Poverty and Social Exclusion in the UK

PSE-UK 2012 Survey
Producing an 'objective' poverty line in eight easy steps

David Gordon

March, 2017

Poverty and Social Exclusion in the UK
Overview

The Poverty and Social Exclusion in the UK Project is funded by the Economic, Science and Research Council (ESRC). The Project is a collaboration between the University of Bristol, University of Glasgow, Heriot Watt University, Open University, Queen's University (Belfast), University of York, the National Centre for Social Research and the Northern Ireland Statistics and Research Agency. The project commenced in April 2010 and will run for three-and-a-half years.

The primary purpose is to advance the 'state of the art' of the theory and practice of poverty and social exclusion measurement. In order to improve current measurement methodologies, the research will develop and repeat the 1999 Poverty and Social Exclusion Survey. This research will produce information of immediate and direct interest to policy makers, academics and the general public. It will provide a rigorous and detailed independent assessment on progress towards the UK Government's target of eradicating child poverty.

Objectives
This research has three main objectives:

- To improve the measurement of poverty, deprivation, social exclusion and standard of living
- To assess changes in poverty and social exclusion in the UK
- To conduct policy-relevant analyses of poverty and social exclusion

For more information and other papers in this series, visit www.poverty.ac.uk

Producing an 'objective' poverty line in eight easy steps: PSE 2012 Survey - Adults and Children

Introduction

This 'Steps' document was originally produced as an internal project team working document for the 1999 Poverty and Social Exclusion project to explain (step by step) how the optimum low income and multiple deprivation poverty measure was constructed. This update for the 2012 Poverty and Social Exclusion in the UK project follows the same pattern as the original but incorporates additional analyses which are now feasible due to the advances in the speed/power of computers over the past 20 years. As this is an internal working document it explains what we did but does not go into detail about why we did it i.e. it assumes that the reader is already familiar with the technicalities of quantitative analytical methods[1]

Step 1 – Creating a 'politically' valid deprivation index

Select the deprivation indicators that 50% of the population agree are *'necessities of life that everybody should be able to afford'* – 25 adult and household items and 24 children's items in the PSE UK Omnibus Survey 2012.

UK Omnibus Survey 2012: Adult and Household Deprivation Items

	Deprivation	Necessary	Not Necessary	DK
1	Heating to keep home adequately warm	96%	4%	-
2	Damp-free home	94%	6%	-
3	Two meals a day	91%	9%	-
4	Visiting friends or family in hospital or other institutions	89%	10%	-
5	Replace or repair broken electrical goods such as refrigerator or washing machine	86%	14%	-
6	Fresh fruit and vegetables every day	83%	17%	-
7	Washing machine	82%	18%	-
8	All recommended dental work/treatment	81%	18%	1%
9	Celebrations on special occasions such as Christmas	80%	20%	-
10	A warm waterproof coat	79%	21%	1%
11	Attending weddings, funerals and other such occasions	78%	21%	1%
12	Telephone at home (landline or mobile)	76%	23%	-
13	Meat, fish or vegetarian equivalent every other day	76%	24%	1%
14	Curtains or window blinds	71%	29%	1%
15	A hobby or leisure activity	70%	30%	1%
16	Enough money to keep your home in a decent state of decoration	69%	31%	-
17	Household contents insurance	69%	30%	1%
18	Appropriate clothes to wear for job interviews	68%	31%	1%
19	A table, with chairs, at which all the family can eat	63%	36%	1%
20	To be able to pay an unexpected expense of £500	55%	44%	1%
21	Taking part in sport/exercise activities or classes	55%	44%	1%
22	Two pairs of all-weather shoes	53%	46%	1%
23	Regular savings (of at least £20 a month) for rainy days	52%	47%	1%
24	Television	51%	49%	-

---

[1] Some additional discussion can be found in the *Note on PSE 2012 Poverty & Deprivation Variables* document

25	Regular payments into an occupational or private pension	**50%**	48%	3%
26	Replace worn out clothes with new (not second hand) ones	46%	54%	-
27	Presents for friends or family once a year	46%	53%	1%
28	Friends or family round for a meal or drink at least once a month	45%	54%	1%
29	Car	44%	56%	1%
30	A small amount of money to spend each week on yourself, not on your family	42%	58%	1%
31	A holiday away from home for one week a year, not staying with relatives	42%	57%	1%
32	Mobile phone	40%	60%	1%
33	Home computer	40%	60%	1%
34	Internet connection at home	40%	59%	1%
35	Replace any worn out furniture	39%	60%	1%
36	An outfit to wear for social or family occasions such as parties and weddings	37%	62%	1%
37	A roast joint (or vegetarian equivalent) once a week	36%	63%	2%
38	Hair done or cut regularly	35%	64%	1%
39	Going out socially once a fortnight	34%	65%	1%
40	Attending church, mosque, synagogue or other places of worship	29%	68%	3%
41	Visits to friends or family in other parts of the country 4 times a year	27%	72%	1%
42	A meal out once a month	24%	75%	1%
43	Holidays abroad once a year	18%	81%	1%
44	Going out for a drink once a fortnight	17%	82%	1%
45	Going to the cinema, theatre or music event once a month	15%	84%	1%
46	Dishwasher	10%	88%	2%

Twenty-one items did not pass the 50% population support threshold test:
- Replace worn out clothes with new (not second hand) ones
- Presents for friends or family once a year
- Friends or family round for a meal or drink at least once a month
- Car
- A small amount of money to spend each week on yourself, not on your family
- A holiday away from home for one week a year, not staying with relatives
- Mobile phone
- Home computer
- Internet connection at home
- Replace any worn out furniture
- An outfit to wear for social or family occasions such as parties and weddings
- A roast joint (or vegetarian equivalent) once a week
- Hair done or cut regularly
- Going out socially once a fortnight
- Attending church, mosque, synagogue or other places of worship
- Visits to friends or family in other parts of the country 4 times a year
- A meal out once a month
- Holidays abroad once a year
- Going out for a drink once a fortnight
- Going to the cinema, theatre or music event once a month

Steps to producing an 'objective' poverty line

- Dishwasher

### UK Omnibus Survey 2012: Children's Deprivation Items

	Deprivation	Necessity %	CI (2012)
1	A warm winter coat (coat)	**97**	96-98
2	Fresh fruit or vegetables at least once a day (veg)	**96**	95-97
3	Three meals a day (3 meals)	**93**	91-94
4	New, properly fitting, shoes (shoes)	**93**	91-95
5	A garden or outdoor space nearby where they can play safely (garden)	**92**	91-94
6	Books at home suitable for their ages (books)	**91**	90-93
7	Celebrations on special occasions (celebrations)	**91**	89-92
8	Meat, fish or vegetarian equivalent at least once a day (meat)	**90**	88-91
9	A suitable place to study or do homework (study)	**89**	87-91
10	A hobby or leisure activity (hobby)	**88**	87-90
11	Toddler group or nursery or play group at least once a week for pre-school aged children (nursery)	**86**	84-88
12	Indoor games suitable for their ages (games)	**81**	79-83
13	Enough bedrooms for every child of 10 or over of a different sex to have their own bedroom (bedroom)	**74**	72-77
14	Children's clubs or activities such as drama or football training (clubs)	**74**	71-76
15	Computer and internet for homework (computer)	**66**	64-69
16	Some new, not second hand, clothes (clothes)	**65**	63-68
17	Day trips with family once a month (family trip)	**60**	57-63
18	Outdoor leisure equipment (leisure)	**58**	55-61
19	At least four pairs of trousers, leggings, jeans or jogging bottoms (trousers)	**57**	54-60
20	Money to save (save)	**55**	52-58
21	Going on a school trip at least once a term (school trip)	**55**	52-57
22	Pocket money (money)	**54**	51-57
23	Construction toys (toys)	**53**	50-56
24	A holiday away from home for at least one week a year (holiday)	**53**	50-56
25	Friends round for tea or a snack once a fortnight (snack)	49	47-52
26	A bicycle (bike)	45	43-48
27	Clothes to fit in with friends (style)	31	29-34
28	A mobile phone for children aged 11 or over (mobile)	27	25-29
29	An MP3 player (mp3)	8	7-10
30	Designer/brand name trainers (pumps)	6	5-8

Six items did not pass the 50% population support threshold test:
- Friends round for tea or a snack once a fortnight (snack)
- A bicycle (bike)
- Clothes to fit in with friends (style)
- A mobile phone for children aged 11 or over (mobile)
- An MP3 player (mp3)
- Designer/brand name trainers (pumps)

There appears to be a fairly random relationship between the percent of people who think that an item is a necessity of life and the percent of people who say that they want but cannot afford the item. Deprivation items that less than 25% of the population think are necessities have '*want but cannot afford*' rates that are slightly higher (over 10%) but, in general, the concepts of 'necessity' and 'affordability' seem relatively uncorrelated at the population level.

PSE 2012 Adult & Household Deprivations:
Percent Considering Item a Necessity by Percent Can't Afford

Can't Afford

Necessity
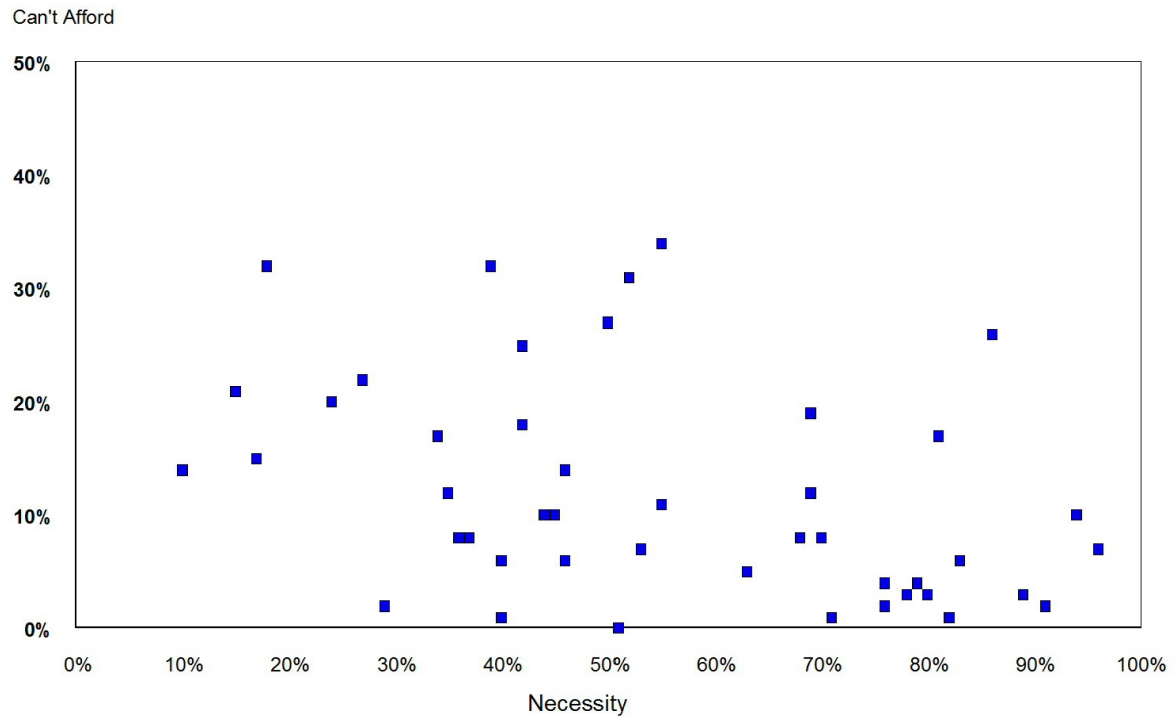
Step 2 – Creating a preference free deprivation index

Only select (where available) items for the deprivation index that people '*don't have because they can't afford*' them.

PSE 2012 Respondents who don't have/do <mark>want</mark> and can't afford an item
Adult and Household - necessities of life are unshaded

Deprivation	Don't have/do want and can't afford
A second home	37%
Private health insurance	35%
Enough money to replace any worn out furniture	32%
Holidays abroad once a year	32%
Regular savings (of at least £20 a month) for rainy days	31%
Regular payments into an occupational or private pension	27%
Enough money to replace or repair broken electrical goods such as refrigerator or washing machine	26%
A holiday away from home for one week a year, not staying with relatives	25%
A second bathroom (with shower or bath)	23%
Home security (burglar alarm) system	22%
Visits to friends or family in other parts of the country 4 times a year	22%
Going to the cinema, theatre or music event once a month	21%
A meal out once a month	20%
A second car or other vehicle (NOT motorcycle)	19%
A spare bedroom	19%
Enough money to keep your home in a decent state of decoration	19%
A small amount of money to spend each week on yourself, not on your family	18%
All recommended dental work/treatment	17%
Going out socially once a fortnight	17%
Going out for a drink once a fortnight	15%
Dishwasher	14%
Replace worn out clothes with new (not second hand) ones	14%
Household contents insurance	12%
Pay TV (eg. Sky, Virgin, etc.)	12%
Hair done or cut regularly	12%
Taking part in sport/exercise activities or classes	11%
Car	10%
Damp-free home	10%
High Definition Plasma or LCD TV	10%
Friends or family round for a meal or drink at least once a month	10%
A roast joint (or vegetarian equivalent) once a week	8%
An outfit to wear for social or family occasions such as parties and weddings	8%
Appropriate clothes to wear for job interviews	8%
A hobby or leisure activity	8%
Two pairs of all-weather shoes	7%
Heating to keep home adequately warm	7%
Home computer	6%

Internet connection at home	6%
Presents for friends or family once a year	6%
Fresh fruit and vegetables every day	6%
A table, with chairs, at which all the family can eat	5%
A warm waterproof coat	4%
Meat, fish or vegetarian equivalent every other day	4%
Celebrations on special occasions such as Christmas	3%
Attending weddings, funerals and other such occasions	3%
Visiting friends or family in hospital or other institutions	3%
Telephone at home (landline or mobile)	2%
Two meals a day	2%
Attending church, mosque, synagogue or other places of worship	2%
Washing machine	1%
Curtains or window blinds	1%
Mobile phone	1%
Television	-%

Note: Less than 2 % of respondents don't have and can't afford a TV, Washing Machine or Curtains/window blinds so these three variables do not add much to the deprivation index.

Parents whose children don't have/do want and can't afford an item

Children's Deprivations (Necessities of Life are Unshaded)	Don't have/do want and can't afford
Money to save	29%
A holiday away from home for at least one week a year	25%
Designer/brand name trainers	19%
Day trips with family once a month	18%
MP3 player such as an iPod	16%
Pocket money	14%
Enough bedrooms for every child of 10 or over of a different sex to have their own bedroom	9%
Clothes to fit in with friends	8%
Children's clubs or activities such as drama or football training	8%
Bicycle	7%
Outdoor leisure equipment such as roller skates, skateboards, footballs	6%
Computer and internet for homework	6%
Mobile phone for children aged 11 or older	6%
A hobby or leisure activity	6%
Friends round for tea or a snack once a fortnight	6%
Going on a school trip at least once a term	6%
A garden or outdoor space nearby where they can play safely	5%
A suitable place at home to study or do homework	5%
New, properly fitting, shoes	4%
Some new, not second-hand clothes	4%
Fresh fruit or vegetables at least once a day	4%
At least 4 pairs of trousers, leggings, jeans or jogging bottoms	4%
Construction toys such as Duplo or Lego	4%
Meat, fish or vegetarian equivalent at least once a day	3%
Toddler group or nursery or play group at least once a week for pre-school aged children	3%
Books at home suitable for their ages	2%

Celebrations on special occasions such as birthdays Christmas or other religious festivals	2%
Three meals a day	1%
A warm winter coat	1%
Indoor games suitable for their ages (building blocks, board games, etc)	1%

Age appropriate child deprivation measures

Children's needs change as they grow older, thus deprivation measures for children need to be age appropriate. The following protocol was used:

1. Age 10-17 for bedrooms for every child of different sex 10 or over, i.e. children under 10 years old cannot be deprived on this measure (by definition).
2. Age 5-17 for place to study, computer & internet for homework, hobby or leisure activity, going on a school trip, savings and pocket money.
3. Age 2-17 for suitable books for age and Children's clubs/activities.
4. Age under 5 for toddler/nursery or playgroup.
5. All other child deprivations are 0-17.

Therefore, young children cannot score as highly on the deprivation index as older children.

Consensual deprivation all item index for adults and children
(50+% public support - 49 items)

	Frequency	Percent	Valid Percent	Cumulative Percent
.00	4314	37.2	40.9	40.9
1.00	1661	14.3	15.7	56.6
2.00	993	8.6	9.4	66.0
3.00	747	6.4	7.1	73.1
4.00	583	5.0	5.5	78.6
5.00	485	4.2	4.6	83.2
6.00	392	3.4	3.7	86.9
7.00	312	2.7	3.0	89.9
8.00	265	2.3	2.5	92.4
9.00	240	2.1	2.3	94.7
10.00	166	1.4	1.6	96.2
11.00	110	1.0	1.0	97.3
12.00	82	.7	.8	98.0
13.00	51	.4	.5	98.5
14.00	60	.5	.6	99.1
15.00	30	.3	.3	99.4
16.00	26	.2	.3	99.6
17.00	19	.2	.2	99.8
18.00	7	.1	.1	99.9

	19.00	6	.1	.1	99.9
	20.00	3	.0	.0	100.0
	21.00	2	.0	.0	100.0
	22.00	1	.0	.0	100.0
	Total	10556	91.1	100.0	
Missing	System	1028	8.9		
Total		**11584**	**100.0**		

Error Bar Plot: Initial average 49 item deprivation index score by five year age band
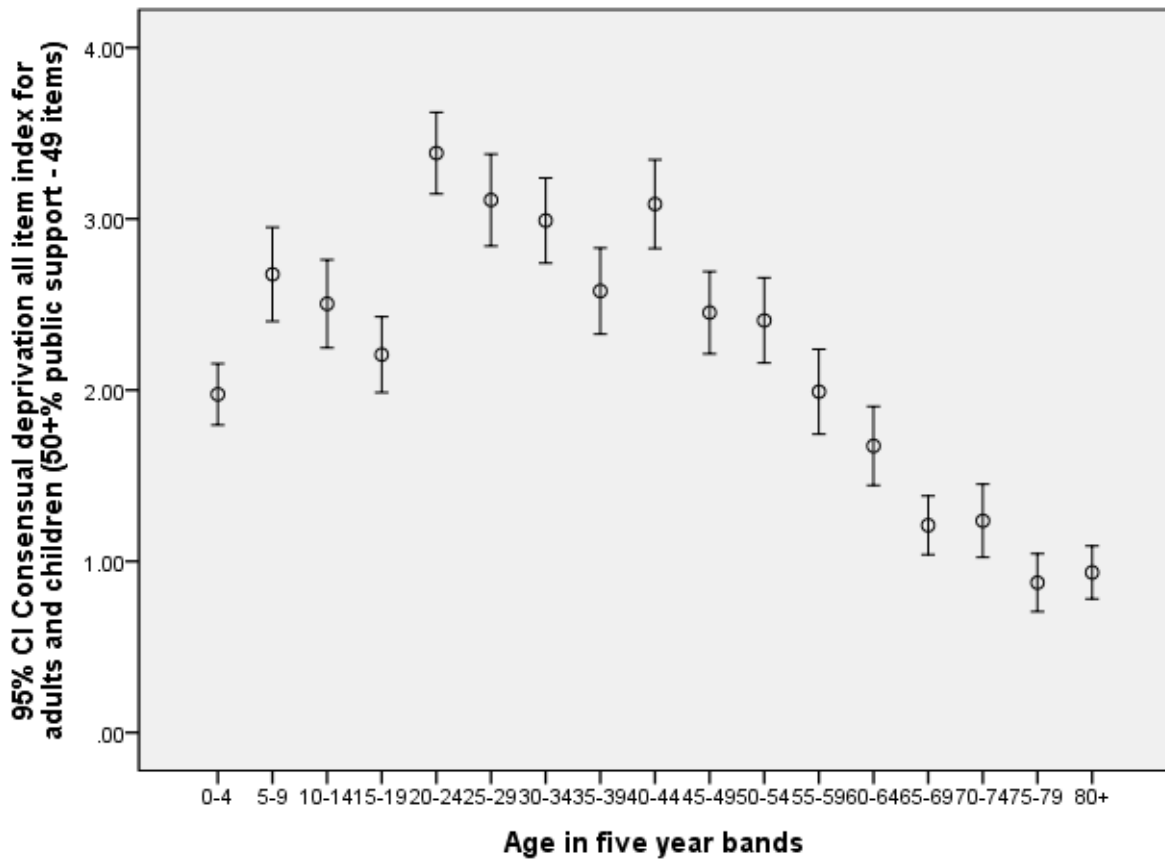
Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

Note: The maximum possible deprivation scores by age group are:

Adults – aged 18+	25
Child – aged 10-17	30
Child – aged 5-10	29
Child – aged 2-4	24
Child – under 2	22

The error bar plot shows that children have lower average deprivation scores than adults in their 20s and early 30s. Deprivation appears to decline with age in adulthood. These results must be interpreted with caution until invalid and unreliable items have been deleted from the deprivation index (see below).

