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# Editorial - The growing inter-disciplinary field of longitudinal studies beginning in early life: this journal's response

**Michael Wadsworth, Carol Dezateux**
Health Section Editors

Longitudinal studies concerned with development and health in childhood were in important respects the springboard for a life course approach to health, educational, developmental and policy studies. Early examples of longitudinal studies of children include, in the United States, the Terman study of intelligence (1921), the Berkeley Guidance Study (1928), the Fels Longitudinal Study of child growth (1929), the Oakland Growth Study (1931), and the Cambridge-Somerville Study of delinquency (1939). Early European examples include the 1932 Scottish Mental Survey of cognitive function of all school children, the British Boyd-Orr study (1937-9) of diet and growth, and the Swedish (Malmo) Children of the 1930s study (1938). All of these studies from the inter-war period were developed by later generations of researchers as resources for the longitudinal study of adult outcomes, in terms of, for example, mental and physical health, cognitive function, educational development and behavioural trajectories starting in childhood.

Then immediately after the Second World War concerns about perinatal and infant mortality and reproductive health led to the first national British birth cohort study. Begun in 1946, two years before the UK National Health Service, the National Survey of Health and Development study identified the associated range of risk factors and the magnitude of socio-economic and geographic inequity in the distribution of infant deaths and, at follow-up, in physical and mental growth and development during childhood. Subsequently, two further British birth cohort studies were begun in 1958 (the National Child Development Study) and 1970 (the 1970 British Birth Cohort), initially to find out whether these markers of perinatal and infant health had improved in the context of a universal National Health Service free at the point of use: their initial findings profoundly influenced UK maternity services. Each of these three studies went on to collect data on cognitive development, behaviour, family life and educational attainment throughout childhood and adolescence, and so provided unique new opportunities for research into human development, new policy perspectives on education, family life and child care, and new understanding about the impact of socio-economic change on children. Their continuation into adulthood provides exceptional opportunities for modelling the profiles of individual development and change in ways that were not anticipated when they commenced. Parallel developments in Sweden included the Individual Development and Adaptation programme starting in 1964 and the Project Metropolitan longitudinal studies based in the Nordic capital cities, including the Stockholm study based on male births followed up from 1953.

The methods and hypotheses of those studies were developed further by subsequent longitudinal studies which probed deeper into the processes of early life growth and development starting in pregnancy (for example the Avon Longitudinal Study of Parents and Children (1991-2), and the Northern Finland Cohort Studies (1966 and 1986) or at birth (e.g. in New Zealand, the Dunedin Multidisciplinary Health and Development Study in 1972-73 and the Christchurch, Health and Development Study in 1977). These studies were more intense in their frequency of data collection and the extent of data collected in early life and childhood, and made good use of new methods of measurement in the social, psychological and health sciences. A comprehensive list of longitudinal studies up to 2006 can be found in http://www.longviewuk.com/pages/documents/ReviewofPanelandCohortStudies-Appendix27.04.06.pdf.

All of these studies from the pre- and post-war periods continue to contribute greatly to understanding the life-long impact of early life physical and mental development and its family and

socio-economic context. They stimulate new thinking about early life, and continue to provide unique research opportunities for exploring how early life growth and developmental effects are mediated and modified with age. They ask, for example, how aspects of the child's socio-economic and material environment affect biological, cognitive and behavioural development, growth, and the onset of physical and mental illnesses. They are now evaluating childhood and adult trajectories and the accumulation of risk in relation to a wide range of factors including, for instance, socio-economic position and the processes of ageing. Data from these same sources have also been used in comparative studies of cohort differences of early life and childhood growth, and cognitive and physical developmental trajectories, behaviour and attainment, and adult health and health-related behaviour, making opportune use of cohort differences in exposure to environmental and socio-economic differences of all kinds.

