

Breast is best? Can breast feeding really increase one's life chances?

Amanda Sacker, UCL Lunch Hour Lecture

October 2013

Abstract We all want to give our children a good start in life. Breastfeeding an infant is one of the many ways to do that. This talk will examine the latest evidence on the long-term benefits of breastfeeding and whether being breastfed can boost your chances of climbing up the social ladder.

Speaker Amanda Sacker is a Professor of Lifecourse Studies at UCL and Director of ICLS. Her research interests include the development of social inequalities in health over the lifecourse and longitudinal methodology to study such phenomena.

Breast is best? Can breast feeding really increase one's life chances?

Amanda Sacker

SLIDE 1

*I am very pleased to come here *today and to present some of our findings to you. In our centre we focus on the inter-relationship of sociological and biological factors affecting each other over people's lifespan. And this particular study, looking at the influence of breast feeding, exemplifies some of the challenges that we face when doing this sort of research.*

**UCL Lunch time Lecture Oct. 13. You Tube: www.youtube.com/watch?v=Mf1eFJzxUwo*

UCL

Breast is best?

Professor Amanda Sacker
ESRC International Centre for Lifecourse Studies in Society and Health
Research Department of Epidemiology and Public Health

SLIDE 2

So the sub-title of my talk is Can Breast Feeding Really Increase One's Life Chances? And here we're talking about one's chances in being socially mobile. So does breastfeeding increase your chance of being in a higher social class than your parents, or prevent you from being in a lower social class than your parents. And why might this be of interest. Well first of all, I just thought I'd say for the men in the audience, I'm sorry but there's no research evidence to show that breastfeeding beyond infancy has any particular benefits to your health or your social standing. And I should also reassure the women in the audience, especially the academics here, that you're not likely to become a middle class member of the Women's Institute either if you've been breastfed. And neither are your

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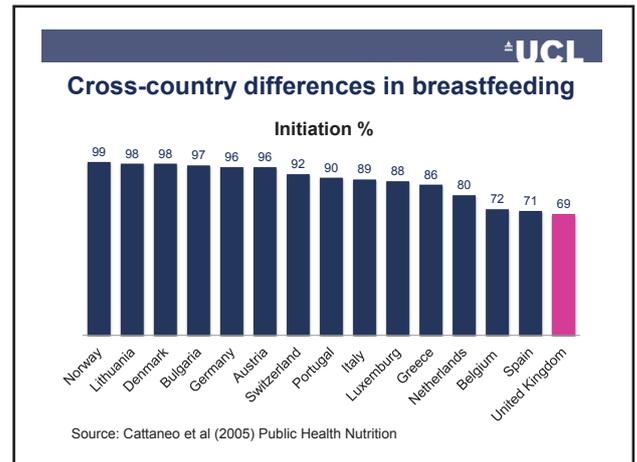
Can breastfeeding really increase one's life chances?

The slide features a collage of three images. The top image shows a woman breastfeeding a child. The bottom-left image shows two women sitting at a table, likely in a Women's Institute setting. The bottom-right image shows a woman with large, red hair, identified as Vicky Pollard from the TV show Little Britain.

children likely to become like Vicky Pollard if you were unable or didn't want to breastfeed. You are unlikely to be out of employment, education or training like this character from Little Britain.

