This is a repository copy of *Identifying critical periods for maintaining weight loss in obese children*.

White Rose Research Online URL for this paper:
http://eprints.whiterose.ac.uk/118972/

Version: Accepted Version

**Proceedings Paper:**

https://doi.org/10.1530/endoabs.39.OC9.2

Disclaimer: this is not the definitive version of record of this article. This manuscript has been accepted for publication in Endocrine Abstracts, but the version presented here has not yet been copy-edited, formatted or proofed. Consequently, Bioscientifica accepts no responsibility for any errors or omissions it may contain. The definitive version is now freely available at http://doi.org/10.1530/endoabs.39.OC9.2 2015.

**Reuse**
Unless indicated otherwise, fulltext items are protected by copyright with all rights reserved. The copyright exception in section 29 of the Copyright, Designs and Patents Act 1988 allows the making of a single copy solely for the purpose of non-commercial research or private study within the limits of fair dealing. The publisher or other rights-holder may allow further reproduction and re-use of this version - refer to the White Rose Research Online record for this item. Where records identify the publisher as the copyright holder, users can verify any specific terms of use on the publisher’s website.

**Takedown**
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.
Identifying critical periods for maintaining weight loss in obese children

Amanda Peacock¹, Talat Mushtaq¹, Erin Alexander², Helen Truby³, Darren Greenwood⁴, Vince Russo², Steven Yau², George Werther² & Matthew Sabin²

Author affiliations
¹Leeds Children’s Hospital, Leeds, UK; ²The Royal Children’s Hospital and Murdoch Children’s Research Institute, Melbourne, Australia; ³Department of Nutrition and Dietetics, Monash University, Melbourne, Australia; ⁴Division of Biostatistics, University of Leeds, Leeds, UK.

Background: Studies in adults have shown physiological protection of a ‘set-point’ for weight, explaining why obese adults who diet eventually regain weight.

Objective: We hypothesised that set-points for weight, and their physiological defence, are flexible in childhood but become fixed around puberty. We aimed to show that obese children who lost weight had less ‘reflex’ changes in satiety hormone profiles (that would drive weight regain), compared with adolescents who had experienced a similar degree of weight change.

Method: Prospective cohort study. 41 subjects; 21 obese pre-pubertal children (age 3–7 yrs; 11 male) and 20 obese adolescents (age 14–18 yrs; 10 male). Obesity defined as BMI >2.4 SDS. Subjects recruited as either ‘reducers’ (relative/absolute weight loss of ≥10% in the preceding 9–15 months) or ‘maintainers’ (controls).

Measures: Resting energy expenditure (REE), bioelectrical impedance, and fasting and post-prandial (every 30 min for 3 h) satiety hormone profiles.

Results: Post-pubertal adolescents had 31% lower Ghrelin concentrations (4–51%, P=0.03) and 50% higher Amylin concentrations than pre-pubertal children (18–91%, P=0.001). The association between Ghrelin, Amylin and GIP concentration and weight change was similar for both pre- and post-pubertal children (P=0.79, P=0.39, P=0.79 respectively). No associations were found for Peptide YY, Pancreatic Polypeptide, or active GLP1. Regarding satiety, post-pubertal reducers reported less hunger and higher satiety than pre-pubertal children (P<0.05). REE in pre-pubertal weight reducers and maintainers were similar (50 kcal lower, −143 to 242, P=0.6) but post-pubertal reducers had 250 kcal lower REE compared to post-pubertal maintainers (−68 to 572, P=0.1).

Conclusion: Satiety hormone profiles were similar between pre- and post-pubertal subjects, and contrast with adult data where weight reduction leads to sustained
increases in Ghrelin and reductions in the other hormones. These findings indicate that the physiological mechanisms which act to protect against weight change in adults develop later than in the adolescent years.