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**Multi-dimensional Deprivation in Ireland Among 9-Year Olds in Ireland:
An Analysis of the *Growing Up in Ireland* Survey**

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Abstract

In this paper we make use of the 9-year old wave of the *Growing Up in Ireland* study to analyse multidimensional deprivation in Ireland. The Alkire and Foster adjusted head count ratio approach (AHCR; 2007, 2011a, 2011b) applied here constitutes a significant improvement on union and intersection approaches and allows for the decomposition of multidimensional poverty in terms of dimensions and sub-groups. The approach involves a censoring of data such that deprivations count only for those above the specified multidimensional threshold leading to a stronger set of interrelationships between deprivation dimensions. Our analysis shows that the composition of the adjusted head ratio is influenced by a range of socio-economic factors. For less-favoured socio-economic groups dimensions relating to material deprivation are disproportionately represented while for the more advantaged groups, those relating to behavioral and emotional issues and social interaction play a greater role. Notwithstanding such variation in composition, our analysis showed that the AHCR varied systematically across categories of household type, and the social class, education and age group of the primary care giver. Furthermore, these variables combined in a cumulative manner. The most systematic variation was in relation to the head count of those above the multidimensional threshold rather than intensity, conditional on being above that cut-off point. Without seeking to arbitrate on the relative value of composite indices versus disaggregated profiles, our analysis demonstrates that there is much to be gained from adopting an approach with clearly understood axiomatic properties. Doing so allows one to evaluate the consequences of the measurement strategy employed for the understanding of levels of multidimensional deprivation, the nature of such deprivation profiles and socio-economic risk patterns. Ultimately it permits an informed assessment of the strengths and weaknesses of the particular choices made.

1. Background

1.1 Understanding Multidimensionality

It has long been argued that poverty ‘is not just the absence of income or even the material deprivation that accompanies it’ (Tomlinson and Walker, 2009:20). As far back as 1979, Townsend argued that poverty was not simply a matter of lacking the income ‘necessary to purchase a basket of goods, but rather the lack of resources required to participate fully in society’ (Townsend, 1979, p.13). A considerable literature has argued for a multidimensional measure of poverty that incorporates direct measures of living standard as well as income (Ringen, 1988; Nolan and Whelan, 2007). Thus, poverty is more than a matter of low income – it is multidimensional. In the European context, the widespread adoption of the term ‘social exclusion’ is a mark of this awareness that income poverty alone does not do justice to the understanding of the phenomenon of concern.

The multidimensional approach has particular salience in relation to children. In an in-depth study of 40 children (aged 10 to 17) from low-income families in Bristol and Bath, conducted in 1999, Ridge (2002) found that the effects of poverty and disadvantage can permeate every aspect of children’s lives – material, social and emotional. The distinctive nature of childhood deprivation was related to the manner in which it is experienced in family, school and peer contexts (Ridge, 2002). This consensus relating to multidimensionality has led to attempts to specify what exactly we mean when we say that poverty is multidimensional. There are a number of distinct ways of thinking about multidimensionality. One could focus on the accumulation of negative outcomes with individuals exhibiting a particular magnitude of negative outcomes being treated as equivalent irrespective of differences in the multidimensional profiles being represented. With such an approach information is necessarily lost that would be available from detailed dimensional profiles that span a range

of dimensions but without forming a composite single index. The latter approach enables us to distinguish between different forms of multidimensional poverty and to explore the varying pathways leading to such diverse outcomes. It is also entirely consistent with an understanding of poverty as multi-dimensional.

The academic and policy debates on such methodological approaches has been vigorous, focusing inter alia on the value of summary indices for communication to a wide audience versus the arbitrary nature of decisions required in combining distinct dimensions in producing such indices. A number of authors have questioned whether acceptance that poverty is multidimensional necessarily implies a need for a multidimensional poverty index (MPI). Ravallion (2011), for example, concludes that it is one thing to recognise that something is missing from a given measure and quite another to conclude that what is required is a single composite index. Concern that the construction of such indices inevitably involves an arbitrary element has been a recurring theme (OECD, 2009). Nolan and Whelan (2007) note that while a case can be made for a multidimensional approach in seeking to adequately measure, understand and respond to poverty, they are not the same case, they have different implications and one does not simply follow from the other. In that context considerable discussion has focused on the relative merits of the composite UNDP Human Development Index and the Millennium Development Goals which avoid such aggregation, while a similar contrast exists between the composite European Poverty Target and the EU's full suite of social inclusion indicators.

Without seeking to arbitrate on the relative value of these alternatives, here we argue that where a multidimensional poverty or deprivation index is constructed there is much to be gained from adopting an approach with clearly understood axiomatic properties. Doing so allows one to evaluate the consequences of the measurement strategy employed for the

understanding of levels of poverty, multidimensional poverty profiles and socio-economic risk patterns, and ultimately enables us to make an informed assessment of the strengths and weaknesses of the particular choices made.

In what follows we make use of the rich data base provided by the *Growing Up in Ireland* Study (GUI) wave relating to 9-year-olds, conducted in 2007, to develop and assess a multidimensional deprivation measure. Our focus is on deprivation rather than well-being as in the case of the UNICEF child well-being index and the ‘York Index’ constructed by Jonathan Bradshaw and his colleagues (Bradshaw et al., 2007) and is conducted at the level of the individual.

1.2 Measuring Multi-dimensional Deprivation

Bourguignon and Chakravarty (2003) provide a framework for multidimensional poverty measurement involving both an identification function for counting the number poor and a poverty measure that combines that information into a statistic summarizing the overall extent of poverty. Axioms analogous to the ones used in the one dimensional case ensure that the measure can be decomposed by dimension and sub-group. The simplest summary measure is the number of dimensions on which an individual or household is deprived, which Atkinson (2003) refers to as the ‘counting’ approach. Atkinson (2003) distinguishes between the union and intersection approaches, the former counting as poor those deprived on any dimension while the latter counts only those deprived on all dimensions. While the union and intersection approaches are easy to understand, they can be particularly ineffective at separating the poor from the non-poor, with the former tending to identify implausibly large numbers as poor and the latter tending to capture tiny minorities.