SLIDE 3

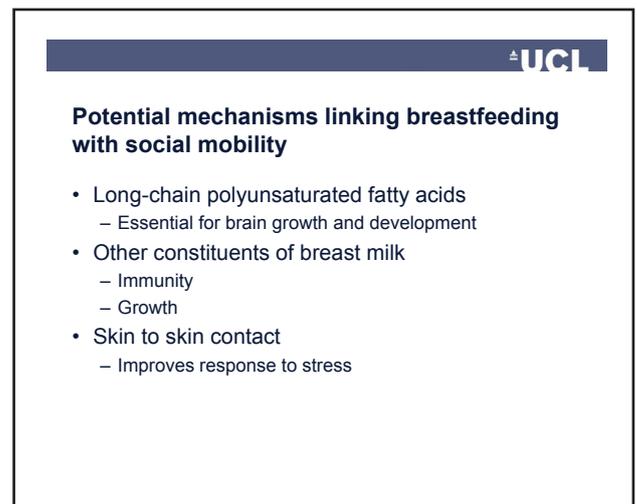
But on a more serious note why is breastfeeding something worthy of research. This slide shows the initiation rates in breastfeeding across Europe, and you can clearly see that we are bottom of the pile when it comes to breastfeeding. Compared with countries like Norway where there's almost universal breastfeeding uptake and breastfeeding is maintained throughout infancy until at least six months of the child's life, here in Britain we had only a 69% uptake in starting to breastfeed and the majority of those will have given up breastfeeding within the first week or two. So these are quite stark differences – are they going to have an effect on public health and the



economy of the country if we don't manage to change people's habits? And that is the subtext of this talk today.

SLIDE 4

The first thing I normally get asked when talking about or presenting work on breastfeeding is why should there be a link between social mobility and breastfeeding? What on earth can the mechanisms be? And there's several that have been hypothesised in the literature. The most commonly cited mechanism is the fact that breastfeed contains long chain polyunsaturated fatty acids; these are components that are essential for cell growth and brain development. And it's thought that these components of breast milk could be implicated in increasing children's brain development, hence they do better at school potentially and then they could be more likely to be socially mobile. Unfortunately the research evidence also shows that when these fatty acids are added to formula milk there doesn't seem to be particular difference in the children's development. But we're still unsure about that. There are also other constituents of breast milk that might make children's development more beneficial and then have ongoing effect in later life, for example immune factors in breast milk protect children against infections, and work has shown that children who are breastfed are less



likely to be hospitalised for infections such as diarrhoeal infections or respiratory infections. And you could link that with other research that hospitalisation of infants and children does set back their development. So if they're not becoming ill so often, again they may have more optimal development. There are several growth factors that are part of breast milk and again these support the development of the brain and just general physiological development throughout childhood. And finally there's a mechanism which has been suggested in that the skin contact that you get when breastfeeding between the mother and the infant improves

SLIDE 4 *continued*

the infant's response to stress and it sets their response mechanism. So not only does it placate them during childhood but it can mean that when they grow up into adulthood they're just better able to deal with the stresses

of life and it may also mean that they're more likely to be able to fulfil their potential and become upwardly mobile. So several different mechanisms that give a plausible link between breastfeeding and social mobility.

SLIDE 5

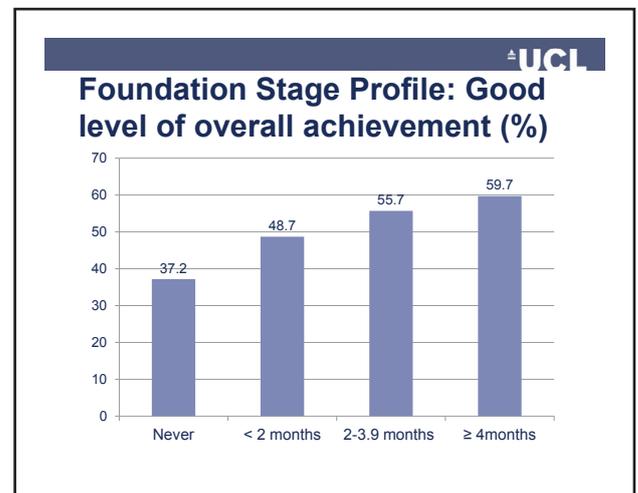
And just to show you the result of some of those routes I'll start with infancy at nine months of age, and this slide shows some delay in the developmental milestones that you would normally expect 9 month old children to be able to achieve. So gross motor milestones are things like being able to sit, to crawl or shuffle along the floor, to stand up holding on to something, those are the sorts of things you'd expect most nine month olds to be able to do. Then fine motor development is things like being able to pick up a pea to eat it, or to clap hands, those sorts of activities. And compared with the breastfed children the non-breastfed children

Breastfeeding pattern	Gross motor delay (%)	Fine motor delay (%)
Not breastfed	10.7	7.4
Breastfed	8.0	5.5

were more likely to be delayed in achieving these milestones, both with the gross motor functions and the fine motor functions.