Some studies collect biological samples, adding genetic information derived from their cohort members, while a number of the longer running studies are undertaking research into the health, educational and occupational attainment of their cohort's offspring, thereby creating an inter-generational data resource. In addition, these latter kinds of questions are being addressed in longitudinal studies of households which have collected data on panel members' children followed up from birth (e.g. the US Panel Study of Income Dynamics (1998), Understanding Society (2009), and the German Socio-economic Panel Study (1990)), and children of longitudinal studies of adolescent cohorts (e.g. the US National Longitudinal Study of Youth study (1979)), and in Europe, the Longitudinal Study of Immigrants to Germany (1984). These studies are continuing to stimulate new thinking about childhood and early life in all the relevant research disciplines as well as among policymakers. An exciting development is the comparison between cohorts in countries of different income status and with contrasting socio-economic patterning of exposures and behaviours.

In the health sciences new ideas are developing about the processes by which environmental and genetic effects combine to influence health and behaviour throughout the life course. New methods of measurement (e.g. of an individual's and family's genetic makeup, organ development in the prenatal and early postnatal period, behaviours such as physical activity, environmental exposures, and age-related change – both developmental and in adulthood – in for example cardiac, respiratory or cognitive function) make it possible to study the influence of genetically-determined processes on trajectories of development and ageing, and – most recently - to increase our understanding of how environmental exposures, both adverse and protective, are expressed through epigenetic mechanisms.

Such studies, especially those involving research on gene-environment interaction, require very large samples, ideally beginning before or soon after birth (e.g. the Danish National Birth Cohort (1996), the Norwegian Mother and Child Cohort Study (1999), the UK Millennium Cohort study (2000-2001), the French L'Étude Longitudinale Française depuis l'Enfance study (2012), and in the UK the new national birth cohort called the 'Life Study' (2013), as well as before pregnancy, such as in the US National Children's Study (2012) and, in England, the Southampton Women's Survey (1998). Many smaller sample longitudinal studies have been established including those, such as the Rotterdam-based Generation R study (2006) and the Born in Bradford Study (2010), designed to study specific groups, exposures, conditions and/or outcomes.

Throughout their histories the early longitudinal studies have also stimulated new thinking in the behavioural and social sciences concerned, for instance, with children's well-being, and the life course and inter-generational development of, for example, pro- and anti-social behaviour, the processes of learning, and the effectiveness of policies for child care and education. Such work has extended to the impact of rapid social and economic change across time and generations on children's lives, using cross-cohort comparative research. New and recent longitudinal studies in these areas include the Millennium Cohort study (2000-2001) based on births in 400 polling districts the Young Lives project comprising new child cohort studies in Ethiopia, India, Peru and Vietnam and the multi-cohort German National Education Panel study (2008) that for the youngest of 6 age cohorts extends data collection back to birth. These new ideas in the social and behavioural sciences have also generated policy-oriented 'Growing Up' studies such as Growing Up in Australia (2004), Growing Up

in Scotland (2004), Growing Up in Ireland (2007) and Growing up In New Zealand (2009-2010). The European studies listed, together with the ELFE, ALSPAC, Generation R and Born in Bradford studies - all of which have a major interest in child health - form the European Child Cohort Studies Network (EUCCONET), which extends internationally to include such studies as the Young Lives project and Growing Up in New Zealand (2010). Details of all the EUCCONET studies can be found via www.eucconet.com.

The social, behavioural and population health sciences concerned with childhood are all benefiting from new methods of measurement in longitudinal studies (e.g. of early cognitive function, nutrition in childhood, biomarkers, child rearing practices, environmental pollutants). In addition, research across the disciplines is stimulating new development and application of more sophisticated methods of data analysis, including multi-level or latent class models, methods of handling missing data such as multiple imputation, as well as Mendelian randomisation.

The value of longitudinal studies of early life and childhood is being increasingly recognised by policy makers, governments, professionals concerned with children, and research funders, as well as the public. Consequently the older studies are being continued and expanded, and new funding invested in many countries in newer larger studies. This investment is encouraging researchers to make use of data from the older as well as the more recent life course studies and of studies carried out in different settings. For example data are being shared, harmonised and pooled through initiatives such as ENRIECO (Environmental Risks in European Birth Cohorts www.enrieco.org), CHICOS (Developing a Child Cohort Research Strategy for Europe www.chicosproject.eu), I4C (International Childhood Cancer Consortium http://ije.oxfordjournals.org/content/36/4/724.full), GA2LEN (Global Allergy and Asthma European Network www.ga21en.net), and CLOSER (Cohorts and Longitudinal Studies Enhancement Resource www.closer.ac.uk). There is also increasing prospective harmonisation of data on key variables and collection plans, such as the HALCyon collaborative research programme funded by five UK Research Councils under the New Dynamics of Ageing programme, the remit of which is to improve the quality of life of older people. (see http://www.halcyon.ac.uk/?q=project )