Step 3 – Creating a 'scientifically' valid deprivation index

It is essential that each component in the index is a valid measure of deprivation. The simplest way to achieve this is to ensure that every deprivation item has a high odds ratio (using SPSS Logisitic Regression) with independent indicators known to correlate highly with poverty – specifically:

- Ill Health (health in last 12 months was 'Very Bad' or 'Bad' and Long Term Illness was 'Yes')
- Subjective poverty measures (Genuinely poor now 'all the time', income 'a lot below' the poverty line, Standard of Living rating 'Well Below' or 'Below' average)

Odds Ratios for Can't Afford Necessities by Poor Health Variables
(Items highlighted in bold are not significant at the 5% level)

Item/Activity	General Health	Long Term Illness
Meat, fish or vegetarian equivalent every other day	7.5	3.2
Attending weddings, funerals and other such occasions	7.1	3.9
Fresh fruit and vegetables every day	6.8	3.6
Two pairs of all-weather shoes	6.7	3.1
Presents for friends or family once a year	6.6	2.5
Heating to keep home adequately warm	6.4	3.4
Replace worn out clothes with new (not second hand) ones	5.7	2.9
Two meals a day	5.6	3.1
Curtains or window blinds	5.6	2.4
A table, with chairs, at which all the family can eat	5.3	2.8
A warm waterproof coat	5.3	2.7
Celebrations on special occasions such as Christmas	5.2	4.0
Appropriate clothes to wear for job interviews	5.2	2.7
Washing machine	5.1	3.4
Household contents insurance	5.0	2.5
A roast joint (or vegetarian equivalent) once a week	4.9	2.7
Hair done or cut regularly	4.9	2.5
An outfit to wear for social or family occasions such as parties and weddings	4.8	2.6
Enough money to replace or repair broken electrical goods such as refrigerator or washing machine	4.7	2.3
Home computer	4.5	3.1
Visiting friends or family in hospital or other institutions	4.5	2.4
Internet connection at home	4.4	3.3
A hobby or leisure activity	4.3	2.0
Friends or family round for a meal or drink at least once a month	4.2	2.7
Car	4.2	2.4
A small amount of money to spend each week on yourself, not on your family	4.1	2.0
Telephone at home (landline or mobile)	4.0	3.8
Mobile phone	3.9	2.5
Enough money to replace any worn out furniture	3.9	1.9
Enough money to keep your home in a decent state of decoration	3.8	2.1
A holiday away from home for one week a year, not staying with relatives	3.8	2.1
Visits to friends or family in other parts of the country 4 times a year	3.7	1.8
Attending church, mosque, synagogue or other places of worship	3.6	2.1

Steps to producing an 'objective' poverty line

Regular savings (of at least £20 a month) for rainy days	3.5	1.9
A meal out once a month	3.5	2.0
Dishwasher	3.4	1.9
High Definition Plasma or LCD TV	3.3	2.3
Regular payments into an occupational or private pension	2.9	1.8
Holidays abroad once a year	2.9	1.8
Going out socially once a fortnight	2.8	1.8
Taking part in sport/exercise activities or classes	2.8	2.1
Damp-free home	2.7	2.1
Going to the cinema, theatre or music event once a month	2.7	1.8
Home security (burglar alarm) system	2.6	1.6
A second car or other vehicle (NOT motorcycle)	2.5	1.6
Television	**2.5**	3.5
Pay TV (eg. Sky, Virgin, etc.)	2.5	1.8
Going out for a drink once a fortnight	2.4	1.8
Private health insurance	2.4	1.6
All recommended dental work/treatment	2.3	1.6
A second bathroom (with shower or bath)	1.9	1.6
A spare bedroom	1.8	1.5
A second home	1.6	1.2

Note: due to multiple tests you can expect up to 1 in 20 items to be misclassified, e.g. shown as not significant when in reality they are or *vice versa*

After allowing for age and gender differences, the odds ratio table above shows that respondents who cannot afford but want to have '*Meat, fish or vegetarian equivalent every other day*' are 7.5 times more likely to report that their health over the last 12 months was 'Bad' or 'very Bad'. They were also 3.2 times more likely to have been suffering from a Long Term Illness. In both these cases, the 95% confidence intervals for these odds does not span 1.0 and so can be considered to be 'significant'.

Adult and Household Items Odds Ratios for '*Want But Cannot Afford*' by Perceptions of Poverty Variables
(Items highlighted in bold are not significant at the 5% level)

Item/Activity	Poor all the time	Income a lot below the poverty line	Standard of living is below average
Two meals a day	20.0	12.6	12.5
Enough money to replace any worn out furniture	15.5	10.0	10.3
Meat, fish or vegetarian equivalent every other day	15.0	10.2	13.9
Enough money to replace or repair broken electrical goods such as refrigerator or washing machine	14.7	11.7	11.2
Replace worn out clothes with new (not second hand) ones	14.1	9.6	10.3
A small amount of money to spend each week on yourself, not on your family	13.6	9.8	10.0
Fresh fruit and vegetables every day	12.6	11.3	10.5
Enough money to keep your home in a decent state of decoration	12.6	9.2	11.4
Celebrations on special occasions such as Christmas	12.1	7.4	9.9
Two pairs of all-weather shoes	11.9	7.6	8.7
A holiday away from home for one week a year, not staying with relatives	11.7	9.8	9.6
Regular savings (of at least £20 a month) for rainy days	11.1	9.9	9.3

Heating to keep home adequately warm	11.0	8.8	10.7
A warm waterproof coat	11.0	7.6	6.9
A meal out once a month	10.7	8.2	9.1
An outfit to wear for social or family occasions such as parties and weddings	10.6	9.3	8.7
Presents for friends or family once a year	10.4	8.4	10.7
Telephone at home (landline or mobile)	10.2	9.6	8.0
A roast joint (or vegetarian equivalent) once a week	10.0	8.1	9.1
Appropriate clothes to wear for job interviews	9.4	7.2	7.1
Going to the cinema, theatre or music event once a month	9.2	6.1	7.4
Going out socially once a fortnight	8.6	6.2	7.7
Hair done or cut regularly	8.4	7.0	6.5
Holidays abroad once a year	8.3	7.6	7.2
Washing machine	8.3	9.4	9.7
Curtains or window blinds	8.2	13.4	9.1
Friends or family round for a meal or drink at least once a month	8.1	6.9	8.0
Television	8.0	**1.6**	**2.8**
Going out for a drink once a fortnight	7.7	6.8	7.4
Household contents insurance	7.1	7.6	6.0
A hobby or leisure activity	7.0	5.4	6.4
Car	6.7	6.9	4.9
Regular payments into an occupational or private pension	6.4	5.8	4.8
Attending weddings, funerals and other such occasions	6.1	7.0	5.7
Internet connection at home	6.0	4.7	6.2
Taking part in sport/exercise activities or classes	5.8	5.1	5.7
Visits to friends or family in other parts of the country 4 times a year	5.7	4.7	5.8
A table, with chairs, at which all the family can eat	5.7	6.1	4.5
Visiting friends or family in hospital or other institutions	5.4	3.7	4.0
Pay TV (eg. Sky, Virgin, etc.)	5.2	4.3	4.5
Mobile phone	5.0	5.3	5.2
Dishwasher	4.7	5.2	4.1
All recommended dental work/treatment	4.7	3.9	3.4
High Definition Plasma or LCD TV	4.6	3.9	4.7
Home computer	4.5	2.9	4.8
Private health insurance	4.2	3.7	3.7
Home security (burglar alarm) system	4.1	4.6	3.1
Attending church, mosque, synagogue or other places of worship	3.6	3.0	3.5
A second car or other vehicle (NOT motorcycle)	3.5	3.9	3.1
Damp-free home	3.2	3.3	3.5
A second bathroom (with shower or bath)	2.3	2.7	2.3
A spare bedroom	1.8	2.3	2.3
A second home	1.5	1.6	1.5

Possible invalid indicator summary table
(Scores of 2 or more are likely to denote a lack of validity)

	Number of non-significant validity indicators
Television	**3**

Children's Items Odds Ratios for '*Want But Cannot Afford*' by Perceptions of Poverty Variables

Item/Activity	Poor all the time	Income a lot below poverty line	Below Average Standard of living
Three meals a day (children)	21.0	21.0	-
Books at home suitable for their ages (children)	17.8	76.8	11.0
Some new, not second-hand clothes (children)	10.8	8.0	10.3
A warm winter coat (children)	8.2	14.8	21.1
Fresh fruit or vegetables at least once a day (children)	7.7	8.6	13.2
New, properly fitting shoes (children)	6.8	12.6	9.1
Meat, fish or vegetarian equivalent at least once a day (children)	6.4	9.4	10.4
Celebrations on special occasions, e.g. birthdays, Christmas or other religious festivals (Children)	6.1	10.6	3.5
Day trips with family once a month (Children)	5.9	9.3	5.3
A holiday away from home at least one week a year (Children)	5.9	7.9	5.4
A garden or outfoor space nearby where they can play safely (children)	5.9	9.6	6.3
Friends round for tea or a snack once a fortnight (Children)	5.5	6.2	6.2
Childrens clubs or activities such as drama or football training(Children)	4.8	4.5	3.7
Clothes to fit in with friends	4.8	4.9	5.6
Outdoor leisure equipment, e.g. roller skates, skateboard, football, etc. (children)	4.6	6.0	5.4
Going on a school trip at least once a term (Children)	4.5	4.3	3.5
A hobby or leisure activity (Children)	4.3	7.8	3.8
At least four pairs of trousers, leggings, jeans or jogging bottoms (children)	4.2	4.4	6.1
Bicycle (children)	4.1	7.5	6.8
Money to save (children)	3.5	3.7	3.3
Construction toys such as Duplo/Lego etc (children)	3.4	4.3	3.5
Pocket money (children)	3.3	4.3	4.4
Computer and internet for homework	3.2	4.5	2.9
Toddler group, nursery, or play group at least once a week for pre-school aged children (Children)	2.8	8.8	3.4
A suitable place at home to study or do homework (children)	2.6	3.2	4.7
MP3 music player, e.g. ipod (children)	2.4	3.3	2.9
Designer/brand name trainers (children)	2.3	2.8	2.3
Indoor games suitable for their ages (e.g.building blocks, board games, computer games, etc) (children)	**1.7**	2.8	4.3
Enough bedrooms for every child of 10 or over of a different sex to have their own bedroom (children)	**1.6**	2.3	2.4
Mobile phone for children aged 11+	**0.6**	**1.3**	4.2

Possible invalid indicator summary table (Scores of 1 or more may denote lack of validity)

	Number of non-significant validity indicators
Mobile phone for children aged 11+	**2**
Indoor games suitable for their ages	**1**
Enough bedrooms for every child of 10+	*1*

Note: 'Enough Bedrooms is a valid indicator (i.e. odds=1.8 - significant) for children aged 10-17

Step 4a – Creating a reliable index of deprivation (Classical Test Theory)

Reliability analysis using the 25 Adult and Household deprivation items which 50+% of the population thought were necessities – these analyses are for adults (aged 18+). 'Unreliable' items (e.g. those that do not decrease alpha) are highlighted in bold below. **Cronbach's Alpha= 0.867** Guttman's Lambda 2= 0.886[2]

Deprivation item (adults 18+)	Cronbach's Alpha if Item Deleted
Enough money to replace or repair broken electrical goods such as a fridge or washing machine	.852
Enough money to keep home in a decent state of decoration	.855
Regular savings (of at least £20) for rainy days	.857
Could your household afford to pay an unexpected, but necessary, expense of £500?	.857
Two pairs of all-weather shoes	.860
Home Insurance	.860
Fresh fruit and vegetables everyday	.861
Appropriate clothes for job interviews	.861
A hobby or leisure activity.	.861
Taking part in sport/exercise activities or classes	.861
Heating to keep home adequately warm	.862
All recommended dental work/treatment	.862
Regular payments into an occupational or private pension	.862
Meat, fish or vegetarian equivalent every other day	.863
A warm waterproof coat	.864
Celebrations on special occasions, such as Christmas	.865
Attending weddings, funerals and other such occasions	.865
Table and chairs at which all the family can eat	.865
Two meals a day	.866
Damp-free home	.866
Visiting friends or family in hospital or other institutions	.867
Curtains or window blinds	.867
Telephone	**.868**
Washing machine	**.868**
Television	**.869**

This analysis indicates that **Phone, Washing Machine and TV** may be unreliable indicators of deprivation for adults (aged 18 and over).

Older People (aged 65+)

---

[2]   Chronbach's alpha often provides a conservative estimate of the 'true' reliability of a deprivation index. In some circumstance Guttman's Lambda 2 provides a 'better' estimate. There are also other reliability measures (e.g. Omega, Beta) which provide 'better' estimates and/or additional information but these measures can be time consuming to calculate.

The DWP included new measures of 'pensioner' deprivation in the 2011/12 FRS survey which are similar but not directly comparable with the deprivation indicators for adults younger than 65. The PSE team decided that it was important to be able to directly compare the standard of living of both younger and older adults – so all adults were asked the same set of deprivation questions in the PSE survey. The 22 item adult deprivation index (after excluding *Phone, Washing Machine and TV*) had a high reliability for the older population (aged 65+) - Chronbach's Alpha of 0.791 and a Guttman's Lambda 2 of 0.817. Thus, the deprivation index is highly reliable for adults of all ages (older and younger).

Children's Deprivation Reliability Analysis (Classical Test Theory)

Reliability analysis using 24 Children's deprivation items which 50+% of the population thought were necessities – these analyses are for children (aged under 18). 'Unreliable' items (e.g. those that do not decrease alpha) are highlighted in bold below. **Chronbach's Alpha= 0.827** Guttman's Lamda 2= 0.847

Deprivation Item (Children under 18)	Cronbach's Alpha if Item Deleted
Day trips with family once a month (Children)	.812
Pocket money (children)	.813
Money to save (children)	.813
A holiday away from home at least one week a year (Children)	.816
New, properly fitting shoes (children)	.817
Outdoor leisure equipment, e.g. roller skates, skateboard, football, etc. (children)	.818
At least four pairs of trousers, leggings, jeans or jogging bottoms (children)	.818
Children's clubs or activities such as drama or football training (Children)	.819
A hobby or leisure activity (Children)	.820
Meat, fish or vegetarian equivalent at least once a day (children)	.820
Going on a school trip at least once a term (Children)	.821
Some new, not second-hand clothes (children)	.821
Fresh fruit or vegetables at least once a day (children)	.821
Books at home suitable for their ages (children)	.823
Three meals a day (children)	.823
A warm winter coat (children)	.823
Computer and internet for homework	.824
Celebrations on special occasions, e.g. birthdays, Christmas or other religious festivals (Children)	.824
A suitable place at home to study or do homework (children)	.825
A garden or outdoor space nearby where they can play safely (children)	.825
Indoor games suitable for their ages (e.g. building blocks, board games, computer games, etc) (children)	.826
Construction toys such as Duplo/Lego etc (children)	.826
Enough bedrooms for every child of 10 or over of a different sex to have their own bedroom (children)	.827
Toddler group, nursery, or play group at least once a week for pre-school aged children	**.829**

This analysis indicates that **Toddler group nursery or play group** may be unreliable indicators of deprivation for children (aged under 18). However, this deprivation indicator is

only applicable for children aged under 5 and this may have distorted these results (see table below).

Children Under 5

The table below shows the reliability analysis, using the 17 Children's deprivation items, which are age appropriate for the under 5s and which 50+% of the population thought were necessities. 'Unreliable' items (e.g. those that do not decrease alpha) are highlighted in bold below. **Chronbach's Alpha= 0.735** Guttman's Lambda 2= 0.767

Deprivation Item (Children Under 5)	Cronbach's Alpha if Item Deleted
Day trips with family once a month (Children)	.693
A holiday away from home at least one week a year (Children)	.702
Outdoor leisure equipment, e.g. roller skates, skateboard, football, etc. (children)	.711
Meat, fish or vegetarian equivalent at least once a day (children)	.721
Children's clubs or activities such as drama or football training (Children)	.722
Some new, not second-hand clothes (children)	.722
Fresh fruit or vegetables at least once a day (children)	.724
Indoor games suitable for their ages (e.g. building blocks, board games, computer games, etc)	.724
Three meals a day (children)	.725
At least four pairs of trousers, leggings, jeans or jogging bottoms (children)	.725
New, properly fitting shoes (children)	.726
Toddler group, nursery, or play group at least once a week for pre-school aged children	.727
A garden or outdoor space nearby where they can play safely (children)	.727
Books at home suitable for their ages (children)	.728
A warm winter coat (children)	.728
Construction toys such as Duplo/Lego etc (children)	.734
Celebrations on special occasions, e.g. birthdays, Christmas or other religious festivals (Children)	.734

All 17 (age appropriate) deprivation items are reliable for children under five years old - **Toddler group nursery or play group** is clearly a reliable deprivation indicator for this age group of children and omitting it from the deprivation index would result in Chronbach's Alpha falling from 0.735 to 0.727 (i.e. Alpha if item deleted=0.727)

Step 4b – Creating a reliable index of deprivation (Item Response Theory)[3]

Item Response Theory (IRT) models can provide additional information on the reliability of each individual item in the deprivation scale/index. IRT models describe the relationship between a person's response to questions and an unobserved latent trait such as knowledge of biology, level of happiness or amount of deprivation.

IRT results for Adult and Household Items in PSE British Sample

The column marked 'severity' can be interpreted as the likely severity of deprivation suffered by individuals who lack an item because they can't afford it. The severity scores in this table are measured in units of standard deviation from the population average. The table shows that respondents who cannot afford an unexpected expense of £500 or to save money regularly have the lowest latent deprivation score, while those who cannot afford curtains or window blinds, to visit friends in hospital, a telephone, washing machine or television are likely to be much more severely deprived.

Item	Severity	Discrimination
Could your household afford to pay an unexpected, but necessary, expense of £500?	0.5	0.8
Regular savings (of at least £20) for rainy days	0.6	0.8
Enough money to replace or repair broken electrical goods such as a fridge or washing machine	0.7	0.9
Regular payments into an occupational or private pension	0.9	0.7
Enough money to keep home in a decent state of decoration	1.0	0.9
All recommended dental work/treatment	1.4	0.7
Home Insurance	1.5	0.8
Two pairs of all-weather shoes	1.7	0.8
Taking part in sport/exercise activities or classes	1.7	0.7
Appropriate clothes for job interviews	1.7	0.8
Fresh fruit and vegetables everyday	1.8	0.9
A hobby or leisure activity.	1.8	0.8
Heating to keep home adequately warm	1.9	0.8
Meat, fish or vegetarian equivalent every other day	2.0	0.9
Damp-free home	2.1	0.6
A warm waterproof coat	2.1	0.8
Celebrations on special occasions, such as Christmas	2.2	0.8
Two meals a day	2.3	0.8
Table and chairs at which all the family can eat	2.4	0.7
Attending weddings, funerals and other such occasions	2.4	0.8
Curtains or window blinds	2.8	0.8
Visiting friends or family in hospital or other institutions	3.0	0.6
Telephone	**3.1**	0.7
Washing machine	**3.3**	0.7
Television	**3.6**	0.8

Telephone, Washing machine and **Television** have estimated severity scores of more than three standard deviations from the mean level of deprivation and are thus unreliable indicators

---

[3] IRT Analyses by Marco Pomati.

of deprivation in a survey of 12,000 people (i.e. if data are normally distributes then 99.73% of cases will be between plus/minus 3 standard deviations from the mean – so you would need a very large survey to reliably measure deprivation more than 3 standard deviations from the average). All the deprivation items appear to have good levels of discrimination (i.e. the ability to identify deprived from non-deprived people).