SLIDE 6

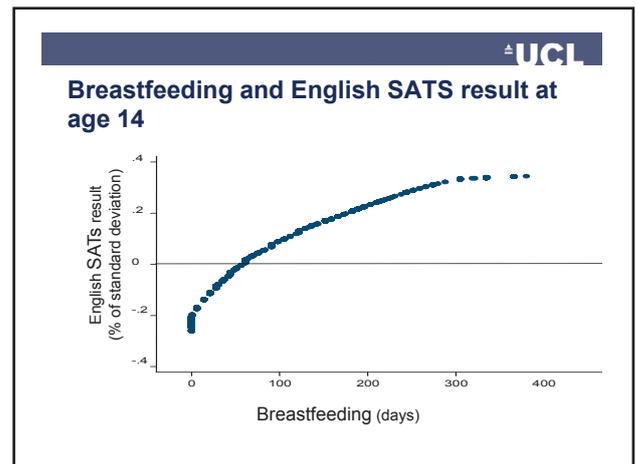
Then if we go on to look at the start of the school year - in this slide we're looking at the foundation stage profile which teachers complete on children as they enter school. This profile assesses children on seven different domains of development, aspects such as language communication skills, numeracy, literacy, understanding of the world, and social and emotional adjustment. And there is a standard scoring mechanism that the government has set out for deciding whether children have reached a good level of overall achievement in all these domains. And this slide shows a clear gradient from those who were never breastfed, about 37% achieved a good level of achievement, rising up to almost 60% of



children who were breastfed for four months or more reaching a good level of achievement. Here again it does seem to be that cognitive ability could be affected by breastfeeding.

SLIDE 7

Going on, one stage later in life, looking at the senior school years, in this slide we're looking at the English SATS results which is part of the Key Stage II assessments that are part of the national curriculum. And here we have breastfeeding in days across the X axis and the English results up the Y axis, and again the longer children are breastfed for, they're better at their English SATS results. And over to the right you can see an indication of what I was talking about when I said that there wasn't much evidence that breastfeeding for very extended periods of time carries on being beneficial for children.



SLIDE 8

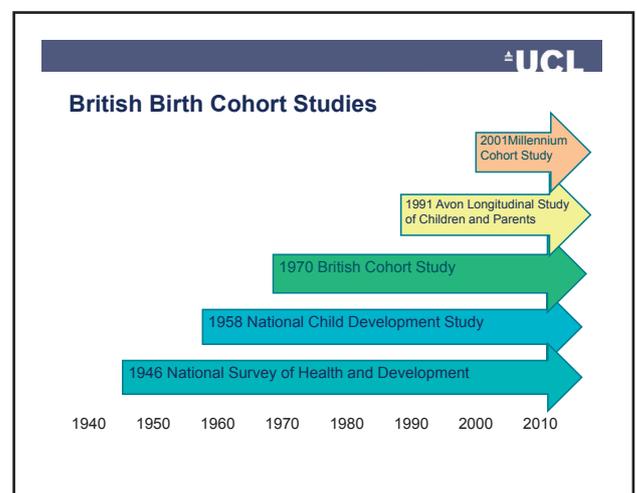
So to go back to my research question which is, is there a causal relationship between breastfeeding and social mobility, we come to the first of the issues that we faced when doing this sort of research. Because how can we determine causality? The gold standard in this area is to carry out a randomised control trial but it would be unethical to carry out a randomised control trial where you assign children to either be breastfed or not, and neither could we wait thirty or forty years to see what their social destinations are. So on practical and ethical grounds it's not an option open to us to do a randomised control trial. So

The slide features the UCL logo in the top right corner. Below it, the text "Research question" is centered. Underneath, a single bullet point asks: "Is there a causal relationship between breastfeeding and social mobility?"

how else can we study the relationship between breastfeeding and people's social destination many years later?