*Longitudinal and Life Course Studies* offers significant benefits to researchers and academics wishing to publish their work in these expanding and fast developing areas of research in early life and childhood. This editorial announces the widening of our editorial team to increase the research expertise available in the child health and population health sciences while recognising the distinctive feature of early childhood study. The expansion signals our desire to publish reports of cross-disciplinary research using longitudinal data from different times or settings to study influences on health and cognitive and behavioural development, which occur during the period from conception to early adolescence and across generations, and their impact and effects throughout the life course. We also wish to publish research that evaluates or otherwise impacts on policy and practice, crosses disciplinary boundaries and/or reports methodological advances in data collection and/or data analysis relevant to longitudinal studies.

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We look forward to receiving manuscripts for publication.

# Childhood overweight: socio-economic inequalities and consequences for later cardiovascular health

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## Abstract

*The last few decades have seen a dramatic rise in the prevalence of overweight/obesity in children and adolescents. Being overweight or obese as a child poses considerable long-term risks, particularly for cardiovascular health. Historically, obesity was a disease of affluence. Today, both adults and children from lower socio-economic backgrounds tend to be more overweight in high-income settings. In this paper, I present analysis of three research questions using data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a cohort of children born in the south west of England in 1991/2. Firstly, I review two previously published papers examining i) the age at which socio-economic inequalities in adiposity emerge and ii) socio-economic inequalities in cardiovascular risk factors when the participants were age 10 years. And finally, I present new findings on the tracking of overweight/obesity across childhood and adolescence, and whether this differs across socio-economic groups. The findings show that socio-economic differences in adiposity and cardiovascular risk factors emerge at a much earlier age than in older generations. If children are overweight/obese at age 7, there is a low probability that they will return to a healthy weight by age 15, and this probability is lower in low socio-economic groups. Together, these findings suggest an urgent need to prevent obesity at an early age, particularly amongst disadvantaged groups, in order to prevent wide socio-economic differences in cardiovascular health in later life.*

**Key words:** socio-economic factors, obesity, cardiovascular diseases, cardiovascular system, child, adolescent, ALSPAC

## 1. Introduction

The last few decades have seen a dramatic rise in the prevalence of overweight and obesity in children and adolescents. Being overweight or obese as a child poses considerable long-term risks, particularly for cardiovascular health (Owen et al., 2009). Historically, obesity was a disease of affluence, with a high-calorie diet and sedentary lifestyle being the preserve of the rich. This pattern has reversed across high-income countries. Today, both adults (McClaren, 2007) and children (Shrewsbury & Wardle, 2008) from lower socio-economic backgrounds tend to be more overweight in high-income settings. In low- and middle-income countries, the social patterning of obesity is beginning to change, with the burden of excess adiposity moving towards lower socio-economic groups in many countries, particularly amongst women (Monteiro, Moura, Conde, & Popkin, 2004). Whereas a gradient of higher levels of adult obesity with decreasing socio-economic position (SEP) has long been established in high income countries (McClaren, 2007) a similar socio-economic gradient in childhood adiposity is a relatively recent phenomenon (Batty & Leon, 2002). The emerging socio-economic inequalities in obesity amongst today's children may result in larger inequalities in cardiovascular disease and other adult outcomes than those already seen in today's adults.