A key motivation underlying the recent methodological contributions of Alkire and Foster (2011a & 2011b) is to address these shortcomings. Their procedure involves a dual cutoff

approach. The first relates to the choice of thresholds for individual dimensions. Given a set of deprivation dimensions considered as of equal weight, if a person's outcome on a given deprivation dimension j exceeds the appropriate threshold z_j then the person is said to be deprived on that dimension. The breadth of each person's deprivation is simply the number of deprivations s/he experiences. The second cutoff point k is used to determine whether a person has sufficient deprivations to be considered poor. If an individual's deprivation count is k or above the person is identified as poor. Thus in order to be multi-dimensionally poor an individual must be above the deprivation threshold on the requisite number of dimensions.

Following Alkire and Foster (2011a and 2011b), the implementation of the approach is best understood as involving a progression of matrices. The starting point is a set of scores for a group of n individuals on d dimensions. This is the achievement matrix Y . For the second matrix, rather than considering the full range of scores on the deprivation dimensions we simply distinguish between those above and below the threshold for each dimension. This produces the deprivation matrix g^0 by replacing each entry in Y that is above its deprivation cutoff z_j with the deprivation value w_j and each entry that is not above the deprivation threshold with 0. Deprivation scores above 0 now relate only to those individuals above the cutoff point. Finally, we proceed to take into account deprivation only for those experiencing sufficient deprivation to be above the second cutoff point relating to number of dimensions. The censored deprivation matrix $g^0(k)$ multiplies each row in the deprivation matrix by the identification function which has value of 1 for those identified as multi-dimensionally poor and 0 otherwise. In the former case the value for an individual remains unchanged; while in the latter cases the information for that person is replaced with zeros. Deprivation scores above 0 in the *censored* matrix thus relate only to those who are above the threshold on the requisite number of dimensions and are also above the threshold for the specific dimension under consideration.

Censoring is central to the method in excluding information on those not multi-dimensionally poor contained in the earlier deprivation matrices. Our focus in this paper is on the *adjusted headcount ratio* (AHCR) and its components. The adjusted headcount ratio is defined as the mean of the censored deprivation matrix or $M_{0=\mu}(g^O(k))$. The headcount H is the proportion of people who are multi-dimensionally poor. The intensity I is the average deprivation share among the poor. Alkire and Foster (2011b) demonstrate that their methodology satisfies a range of desirable axiomatic properties. Of particular relevance for our analysis is decomposability in relation to dimensions and socio-economic groups.

Particularly given the importance of such censoring to the procedures that we adopt, it should be clear that the exercise in which we are involved is somewhat different from that involved in constructing a general index of child well-being (Sanson et al., 2010).

2. Method

2.1 The Growing Up in Ireland 9-Year Old Data

As Alkire and Foster (2011b) stress, their methodology is best seen as a general framework for measuring multidimensional poverty since it leaves many key decisions to the analysts. This includes the number of dimensions, the choice of cut-offs for each dimension and the threshold for number of dimensions on which an individual must be deprived before they can consider to be multi-dimensionally poor.

Analysis is based on information recorded in respect of just over 8,500 9-year-olds from Ireland's national longitudinal study of children – the *Growing Up in Ireland* (GUI) project. The purpose of the study is to improve our understanding of the lives and development of children in Ireland. It includes two cohorts of children and their carers and includes almost 20,000 children. One cohort (of just over 11,100 children) was recruited when the children were 9 months old. The other (of 8,500 children) was recruited when the children were 9

years of age. Analysis in this paper is based on the older cohort.

Growing Up in Ireland is a broadly-based longitudinal child cohort study which focuses on the child's health; socio-emotional/behavioural; and educational/cognitive development. It records detailed information on the experiences and circumstances of children living in Ireland. The 9-year-old children (along with their parents, school principals and teachers) were recruited into the study and first interviewed in 2007. A two-stage sample design was used. At the first stage, a nationally representative sample of 900 schools was recruited from the population of 3,200 primary level schools in Ireland. The sample of 8,500 nine-year-old children was then recruited from within these schools. All data presented in the paper were reweighted to reflect sample design and response characteristics.

2.2 *Field Procedures and Measures*

The majority of information was collected from the Primary Caregiver, the majority of whom were the children's biological mothers, during a face-to-face interview in the home. Information from teachers was collected via a self-complete questionnaire that was returned by post. The direct assessment of the child's reading ability (see Table 1) was undertaken in a classroom-setting. The procedures and materials for *Growing Up in Ireland* were reviewed and approved by an independent Research Ethics Committee and informed consent was obtained from the Primary Caregiver, with the child providing informed assent.

Information from a number of domains in the child's life is included in the multi-dimensional treatment of disadvantage. These include aspects of their family's financial circumstances; parental report on the child's socio-emotional and behavioural characteristics; parental perception of the quality of the child's residential neighbourhood; and the teacher's

perception of the child's readiness for school each day as well as the child's test scores on a standardised educational performance test which is used in Ireland¹.

Measuring Multiple Deprivation

The effects of multiple deprivation and poverty on children's future outcomes have been the subject of debate and concern for some time. Recently work using data from the 1958 and 1970 British birth cohort studies found that a range of childhood deprivation indicators increased the risk for both poorer general health and lower mental well-being in adulthood (Mensah & Hobcraft, 2008). Importantly these deprivation indicators included not just socioeconomic deprivation but also family disruption, behavioural problems and low academic test scores. Increasingly, however, concern has also been expressed about the effects of deprivation on current child well-being as well as future outcomes both internationally (e.g. Lippman, Anderson Moore & McIntosh [Unicef Innocenti Research Centre], 2009; Tomlinson, Walker & Williams, 2008; OECD, 2009) and nationally (e.g. Hanafin, Brooks, Carroll, Fitzgerald, Nic Gabhainn & Sixsmith, 2007). It is also being recognised that 'poverty' and deprivation embrace wider and more invasive concepts than just low income. Tomlinson et al., (2008) used data from the British Household Panel Survey to show that a composite 'poverty index' that included aspects of neighbourhood and psychosocial strain in addition to material deprivation and economic strain was a better predictor of lower (current) child well-being in relation to 'home life', 'educational orientation', 'low self-worth' and 'risky behaviours' than individual measures of socio-economic disadvantage.