SLIDE 9

Fortunately in the UK we have a multitude of birth cohort studies. These are survey studies which start at birth or sometime around the child's birth and follow children up through their lives. So initially going back to their parents and teachers and asking about all sorts of aspects of their development, and then once the cohort members are old enough themselves to participate they also complete questionnaires and do assessments. And we have the longest study starting in 1946 and carrying on till today.



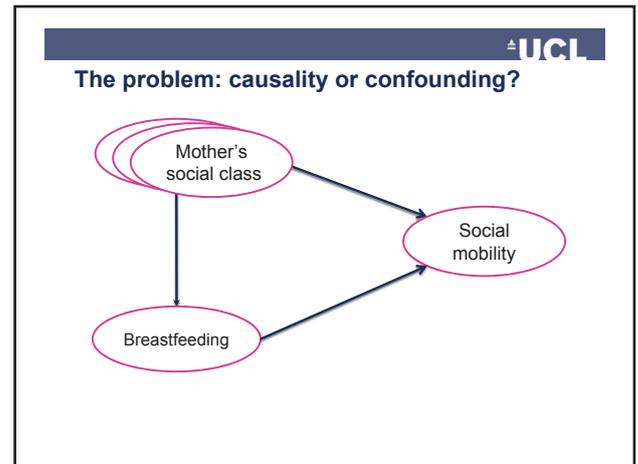
SLIDE 9 *continued*

And then at regular intervals new studies have come on board. So in 1958 and then in 1970 two more studies were funded by the ESRC, these followed roughly 17,000 children each, following children who were born in one week in those respective years. And the most recent study, the Millennium Cohort Study, is the one from which in some of the slides I showed you before,

the data came from that study. There's a new study planned for the end of next year, the Life Study which is going to be the largest and most comprehensive study adding in a much more rigorous biological and medical component to it as well as the social and economic side of the children's lives.

SLIDE 10

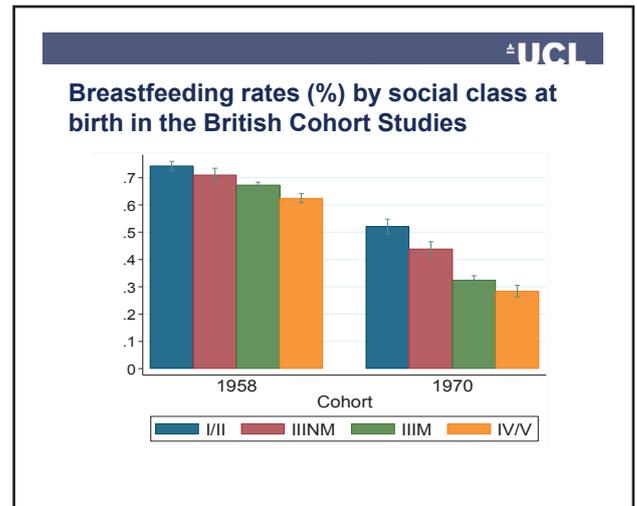
So as I said here we have data collected at birth and then we have data on them as they've gone into adulthood, and we're going to use that to examine the relationship between breastfeeding and social mobility. But here we come to the problem. We're interested in the causal effect between breastfeeding and social mobility. We want to know that direct relationship. And there's always an issue when you're using observational data, or survey data as it's called, that you can't be sure about this relationship when we have a lot of other aspects of people's lives that might be influencing both their decisions to breastfeed and also how the child is going to develop into adulthood. So for example a mother's education influences whether she decides to breastfeed and mother's education is clearly related to the children's social destinations as well. And when we have another variable like this that is related both to our exposure, breastfeeding, and our outcome, social mobility, and so we can't be sure about the relationship between breastfeeding and social mobility, we call this an issue of confounding. And it's not just mother's education, there can be a plethora of other



factors, housing conditions, social class and so on and many, many more that can cause an artefactual relationship between breastfeeding and social mobility so it's not necessarily causal. So how do we get over that problem. Well, in this study we use two different ways of trying to overcome the problem. First of all we use the fact that we have these multiple birth cohort studies to see if we could get exactly the same effect in two different studies, so we're looking to replicate our findings using two different studies. And secondly we use a statistical method to try and mimic that randomised control trial I was talking about. And I'll go into details about that in a minute.

