ICLS OCCASIONAL PAPER 15.1

Why are early adolescents from poor families at increased risk of overweight and obesity?

Amanda Sacker **December 2014**

Abstract Overweight (including obesity) poses a major global public health burden; is becoming more common across the lifecourse; is linked to the elevated risk of long term poor health, including diabetes, coronary heart disease and cancers; and tracks forward from early life through the adult years – overweight adults are more likely to have been overweight in their youth compared with healthy weight adults. Socioeconomic inequalities in overweight are apparent across all ages, but we understand relatively little about how these inequalities might be tackled. In this paper we examine information on over 10,000 children on the cusp of adolescence, at 11 years old, from the Millennium Cohort Study. We find striking socioeconomic inequalities with early adolescents from the poorest families 3 times more likely to be obese compared with their wealthier counterparts. We show that markers of family health behaviours including physical and sedentary activities and dietary factors help to explain observed inequalities. We go on to assess how factors from early childhood combine to influence the development of overweight and obesity by early adolescence. Our findings support the need for early interventions which take account of family and broader contextual factors.

Speaker Amanda Sacker Professor of Lifecourse Studies at UCL and Director of ICLS.

Notes ICLS hosted a policy seminar on Sleep & Health at UCL on 2 December 2014. The seminar was chaired by Richard Bartholomew, (former), Chief Research Officer, Children, Young People and Families Directorate, Department for Education and the presentations co-ordinated by Professor Yvonne Kelly, Associate Director ICLS. Transcripts from this event, including this paper, have been made available via the ICLS Occasional Paper Series. This series allows all (those who were or were not able to attend) to read an account of the presentation. Other papers in the series include:

OP15.2 Who are the 11 year old drinkers? Yvonne Kelly, Professor of Epidemiology and ICLS Associate Director.

OP15.3 Diet quality and the factors that influence nutrient intake in teenage girls. Laura Weston (NatCen Social Research) (Principal Investigator) & Eva Almiron-Roig (Nutrition Surveys and Studies Group, MRC HNR)

OP15.4 Stress resilience and inflammation in adolescence predict poor mental and physical health in middle-aged men. Scott Montgomery, Professor of Clinical Epidemiology, ICLS, Orebro University Hospital and Karolinska Institute, Sweden

ICLS LIFECOURSE STUDIES IN SOCIETY AND HEALTH

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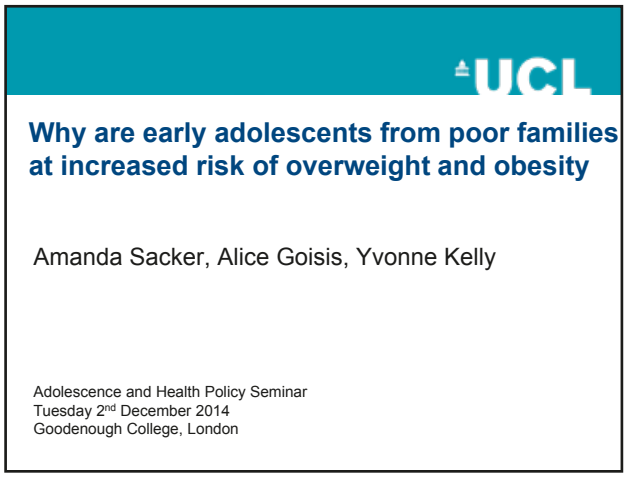
ICLS Occasional Paper 15.1

Why are early adolescents from poor families at increased risk of overweight and obesity?

Amanda Sacker, December 2014

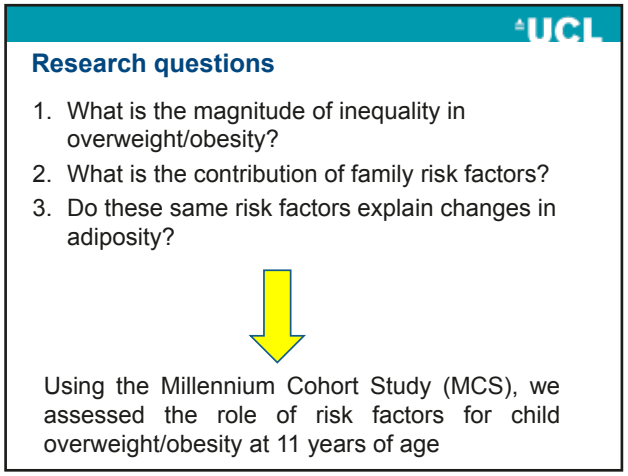
SLIDE 1

I'd like to thank my colleagues Alice and Yvonne who did most of the work on this paper that I'm presenting today.