In terms of choosing indicators of current child well-being, or the obverse to well-being, different indices have been proposed by various authors, but tend to cover the broad domains of economic security, cognitive development/education, physical health and psychological or

¹ This is the standardised Drumcondra reading test for 9-year-olds.

emotional well-being (Lippmann et al., 2009). For our purposes we have chosen the domain sub-headings used by the OECD in its comparison of child well-being across member countries (including Ireland), which are *Material Well-being, Housing and Environment, Education, Health, Risk Behaviours, and Quality of School Life* (OECD, 2009). From the variables available in the Growing Up in Ireland dataset (Wave 1, Child Cohort), we have endeavoured to place at least one indicator in each of these domains, with the focus being on *deprivation* rather than *wellness*. In addition we have included an ‘*Emotional Well-being*’ domain as this is not directly covered by the OECD sub-headings but is a common theme in other indices. The chosen variables are all indicators that are thought to potentially present both a current impediment to the child’s well-being or opportunities as well as their future outcomes. These variables are summarised in Table 1.

Table 1: Description of indicators used to measure multi-dimensional deprivation

<i>Domain</i>	<i>Indicator</i>	<i>Description</i>	<i>Source</i>
A. Material well-being	1. Low Income	Family is in the bottom two income deciles of the income distribution of equivalised income	Details provided at L35-L36 - Primary Caregiver (PCG) Questionnaire*
B. Housing and Environment	2. Unsafe Community	Primary Caregiver responded ‘disagree’ or ‘strongly disagree’ to any of: <ul style="list-style-type: none"> • It is safe to walk alone after dark • It is safe for children to play outside during the day • There are safe parks, playgrounds and play spaces in the local area 	M3. PCG Questionnaire
	3. Negative environment	Primary Caregiver responded ‘agree’ or ‘strongly agree’ to any of: <ul style="list-style-type: none"> • Rubbish and litter lying about • Homes and gardens in bad condition • Vandalism and deliberate damage to property • People being drunk or taking drugs in public 	M2. PCG Questionnaire
C. Education	4. Poor reading ability	Child scored in the lowest two deciles in a standardised English reading test.	Drumcondra Reading Test†(ERC, 2007) – directly administered by interviewers in school
D. Health	5. Overweight or obese	Child classified as overweight or obese on measured Body Mass Index	Height and weight measured in the home by interviewers using

<i>Domain</i>	<i>Indicator</i>	<i>Description</i>	<i>Source</i>
			medical-grade equipment
E. Risk Behaviours	6. Engaged in delinquent behaviour(s)	PCG reports that child has engaged in any of the delinquent behaviours adapted from the conduct disorder checklist in the DSM-IV including <ul style="list-style-type: none"> • started fights or bullies, threatens or intimidates others • physically cruel to other people or animals • deliberately destroyed or damaged property • often lied to obtain goods or favours • stolen items of value • run away from home overnight • often truanted from school 	K14. PCG Questionnaire
F. Quality of School Life	7. Victim of bullying	Parental report of whether or not the child has been a victim of bullying in the year preceding their interview	J18. PCG Questionnaire
	8. Inadequately prepared for school	Teacher report that any of the following applied to the child in the current school year 'sometimes', 'often' or 'always': <ul style="list-style-type: none"> • inadequately dressed for the weather conditions • too tired to participate as he / she should in class • without a lunch / snack • hungry • with a general lack of cleanliness 	Question 7. Teacher-on-Pupil Questionnaire**
G. Emotional well-being	9. Behavioural problems	Child scores in the 'above average' or 'abnormal' range of a parent-report measure on behaviour where higher scores indicate worse behaviour. Measure used is the Total Difficulties score from the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997), based on subscales of hyperactivity, emotional symptoms, conduct problems, and peer relationship problems†.	Parent-report SDQ (H2. PCG Questionnaire)
	10. Experienced at least one adverse life event	PCG reports that child has experienced any of the following non-normative adverse life events: <ul style="list-style-type: none"> • Stay in foster home/ residential care • Drug taking/alcoholism in the immediate family • Conflict between parents • Parent in prison 	Selected items from H2. PCG Questionnaire

*Primary Caregiver Questionnaire, *Growing Up in Ireland* can be accessed at:
http://www.growingup.ie/fileadmin/user_upload/documents/Questionnaires/9_Year_Cohort_Mother_or_Lone_Father_Main_Questionnaire.pdf

**Teacher-on-Pupil Questionnaire, *Growing Up in Ireland* can be accessed at:
http://www.growingup.ie/fileadmin/user_upload/documents/Questionnaires/9_Year_Cohort_Teacher_on_Pupil_Questionnaire.pdf

†Further information on this measure is available in the Growing Up in Ireland Technical Report No. 1 (Murray et al, 2011)

3. Results

3.1 Deprivation Thresholds

In principle, a weight could be applied to each of the ten dimensions so as to assign differential importance to its role in the overall measure. In the absence of any external information which could be used as the basis of a weighting system the current analysis assumes that all dimensions have an equal weight of one. In line with this we have attempted to choose cut-off points for each of the dimensions so as far as possible to have equal numbers above the threshold. The numbers above the relevant cut off point are set out in Table 2. For eight of the dimensions, the percentage of children defined as deprived range between 15% and 25%. For the readiness measure the figure falls to 12% and for deviant behaviour to 10%. In the interpreting the analysis it is necessary to keep such differences in mind.