IRT Item Characteristic Curves for Adult and Household Deprivations (PSE British Data)

The severity of deprivation is shown by the position of each asymptotic (i.e. 'S' shaped) curve
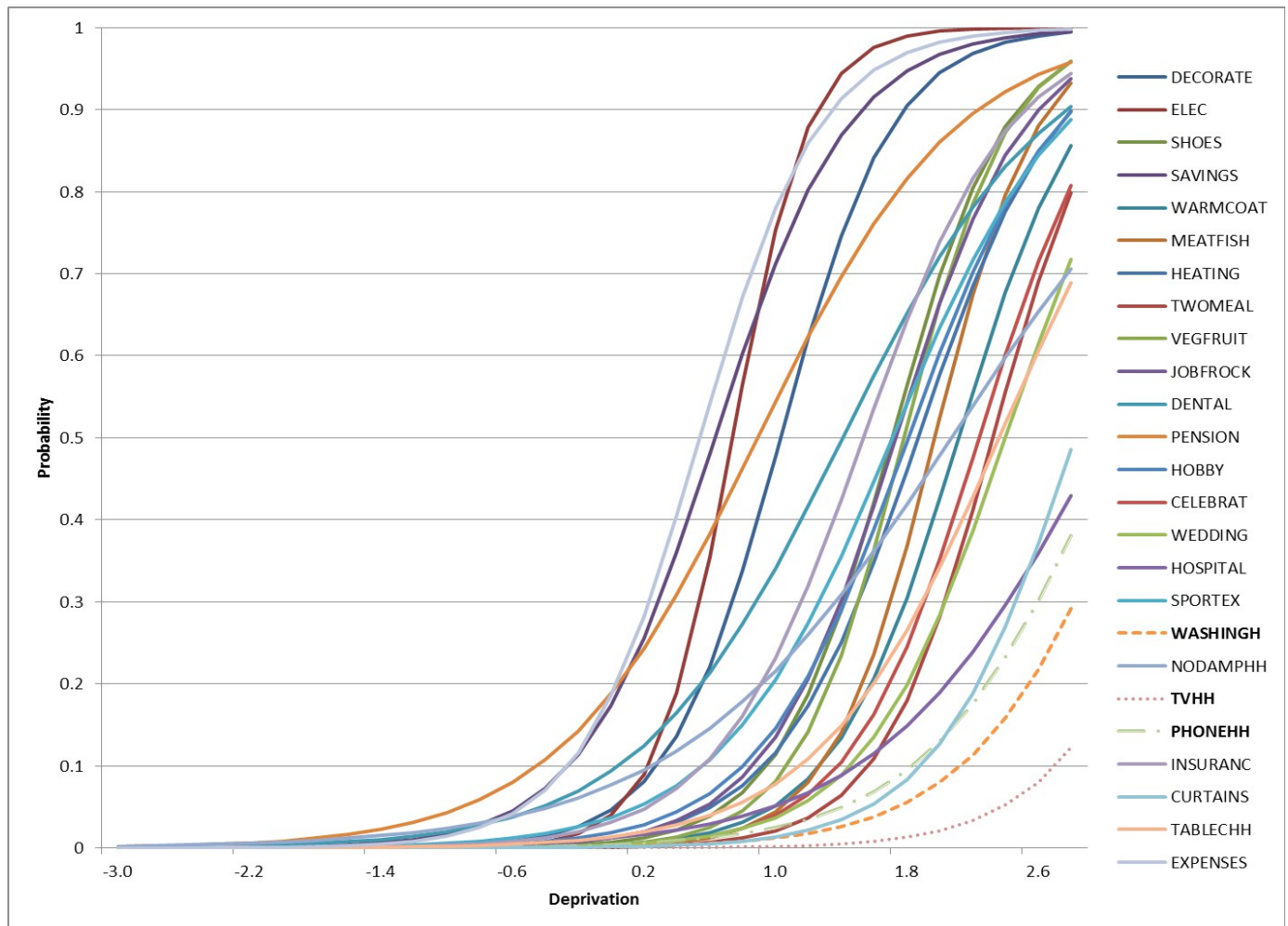
(see figure above) along the X-axis – the further to the right the more severe the deprivation. The effectiveness of each item to discriminate between deprived and non-deprived people is shown by how vertical each curve is - the more upright, the better the discrimination.

Ideally, a good deprivation index would be shown by a series of fairly vertical 'S' shaped curves spread out along the X-axis. The inflection point of each curve, that is, half the distance between the upper and lower asymptotes, where the slope is steepest, should lie between 0 and +3 on the X-axis. However, **Telephone, Washing machine and Television** stand out as items which conform less to the ideal pattern.

The Item Characteristic Curves (see above) are a graphical display of the results of the IRT models. It can be difficult to identify potentially 'problematic' deprivation items when a lot

of Item Characteristic Curves are displayed on the same graph (see above). It is also important to examine the fit of the IRT model. Item Characteristic Curves (ICC) for each adult and household deprivation are shown below. The ICCs for deprivation items such as **Elec** ('replace broken electrical goods') and **Shoes** ('Two pairs of all-weather shoes') correspond closely to the ideal, i.e. a fairly vertical 'S' shaped curve. By contrast, **Television**, **Washing machine** and **Phone** have ICCs which are far from the ideal. In addition, it can be seen that items such as **No Damp** ('Damp Free Home') have a fairly flat/not very vertical curve, which is indicative of the low discrimination ability of this indicator (i.e. many 'poor' households live in relatively 'good' social housing which is free of damp). The ICC curves (below) show that the fit of the IRT model to the data is not very good for **Expenses** and to a lesser extent **No Damp**.

PSE2012 IRT Results - Adult and Household Deprivations
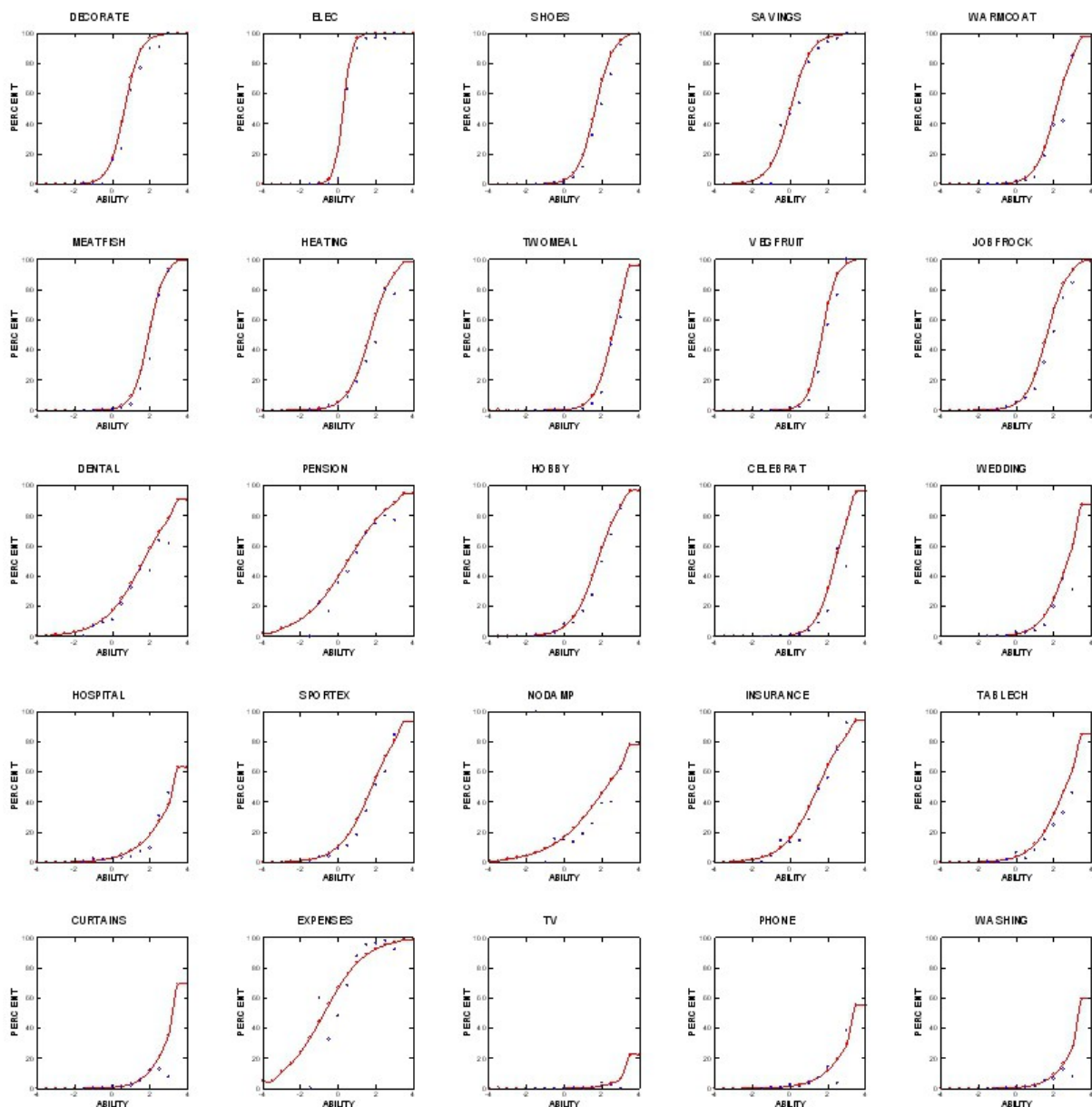
Children's deprivation index IRT results for PSE UK data (0-17)

The IRT severity and discrimination results for the children's deprivation items show that all items are reliable for children (aged 0-17) except '*enough bedrooms for children aged 10 and over*' and '*Playgroups, etc.*' for children aged under 5. However, these results are likely to be an artefact caused by these two deprivation measures not being applicable for all children aged 0-17. For example, if the IRT analyses are run for children aged 10 to 17, then the severity score for '*enough bedrooms for children aged 10 and over*' falls from 3.1 to 2.2 standard deviations, i.e. it is a reliable measure of deprivation for children aged 10 and over.

Item	Severity	Discrimination
A holiday away from home at least one week a year (Children)	0.9	0.8
Savings (5+)	1.0	0.8
Day trips with family once a month (Children)	1.1	0.8
Pocket money (5+)	1.5	0.8
Clubs/activities (2+)	2.0	0.7
At least four pairs of trousers, leggings, jeans or jogging bottoms (children)	2.0	0.8
New, properly fitting shoes (children)	2.0	0.9
Outdoor leisure equipment, e.g. roller skates, skateboard, football, etc. (children)	2.0	0.8
Hobby (5+)	2.2	0.8
Some new, not second-hand clothes (children)	2.2	0.8
Meat, fish or vegetarian equivalent at least once a day (children)	2.2	0.8
School trips (5+)	2.2	0.7
Fresh fruit or vegetables at least once a day (children)	2.2	0.8
Three meals a day (children)	2.3	0.9
A warm winter coat (children)	2.3	0.9
Books (2+)	2.4	0.9
Celebrations on special occasions, e.g. birthdays, Christmas or other religious festivals (Children)	2.6	0.8
Computer & internet (5+)	2.6	0.7
Place to study (5+)	2.6	0.7
Indoor games suitable for their ages (e.g. Building blocks, board games, computer games, etc) (children)	2.7	0.8
A garden or outdoor space nearby where they can play safely (children)	2.7	0.6
Construction toys such as Duplo/Lego etc (children)	2.9	0.6
Enough bedrooms (10+)	**3.1**	0.5
Play groups, etc. (under 5)	**4.7**	0.5

The ICCs for each child deprivation are shown below. The 'problems' of Play Groups and Bedrooms when applied to the whole child population can be clearly seen from the ICC curves. Holiday also shows a poor model fit and likely low discriminating ability to identify the deprived from the non-deprived, compared with the data – the IRT model fit for Holiday is not good.


PSE2012 IRT Results (Child Deprivations)
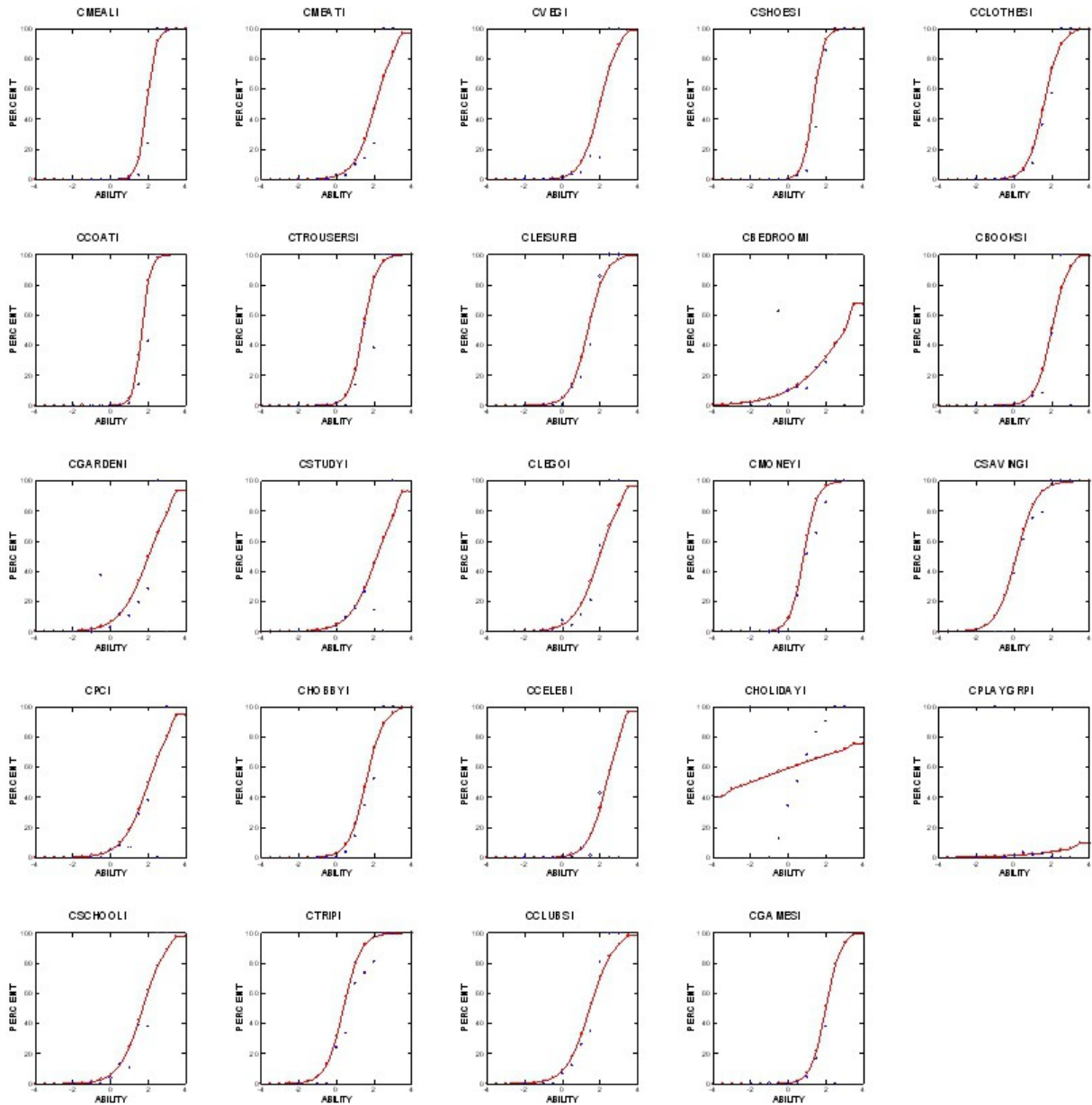
Multi-dimensional deprivation?

IRT assumes that there is just one single latent variable, i.e. that deprivation has just one dimension and is not multi-dimensional. To a lesser extent, the Classical Test Theory models (e.g. Cronbach's Alpha) also make this assumption[4] – although they are more robust when measuring the reliability of multi-dimensional deprivation indices. It should be noted that the idea that there could be any test, scale or index that only measures one single concept is of course a convenient fiction to which psychologists and medical researchers are prone. For example, how could any test of knowledge of history only measure a person's historical 'ability' and not also their ability to read, their political beliefs, etc.

The poor fit of the IRT models for some variables, e.g. holidays for children, expenses, etc. may be a result of multi-dimensional structure in the deprivation data, i.e. more than one latent dimension of deprivation. The Cluster Analyses and Multi-Dimensional Scaling plots for child deprivations (below) indicate that Holidays for children (cholidayi) and, to a lesser extent, School Trips which cost money (Ctripi) are separated from the main set of child deprivations – as are pocket money (cmoneyi) and childrens savings.

Dendrogram of Child Deprivation Items with three clusters highlighted (in yellow)
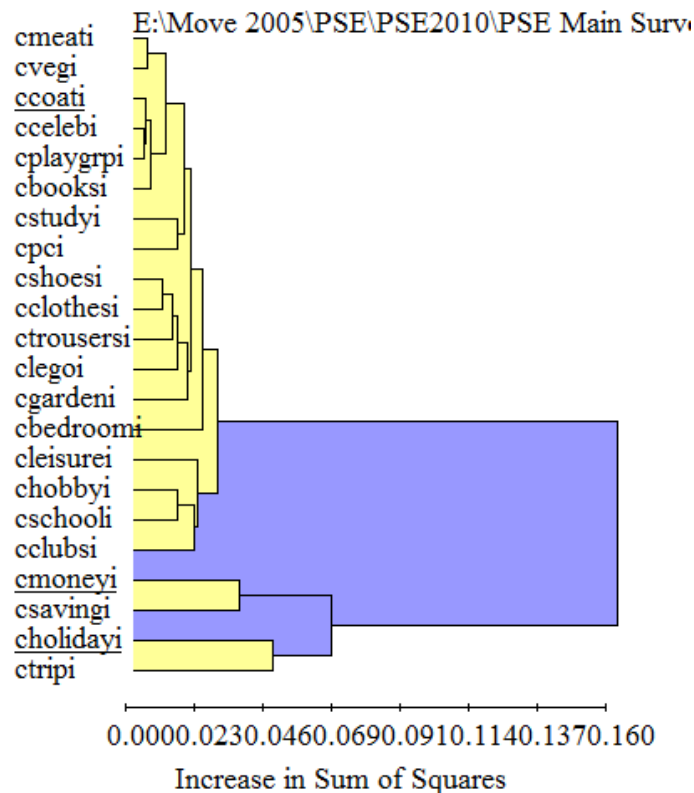
The Multidimensional Scaling plot for the three cluster solution (shown in the dendrogram above) indicates that most of the child deprivations are tightly grouped together but that holiday and school trips are at a distance from the main group along the horizontal axis whereas savings and money are distant from the main group of deprivations along the Y axis. This provides some evidence for multi-dimensional structure in the child deprivation

---

[4] Unidimensonality is not an assumption of the Chronbach's Alpha statistic but it is an implicit assumption of the underlying measurement model – the *essentially tau equivalent* model.

data/index. This is not a 'problem' as we *a priori* expect deprivation to consist of several dimensions which are correlated, i.e. to a certain extent people can choose how to be deprived and parents with children may make different choices from older people without children, etc.

**Multi-Dimensional Scaling Plot for Child Deprivation-Three Cluster Solution**
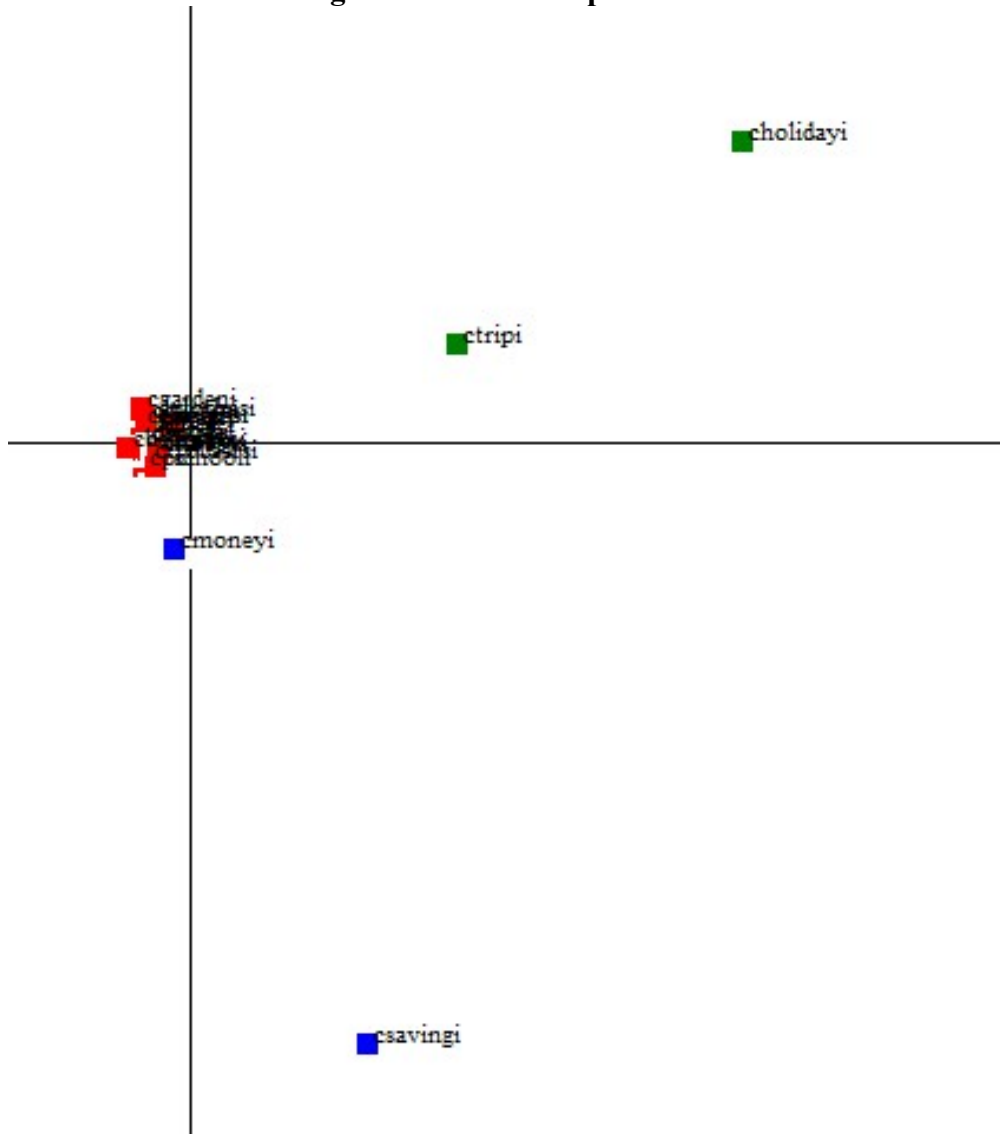
The MDS plot for all the adult and child deprivations (below) shows that most deprivations lie along a single dimension (Y-axis) but that the 'ability to pay unexpected expenses' (Expenses) is separated from the rest of the other deprivations along the X-axis. It should be noted that 'Expenses' was a simple yes/no question whereas all the other derivation items were collected using the sort card method, so the MDS result may simply reflect the different data collection methods.