SLIDE 11

So first of all I want to go back to that issue of being able to look at two different studies and how that can be helpful. Well, these are the breastfeeding rates and social class at birth in the two British cohort studies I'm using for the rest of this talk, the 1958 Birth Cohort and the 1970 Birth Cohort. And on the left hand side we have the most advantaged social groups, those in managerial and professional occupations and on the right hand side in these mustard coloured bars the non-skilled occupations. And you can see two things in this slide. First of all that in 1958 breastfeeding rates were much higher than in 1970. In fact 1970 was a real low as far as breastfeeding rates were concerned, and rates now as I showed on the earlier slide are back to where they were for the 1958 cohort. And the other thing to notice is that the differences across social groups aren't so great for the earlier born cohort, the 1958 cohort, as for the 1970 cohort. So here we have only small



differences between groups for one cohort and quite large differences between social groups for the other cohort. So despite these differences we're looking to see whether the effect of breastfeeding on children's outcomes is the same or not. If it's the same despite this different patterning we might feel more confident in being able to infer causality.

SLIDE 12

And then if we look at intergenerational social mobility in the two cohorts - this is a rather busy slide, don't worry too much about it. So we're looking at father's social class when the children were ten or eleven years, and then at social class when the children had grown up and were now in their thirties. So when children were ten or eleven in these cohorts fathers were around the same age, in their thirties as well, on average. And there's three things to notice again about the differences between the 1958 and the 1970 cohort: First of all, for both cohorts there is quite a lot of downward social mobility. People don't normally think about social mobility as people moving down and being in a lower social position than their fathers. They normally think about the fact that, you know, manufacturing has come to a halt in this country and that most people are upwardly socially mobile to white collar occupations. But

Origin	Destination			Origin	Destination		
	Up	Same	Down		Up	Same	Down
Prof & Manag	n/a	0.55	0.45	Prof & Manag	n/a	0.60	0.40
Skilled NonMan	0.41	0.26	0.32	Skilled NonMan	0.48	0.23	0.29
Skilled Man	0.52	0.23	0.24	Skilled Man	0.57	0.24	0.19
Unskilled Man	0.67	0.33	n/a	Unskilled Man	0.75	0.25	n/a

Origin : father's class at 10/11 years; destination: own class at 33/34 years

here you can see there's actually quite a lot of downward social mobility as well. And again we're going to exploit this difference and look at both upward and downward social mobility because if we can see that breastfeeding has similar influences on both upward and downward social mobility again it's consistent with the causal interpretation. And in these two cohorts we have different patterns again about

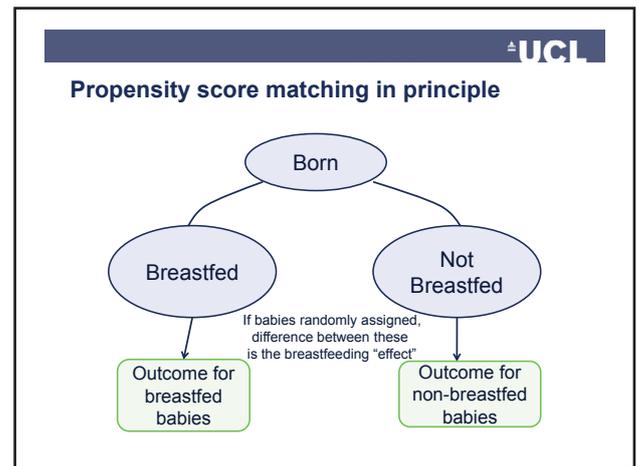
SLIDE 12 *continued*

social mobility. So the total amount, what is called churning, of people changing, is about the same in both cohorts. But the patterns are different. So for the 1958 cohort people are more likely to be downwardly mobile than in the 1970 cohort but at the same time they're less

likely to be upwardly socially mobile in the 1958 cohort. So different patterns of social mobility. Which again helps us with making a causal interpretation if we can see the same findings despite these different patterns.