Table 2: Weighted percentage of children experiencing each dimension of disadvantage (uncensored)

<i>Domain</i>	<i>Deprivation indicator</i>	<i>% of 9-year-olds</i>
Material well-being	1. Low income	20.0
Housing and environment	2. Unsafe community	20.1
	3. Negative environment	18.3
Education	4. Poor reading ability	21.1
Health	5. Overweight or obese	25.2
Risk behaviours	6. Delinquent behaviour	10.0
Quality of school life	7. Victim of bullying	23.4
	8. Inadequately prepared for school	12.1
Emotional well-being	9. Behavioural problems	22.4
	10. Adverse life event	15.0

In adopting the multi-dimensional approach a further issue arises in determining the threshold for disadvantage. This refers to the number of dimensions (as summarised in Table 2) which must be experienced by the child to be classified as 'disadvantaged'. Only if a child was found to be disadvantaged on three or more of the dimensions in question was s/he considered to be experiencing multi-dimensional disadvantage, as defined in our analysis. This is the 'censoring' threshold referred to above.

3.2 *The Relationships between Deprivation Dimensions: Censored and Uncensored Approaches*

Before proceeding to look directly at the results of applying the adjusted head count ratio (AHCR) approach, we first explore the consequences for the relationships between our selected deprivation dimensions of moving from an *uncensored* to a *censored* approach. In Table 3 we show the correlations between each of the dimensions. The uncensored outcomes are above the diagonal and the censored below. Focusing first on the former we can see that the highest correlations of .304 and .250 are between general behavioural problems and respectively delinquent behaviour and being a victim of bullying. Of the remaining correlations, none exceed 0.2. The average correlation between uncensored dimensions is .098. The magnitude of these correlations has inevitable consequences in minimising the numbers counted as deprived.

Table 3: Correlation coefficients of uncensored with uncensored (top right quadrant) and censored with censored (bottom left quadrant)

		UNCENSORED									
		Low inc.	Unsafe comm..	Poor environ.	Poor reading	Over-weight	Delin. behav.	Victim bullying	School unprep.	Behav. prob's	Adv. events
CENSORED	<i>Low income</i>	1	.046	.137	.173	.008	.050	.070	.186	.091	.088
	<i>Unsafe community</i>	.275	1	.159	.020	.033	.019	.049	.007	.038	.009
	<i>Poor environment</i>	.340	.387	1	.142	.021	.089	.120	.081	.162	.093
	<i>Poor reading</i>	.391	.253	.363	1	.031	.093	.053	.186	.182	.079
	<i>Over-weight</i>	.255	.301	.268	.277	1	.024	.091	.053	.070	.008
	<i>Delinquent behaviour</i>	.186	.158	.209	.224	.179	1	.100	.134	.304	.153
	<i>Victim of bullying</i>	.304	.292	.343	.297	.362	.250	1	.107	.250	.111
	<i>School unprepared-</i>	.350	.152	.215	.351	.241	.233	.272	1	.176	.131
	<i>Behavioural problems</i>	.313	.262	.364	.402	.349	.456	.499	.327	1	.161
	<i>Adverse life events</i>	.244	.202	.260	.262	.221	.282	.323	.275	.325	1
		Mean correlation top right quadrant				0.098					
		Mean correlation bottom left quadrant				0.291					

Turning to the censored data, we find a much more even pattern of correlation between dimensions, reflected in an average correlation of .291 which is nearly triple that in the uncensored case. The largest correlations are again between general behavioural problems, and delinquent behaviour and victim of bullying. However, on this occasion the correlations rise respectively to .456 and 0.499. It is clear that, conditional on being above the multidimensional poverty threshold, the association between different forms of poverty/deprivation is considerably stronger. This in turn means that the proportion of such individuals fulfilling particular intersection conditions will be significantly increased.

In Table 4 we show the cumulative distribution of deprivation for the censored and uncensored cases. We focus first on the uncensored case. The union approach counts as poor those experiencing deprivation on any of the component dimensions. From Table 4 we can see that in this case it identifies 77.4% of children. This outcome is typical of the union approach which typically identifies a large segment of the population as poor. The intersection approach identifies as poor only those experiencing predefined levels of multiple deprivation. Were we to require that those classified as poor should be deprived on all ten dimensions the figure would be 0. As we relax the condition relating to the number of deprivation items we observe a corresponding increase in poverty levels. However, it rises to only 3.5% for 6+ items and 7.8% for 5+. For the 3+ threshold with which we have chosen to operate the figure is 29.4%. Again this is consistent with previous analysis employing the intersection approach to identify multidimensional poverty which has shown that where the threshold in terms of number of dimensions is set high the proportion of the population fulfilling the condition is derisory. Where either an extremely large or modest proportion of the population is identified as experiencing multidimensional poverty, observed socio-economic differentiation is inevitably modest. Switching our attention to the censored distribution we find that of the 29.4% who are above the 3+ deprivation threshold, 46.9% are

deprived on three items, 26.6% on four items and 14.6% on five or more. Even among this group only 12.1% are deprived on six or more.