Multi-Dimensional Scaling Plot for Adult and Child Deprivation-Six Cluster Solution
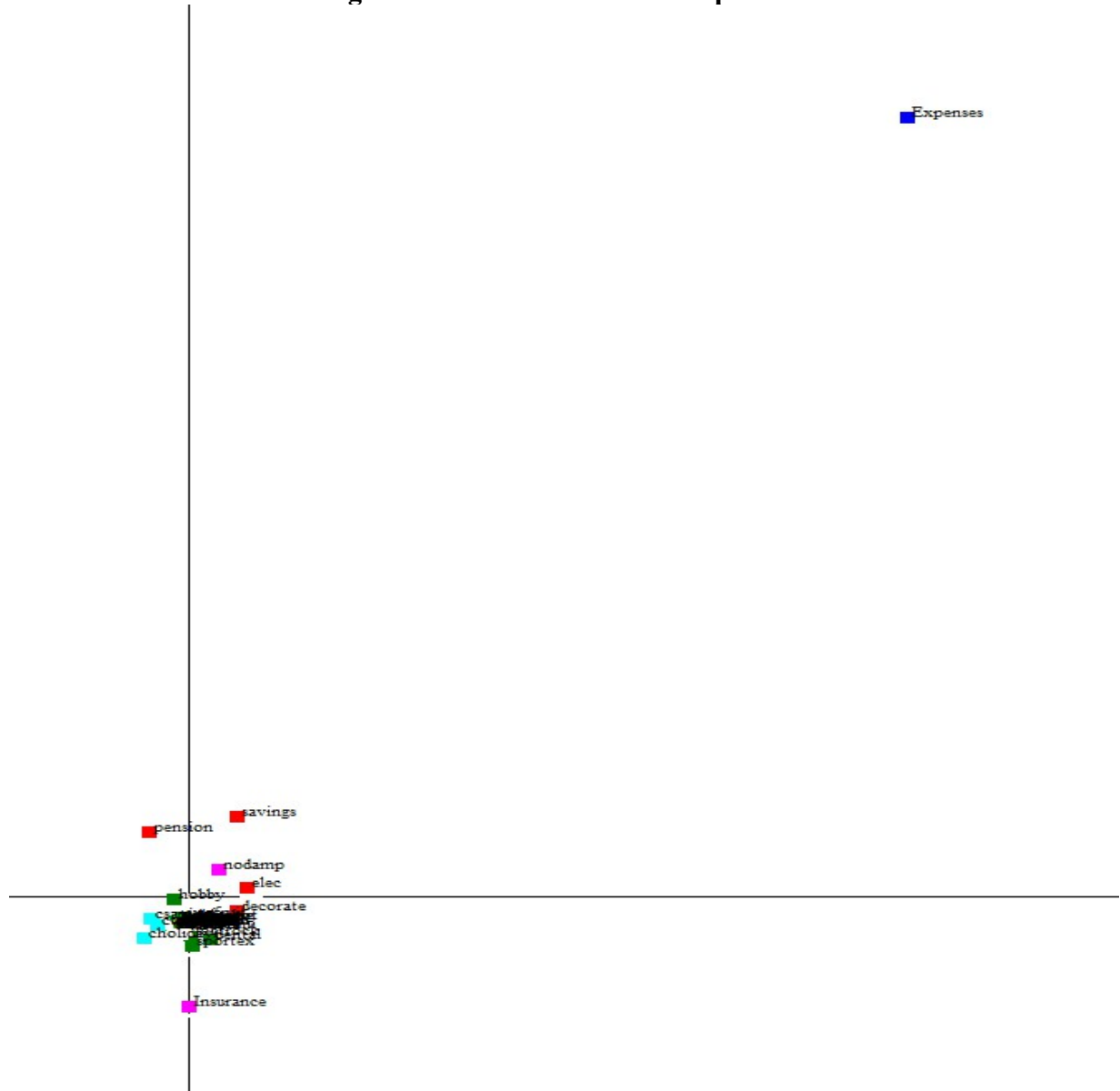
Dendrogram of the Adult and Child Deprivation Items with six clusters highlighted
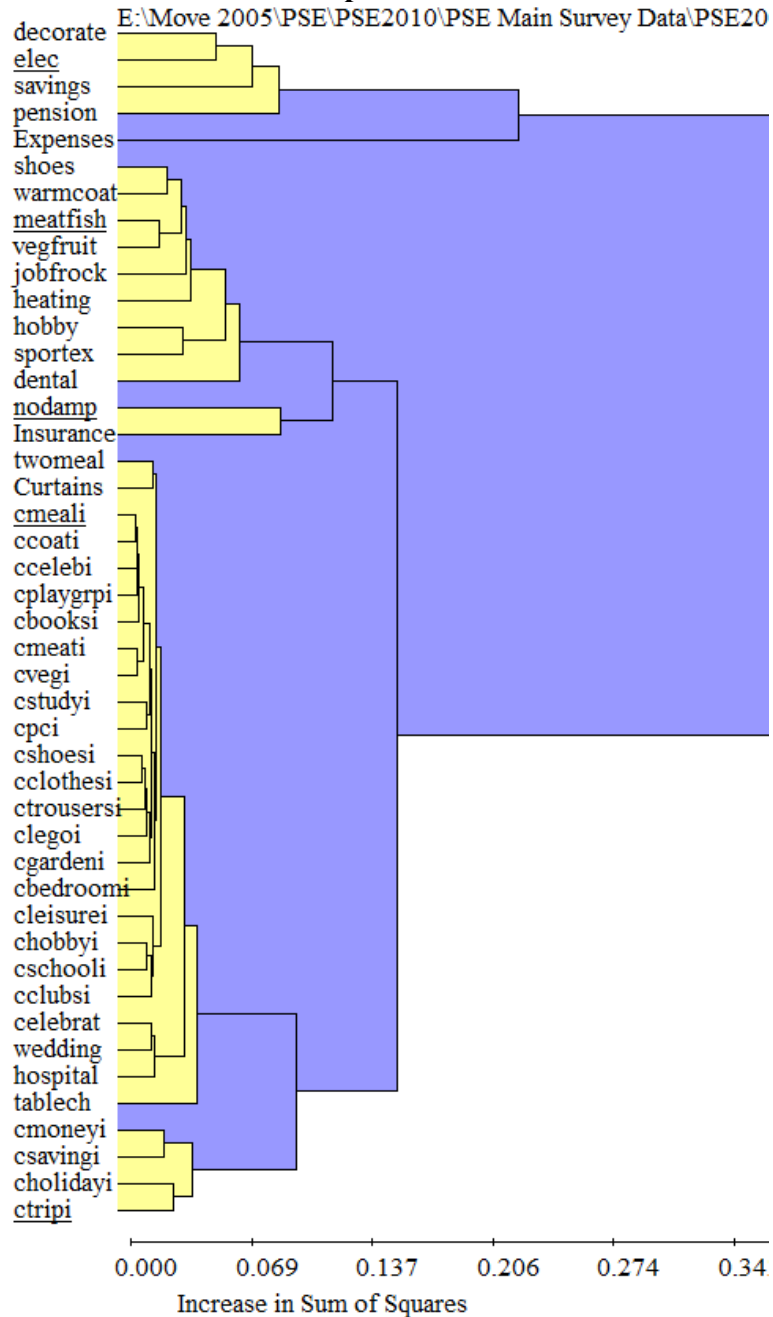
The results of the full adult and child deprivation cluster analyses are shown in the dendrogram above – six clusters are highlighted from this Ward's method followed by K-Means analysis using a squared Euclidian distance proximity matrix.

1. Cluster 1 – 4 deprivation which asked about financial deprivation i.e. the ability to make regular payments/savings and afford to repair broken electrical goods/decorate.
2. Cluster 2 – only contains the item 'Expenses' and it is associated with the Cluster 1.
3. Cluster 3 – this cluster contains nine deprivation questions answered by all adults in the household which relate to personal deprivations e.g. diet, keeping warm, dental care, etc
4. Cluster 4 – contains two housing items – no damp and contents insurance
5. Cluster 5 – contains 25 children's and family life deprivation items
6. Cluster 6 – contains children's financial deprivation (pocket money and savings) and two leisure items (school trips which cost money and holidays).

Summary Deprivation Items Excluded

Population Consensus Criteria
Adult and Household items which less than 50% of the population thought were necessities
1. Replace worn out clothes with new (not second hand) ones
2. Presents for friends or family once a year
3. Friends or family round for a meal or drink at least once a month
4. Car
5. A small amount of money to spend each week on yourself, not on your family
6. A holiday away from home for one week a year, not staying with relatives
7. Mobile phone
8. Home computer
9. Internet connection at home
10. Replace any worn out furniture
11. An outfit to wear for social or family occasions such as parties and weddings
12. A roast joint (or vegetarian equivalent) once a week
13. Hair done or cut regularly
14. Going out socially once a fortnight
15. Attending church, mosque, synagogue or other places of worship
16. Visits to friends or family in other parts of the country 4 times a year
17. A meal out once a month
18. Holidays abroad once a year
19. Going out for a drink once a fortnight
20. Going to the cinema, theatre or music event once a month
21. Dishwasher

Children's items which less than 50% of the population thought were necessities
1. Friends round for tea or a snack once a fortnight (snack)
2. A bicycle (bike)
3. Clothes to fit in with friends (style)
4. A mobile phone for children aged 11 or over (mobile)
5. An MP3 player (mp3)
6. Designer/brand name trainers (pumps)

Validity Criteria
1. Television
2. Mobile phone for children aged 11+
3. Indoor games suitable for their ages

Reliability Criteria
1. Television
2. Washing machine
3. Telephone

Final Valid and Reliable Consensual Deprivation Index for Adults and Children

Reliability analysis using 45 Adult and Children and Household deprivation items which 50+ % of the population thought were necessities and which passed the validity and reliability tests. All items in this index are valid and reliable.
Cronbach's Alpha= 0.837 Guttman's Lambda 2= 0.866

Deprivation Items for Adults and Children	Cronbach's Alpha if Item Deleted
Enough money to replace or repair broken electrical goods such as a fridge or washing machine	.823
Could your household afford to pay an unexpected, but necessary, expense of £500?	.824
Enough money to keep home in a decent state of decoration	.825
Regular savings (of at least £20) for rainy days	.828
Home Insurance	.828
Two pairs of all-weather shoes	.829
Appropriate clothes for job interviews	.829
Heating to keep home adequately warm	.830
Fresh fruit and vegetables everyday	.830
A hobby or leisure activity.	.830
Taking part in sport/exercise activities or classes	.830
All recommended dental work/treatment	.831
A warm waterproof coat	.832
Meat, fish or vegetarian equivalent every other day	.832
Regular payments into an occupational or private pension	.832
Celebrations on special occasions, such as Christmas	.833
Damp-free home	.833
Table and chairs at which all the family can eat	.833
Two meals a day	.834
Attending weddings, funerals and other such occasions	.834
Visiting friends or family in hospital or other institutions	.835
Curtains or window blinds	.835
Pocket money (children)	.835
Day trips with family once a month (Children)	.835
Three meals a day (children)	.836
Meat, fish or vegetarian equivalent at least once a day (children)	.836
Fresh fruit or vegetables at least once a day (children)	.836
New, properly fitting shoes (children)	.836
Some new, not second-hand clothes (children)	.836
A warm winter coat (children)	.836
At least four pairs of trousers, leggings, jeans or jogging bottoms (children)	.836
Outdoor leisure equipment, e.g. roller skates, skateboard, football, etc. (children)	.836
Books at home suitable for their ages (children)	.836

A garden or outdoor space nearby where they can play safely (children)	.836
A suitable place at home to study or do homework (children)	.836
Construction toys such as Duplo/Lego etc (children)	.836
Money to save (children)	.836
Computer and internet for homework	.836
A hobby or leisure activity (Children)	.836
Celebrations on special occasions, e.g. birthdays, Christmas or other religious festivals (Children)	.836
A holiday away from home at least one week a year (Children)	.836
Going on a school trip at least once a term (Children)	.836
children's clubs or activities such as drama or football training (Children)	.836
Enough bedrooms for every child of 10 or over of a different sex to have their own bedroom (children)	.837
Toddler group, nursery, or play group at least once a week for pre-school aged children (Children)	.837

Note: Unsurprisingly, the household deprivation items are amongst the most reliable indicators in this combined adult and child deprivation index as these are the only indicators which apply to both adults and children. The children's items in general appear to have a low reliability (i.e. not much change in alpha if deleted) but this is an artefact resulting from these items not applying to the whole population (i.e. they do not apply to adults). For example, the least reliable deprivation items are Toddler/playgroups, etc. for the under 5s and separate bedrooms for children aged 10 and over, i.e. these are the two deprivation indicators which are applicable to the smallest population age groups.

Step 5a – Checking the revised index is additive after removing outliers

The components of any deprivation index should be additive, e.g. a person or household with a deprivation score of three should be poorer than a person or household with a deprivation score of two. Some components of the index may not be additive, for example, it is important to check that a respondent who 'cannot afford' a hobby and two pairs of good shoes is poorer than a person who 'cannot afford' a hobby but has shoes.
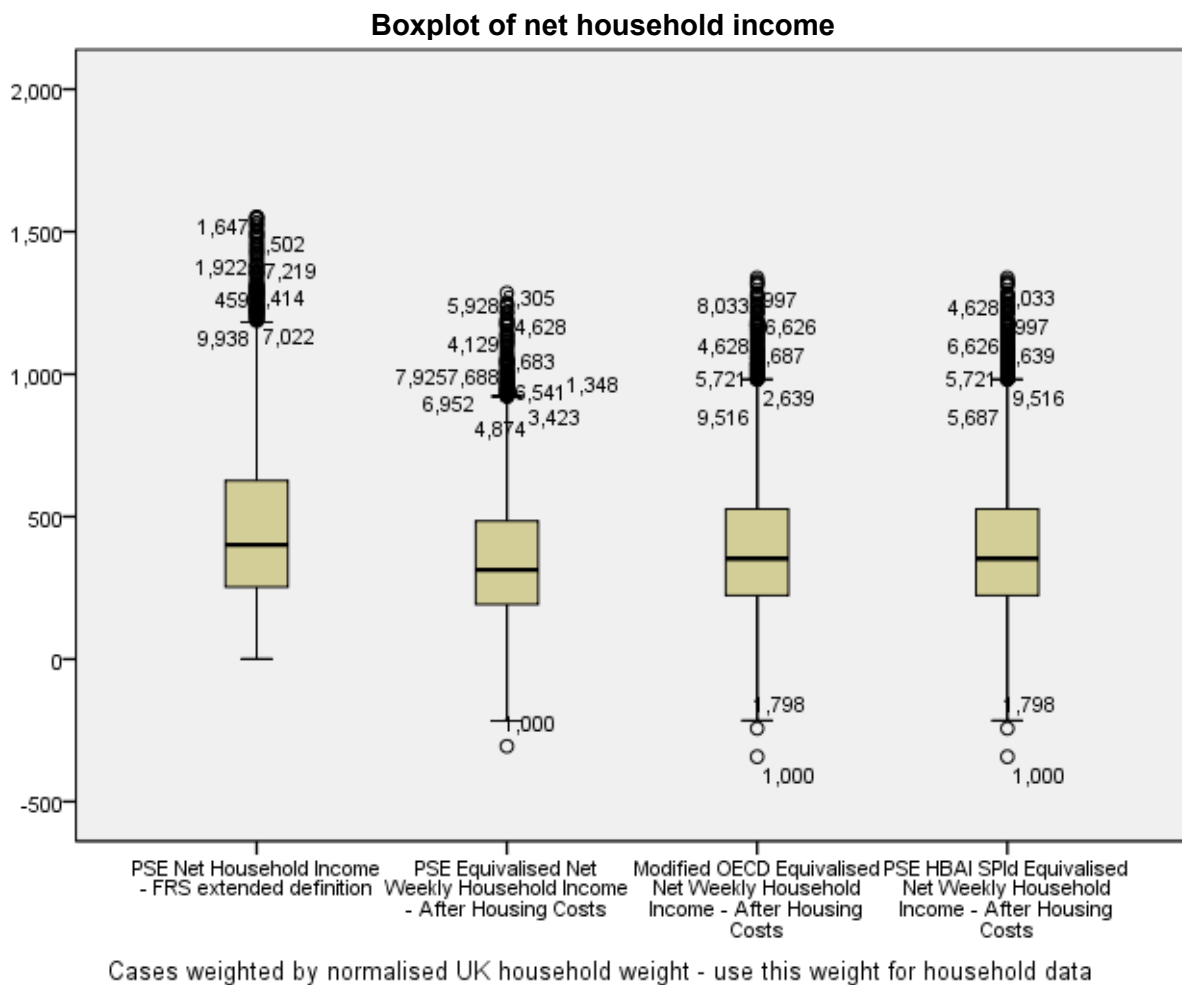
Removing outliers

It is also essential to remove large outliers, e.g there is invariably somebody in a survey who says they earn £1,000,000 but can't afford any item on the deprivation index. Boxplots were used to detect and remove large income outliers. As the summary statistics below show, there are a few households with very large incomes in the FRS/PSE Gross Income Data, e.g. an investment banker's household with a gross income of £63,000 per week – more than most households earn in a year.

Summary for pseGrossInc

Anderson-Darling Normality Test

A-Squared	1886.32
P-Value <	0.005
Mean	776.3
StDev	1402.6
Variance	1967284.9
Skewness	31.46
Kurtosis	1336.52
N	11998
Minimum	1.0
1st Quartile	346.7
Median	564.3
3rd Quartile	930.3
Maximum	63294.5

95% Confidence Interval for Mean
751.2   801.4

95% Confidence Interval for Median
556.3   575.6

95% Confidence Interval for StDev
1385.1   1420.6

In order for the poverty line to not be unduly affected by a few households with very large incomes (after equivalisation), these have been removed from the model. That is all households with PSE net incomes After Housing Costs of above £1,290, which is the equivalent of an annual income after tax of over £67,000 per year. In addition, a few households with large negative net incomes (AHC) have also been removed (incomes below minus £557 per week). As have households with Gross incomes above £1,312, which is the equivalent of a pre-tax income of £68,224. This removes from the analysis 190 households (3.7%). This means that the richest 4% of households have been excluded from the poverty threshold analysis.

As can be seen from the boxplots below, removing the households with net incomes in the top 4% of the income distribution removes most all definite and potential outliers from the net household income distribution and most all definite outliers from the three equivalised income distributions (PSE, OECD and HBAI).

Boxplot of net household income

Cases weighted by normalised UK household weight - use this weight for household data

The histogram of PSE equivalised net household income after housing costs (see below) is a left skewed normal distribution which you typically find with equivalised UK income.

Histogram

Mean = 360.76
Std. Dev. = 239.935
N = 4,967.2

**PSE Equivalised Net Weekly Household Income - After Housing Costs**
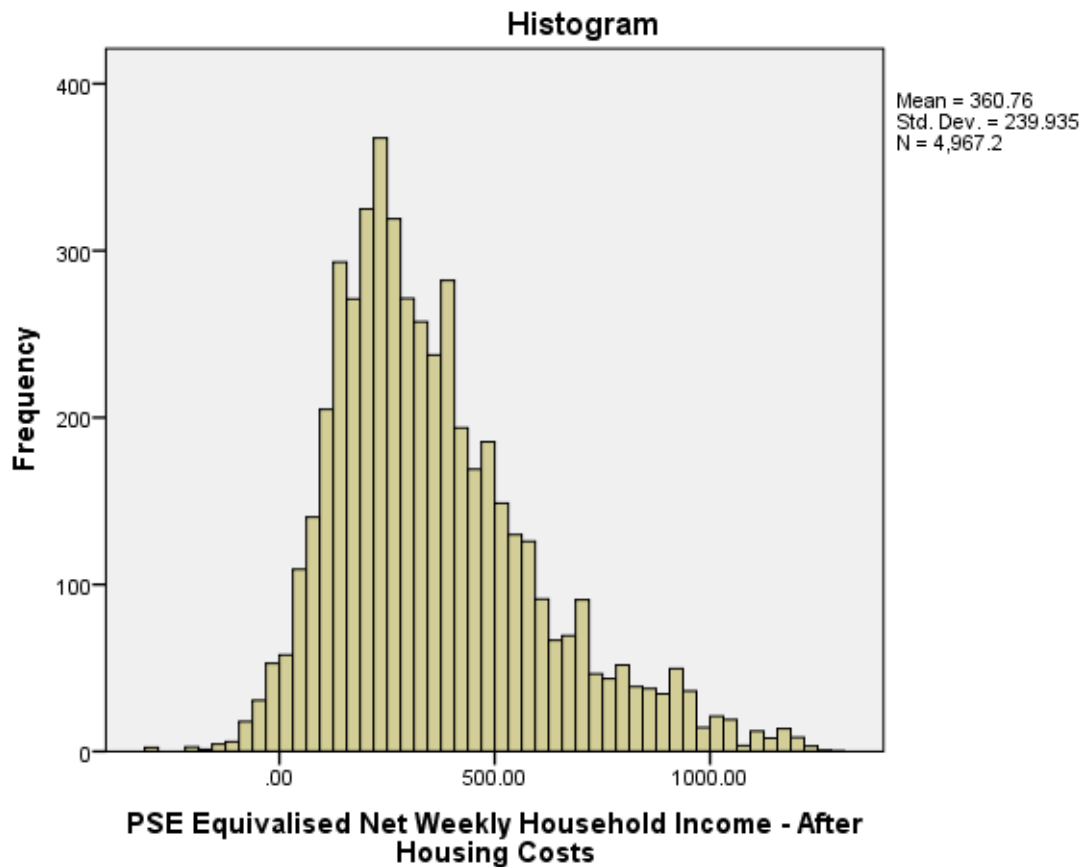
Cases weighted by normalised UK household weight - use this weight for household data

The Individual Value Plot for Net and Gross PSE, OECD and HBAI equivalised household income show similar distributions and amounts of variability.