SLIDE 13

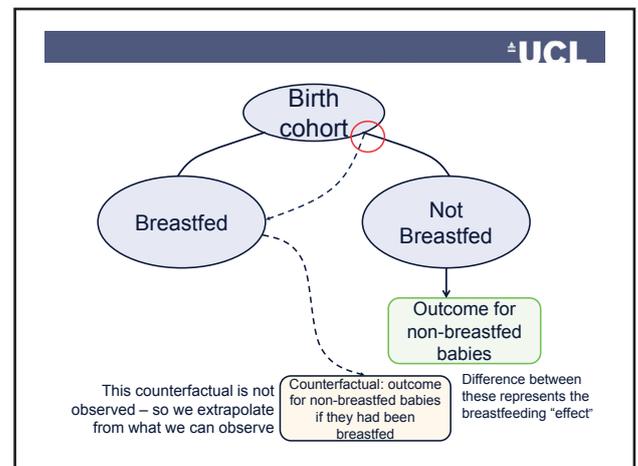
So I mentioned that the other way that we were trying to be rigorous in our analysis was to use a statistical method which tries to mimic the method of a randomised control trial. And this is called propensity score matching. So in principle what happens, well, in a randomised control trial you have a child who is born and it is allocated to be in either a breastfed or a non-breastfed group, and then we can measure the outcome for the breastfed babies and the outcome for non-breastfed babies. And because they're randomly assigned to these two groups we can then say that the difference between



these two groups is the breastfeeding effect, the true causal effect.

SLIDE 14

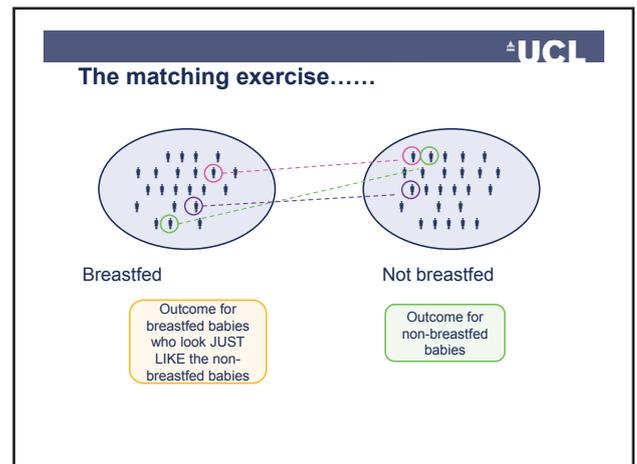
Now we can't do that. We have a birth cohort instead. And the birth cohort children are either not-breastfed or breastfed according to their mother's choice or, you know, some other factors. And we can see the results for the non-breastfed child, we can see the outcome for the non-breastfed babies, and we can measure that. But what we really want to be able to ask the question about is "if there is a policy intervention and we could move some of those non-breastfed babies over to the breastfed group, so the policy intervention had some effect on changing the likelihood that children were breastfed, then what would be the outcome then for those babies, those babies that have been enabled to be moved by the intervention". And this is called the counterfactual, it's the outcome for non-breastfed babies if they had been breastfed. And then we can say that the causal effect for breastfeeding is the difference



between the observed outcome for the non-breastfed babies and this counterfactual. Of course we can't observe the counterfactual, it's just a hypothetical case of what would happen if we could shift some of those non-breastfed babies to the breastfed group. So we have to extrapolate from what we can observe to make those causal inferences. And that's what propensity score matching is actually all about.