Table 4: Distribution of Deprivation Scores on the Uncensored and Censored Totals

<i>Number</i>	<i>Uncensored Cumulative %</i>	<i>Censored %</i>
0+	100.0	--
1+	77.4	-
2+	50.8	-
3+	29.4	46.9
4+	15.6	26.6
5+	7.8	14.6
6+	3.5	6.9
7+	1.5	3.2
8+	0.6	1.4
9+	0.2	0.6
10	0.0	0.0

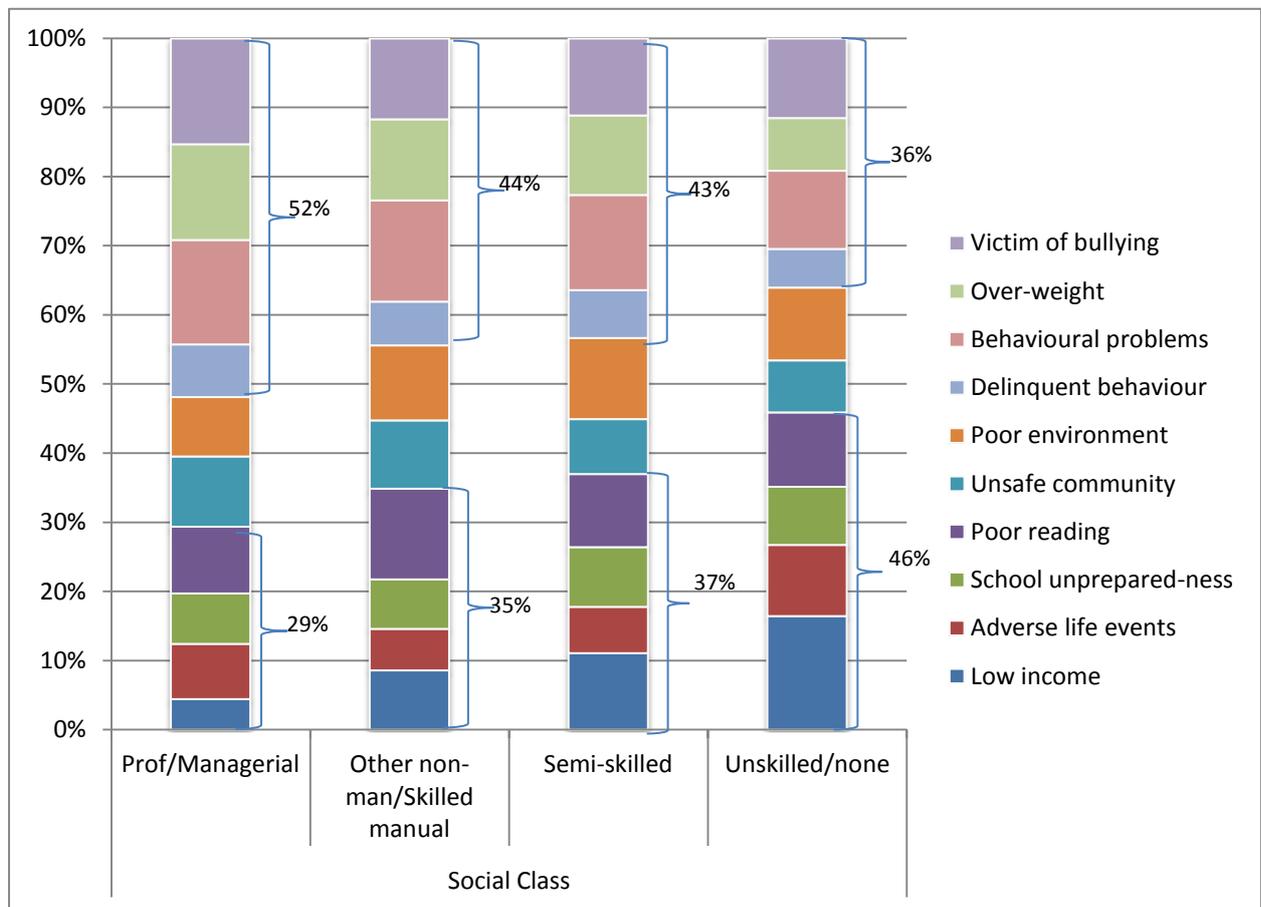
3.3 Decomposition of Multidimensional Poverty by Dimension

In Table 5 we show this decomposition of dimensions broken down by household, Primary Caregiver and child characteristics. It is clear that there is substantial variation by these characteristics in the extent to which different dimensions contribute to the overall multidimensional profile. The issue at stake here is the inevitable one of the extent to which, when we combine information from a range of dimensions, we are comparing like with like and the degree to which this varies across socio-economic groups. In addressing this issue as we do in Table 5, it is important to keep in mind that this is a matter of composition rather than risk level. The contribution of the dimensions necessarily sum to 100% (1.00). A higher contribution for one dimension for a particular social group requires a compensating trade-off for other dimensions. The fact that a particular dimension makes a larger contribution to the profile of a particular socio-economic group does not necessarily imply that the risk level for that dimension is higher in that group than on others.

Analysis of Table 5 reveals significant socio-economic variation in deprivation composition. It also shows that the nature of such variation is to some extent dependent on the particular characteristic on which focuses. For household type the contrast is between the dimensions of low income, adverse life events, and unpreparedness for school versus dimensions of behavioural problems, overweight and victim of bullying. For the single parent with 3+ children the former account for 0.36 and the latter accounts for 0.26. In contrast for couple with 1 or 2 children the corresponding figures are 0.18 and 0.44. Expressing these as ratios we get 1.38 and 0.42.; taking the ratio of these outcomes we get a ratio of 3.29 which provides a reflection of the contrasting extent to which clusters of deprivation contribute differentially to the multidimensional deprivation profile for these groups. It is worth noting that within the first cluster the contrast involving the first two dimensions is particularly sharp with the respective figures being 0.27 and 0.12.

For social class the relevant contrasts are illustrated in Figure 1: between low income, adverse life event, unprepared for school and poor reading compared to general behavioural problems, delinquent behavior, overweight and victim of bullying). For unskilled/unassigned group the respective composition figures are 0.46 and 0.36 while for the professional and managerial groups the corresponding figures are 0.29 and 0.52. The respective ratios are 1.27 and 0.56. Taking the ratio of these figures we get a figure of 2.27. In this case the contrast in relation to income is particularly striking with the respective contributions to multidimensional deprivation being 0.16 and 0.04 respectively.