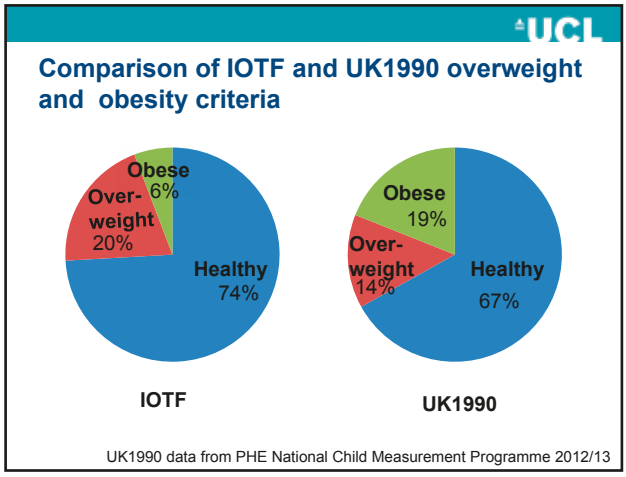
SLIDE 2

I'll run through the research questions that we're going to discuss over the next ten or fifteen minutes. First summarising what the magnitude of inequalities is in overweight and obesity, and then go on to look at the contribution from family risk factors in different domains to see if we can explain why those inequalities occur. And finally we ask do you see the same risk factors when you are looking at changes in adiposity or weight gainover the childhood years? And I'm going to be using MCS data for eleven year olds. This seems to be a particular pertinent age group to be looking at regarding this issue. At eleven they're just on the cusp of adolescence. And the WHO has recommended this age group as being one that is a key target group for intervention. They are prepubescent for the most part, although some of the girls have already reached puberty at this age. But nevertheless changing from primary to secondary school seems to be a good time for intervention.



SLIDE 3

The measure of overweight and obesity that we're using are the International Obesity Task Force thresholds. And I just wanted to highlight that they are different from the UK 1990 thresholds which are normally used for monitoring obesity and overweight in this country. The 1990 thresholds allow you to track what's happening over time but the international thresholds give a better indication of overweight and obesity for today's generation of children. It ties up with what clinicians suggest is overweight and obesity and is a more recent measure. The UK 1990 thresholds have actually come from data that is between 40 and 25 years old now and it may not be so relevant for research into today's children.



SLIDE 4

The measure of income I'm using is family income split up into five income group quintiles that we adjust for the household composition and size. The MCS provide these figures of what is the poverty line for an average family with a young child of just over £16,000 and their statistics show that over 20% of the cohort are in poverty. So when you look at the average incomes by income quintiles that they produce you can see that that bottom quintile - the poorest quintile - are all going to be below the poverty line and a minority of people even into the next quintile are going to be below the poverty line too. This is something to consider when reviewing the results.

UCL

Measurement of income

- Family income quintiles (adjusted for household composition and size)
- Poverty line £16,123; 21.41% poor*

Average income by income quintiles*

Quintiles	£
Q1 Poorest	12, 961
Q2	19,554
Q3	26,839
Q4	33,145
Q5 Richest	45,054

* Figures from Millennium Cohort Study User Guide (8th ed)

SLIDE 5

The risk factors that we're looking at come from a large number of variables that we initially selected based on the literature and theories about obesity and overweight The variables, on the slide here, were the ones that actually did have a relationship with obesity and overweight in our data.

Considering health behaviours around the time of the child's birth we have whether the mother smoked during pregnancy, the duration of breastfeeding and whether the child was introduced to solid food before four months (early weaning).

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Then at age eleven we have data on the physical activity or the other side of it, sedentary

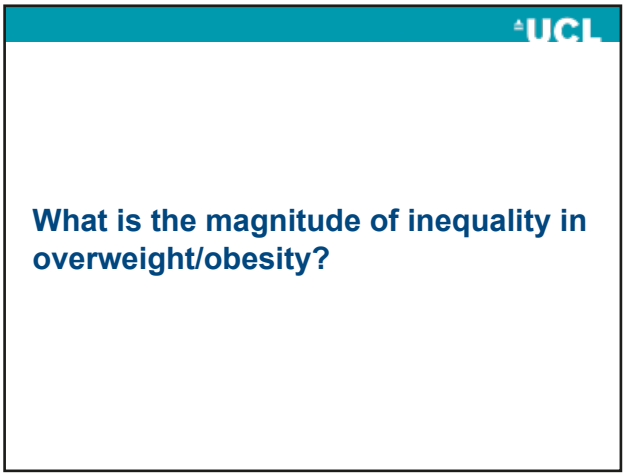
SLIDE 5 … *CONTINUED*

behaviour, so how often the children play sport, whether they play actively with a parent, what time they go to bed, the hours they spend watching TV or using a personal computer, and whether they cycled for pleasure.