SLIDE 15

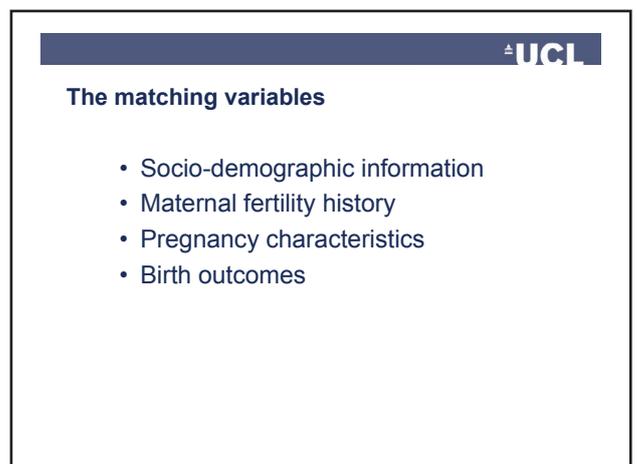
Now here we have some children in the non-breastfed group and another group in the breastfed group. Now for each child in the non-breastfed group we matched them with a child in the breastfed group. So that their characteristics, their conditions in which they're growing up and in which they were born match each other perfectly. And then take another child and do the same process, matching with another child who's like them. And so on, keeping going, and repeating all the way through with the whole group from the non-breastfed group. And if there's any children in the group who weren't breastfed and whom we can't find a match for in the breastfed group so for some reason their circumstances of their birth or whatever is so extreme that we cannot find a child to match with, then those children don't participate in the analysis. We discard their information and just concentrate on the children that we can match



up together. So then what do we have? We have the outcomes as before for the non-breastfed babies which we were able to measure and now we have the outcome for breastfed babies who look just like those non-breastfed babies. And by doing this matching, if we still see an effect, again we can be more confident about the effect size that we measure

SLIDE 16

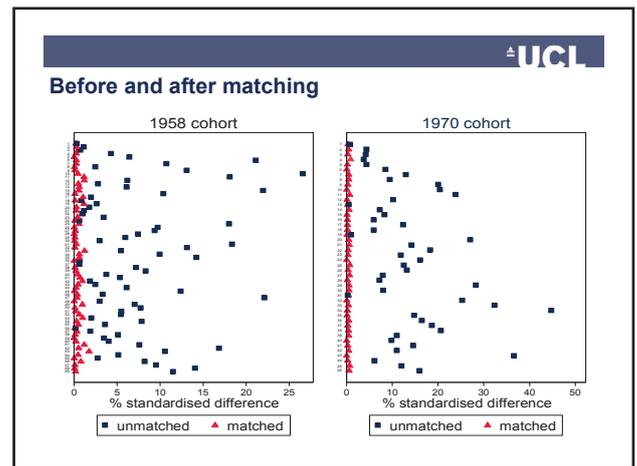
So how do we match the children together. We used all the relevant information we had. This is where these cohort studies come into their own because they have so much information on children, on their births, on their social circumstances. So we're able to match the children on demographic information about their parents, so their parents ages, their education, their social position, their housing circumstances, whether there's any overcrowding and so on. We're able to look at the mother's fertility history because that might affect her propensity to breastfeed, so how many other children she's got, whether she'd had any problems with previous births, and other factors like that. We looked at the pregnancy and how well that's gone for the mother, whether she was ill at all, whether she smoked during pregnancy, whether she was working during the pregnancy, those sorts of things. And then we look at the



birth outcomes for the child itself, whether it was born full term or not, whether it was low birth weight, whether there were any problems with the birth itself, whether it was a natural birth or by Caesarean or whatever, whether the child had to be in a special care unit at all. So we matched all these variables between the two groups of breastfed and non-breastfed children until we found matches for all the children.