Figure 1: Partitioning of drivers of multiple deprivation according to household social class



For education the contrast is between dimensions of low income, school unpreparedness, negative environment, and poor reading versus behavioural problems and victim of bullying. It is notable that unlike the previous two contrasts, the poor reading score plays a prominent role with this dimension contributing 0.13 to multidimensional poverty for the lower secondary or less group and 0.07 for the degree group. Focusing on the overall contrast we find that the first set of dimensions contribute 0.45 of the total for the lower secondary or less group and the second 0.34. The respective figures for the degree group are 0.30 and 0.44. The respective ratios are 1.32 and 0.68 with the ratio of the ratios giving us a figure of 1.97.

For age group of the Primary Caregiver, differentiation is relatively modest with contrast being between dimensions school unpreparedness, negative environment, and poor reading) versus delinquent behavior and unsafe community). For < 30 group the respective figures for the first and second clusters are 0.34 and 0.11. For the 45+ group the respective figures are 0.27 and 0.16. The respective ratios are 3.09 and 1.69 with the ratio of the ratios being 1.83.

As we have seen, for children characterized by less favoured statuses multidimensional poverty tends to disproportionately involve material factors such as low income and school unpreparedness. Lack of education qualifications is associated with higher prominence of reading difficulty and lone parenthood with a greater role for adverse events. In contrast multidimensional deprivation among those children characterized by more favourable statuses disproportionately involves being a victim of bullying, more behavioural problems and being overweight.

An inevitable consequence of this somewhat different patterning of deprivation across socio-economic groups is that our ability to predict the Adjusted Head Count Ratio employing such variables will be somewhat less than when employing a dependent variable whose constituent components are identical across socio-economic groups.

Table 5: Decomposition of Adjusted Head Count Ratio by Household and Primary Care Giver Characteristics

		Low income	Unsafe community	Poor environment	Poor reading	Over-weight	Delinquent behaviour	Victim of bullying	School unpreparedness	Behavioural problems	Adverse life events	Total
Family Type	Single Parent 3 or more children	.1405	.0918	.1008	.1144	.0794	.0642	.0855	.0898	.0999	.1341	1.00
	Single Parent 1 or 2 children	.1087	.0731	.1042	.0864	.0965	.0494	.1358	.0811	.1309	.1347	1.00
	Couple 3 or more children	.1076	.0970	.1002	.1269	.1074	.0728	.1188	.0813	.1320	.0553	1.00
	Couple 1 or 2 children	.0611	.0868	.1103	.1142	.1321	.0655	.1389	.0682	.1669	.0543	1.00
Social Class	Prof/Managerial	.0443	.1022	.0860	.0963	.1387	.0764	.1536	.0734	.1510	.0802	1.00
	Other non-man/Skilled Manual	.0858	.0987	.1086	.1312	.1170	.0628	.1170	.0712	.1464	.0601	1.00
	Semi-skilled	.1107	.0792	.1169	.1058	.1147	.0694	.1113	.0863	.1375	.0669	1.00
	Unskilled/none	.1643	.0756	.1053	.1074	.0759	.0558	.1154	.0842	.1131	.1031	1.00
PCG Education	Lower secondary or less	.1189	.0758	.1123	.1325	.0992	.0613	.1017	.0873	.1370	.0740	1.00
	Leaving/Subdegree	.0849	.1035	.0995	.1017	.1132	.0711	.1368	.0700	.1325	.0869	1.00
	Degree	.0754	.0896	.0781	.0653	.1250	.0549	.1671	.0778	.1478	.1192	1.00
PCG Age	29 years or younger	.1050	.0573	.1176	.1263	.1026	.0492	.1107	.0973	.1523	.0809	1.00
	30 thru 34	.0923	.0899	.1142	.1233	.0962	.0682	.1272	.0779	.1295	.0796	1.00
	35 thru 39	.1087	.0951	.1093	.1130	.1028	.0606	.1231	.0757	.1321	.0798	1.00
	40 thru 44	.0851	.0996	.0905	.1041	.1207	.0723	.1280	.0753	.1377	.0842	1.00
	45 +	.1119	.0873	.0862	.1032	.1155	.0718	.1167	.0762	.1344	.0960	1.00
Gender	Boys	.0952	.0852	.0985	.1118	.0924	.0747	.1254	.0865	.1471	.0827	1.00
	Girls	.1060	.0921	.1091	.1151	.1222	.0550	.1192	.0718	.1250	.0842	1.00

3.4 Socio-demographic Variation in Headcount, Intensity and Adjusted Head Count Ratio

In Table 6 we show the breakdown by a number of socio-economic categories of the headcount (H), the intensity (I) and the adjusted headcount ratio (AHR). The headcount figures set out in column A shows the number above the multidimensional threshold as a consequence of being above the defined cut-off points on 3+ dimensions. Focusing first on family type we find that the value of H for two parent families is close to 0.23 for two-parent families with number of children having little effect. This more than doubles for one-parent families with 1-2 children reaching 0.515. A further increase to 0.621 is observed for one-parent families with 3+ children. The odds ratio for the comparison of the one parent with 3+ children with the two parent 1-2 children is 5.44. For the one parent family with 1-2 children it falls to 3.53. There is therefore a sharp contrast between one parent and other families with further differentiation by number of children within the former group.

A clear pattern of differentiation is also observed in relation to the household's social class. The lowest value of 0.165 is observed for the professional/managerial group. The headcount figure then almost doubles in reaching 0.285 for the non-manual and skilled manual groups. A further increase to 0.410 is observed for the semi-skilled class and peaks at 0.623 for unskilled and unassigned class. The odds ratio for the comparison of the unskilled and unassigned with the professional/managerial class reaches 8.34. For the semi-skilled it falls to 3.50 and for the non-manual/skilled class to 2.01. The results reveal a clear pattern of hierarchical differentiation in social class terms.

Differentiation is also significant across educational categories. The lowest value of 0.169 is observed where the Primary Caregiver falls into the degree category. It rises to 0.245 for the sub-degree and higher secondary category and finally to 0.457 for those with lower secondary

or less. The odds ratio for the contrast between the lowest and highest educational categories is 4.14 while for that involving the former and the intermediate category is 1.60.