Individual Value Plot of PSEincAHC, OECDincAHC, HBAIincAHC, ...
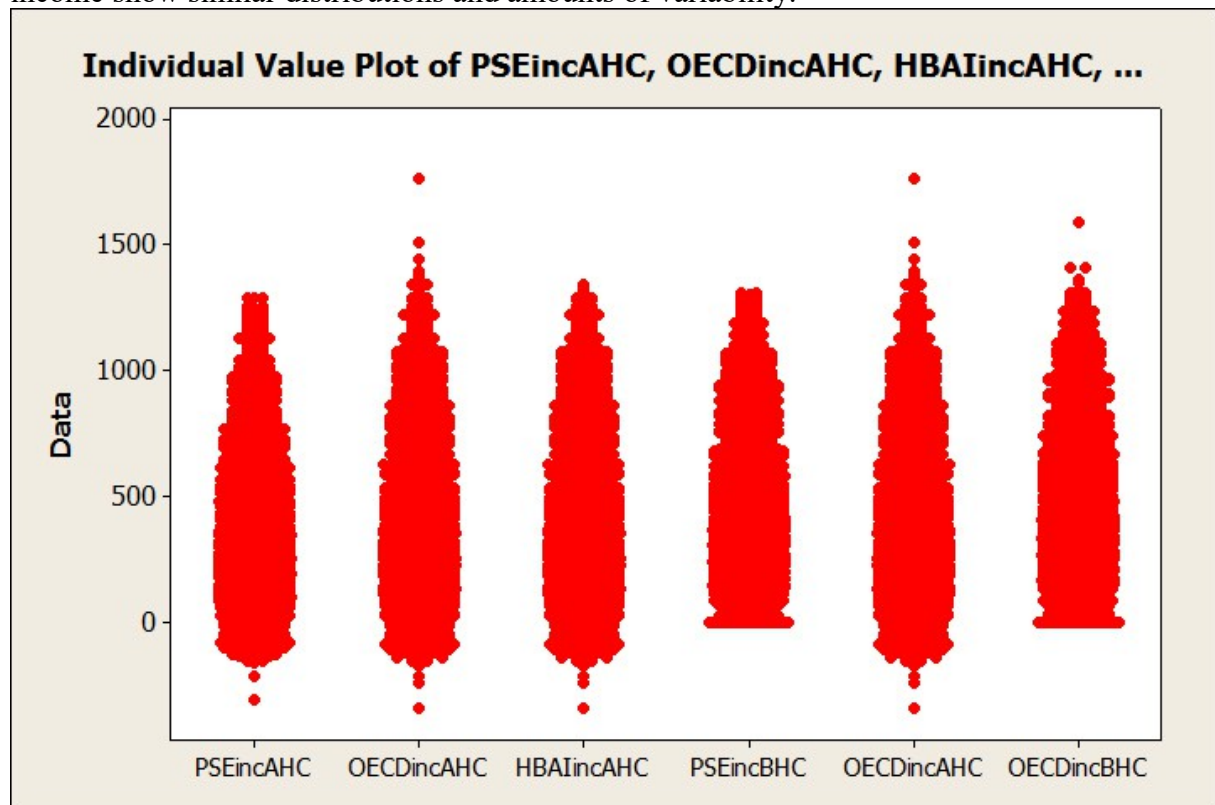
STEP 5b – Checking additivity

The main effects plots below show the mean amount of equivalised net household income (AHC) of respondents who *'don't have and can't afford'* an item (dot on lower right of each graph) compared with the income of those who gave another answer (e.g. have, don't want, etc) for each of the 45 deprivation items. The horizontal line is the average equivalised net household income for the PSE sample (e.g. £335 per week). As the first plot shows, respondents who don't have and can't afford to decorate their homes have considerably less equivalised household income (£120 per week less on average) than those that gave a different answer to this question.

Main Effects Plot for PSEincAHC
Data Means
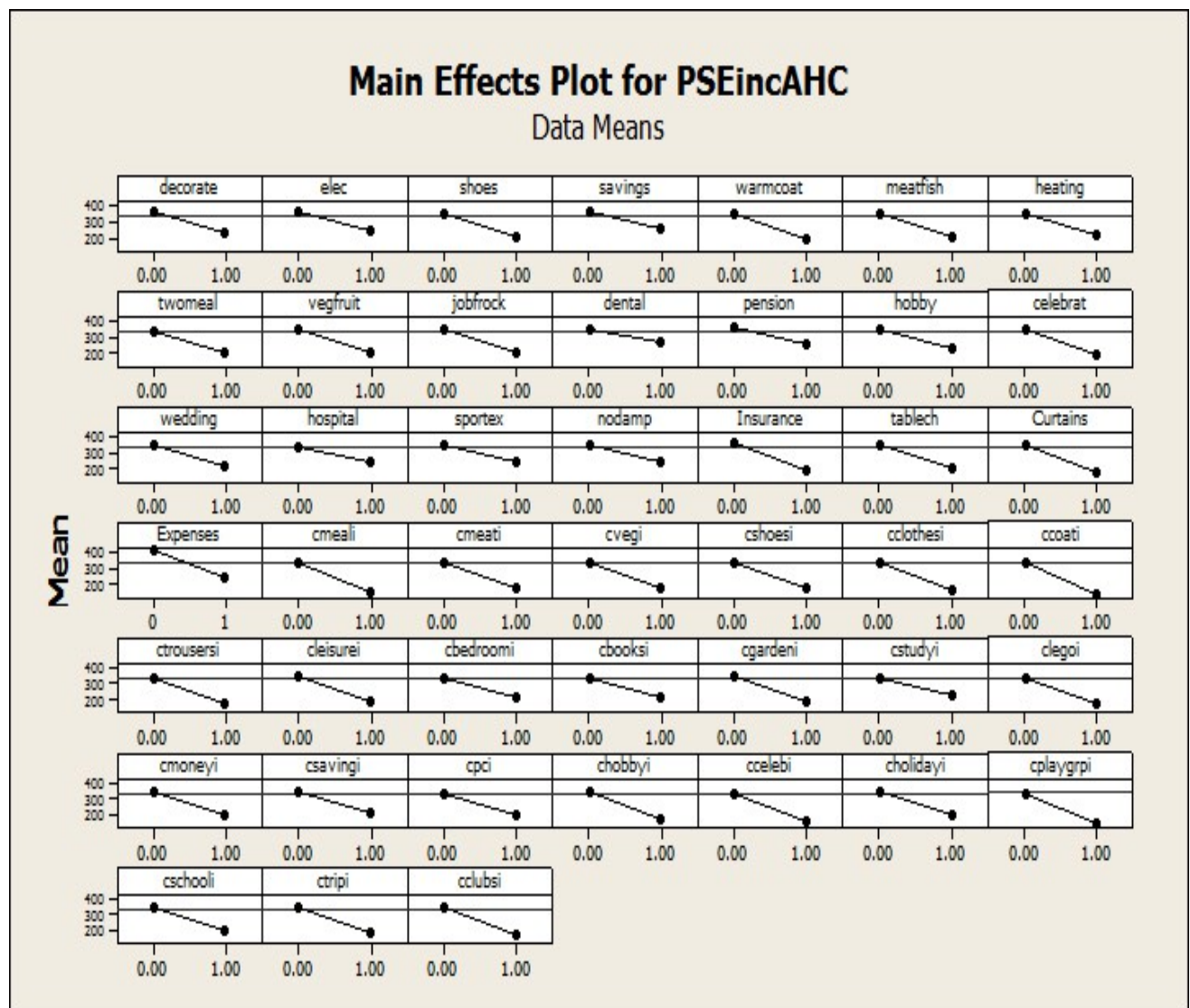
Some of the possible second order interaction plots are shown below. The first graph shows the interaction between decorate (not able to afford to have a decent state of decoration) and Elec (unable to replace broken electrical goods). The vertical scale on each graph is equivalised net PSE household income which ranges between £160 and £320 and the horizontal scale is don't have and can't afford = 1 or other = 0. There are two lines on the each graph – a solid black line and a dotted red line. The first black dot on the solid line (top left) shows the average equivalised net household income of those respondents who can afford to decorate their homes and can also afford to replace broken electrical goods (i.e. richer people who are not deprived). The first red dot on the dotted line (on the left just below the black dot) shows the income of those who can't afford to decorate but can replace broken electrical goods e.g. it's less. The second black dot on the solid line (bottom right) shows the income of those who can afford to decorate but cannot afford to repair electrical goods and the second red dot on the dotted line (bottom right) shows the average equivalised net household incomes of respondents who don't have and can't afford to decorate or repair electrical goods. Therefore, respondents who don't have and can't afford both decoration and to repair electrical goods are 'poorer' than respondents who can't afford just one of these items.

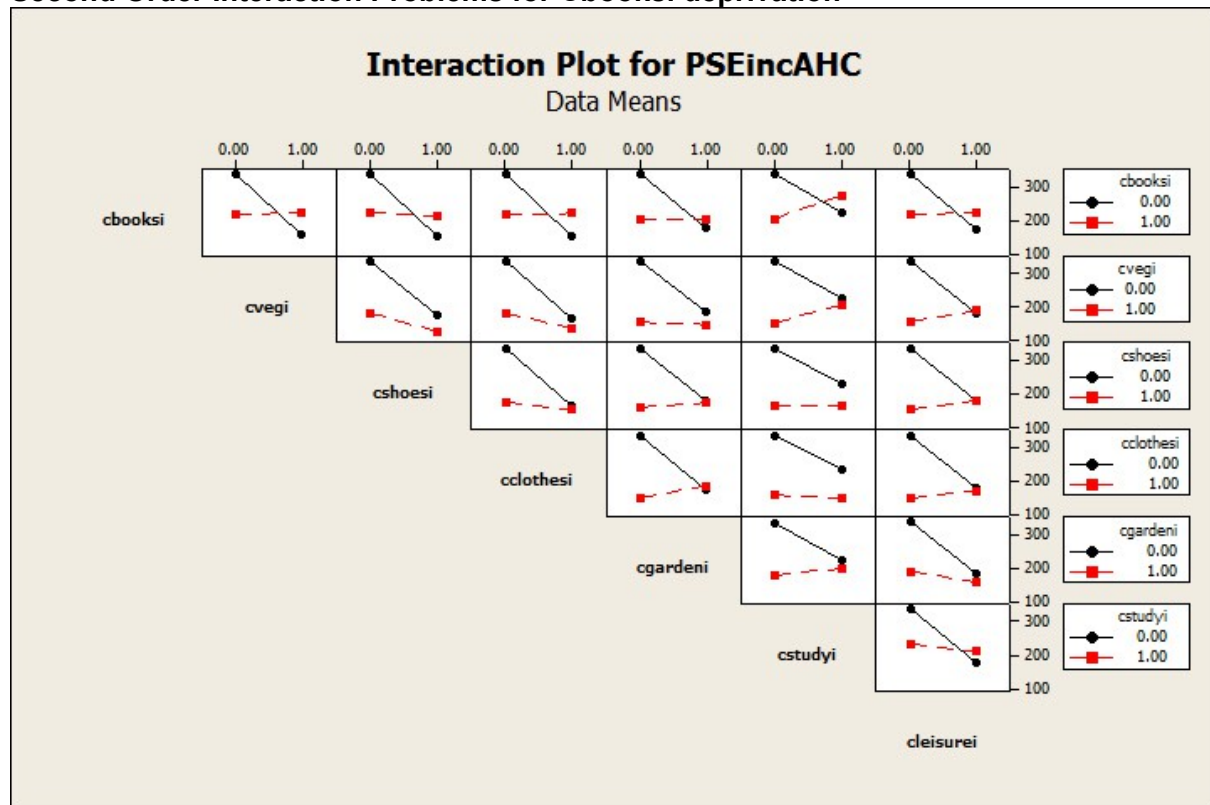**Second Order Interaction Plots for Decorate to Pension Deprivation**
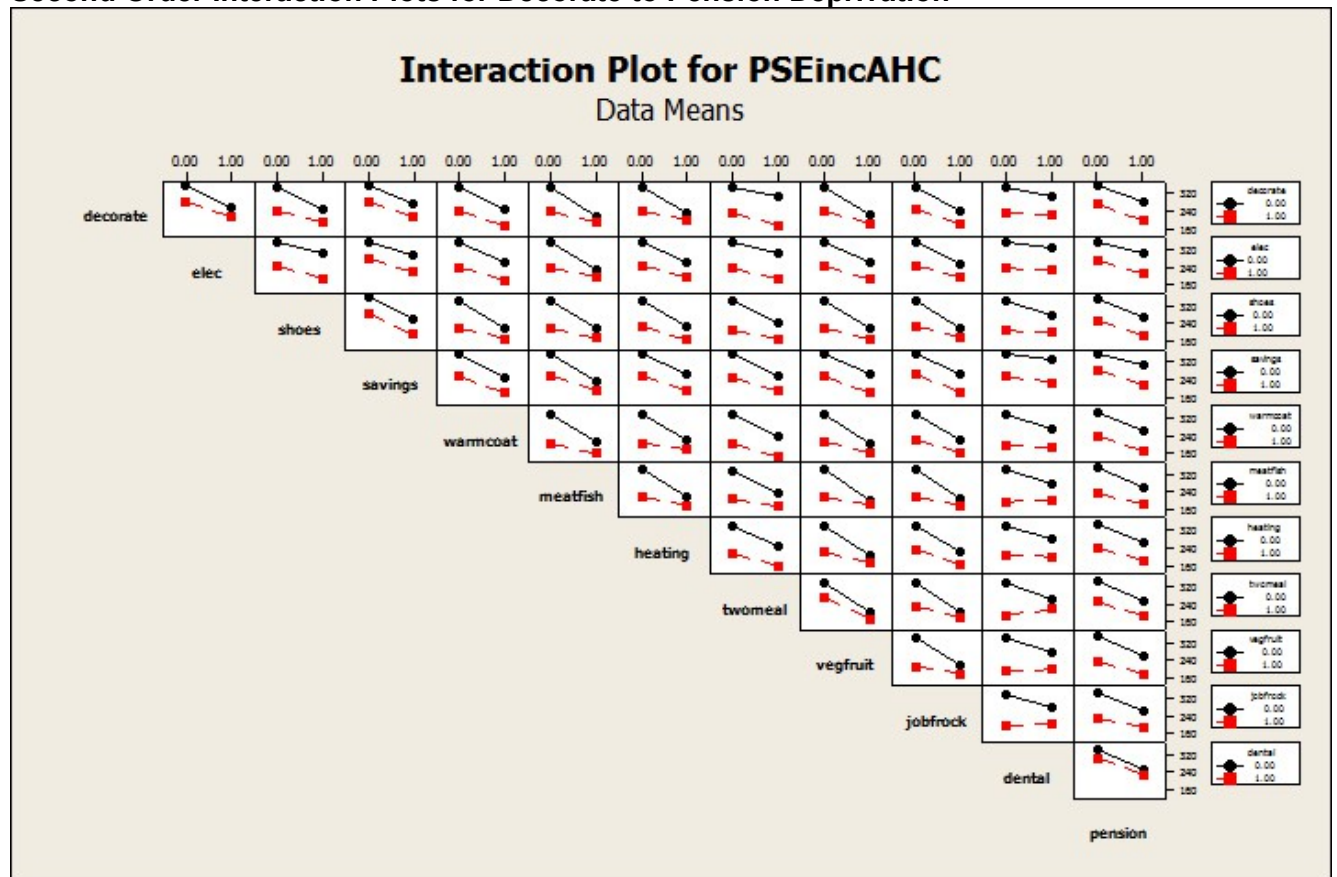
Basically, two parallel line slanting from top left to bottom right are good (e.g. the variables are additive). However, if the lines cross there may be problems, e.g. the variables are not additive, e.g. Wedding and Curtains – see below. However, there will be a few graphs with crossing lines due to multiple test effects so these results are only of concern if there are variables which do not appear to be additive with several other variables, e.g. Cbooksi – see below.

Second Order Interaction Plots for Hobby to Expenses Deprivation
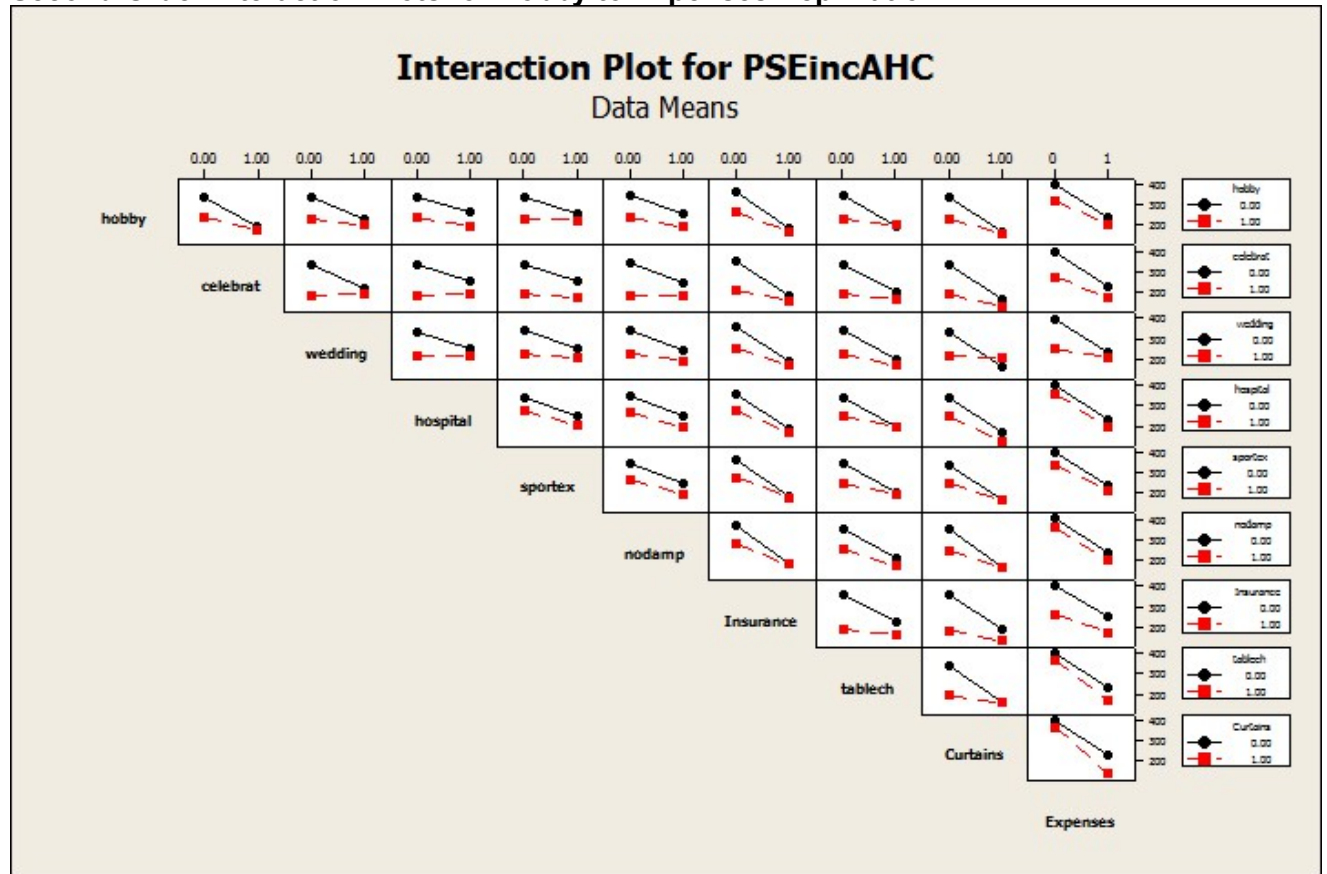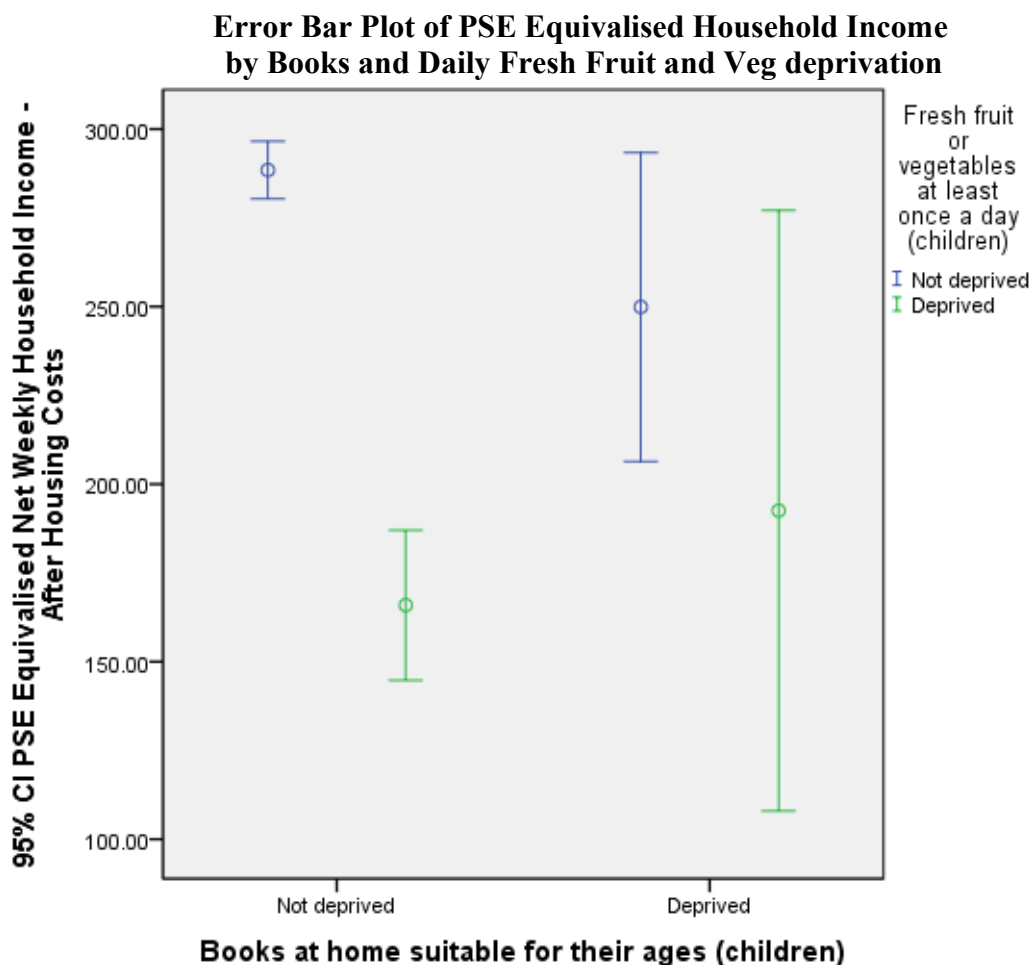

