



## RESEARCH SUMMARY

### Obesity in Young Children

- 1. Childcare and Overweight or Obesity over 10 years of follow-up. (2012)**  
Geoffroy, M-C., Power, C., Touchette, E., Dubois, L., Bolvin, M., Seguin, J.R., Tremblay, R.E. Cote, S.M.  
*Journal of Pediatrics*, published online 8 November 2012
- 2. Adrenocortical regulation, eating in the absence of hunger and BMI in young children. (2013)**  
Francis, L.A., Granger, D.A. and Susman, E.J.  
*Appetite* 2013, 64, 32-38.

Obesity in children is a potential major health issue; the effect of obesity often carries through into adulthood where it is associated with major diseases such as diabetes and hypertension. Are there social reasons for this increase in childhood obesity? The first paper examines the link between childhood obesity and centre-based childcare. Compared with parental childcare, centre-based childcare is strongly associated with increases in children's obesity. This increase in obesity is incremental and dependant on the number of hours per week spent in centre-based childcare. Centre-based childcare is known to be stressful to the infant as measured by the levels of cortisol released. The second paper examines the feeding habits of children who are not hungry. Overweight children eat more. When stressed, these overweight children release more cortisol than children who are not overweight.

---

**Paper 1** examined the relationship between preschool childcare arrangements and overweight/obesity in childhood up to the age of 10 years. The data was taken from a large Canadian birth cohort of 1649 children. Childcare arrangements were obtained by questionnaires at 5 months, 1.5, 2.5, 3.5 and 4 years after the child's birth. Childcare was categorised into 5 groups: centre-based, relative, family-based, nanny and parental care. The number of hours per week spent in each type of childcare was documented. Body-mass index (BMI) was obtained by measuring the weight in kilograms and dividing by height squared in meters (BMI in units of  $\text{kg/m}^2$ ). BMIs were measured at the 5 pre-school ages at the times the questionnaires were determined, and subsequently at the ages of 4, 6, 7, 8 and 10 years. The classification of whether a child was overweight or obese was determined from the BMI measurement using the World Standard cut-off points for overweight/obesity. A range of other variables were considered in the statistical analysis such as: birth weight, maternal smoking during pregnancy, maternal employment by age 4, child's ethnic background, breast feeding duration, maternal BMI, maternal depression, family functioning at 5 months, maternal overprotection at 5 months and family SES (a social selection factor).

The odds ratios for overweight/obesity were standardised to 1.00 for parental childcare. The odds ratio (OR) is the ratio of the odds [an expression of relative probabilities] of an event occurring in one group to the odds of it occurring in another group. The OR for overweight/obesity in centre-base childcare was 1.65 (statistically significant at  $P < 0.01$ ) compared with 1.00 for parental childcare. In other words, children attending centre-based childcare were more likely to be overweight/obese compared with parental care only. This observation occurred through the ages 4-10 years. The other types of childcare: relative, family-based or nanny showed no statistically significant effect of overweight/obesity compared to parental care.

---

(this Summary may be photocopied)

**Website:** <http://www.whataboutthechildren.org.uk>

Perhaps the most striking statistic was found when the number of hours spent in centre-based childcare was compared with parental care. The OR for overweight/obesity in centre-based childcare was 1.09 for each increase in 5 hours/week spent in centre-based child care compared with OR 1.00 for parental care. The statistical difference was highly significant ( $P < 0.002$ ).

In summary the results suggest that children attending centre-based childcare are 65% more likely to be overweight/obese compared with children having only parental childcare. This increase in overweight/obesity is incrementally related to the number of hours spent in centre-based childcare and amounts to a 9% increase for each 5 hours per week spent in childcare.

---

**Paper 2** examined the role of the stress hormone cortisol in the regulation of food intake in the absence of hunger and its relationship with Body Mass Index (BMI) in two groups of children 5-7 and 8-9 years old. Weight gain in adults and children, in the absence of hunger, is often associated with dysregulated feeding behaviour. In many cases, this type of eating seems to be a way of coping with stress.

In this study the children's BMI was calculated from the weight and height of each child (weight in kilograms divided by the square of the height in metres); 19% of the children were deemed overweight by the BMI measurement. The 43 children were predominantly from US middle-income well-educated parents.

The child's temperament was obtained from the caregiver in response to a Children's Behaviour Questionnaire. This enabled the child to be allocated a category of either *inhibitory control* (able to resist temptation when told something), or *impulsivity* (where the child carries out an action without thinking). The children were given a meal, where they could eat as much as they wanted, before the start of the procedures and asked to rate their level of hunger at the end of the meal (hungry, in between, full). After the hunger assessment the children were allowed free access to 10 different snack foods for a 10 minute period. The calorific value of the consumed snack food was calculated. During this free access period for food, a mean of 256 kcals was consumed (ranging from 20 to 700 kcals during that 10 minute period).

Samples of cortisol were obtained from the children's saliva. Two separate samples were taken with a twenty minute interval between them, to obtain a baseline salivary cortisol measurement. Social stress was induced 20 minutes after the second sample was taken. This stress test was the standard Trier Social Stress Test for Children (TSST-C); 5 minutes were allocated for the child to anticipate a test, the test was to prepare a 4 minute talk and then carry out a mental arithmetic test of serial subtraction for 4 minutes. Further saliva samples were taken at 20, 40 and 60 minutes after the start of the TSST-C.

In the older group of children, the amounts of cortisol released following TSST-C were significantly associated with high BMI and the consumption of a greater number of free access calories in the absence of hunger. No statistically significant association was found in the younger group between cortisol levels, BMI and eating in the absence of hunger.

In the group of young children, those rated highly for impulsivity showed a significant correlation only with high BMI. No such relationship was found with the older group of children.

In summary, this work suggests that there are differences in HPA-axis responses with respect to psychosocial stress in the eating habits of children aged 8-9 years. Even when not hungry, overweight children eat more snack foods before being stressed, but after they are stressed they have greater release of cortisol than children with body weights (BMI) in the clinically desirable range.

Dr. P.M. Dean