Table 6: Multidimensional well-being by basic characteristics

	A <i>(i)</i> MD headcount Proportion of 9- year-olds above threshold of 3 or more	B Univariate Odds Ratio	C <i>(ii)</i> MD intensity Ave. proportion of censored scores for children above threshold of 3 or more	D <i>(iii)</i> MD adjusted headcount ratio
<i>Family Type</i>				
One parent, 3+ children	0.621	5.44**	0.449	0.279
One parent, 1-2 children	0.515	3.53**	0.407	0.210
Two parent, 3+ children	0.242	1.06	0.387	0.094
Two parent, 1-2 children	0.232	1.00	0.385	0.089
<i>Family social class</i>				
Prof / Managerial	0.165	1.00	0.361	0.060
Non manual/Skilled Manual	0.285	2.01**	0.387	0.110
Semi-skilled	0.410	3.50**	0.407	0.167
Unskilled/Class not assigned	0.623	8.34**	0.438	0.273
<i>PCG's Education</i>				
Lower Sec or less	0.457	4.14**	0.426	0.195
Higher Sec/Cert Diploma	0.245	1.60**	0.381	0.093
Degree	0.169	1.00	0.358	0.061
<i>PCG's age</i>				
<30	0.550	3.41**	0.433	0.238
30-<35	0.410	1.94**	0.409	0.168
35-<40	0.290	1.14	0.401	0.116
40-<44	0.212	0.75**	0.376	0.080
45+	0.264	1.00	0.390	0.103
<i>Total</i>	0.294	—	0.399	0.117

Finally, the head count rate tends to decline with the age of the Primary Caregiver before increasing slightly for the 45+ age group. For the <30 age group the observed rate is 0.550. This declines to 0.212 for the 40-44 age group. The odds ratio corresponding to this comparison is 42.

The situation in relation to intensity level, which is set out in column (C), is quite different with variation being a good deal more modest. Conditional on a child being above the 3+ dimensions threshold socio-economic variation in relation to family type and social class in the intensity in deprivation is relatively modest. For family type it ranges from 0.449 for the one parent 3+ family to 0.387 for the two parent 1-2 children family. For social class it ranges from 0.438 for the unskilled/unassigned group to 0.361 for the professional managerial group. For education the respective figures for the lowest and highest categories are 0.426 and 0.358. The observed rate of 0.433 for the <30 age group declines to 0.376 for the 40-44 age group.

The AHCR rate reported in column (D) is a product of the H & I figures reported in columns (A) and (C.) As we have indicated, the AHCR has a potential range of values going from 0 to 1. Where no one in the population experiences any of the deprivations it will take on a value of 0 and where every individual experiences deprivation on all items the value will be 1. For family type the highest rate of 0.279 is observed for one parent families with 3+ children. In other words this group experience aggregate levels of deprivation that reach 27.9% of that which would be observed if all children in the group were deprived on all items. It then declines modestly to 0.210 for such families with fewer children. It then falls sharply in regard to social class to an average of 0.060 for the professional/managerial group before rising further to 0.167 for the semi-skilled class. Finally it achieves its highest value of 0.27 for the unskilled/not assigned class.

For Primary Caregiver education a clear pattern of differentiation is observed. The lowest value of 0.061 is observed for the degree group. It rises to 0.093 for the sub-degree and higher secondary groups. It then rises sharply to 0.195 for the lower secondary or less group. Thus this final group experiences an AHCR level that reaches a quarter of that which would be observed if all children in this group were deprived in relation to all ten dimensions. Variation in the AHCR across age groups older than 35 is modest with an average rate cross groups of .10. However, it rises to 0.168 for the 35-40 group and to 0.238 for the < 30 age group.

Our analysis reveals that for all three indicators, but most particularly the head count and the adjusted head count ratio, the level of risk rises in each case where the Primary Caregiver has a lower social class, lacks educational qualifications, is younger, and for one parent families.

3.5 Multivariate Analysis of Distribution of Adjusted Head Count Ratio Scores

In Table 7 we present the results of a multivariate analysis involving the independent variables whose bivariate outcomes we have considered in the previous section. The proportion of variance explained rises gradually from 0.090 where only the family status variable is included to 0.143 when social class is included to 0.161 when age group is added and 0.184 when education is included. Each of the remaining variables has an independent effect on the AHCR. Controlling for the remaining factors, a child in a parent household with 3+ children has an AHCR score that is 0.102 higher than for a two parent household with 1-2 children. For one parent households with 1-2 children the corresponding coefficient is 0.065. For social class we also observe a set of graduated net effects. For the contrast between the unskilled/unassigned class and the professional/managerial class the net effect is 0.114. For the semi-skilled manual class this falls to 0.058 and for the other non-manual/skilled manual class to 0.022. A similar range of effects is found for Primary Caregiver education. The net effect for the contrast between the lower secondary or less group and the degree group is

0.079. For the Leaving certificate/Diploma group it is a modest 0.015. Finally the AHCR rises as one moves from the older to the younger Primary Caregivers. The net effect relating to the contrast between the less than 30 group and the 40-44 age group is 0.090. For the 30-34 age group it falls to 0.046 and to 0.015 for the 35-39 group.

Taking a cumulative deprivation perspective, we observe a predicted AHCR score of 0.405 one parent households with 3+ children where the Primary Caregiver is in the unskilled/non-assigned group, has lower secondary education or less and is aged less than thirty. This contrasts with a score of 0.020 for the sub-group comprising a two parent household with 1-2 children where the Primary Caregiver is in the professional and managerial group and is aged 40-44. Thus for the former group the score is 40% of that which would be observed if all members of the group were deprived on all ten dimensions while for the latter the figure is 2%. Obviously the numbers in the former category in particular are rather modest but the general conclusion regarding the cumulative nature of the impact of these variables holds and less extreme comparison still produce striking differences. Notwithstanding the differences in composition across socio-economic groups that we have discussed earlier, the adjusted head count ratio indicator is highly structured in socio-economic terms.