SLIDE 17

And in this next slide you can see the effect of this matching. So the black squares show differences between the breastfed and the non-breastfed group before the matching process, and the further to the right, the greater the differences between the groups. And you can see that there are a lot of differences on all the variables that we've used. And then the red triangles show the differences after the matching process. And they're all virtually at zero, statistically there's no difference at all between the two groups after the matching process. So it shows that it's been successful, we have managed to match the children



successfully. And then we carry on and we look at the two matched groups and see the outcome.

SLIDE 18

So now we come to the punch line of "is there a relationship between breastfeeding and social mobility?". So this slide shows the effects expressed in odds ratios. That shows the ratio of the odds if you were breastfed compared to the odds if you weren't breastfed. And if this ratio is greater than one, that means that children who were breastfed are more likely to have this outcome. If the ratio is less than one it means that they're less likely to have the outcome. And then we have something called the 95% confidence interval and that gives a range of values that we think with 95% confidence a true estimate would lie in. And so we've got an estimate from our sample of 17,000 babies in each cohort. That's a good size sample but it doesn't represent all babies. So the confidence interval gives you a range within which we expect the true value to lie. And if the value one isn't encompassed by this range we can say that this isn't just a random finding but that there are differences between the two groups. So first of all looking at upward social mobility, so this is where the children are in a higher social class than their fathers were, then the odds ratios are greater than one for both the 1958

Is there a link between breastfeeding and social mobility?

	1958 cohort		1970 cohort	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Up	1.24***	1.12 – 1.38	1.24**	1.12 – 1.37
Down	0.81***	0.73 – 0.90	0.79***	0.71 – 0.88

and 1970 cohort. And not only that but they're actually equal in magnitude. So the effects are exactly the same in these two different cohorts with different patterns of social mobility and different patterns of breastfeeding. And then looking at downward social mobility again for the breastfed babies the odds ratio is less than one, they're less likely to be downwardly socially mobile. And again the magnitude of the effect is the same across the two cohorts and not only that but if you compare the upward and the downward rates they're equal and opposite in magnitude as well. So again all consistent with a causal interpretation.

SLIDE 19

Now these odds ratios are actually quite difficult for people to interpret and to tell quite how big these differences are. So what we can do is convert them to probabilities instead, which I think people have a greater feel for, intuitively.



How big are these differences?

- Difficult to tell with odds ratios
- Convert to probabilities instead

SLIDE 20

And once we convert these odds ratios to probabilities which in fact is a safer thing to do when you have something that is very common like the movement up and down social groups, then we find that the effects are quite small but they're still there and real. So in general the chances of being upwardly socially mobile are around 50% and there's two or three percentage points difference between those who are not breastfed and those who are breastfed. For downward social mobility, it is around a 25-30% chance of being downwardly socially mobile, and a 1-2 percentage point difference. So these differences are very small but that's what you would expect when you think about it. We're looking at just one influence on adult outcomes starting thirty years before the measurement of people's social destinations. There are so many other things going on in people's lives that it's



Effects expressed in probabilities

	1958 cohort		1970 cohort	
	Up	Down	Up	Down
Not breastfed	0.50	0.32	0.56	0.26
Breastfed	0.53	0.29	0.58	0.25

a miracle in a way that one ever finds an effect in studies like this because so many influences are affecting children's lives and affecting their social destinations in adulthood. But here we find a very small but nevertheless very consistent finding of a couple of percentage points difference in outcomes for children.

SLIDE 21

So do I think breast is best? Well, I do think that the evidence points to the fact that children who are breastfed are actually more upwardly socially mobile. I don't think they necessarily get a springboard right up the social hierarchy but it has a small influence. And the research also shows, and this is something that hasn't been shown in most studies – most people look at the beneficial effects of breastfeeding, not the other way round – the results also show that they're less likely to be "chucked on the dole" if they're breastfed as well.



SLIDE 22

*Thank you for your attention.
This research has been funded by the Economic and Social Research Council (ESRC)
The lecture can also be viewed on the UCL
You Tube Channel www.youtube.com/watch?v=Mf1eFJzxUwo*