And then the dietary environment is captured by variables about skipping breakfast, the number of portions of fruit they eat per day, whether they drink sweet drinks during the day and the mothers' adiposity, her BMI. I know that the mothers' BMI captures more than just the dietary environment but it was still felt that this was a marker of the general environment of the food consumption in the home.

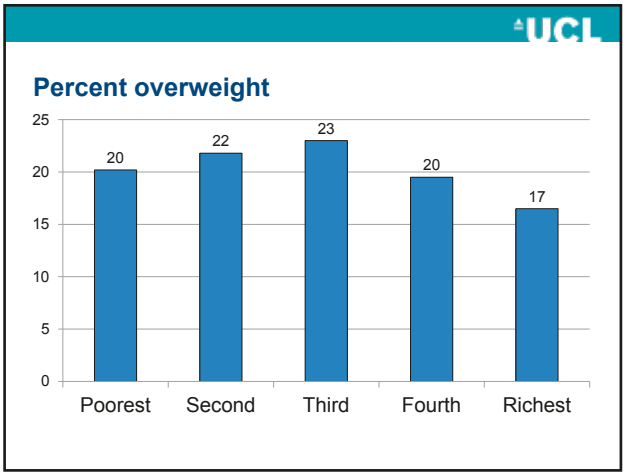
SLIDE 6

The first research question was what is the magnitude of inequality in overweight and obesity?



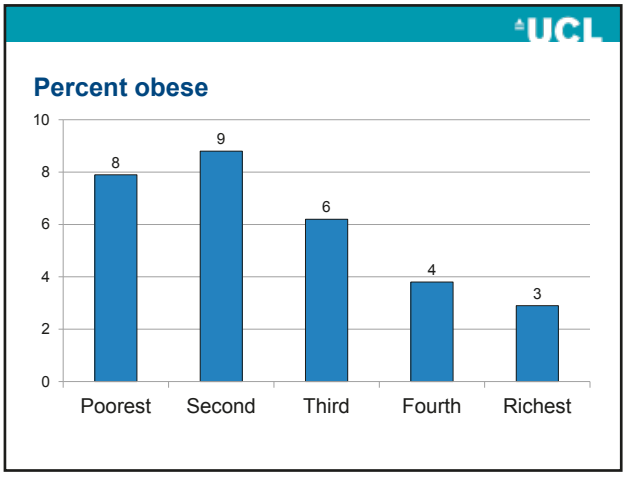
SLIDE 7

If you look at the slide for overweight there doesn't seem to be really that much of a gradient in overweight in this cohort of children. So values range from 17% to 23% but it's actually the middle quintile that has the most children who are classified as overweight. If you look at the slide for overweight there doesn't seem to be really that much of a gradient in overweight in this cohort of children. So values range from 17% to 23% but it's actually the middle quintile that has the most children who are classified as overweight.



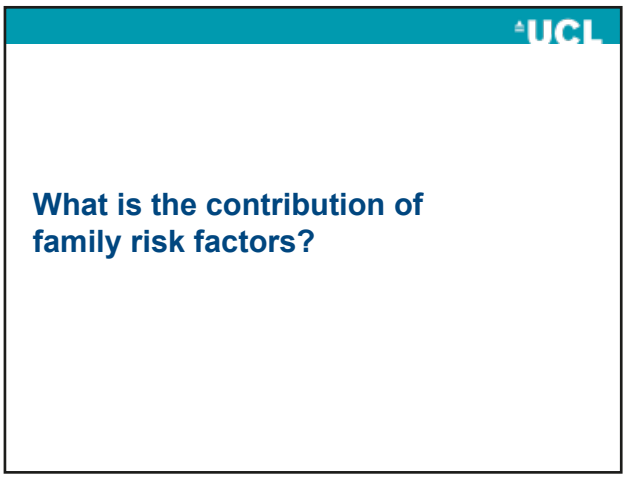
SLIDE 8

But when you look at the per cent of obese then we see a more classic gradient across the income groups ranging from 3% of children in the richest quintile up to 8 or 9 in the poorer quintiles.



SLIDE 9

But when you look at the per cent of obese then we see a more classic gradient across the income groups ranging from 3% of children in the richest quintile up to 8 or 9 in the poorer quintiles.