Second Order Interaction Problems for Cbooksi deprivation

The crossing lines for Cbooksi with Cvegi, Cshoesi, Cclothesi, Cgardeni, Cstudyi and Cleisurei indicate multiple additivity problems for this valid and reliable deprivation indicator.

The second order interaction plot (above) indicates that suitable books for children's ages' deprivation have additivity problems with several other variables. This however, is an artefact resulting from the small numbers of children which suffer from these two kinds of deprivation.

The error bar plot below shows the average equivalised household incomes of children who are deprived of both books and daily fresh fruit or veg (a deprivation score of 2 – see green bar on the far right of the graph). Although children suffering from both these deprivations have on average a higher income than children who are only deprived of fresh fruit or veg (see green bar on left of the graph) – there are so few children suffering from these deprivations that the 95% Confidence Intervals of the means are very wide and overlap (i.e. the two green bars overlap). Thus there is no evidence of additivity problems for these two variables.
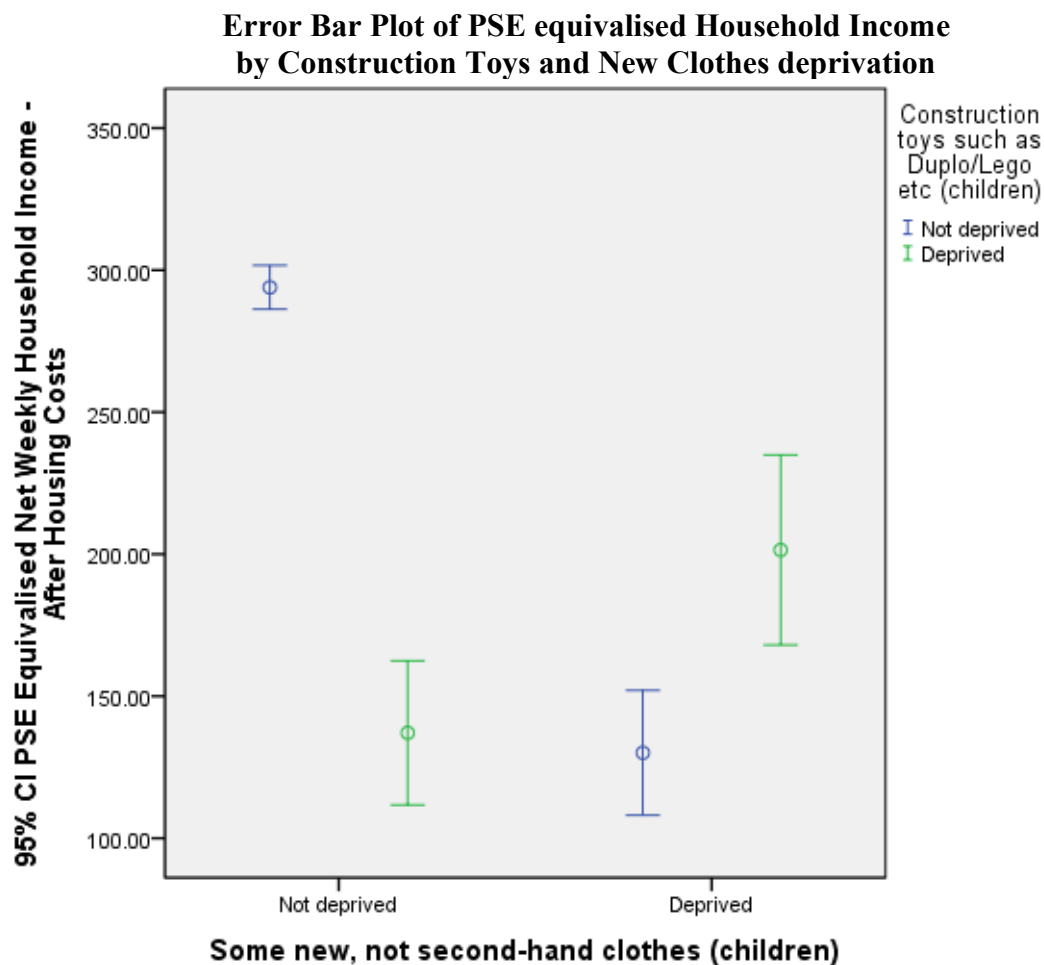
Error Bar Plot of PSE Equivalised Household Income by Books and Daily Fresh Fruit and Veg deprivation

Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

However, *Construction toys such as Duplo/Logo[5]* is not additive with four other deprivation indicators:
1) Some new not second hand clothes
2) Computer & internet for homework
3) Day trips with family
4) An annual one week holiday away from home

---

[5] Lego is marketed at children aged 0 to 16, however, many teenagers may consider it to be too childish to play with Lego. Nevertheless, additivity problems remain for construction toy deprivation even amongst 0 to 11 year old children.

**Error Bar Plot of PSE equivalised Household Income
by Construction Toys and New Clothes deprivation**

Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

The error bar plot above illustrates the additivity problems for Construction toy deprivation. Children deprived of both construction toys **and** new clothes live in households which have average equivalised incomes that are higher than for children who suffer from just one of these deprivations (i.e. compare the green bar on the right of the graph with the green and blue bars to the left).

Thus, five out of 49 deprivation items which received 50% or more support from the population (consensual deprivation) have been excluded from the final deprivation index for the following reasons:

Validity and Reliability Criteria
1. Television

Validity Criteria
2. Indoor games suitable for their ages

Reliability Criteria
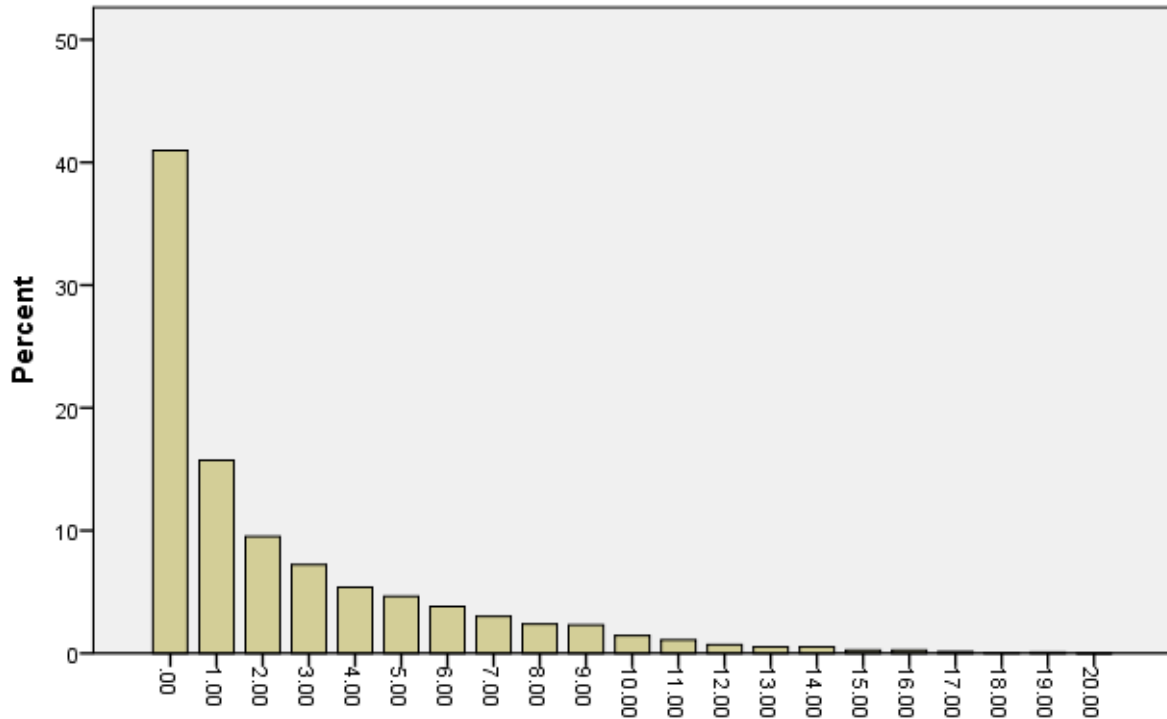3. Washing machine
4. Telephone

Additivity Criteria
5. Construction toys such as Lego

Revised Deprivation Index for Adults and Children
(50+%, Valid & Reliable & additive - 44 items)

	Frequency	Percent	Valid Percent	Cumulative Percent
.00	4325	37.3	41.0	41.0
1.00	1660	14.3	15.7	56.7
2.00	1004	8.7	9.5	66.2
3.00	763	6.6	7.2	73.4
4.00	568	4.9	5.4	78.8
5.00	490	4.2	4.6	83.5
6.00	403	3.5	3.8	87.3
7.00	317	2.7	3.0	90.3
8.00	251	2.2	2.4	92.7
9.00	243	2.1	2.3	95.0
10.00	152	1.3	1.4	96.4
11.00	115	1.0	1.1	97.5
12.00	75	.6	.7	98.2
13.00	54	.5	.5	98.7
14.00	55	.5	.5	99.2
15.00	26	.2	.2	99.5
16.00	26	.2	.2	99.7
17.00	14	.1	.1	99.9
18.00	6	.1	.1	99.9
19.00	7	.1	.1	100.0
20.00	1	.0	.0	100.0
Total	10556	91.1	100.0	
Missing System	1028	8.9		
Total	**11584**	**100.0**		

Although five items have been excluded for validity, reliability and additivity reasons, the final deprivation index frequency count does not differ much from the initial 49 item consensual deprivation index (see page 7). However, the final 44 item adult and child deprivation index should now be **reliable**, **valid** and **additive**.
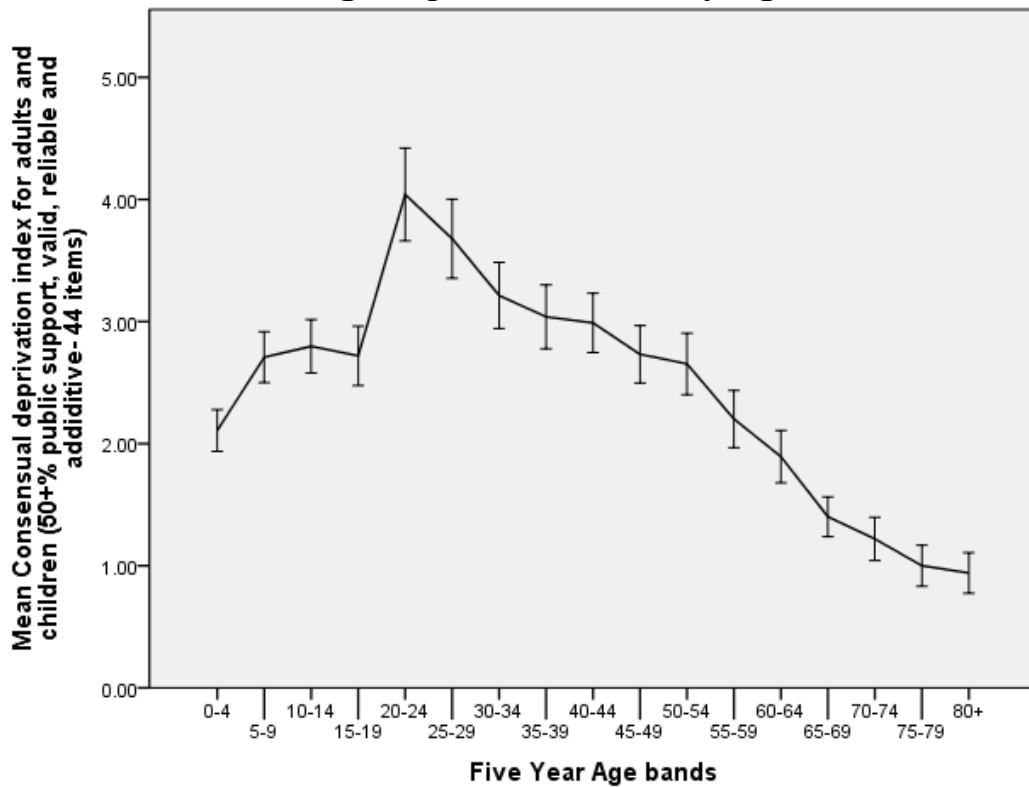
Consensual deprivation index for adults and children (50+% public support, valid, reliable and addiditive- 44 items)

Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

Average Deprivation Score by Age

Error Bars: 95% CI

40

Step 6 – Finding the 'objective' poverty line

The 'objective' poverty line can be defined as the division between the 'poor' group and the 'not poor' group that maximises the *between* group sum of squares and minimises the *within* group sum of squares. The graph below illustrates a multidimensional poverty line – where the 'poor' are identified as those with both a low income *and* a low standard of living (e.g. a high deprivation score). The 'objective' or 'optimal' poverty line is shown on the graph.

Multidimensional poverty line
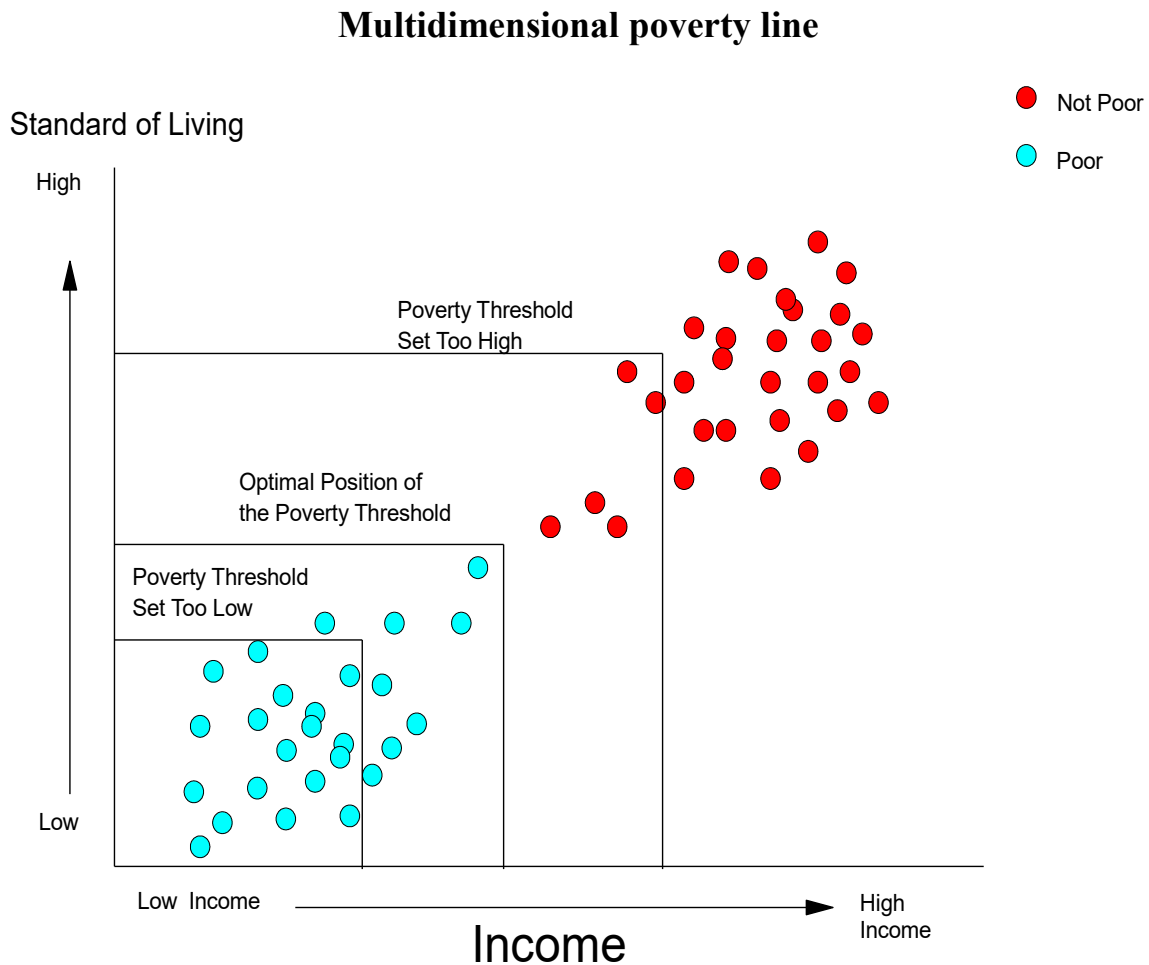
The table below shows the average income (after removal of outliers, e.g the richest 4% of households) before and after equivalisation for each deprivation index score between 0 and 10+.

The largest falls in equivalised income (using PSE - before and after housing costs - and modified OECD scales) are between deprivation scores 0 and 1 and 3 and 4. Therefore, it would be expected that the multivariate analysis would show that the objective poverty line would correspond with a deprivation score of 3 or 4.