Table 7: OLS Multiple Regression for Adjusted Head Count Ratio

	B	B	B	B
<i>Family type</i> (Ref: Two parent, 1-2kids)				
One parent, 3+kids	0.193***	0.106**	0.100***	0.102***
One parent, 1-2kids	0.127***	0.070**	0.054***	0.065***
Two parent, 3+kids	0.010*	0.009	0.010*	0.011*
<i>Social Class</i> (Ref:Prof/Manag)				
Oth nonman/Skilled Man		0.047***	0.038***	0.022***
Semiskilled manual		0.098***	0.085***	0.058***
Unskilled manual/None		0.156***	0.144***	0.114***
<i>PCGs age</i> (Ref: 45+)				
lt30			0.098***	0.090***
30-34			0.049***	0.046***
35-39			0.020**	0.015*
40-44			-0.003	-0.002

<i>PCG education (Ref 3rd level)</i>				
Lower secondary or less				0.079***
Leaving Cert/Dip Cert				0.015*
Constant	0.082	0.050	0.039	0.020
Adj R-sqr	0.090	0.143	0.161	0.184
N	6,854	6,854	6,854	6,854

***p<.001, **p<.01, *p<.05

The findings above also illustrate the extent to which conclusions can be influenced by the choice and construction of the dependent variables on which we focus. Fahey et al., (2012) employed the *Growing Up in Ireland* 9-year-old data set to analyse, among other things, child well-being rather than deprivation. As they note their focus is on human functioning rather than resources – what people manage to be or to do – rather than the means needed for functioning – on ‘being and doing’ rather than ‘having’ (Allardt, 1993, Sen, 1993). The child well-being outcomes on which they focus are reading and maths test scores, emotional adjustment as measured by the SDQ and physical health. Each of the outcomes is treated separately and no attempt is made to construct a composite index. The reading and SDQ variables which are common to the analyses have been dichotomised in an identical fashion. Fahey et al., (2012) treated family and number of children as separate variables. They found that family type had no impact on the outcomes they considered once that had controlled for mother’s education. Number of children as such appeared to have a negative effect on cognitive development but a positive effect on emotional adjustment. In contrast for our analysis where the household type independent variable combined both parent type and number of children both lone parenthood and a greater number of children had a significant net impact on AHCR even when controlling for Primary Caregiver education, social class and age groups. While at first sight the findings might seem paradoxical, in light of our findings relating to the manner in which socio-economic factors contribute to the proportionate importance of material deprivation versus behavioural and socio-emotional adjustment and to

a lesser extent cognitive achievement in the composition of the AHCR score the outcome is not entirely surprising. In any event it is clear that the somewhat different focus of Fahey et al., (2012), the consequent choice of variables and an analysis that does not involve censoring produces somewhat different findings.

4. Discussion

It has long been argued that poverty is about more than low income and that this is particularly true in relation children. Significant disagreement exists relating to whether a multidimensional understanding of poverty or deprivation requires the construction of a multidimensional poverty index. While taking the view that such an approach has both advantages and disadvantages, we have argued that if such a course is pursued then it is preferable to employ measures with clearly defined axiomatic properties. Efforts to implement a multidimensional perspective employing counting approaches have encountered difficulties relating to the fact that while the intersection approaches captures very small numbers, a union approach identifies a substantial proportion of the population. In this paper we have sought to avoid such difficulties by applying the Alkire and Foster (2011 a & b) adjusted head count ratio approach which represents a middle ground between these approaches. By implementing a dual cut-off approach involving a censoring of data such that deprivations count only for those above the specified multidimensional threshold, a level of correlations is observed that is substantially higher than is the case for the uncensored data.

The approach allows for a decomposition of the adjusted head count ratio in relation to key socio-economic characteristics. Our analysis shows that in general for those in the least favoured socio-economic categories the composition of the index was disproportionately influenced by material deprivation elements relating to low income, neglect and poor quality of environment and in some cases to poor performance in relation to reading. In contrast, for

the more favoured socio-economic groups factors relating behavioural and emotional issues and social interaction play greater role. Such differences relate to composition rather than risk levels. However, such differences in composition by socio-economic group reduce our ability to account for variation in the adjusted head count ration employing such variables.

Notwithstanding such differences in composition, our analysis showed that the AHCR varied systematically across categories of household type, and the social class, education and age group of the primary care giver. Furthermore, these variables combined in a cumulative manner. Further analysis focused on the elements of the AHCR showed that the most systematic variation was in relation to the head count of those above the multidimensional threshold rather than intensity conditional on being above that cut-off point. The AHCR approach identifies a non-trivial proportion of the population as exposed to multi-dimensional deprivation while the risk of such exposure varies systematically across socio-economic groups.

The advantages of a multidimensional perspective depend on the aims of the analysis, the particular approach adopted and the manner in which it is implemented. Furthermore, as Nolan and Whelan (2007) emphasise, the identification of those exposed to multidimensional poverty is primarily intended to help in understanding and addressing the causes of poverty; the framework employed and groups identified can clarify or obscure those causal mechanisms. The analysis described shows that a price must be paid in constructing a multidimensional poverty or deprivation index: at least to some extent – one is no longer comparing like with like. Information is necessarily lost that would be available from detailed dimensional profiles that span a range of dimensions but without forming a composite single index. The latter approach is also entirely consistent with an understanding of poverty as multi-dimensional.

Without seeking to arbitrate on the relative value of composite indices versus disaggregated profiles here we have sought to demonstrate that there is much to be gained from adopting an approach with clearly understood axiomatic properties. Doing so allows one to evaluate the consequences of the measurement strategy employed for the understanding of levels of multidimensional deprivation, the nature of multidimensional profiles and socio-economic risk patterns. Ultimately it allows one to make an informed assessment of the strengths and weaknesses of the particular choices made in constructing such indices.

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