 2.60)	0.430	1.21 (0.60 2.46)	0.597
Normal (reference)	2564 (83.2)	63 (81.8)						
Overweight/Obese	212 (6.9)	4 (5.2)	0.77 (0.28 2.13)	0.612	0.74 (0.27 2.07)	0.568	0.65 (0.23 1.87)	0.427
Total	3083	77						
FEMALES								
BMI class at 34				0.001		0.004		0.033
Underweight	79 (2.4)	0 (0.0)	no estimation possible		no estimation possible		no estimation possible	
Normal (reference)	1921 (58.1)	32 (39.0)						
Overweight	818 (24.7)	25 (30.5)	1.83 (1.08 3.12)	0.025	1.71 (1.00 2.92)	0.049	1.65 (0.96 2.83)	0.070
Obese	488 (14.8)	25 (30.5)	3.08 (1.81 5.24)	0.000	2.73 (1.58 4.71)	0.000	2.37 (1.33 4.24)	0.004
BMI class at 10				0.002		0.008		0.116
Underweight	371 (11.2)	8 (9.8)	1.03 (0.48 2.17)	0.948	1.08 (0.51 2.30)	0.846	1.31 (0.61 2.81)	0.493
Normal (reference)	2567 (77.6)	54 (65.9)						
Overweight/Obese	368 (11.1)	20 (24.4)	2.58 (1.53 4.37)	0.000	2.33 (1.36 3.99)	0.002	1.79 (1.02 3.14)	0.043
Total	3306	82						

†Adjusted for social class, mother's education level, cohort member's pubertal development at 10 years, if father/mother is present, BMI at 34 and 10 in separate models.
‡Adjusted for all of the above and BMI at 34 and 10 in the same model

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