## Average Income by Deprivation Index Score both after and before equivalisation

PSE Final Deprivation Index Score	PSE Equivalised Net Weekly Household Income - After Housing Costs	PSE Equivalised Net Weekly Household Income - Before Housing Costs	PSE HBAI SPId OECD Equivalised Net Weekly Household Income - Before Housing Costs	PSE Net Household Income - FRS extended definition	PSE Household Gross Income - FRS extended definition
0	454	512	540	616	832
1	357	426	457	569	739
2	337	411	441	522	674
3	304	379	408	515	640
4	261	338	372	473	571
5	241	323	352	436	533
6	234	315	345	424	519
7	213	308	336	403	473
8	192	285	318	376	429
9	191	281	316	364	435
10+	181	267	303	351	396
Average (N=10,078)	**352**	**422**	**452**	**535**	**693**

The fall in PSE equivalised income (after housing costs), by increasing deprivation score, are illustrated in the graph below.
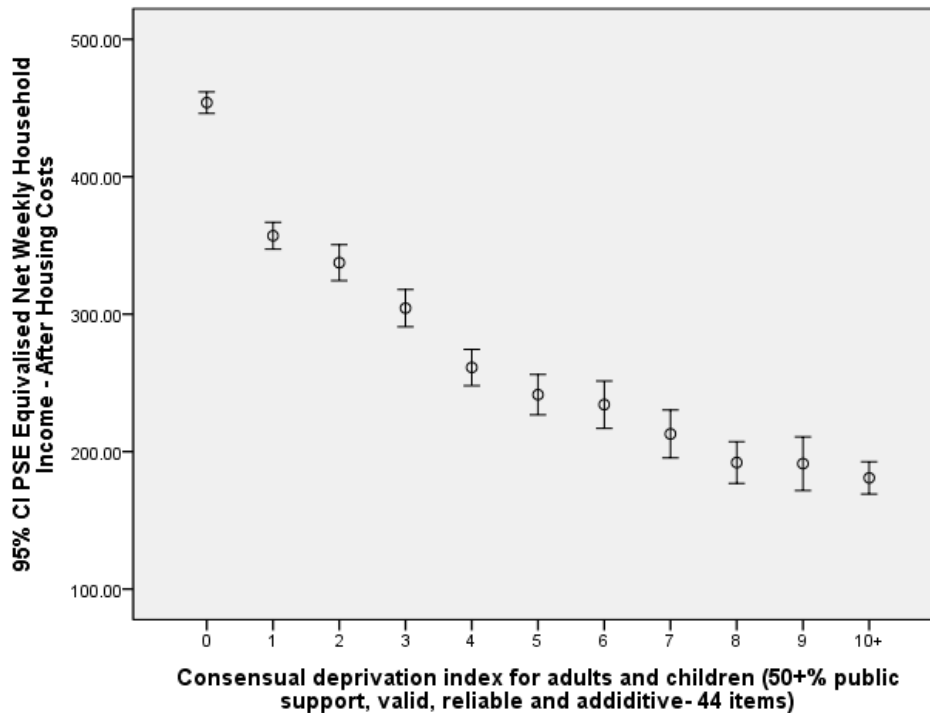
Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

Most studies of poverty and deprivation usually measure poverty at the household level due to a lack of individual level measures of income and deprivation. The error bar graph below shows PSE equivalised household income by the household's average deprivation score (rounded). The falls in income between 0 and 1 and between 3 and 4 deprivations are more marked at household level.
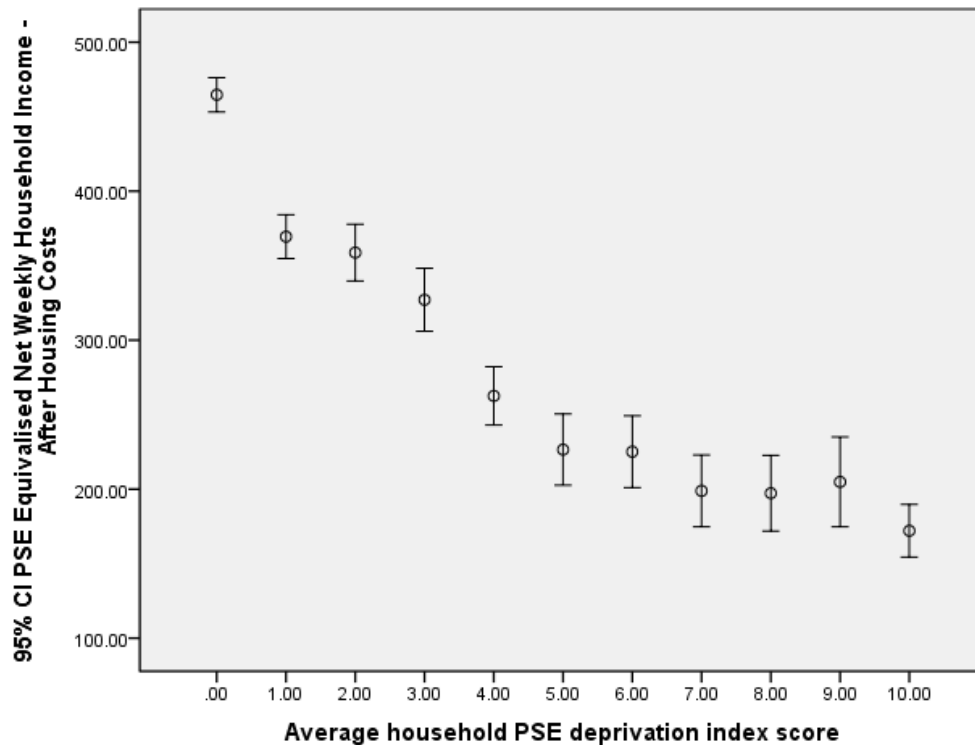
Cases weighted by normalised UK household weight - use this weight for household data

Step 7 − Identifying the combined income and deprivation poverty line

The 'objective' combined poverty line can be defined as the division between the 'poor' group and the 'not poor' group that maximises the between group sum of squares and minimises the within group sum of squares. This can be identified using the General Linear Model (GLM) in one of its forms (e.g. ANOVA, Discriminant Analysis or Logistic Regression), controlling for income, deprivation and household size and composition. The richest 4% of households were excluded from the modelling exercise.

The General Linear Models (both ANOVA and Logistic Regression) were used to determine the scientific poverty threshold, i.e. the deprivation score that maximises the between group differences and minimises the within group differences (sum of squares). These techniques were applied to a succession of groups created by increasing the number of items of which respondents were deprived. Thus, the first analysis was undertaken on groups defined by people lacking no items compared with people lacking one or more items (a deprivation score of one or more). Similarly, the second analysis was undertaken on a group comprised of people lacking one or no items against two or more items, and so forth.

The dependent variable in the ANOVA model was the log net PSE equivalised household income after housing costs and the independent variables were deprivation group (constructed as described above), number of adults in each household and the number of children in each household. With the Logistic Regression models the dependent variable was the deprivation

group and the independent variables were log net PSE equivalised household income after housing costs, number of adults and number of children.

ANOVA and Logistic Regression Models of Optimum Position for the Poverty Threshold (log equivalised household income AHC by average household deprivation)

Model	Individual F Statistic for corrected ANOVA Model	Individual Logistic Regression Model Chi-square	Household F Statistic for corrected ANOVA Model	Household Logistic Regression Model Chi-square
Null Model[6]	277		81	
Deprivation score of 1 or more	547	1,461	233	645
Deprivation score of 2 or more	566	1,487	251	706
Deprivation score of 3 or more	**590**	**1,513**	**274**	**816**
Deprivation score of 4 or more	**606**	1,458	**274**	780
Deprivation score of 5 or more	571	1,312	267	707
Deprivation score of 6 or more	531	1,100	242	567

The ANOVA and Logistic Regression results (above) show that the optimum poverty line is either 3 or more or 4 or more deprivations (i.e. it is probably about 3.5 deprivations). Further ANOVA and Logistic Regression analyses were run using the normal (i.e. un-logged) net equivalised household income. The results are shown below and are similar to the results using log income.

ANOVA and Logistic Regression Models of Optimum Position for the Poverty Threshold (PSE equivalised household income AHC by average household deprivation)

Model	Individual F Statistic for corrected ANOVA Model	Individual Logistic Regression Model Chi-square	Household F Statistic for corrected ANOVA Model	Household Logistic Regression Model Chi-square
Null Model[7]	365		99	
Deprivation score of 1 or more	645	1,356	255	629
Deprivation score of 2 or more	630	1,506	251	703
Deprivation score of 3 or more	**638**	**1,625**	265	828
Deprivation score of 4 or more	624	1,620	**274**	**862**
Deprivation score of 5 or more	571	1,474	248	778
Deprivation score of 6 or more	514	1,245	209	642

In his seminal book, *Poverty in the United Kingdom*, Peter Townsend argued that the scientific poverty line could be identified using a deprivation index to provide information external to the measurement of income/resources. Using the General Linear Model method, the income poverty line corresponds with an average household deprivation score of 3.5. The error bar graph below shows that this is approximately a PSE equivalised household income (AHC) of £295 per week. By comparison, the Minimum Income Standard for a Couple in 2012 was £302 per week[8] (excluding rent and child care costs). Thus, the objective income poverty line in 2012 was very similar to the Minimum Income Standard.

---

[6]   The null model only contains the number of adults and the number of children in the household as independent variables

[7]   The null model only contains the number of adults and the number of children in the household as independent variables

[8] See p46 http://www.jrf.org.uk/sites/files/jrf/minimum-income-standards-2012-full.pdf

As deprivation can only be measured in whole numbers for single person households, so the average household deprivation score has been rounded to the nearest integer and the poor have been identified as those households/people who suffer from low income (below £295 per week AHC) and three or more deprivations – marked 'Poor' on the graph (bottom left hand corner). The error bar graph also shows the approximate location of the 'Not Poor' (Top Left), Vulnerable (Bottom Left) and Rising (Top Right) groups of households. Please note that the areas on the error bar graph do not correspond with the size of these four groups (i.e. there are many households with a deprivation score of zero).

Error Bar Plot of Average Household Deprivation by PSE Equivalised Income (AHC)
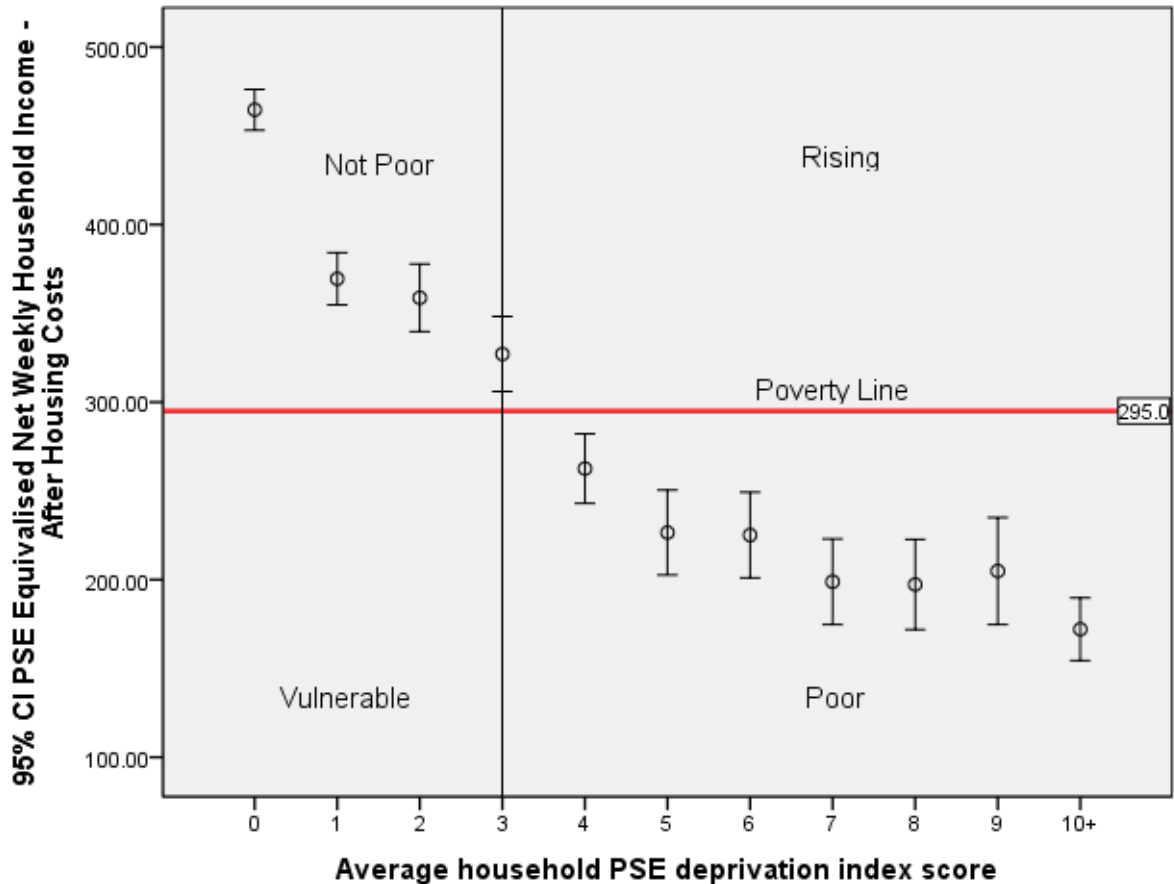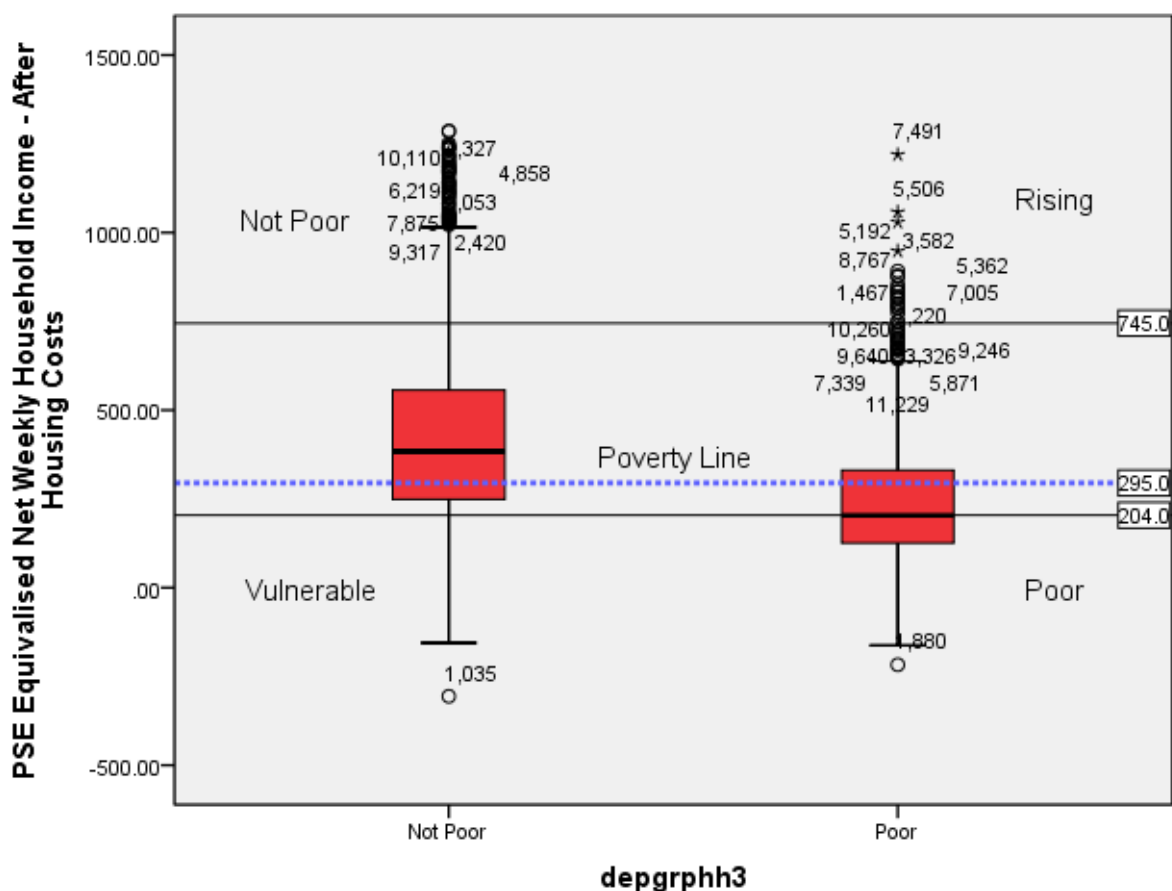

Cases weighted by normalised UK household weight - use this weight for household data

Step 8 − Removing those rising out of poverty and sinking into poverty (vulnerable)

In a cross-sectional survey, there will probably be a few people who are 'rising out of poverty': those with a high deprivation score and a high income. Their incomes and/or 'standard of living' should have increased in the recent past. These few cases can be identified using boxplots of income by 'deprivation threshold group (found on step 6) and controlling for household size/type. The outliers (with high incomes) in each household type should be those rising out of poverty.

The boxplot below shows that there are a few respondents who have deprivation scores of three or more but also high incomes – over £745 per week (e.g. rising out of poverty) – see top right of the boxplot.

Cases weighted by normalised UK household weight - use this weight for household data

The boxplot also shows the other three groups of households. The 'Poor' are those households suffering from 3 or more deprivations and low equivalised income (under £295). The 'Rising' are those households suffering from 3 or more deprivations but with high equivalised incomes (above £745 per week), i.e. income outliers for depgrp3, using Tukey's revised method to identify outliers. The 'Vulnerable' are those households with a low deprivation (less than 3 deprivations) who also have a low income (below £204 per week), i.e. the median income of Depgrp3. The 'Not Poor' are the remaining households that have not been classified as 'poor', 'rising' or 'vulnerable'.

In order to help validate this poverty group model, respondents to the PSE 2012 survey were asked, '*Has anything happened recently (in the last two years) in your life which has Improved your standard of living?*' [Anyimp1]. It would be expected *a priori* that the 'rising' group should have the highest proportion of respondents saying that their standard of living has '*improved*'. The table (below) shows that 32% of respondents in the 'rising' group reported improvements to their standard of living – more than any other group, as predicted.

Poverty Group by Improvement in Standard of Living during the Past Two Years

		Anything happened recently (in last 2 years) which has improved your standard of living		Total
		Not mentioned	**Mentioned**	
poverty	Poor	85%	15%	100%
	Rising	68%	**32%**	100%
	Vulnerable	82%	18%	100%
	Not poor	79%	21%	100%
Total		**81%**	**19%**	**100%**

The final results for the poverty group analyses are shown below:

Classification of the PSE2012 Households by Scientific Poverty Grouping

	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	1143	22.0	22.1	22.1
Rising	51	1.0	1.0	23.1
Vulnerable	542	10.4	10.5	33.6
Not poor	3433	66.1	66.4	100.0
Total	5169	99.5	100.0	
Missing	24	0.5		
Total	**5193**	**100.0**		

Using these definitions, the PSE survey found that in the UK in 2012:

- **22% of households were living in poverty**
- **1% were rising out of poverty**
- **10% were potentially vulnerable to poverty**
- **Two-thirds (66%) were relatively well off**

In order to maintain comparability with previous poverty surveys, the table below shows the poverty rates for individuals classified by their household's average deprivation scores rather than their individual deprivation scores.

Classification of the PSE2012 Individuals by Scientific Poverty Grouping

	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	2784	24.0	**24.1**	24.1
Rising	105	.9	**.9**	25.1
Vulnerable	1100	9.5	**9.5**	34.6
Not poor	7539	65.1	**65.4**	100.0
Total	11528	99.5	100.0	
Missing	56	.5		
Total	**11584**	**100.0**		

Using these definitions, the PSE survey found that in the UK in 2012:

- **24% of people were living in poverty**
- **1% were rising out of poverty**
- **10% were potentially vulnerable to poverty**
- **Almost two-thirds (65%) were relatively well off**

Individual Level Poverty

One unique advantage of the PSE2012 survey over its predecessors is that it is the first poverty survey that allows deprivation to be measured within the household. It is therefore not necessary to assign every person in a household the same average deprivation index score. For example, if parents sacrifice their own wellbeing to protect their children and/or one partner makes sacrifices for their spouse, then the individual level deprivation index in the PSE survey may show different deprivation scores for each person in the household, i.e. some people in the household may be 'poor' while other household members have been protected from poverty.

PSE2012 Individual Level Poverty Groups

	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	2586	22.3	**22.4**	22.4
Rising	78	0.7	**0.7**	23.1
Vulnerable	1117	9.6	**9.7**	32.8
Not poor	7747	66.9	**67.2**	100.0
Total	11528	99.5	100.0	
Missing	56	.5		
Total	**11584**	**100.0**		

Using these definitions, the PSE survey found that in the UK in 2012:

- **22% of people were living in poverty**
- **1% were rising out of poverty**
- **10% were potentially vulnerable to poverty**
- **Two-thirds (67%) were relatively well off**

The percent of adults and children identified as 'poor' using the individual level deprivation index is slightly lower (22%) than the percent poor using average household level deprivation

measures (24%) – indicating that there are some households where some members are 'poor' but others have been protected from poverty.

Rising Group at Individual Level

It would be expected *a priori* that, when deprivation is measured at individual level, the 'Rising' group will show even clearer recent increases in incomes than when defining poverty groups using an average household deprivation index. Additionally, since the rising group are suffering from multiple deprivations (3+), even though they have a high income, you would also expect *a priori* that they are more likely to have had increases in their incomes in the past year than in the previous year (i.e. two years ago).

Respondents were asked about changes to their household incomes in both their 2010/11 FRS and their 2012 PSE interviews – the results are shown in the two tables below. The results conform to the predictions (*a priori* expectations) of the dynamic poverty model proposed by Gordon (2000) – see Appendix II, e.g. 65% of the rising group reported an increase in household incomes since their FRS interviews (*circa* past 12 months). Additionally, 46% of the rising group reported increases in their household's incomes in the 12 months prior to their 2010/11 FRS interviews. The rising group are more likely to report increases in household income than any other poverty group.

By contrast, the vulnerable (sinking into poverty) group are more likely than any other poverty group to report decreases in their household incomes in both their FRS and PSE interviews.