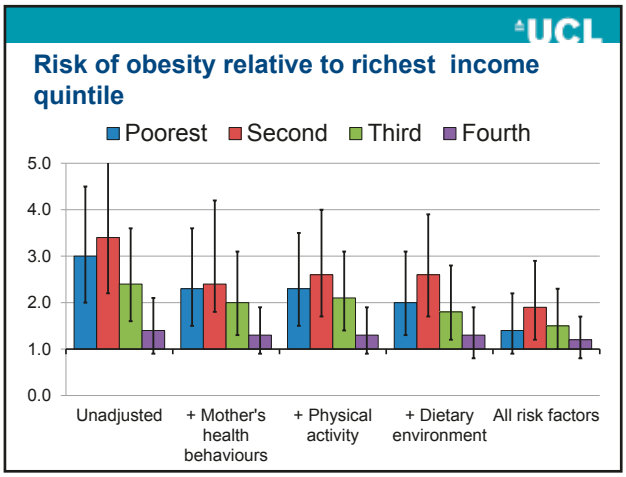


SLIDE 10

This slide gives the risk factors of obesity relative to children in that richest income quintile. The groups of four bars that you see represent the poorest from the left to going forward to become richer towards the right. And we have different models looking at different factors in turn. Looking at the horizontal line, if the black arrow bars go below that line then there is no statistical difference between the quintiles represented there and the richest quintile.

So first of all looking at the unadjusted figures on the left, this really just replicates the figure I showed you on the previous slide except it has some basic controls for sex and whether the child has reached puberty. You see exactly the same gradient as on the previous slide.

The next group of the figure show the



difference in - once we control for mothers' health behaviours - early life behaviours.

The next block along is controlling for physical activity, the next dietary environment and finally look at all the risk factors together.

The first thing to observe is that all the different

SLIDE 10 … *CONTINUED*

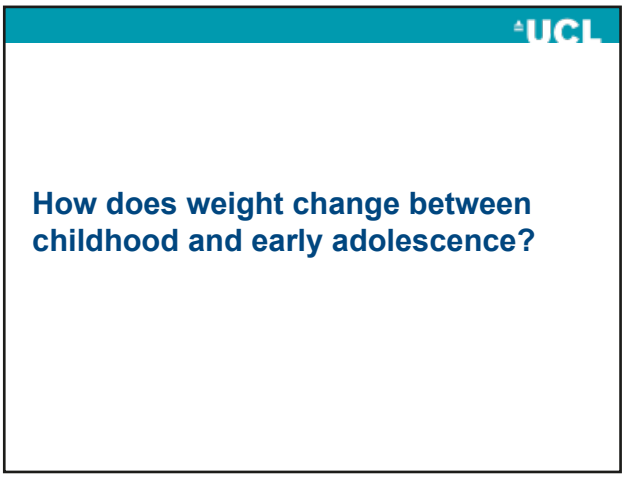
factors that we put in - the early life, the physical activity, the dietary environment – more or less explain similar amounts of that variability in the unadjusted figure. There's not a lot to tell between them which one is doing it. All of them are contributing to explaining those early differences.

Once we put all the variables together in the model we've virtually explained away all the differences between the different income groups. The only group that is statistically different from the richest group is that second from bottom quintile, if you remember, who were the ones that were just above the poverty line.

And if you look at the individual variables that contribute to explaining those differences in the early life it's whether children were fed solid foods before they were four months old and there's a protective effect of breastfeeding for more than four months, so consistent with government guidelines to keep breastfeeding over six months. If you look at the physical activity section pretty much all of those activities contributed significantly to reducing those gradients, so sport, cycling, TV and bedtimes but not PC use, so not computer use particularly, or active playing with parents. And for the dietary environment it was fruit consumption and the mothers' BMI that were predicting obesity and we didn't find any independent effect of having breakfast regularly or consuming sugary drinks.

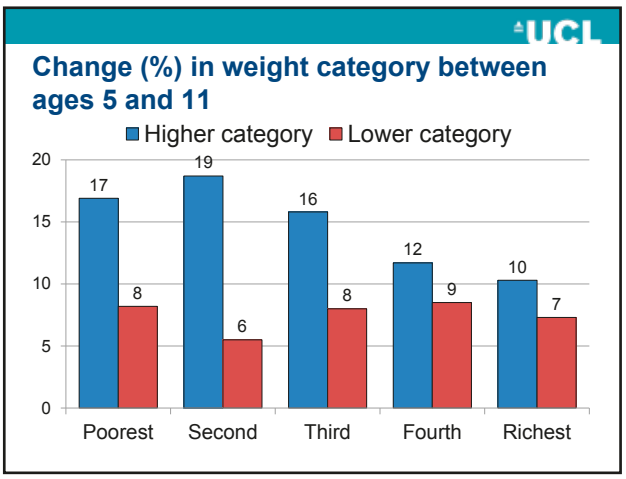
SLIDE 11

Now we look longitudinally and we're saying how does weight change between childhood and early adolescence so between ages five and eleven.