Poverty Group by Whether Household Income Changed in the Last 12 Months Recorded in the 2010/11 FRS Interview

| | | Whether income changed in last 12 months | | | |
		Present income higher	**Present income lower**	**About the same**	**Total**
Poverty Groups - Individual Level Deprivation	Poor	18%	29%	53%	100%
	Rising	**46%**	29%	25%	100%
	Vulnerable	15%	**36%**	49%	100%
	Not poor	27%	20%	53%	100%
Total		**24%**	**24%**	**52%**	**100%**

Poverty Group by Whether Household Income Changed since the FRS Interview Recorded in the 2012 PSE Interview

		Thinking of the income changes of the household as a whole since FRS Date, has your income ...			
		increased,	decreased,	or stayed about the same?	Total
Poverty Groups - Individual Level Deprivation	Poor	25%	29%	46%	100%
	Rising	**65%**	5%	30%	100%
	Vulnerable	34%	**30%**	36%	100%
	Not poor	46%	16%	39%	100%
Total		**39%**	**21%**	**40%**	**100%**

Appendix I: Individual Level Poverty Line Analyses

ANOVA and Logistic Regression Models of Optimum Position for the Poverty Threshold (log equivalised household income AHC by Individual deprivation)

Model	Individual F Statistic for corrected ANOVA Model	Individual Logistic Regression Model Chi-square
Null Model[9]	277	
Deprivation score of 1 or more	547	1,461
Deprivation score of 2 or more	567	1,487
Deprivation score of 3 or more	**590**	**1,513**
Deprivation score of 4 or more	**606**	1,458
Deprivation score of 5 or more	572	1,312
Deprivation score of 6 or more	531	1,100

The ANOVA and Logistic Regression results (above) show that the optimum poverty line is either 3 or more or 4 or more deprivations (i.e. it is probably about 3.5 deprivations). Further ANOVA and Logistic Regression analyses were run using the normal (i.e. un-logged) net equivalised household income. The results are shown below and indicate an objective poverty line of 3 or more deprivations. Thus, the individual level deprivation index optimum poverty threshold results are similar to the average household deprivation results.

ANOVA and Logistic Regression Models of Optimum Position for the Poverty Threshold (PSE equivalised household income AHC by Individual deprivation)

| Model	Individual F Statistic for corrected ANOVA Model	Individual Logistic Regression Model Chi-square
Null Model	365	
Deprivation score of 1 or more	645	1,356
Deprivation score of 2 or more	630	1,506
Deprivation score of 3 or more	**638**	**1,625**
Deprivation score of 4 or more	624	1,620
Deprivation score of 5 or more	571	1,474
Deprivation score of 6 or more	514	1,245

The optimum income poverty line is thus the mean income of those people with a deprivation index score of three, i.e. £304 per week PSE equivalised household income (AHC). The 95% Confidence Intervals for this objective poverty line range from £291 to £318 and thus are statistically indistinguishable from the objective poverty line based on the average household index (£295). Also, by comparison, the Minimum Income Standard for a Couple in 2012 was £302 per week (excluding rent and child care costs). Thus, the objective individual income poverty line in 2012 was very similar to the Minimum Income Standard.

---

[9]   The null model only contains the number of adults and the number of children in the household as independent variables

Error Bar Plot of Individual Deprivation by PSE Equivalised Income (AHC)
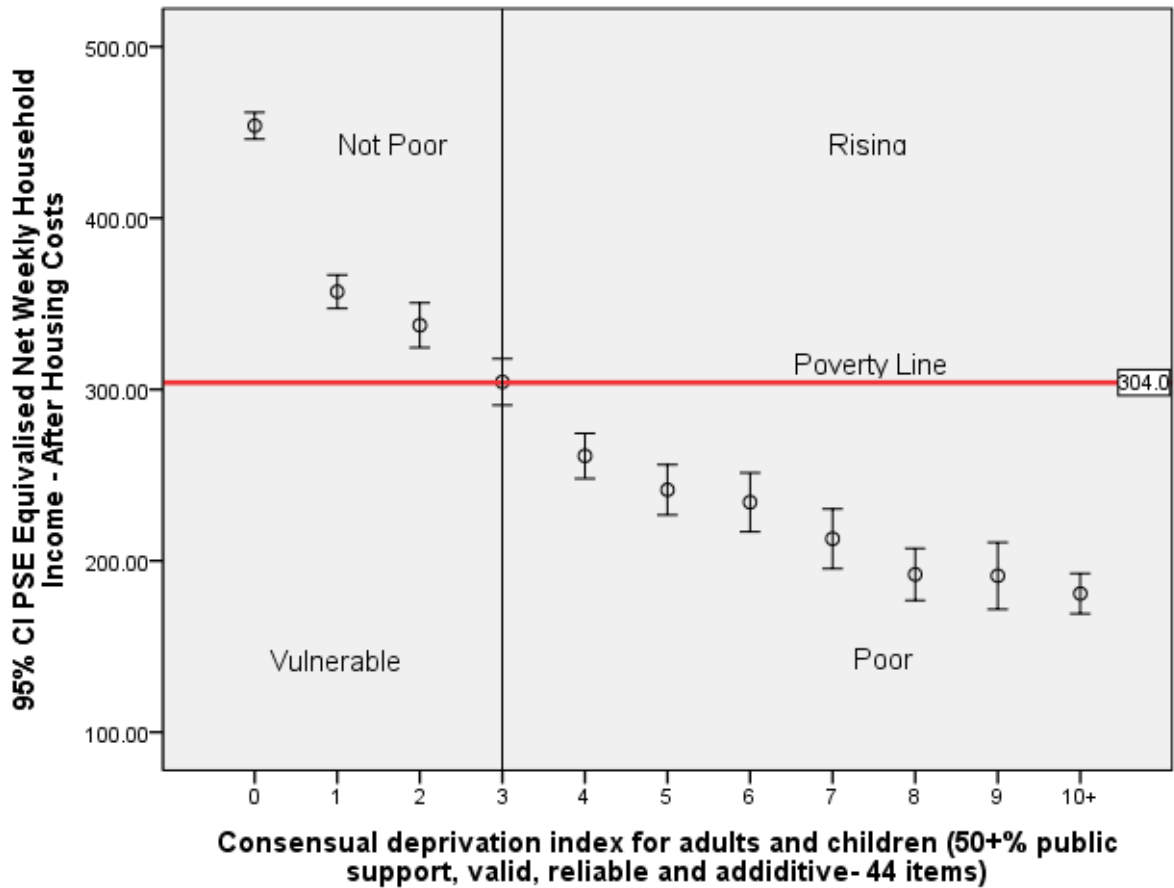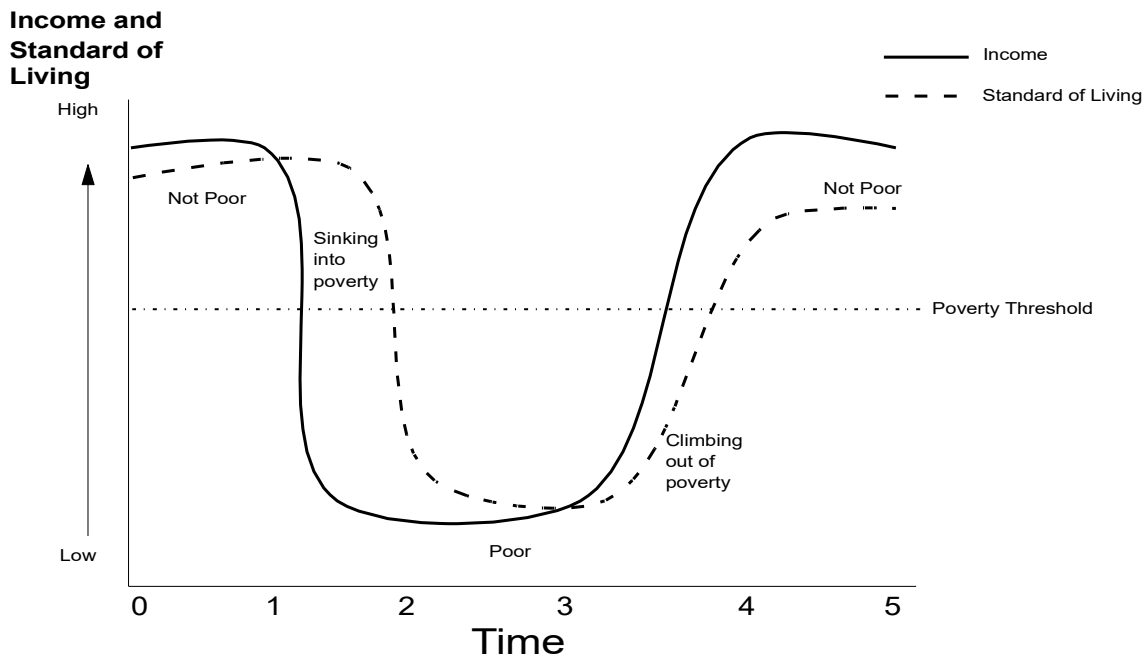

Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses
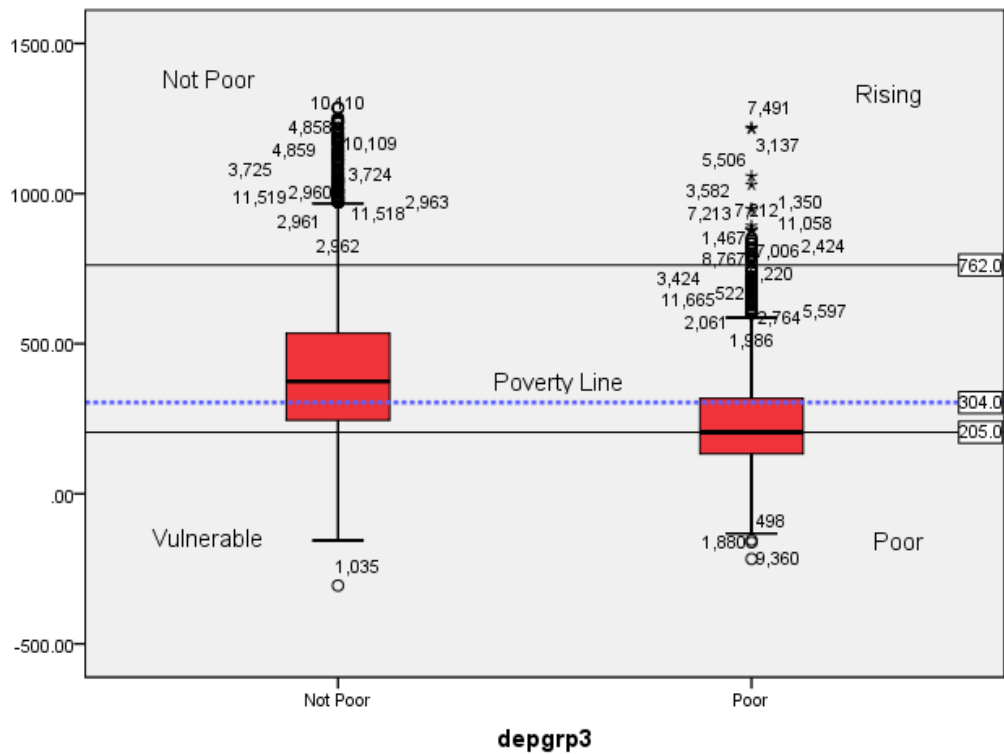
Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

Appendix II: Dynamics of Poverty Model (Gordon 2000)

Gordon (2000) proposed that, in any cross sectional survey, four groups could be identified (not just the 'poor' and 'non-poor') resulting from the dynamic nature of poverty, a vulnerable group (low income and low deprivation) who are at risk of 'sinking into poverty and a rising group (high income and high deprivation) who are climbing out of poverty.

Appendix III: PSE1999 Comparable Poverty Line Analyses Only One Random Adult

ANOVA and Logistic Regression Models of Optimum Position for the Poverty Threshold (log equivalised household income AHC by Individual deprivation)

Model	Individual F Statistic for corrected ANOVA Model	Individual Logistic Regression Model Chi-square
Null Model[10]	103	
Deprivation score of 1 or more	250	764
Deprivation score of 2 or more	266	799
Deprivation score of 3 or more	297	916
Deprivation score of 4 or more	**323**	**957**
Deprivation score of 5 or more	315	828
Deprivation score of 6 or more	281	677

The ANOVA and Logistic Regression results (above) show that the optimum poverty line is 4. Further ANOVA and Logistic Regression analyses were run using the normal (i.e. un-logged) net equivalised household income. The results are shown below and indicate an objective poverty line of 4 or more deprivations. However, it should be noted that the individual weights will not be correct if only one random adult is selected from each household, so these results must be treated with caution.

ANOVA and Logistic Regression Models of Optimum Position for the Poverty Threshold (PSE equivalised household income AHC by Individual deprivation)

Model	Individual F Statistic for corrected ANOVA Model	Individual Logistic Regression Model Chi-square
Null Model	114	
Deprivation score of 1 or more	270	715
Deprivation score of 2 or more	262	788
Deprivation score of 3 or more	284	947
Deprivation score of 4 or more	**299**	**1028**
Deprivation score of 5 or more	279	898
Deprivation score of 6 or more	245	763

The optimum income poverty line using the 1999 PSE methodology is the upper bound of the 95% Confidence Interval of the mean income[11] of those people with a deprivation index score of four, i.e. £292 per week PSE equivalised household income (AHC). By comparison, the Minimum Income Standard for a Couple in 2012 was £302 per week (excluding rent and child care costs). Thus, the objective individual income poverty line in 2012 was very similar to the Minimum Income Standard.

---

[10] The null model only contains the number of adults and the number of children in the household as independent variables

[11] The upper bound of the 95% CI of the mean was used in the PSE1999 study due to the relatively small sample size available for the threshold deprivation group in the 1999 survey data.

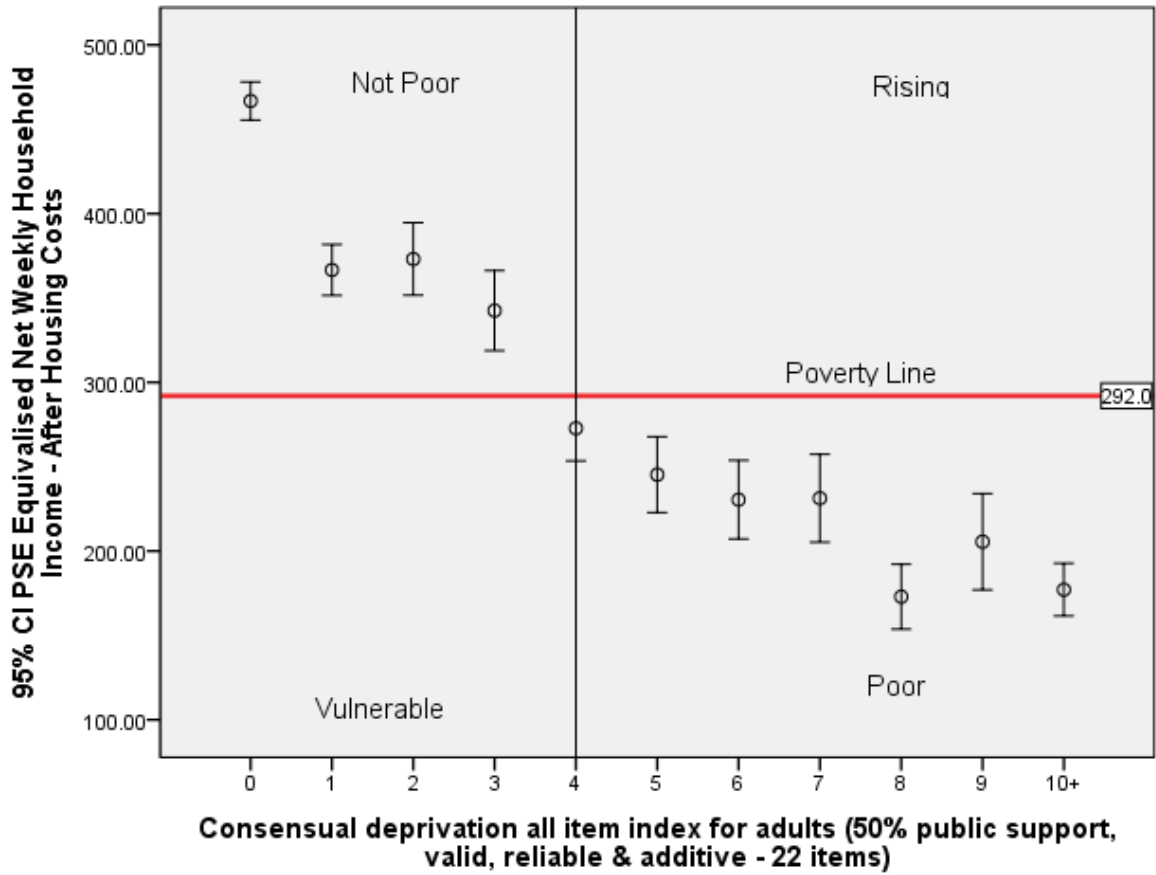**PSE2012 Individual Level Adult (18+) Poverty Groups Using PSE1999 Methodology**

	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	1101	21.1	21.1	21.1
Rising	23	.4	.4	21.6
Vulnerable	494	9.5	9.5	31.0
Not poor	3594	69.0	69.0	100.0
Total	**5211**	**100.0**	**100.0**	

Using the one random adult per household 1999 PSE methodology, the 2012 UK poverty group results were:
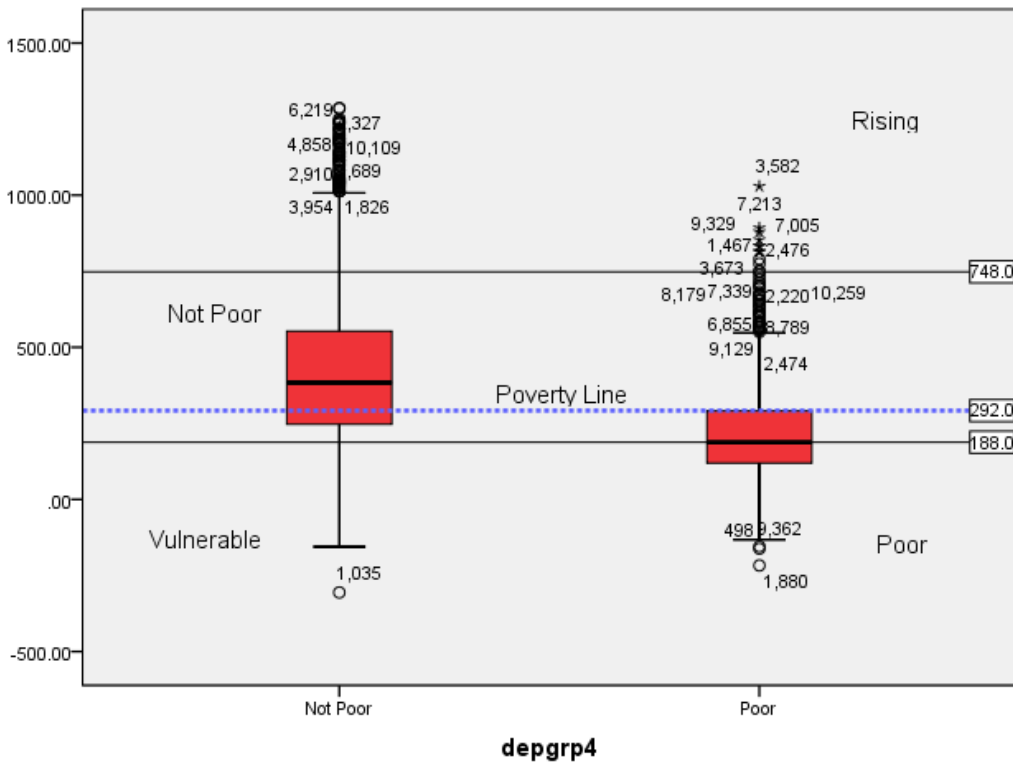
- **21% of people were living in poverty**
- **0.5% were rising out of poverty**
- **9% were potentially vulnerable to poverty**
- **Almost 7 out of 10 (69%) were relatively well off**

However, these results may be somewhat biased as the PSE weights were calculated on the basis that all adults in the household would be used for the analyses (rather than one random adult in each household). Thus, the adult in a single adult household has a 100% chance of being selected whereas each adult in a two adult household only has a 50% chance of being selected. The PSE individual weights may only partially correct for the selection bias introduced into these analyses by using the 1999 PSE methodology. To fully correct for this selection bias would require a re-calculation of the PSE individual weights and this is a non-trivial calculation. Nevertheless, the results using the PSE 1999 methodology are more or less identical to the much more advanced and accurate PSE 2012 method (e.g. both methods identify approximately 22% of the population as living in poverty) – which attests to the strengths of the 1999 PSE methodology, when trying to measure poverty with limited resources.

PSE1999 Methodology: Error Bar Plot of Individual Deprivation of a Random Adult in each Household by PSE Equivalised Income (AHC)

Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses

Cases weighted by Normalised PSE Individual weight - use this weight for individual level analyses