SLIDE 12

You can see in this graph that there's movement in both directions. There are children going down a category from either obese to overweight or from overweight to the normal range, or even from the obese right down to the normal range, but there seems to be far more movement putting on weight so going into a higher category than there is going down a category. The other thing that we can see in this graph is that going down a category doesn't seem to be socially patterned, there is no difference between those in the poorest or the richest quintiles in who manages to go down a category

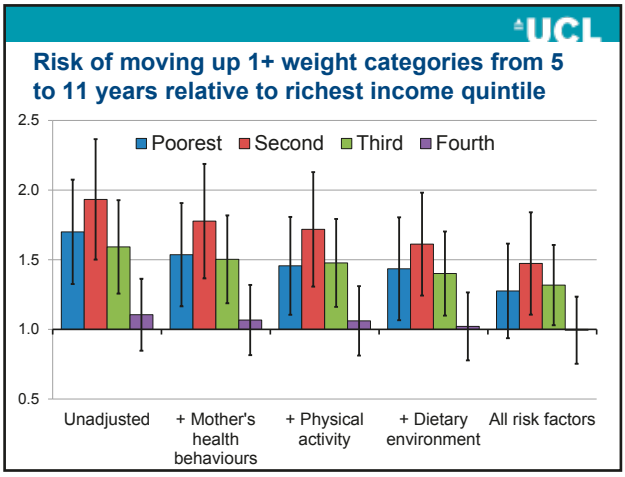


but again exactly the same gradient in putting on weight as we saw for actually being obese.

SLIDE 13

Then we went to look at whether at age five health behaviours could predict who went to put weight and who didn't. This slide is interpreted in just the same way as the previous one that I showed you, the risk of moving up one or more weight categories from five to eleven and the predictors are now the same sorts of variables but at age five.

And here again we see that the physical activity and diet seem to explain a little more of the gradient than the early life behaviours when we're looking at putting on weight, but when you take all the risk factors together they largely explain the difference, certainly comparing the poorest group with the richest group. And it's pretty much all the same behaviours as I spelled out before that are doing the reduction in the risk. So for the mothers' health behaviours all of them have an influence on weight gain. For physical activity here it's computer use and

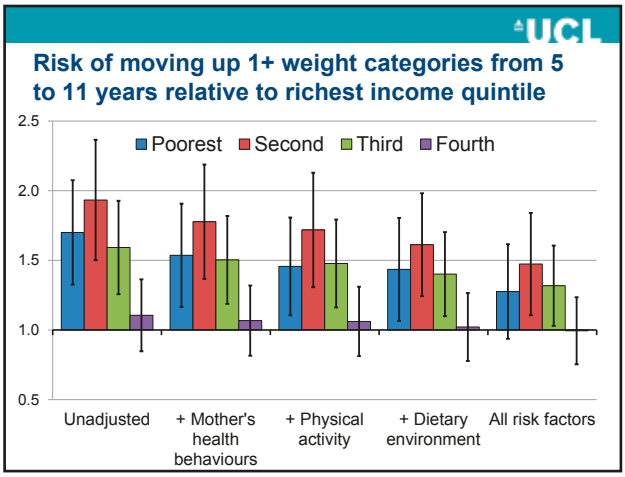


bedtimes that are predicting putting on weight but not the other variables so that's a bit of contrast to earlier, so using a computer a lot at age five maybe is not so normative as it is at age eleven. And finally for the dietary environment again fruit intake, regular breakfast and mothers' BMI predict putting on weight but again sugary drinks didn't predict putting on weight between age five and eleven.

SLIDE 14

To sum up the risk of child obesity and weight gain is socially patterned with a gradient across income quintiles but not child overweight specifically. And there are a range of factors that link family income to child obesity. The concurrently measured variables of physical activity and dietary patterns were most important in that final model where we adjusted for behaviours but you can see that the pathways come from early on in life as well. The pathways run from health behaviours in early life through to the adolescent health behaviours. Those influences in early life accumulate to effect weight gain.

The implications for policy that we could draw out are to say that results suggest a horizontal



prevention strategy tackling multiple risk factors, and that there is no one risk factor that will do it ,if you're trying to prevent obesity. Our evidence - which may not be replicated - doesn't support a policy focus just on sugary drinks.

SLIDE 15