In the UK and internationally, a multitude of interventions are being introduced in order to reduce childhood overweight and obesity prevalence and socio-economic inequalities in overweight/obesity and the resultant cardiovascular consequences. To design and target interventions effectively, it is crucial to have a full understanding of how childhood obesity develops, and how socio-economic inequalities emerge and

change over childhood. This requires high-quality longitudinal studies and appropriate analysis of longitudinal data. In this paper, I synthesise two previously published manuscripts on this topic from the Avon Longitudinal Study of Parents and Children (ALSPAC), a cohort of children born in the south west of England in 1991-1992, as well as presenting new results on the socio-economic patterning of tracking of overweight across childhood, with the aim of discussing how these three related analyses link together to shed light on the picture of socio-economic inequalities in childhood overweight/obesity. The research questions addressed in this paper are i) at what age do socio-economic inequalities in adiposity emerge, ii) are there socio-economic inequalities in cardiovascular risk factors in childhood, and iii) are there socio-economic differences in the tracking of overweight/obesity across childhood/adolescence.

The remainder of this paper is structured as follows: section 2 details the data and methodology, section 3 provides a brief description of the background and existing literature on each research question (although space prohibits an exhaustive literature review of each question) and describes the findings from the analysis of ALSPAC data, and section 4 discusses and brings the three questions together.

## 2. Data and methods

### Sample

The data are taken from a cohort of children born in the UK in the early 1990s, the Avon Longitudinal Study of Parents and Children (ALSPAC). http://www.bristol.ac.uk/alspac/ ALSPAC is a prospective cohort study investigating the health and development of children (Boyd et al., 2012; Fraser et al., 2012). Pregnant women resident in one of three Bristol-based health districts with an expected date of delivery between 1 April 1991 and 31 December 1992 were invited to take part in the study. Of these women, 14,541 were recruited. From these pregnancies, there were 14,062 live-born children, 13,988 of whom were alive at one year. Follow-up has included parent- and child-completed questionnaires, links to routine data, and clinic attendance. Ethical approval was obtained from the ALSPAC Law and Ethics Committee and the Local Research Ethics Committees.

### Measurements

For all analyses, maternal education was used as the measure of SEP; this was self-reported by mothers at approximately 32 weeks gestation and is categorised as below O-Level (Ordinary Level; exams taken in different subjects usually at age 15-16 at the completion of legally-required school attendance, equivalent to today's UK General Certificate of Secondary Education; 30% of study mothers), O-Level only (35% of study mothers), A-Level (Advanced-Level; exams taken in different subjects usually at age 18, 22% of study mothers), or university degree or above (13% of study mothers). All analyses were repeated using family income and highest occupational social class for the mother and father, but results for these SEP measures were similar to those for maternal education so will not be presented or discussed further.

Anthropometric measurements for ALSPAC participants are available from birth records, health visitor measurements that form part of routine clinical care, parent-reports from questionnaires, and research clinics. The exact measurement schedule and number of measures per person has been described in detail elsewhere (Howe et al., 2010). Body mass index (BMI) was calculated from weight in kilograms divided by height in metres squared for each available measurement, and ponderal index was calculated as weight in kilograms divided by height in metres cubed. Where relevant, BMI status (underweight, normal, overweight or obese) was defined by age and sex-specific z-scores for BMI according to International Obesity Task Force cut-offs (Cole, Bellizzi, Flegal, & Dietz, 2000).

Cardiovascular risk factors (cholesterol, triglycerides, high density lipoprotein cholesterol [HDLc], apolipoprotein A1 and B, adiponectin, systolic and diastolic blood pressure, c-reactive protein [CRP], leptin and interleukin 6 [IL]) were measured at a research clinic held when the children were approximately 10 years old, using standard protocols that have been described in detail elsewhere (Howe et al., 2010b).

### Statistical Analysis

For objective 1 (*At what age do socio-economic inequalities in adiposity emerge?*), trajectories of ponderal index from birth to two years, and BMI from two to ten years were estimated using linear

spline multilevel models. These models identify periods of age during which the average change in ponderal index or BMI is approximately linear. Individual-level intercepts (ponderal index at birth or BMI at age two) and slopes (linear change in ponderal index or BMI within each of the identified periods of age) are then estimated using multilevel models (two levels: measurement occasions nested within individuals). These models create a full trajectory for each individual with one or more anthropometry measurement, regardless of their exact number of measures and ages at measurement, under a missing at random assumption. The full details of the model have been presented elsewhere (Howe et al., 2010). To explore maternal education differences in trajectories of ponderal index and BMI, interactions between the four-category maternal education variable and the intercept and each linear slope were included in the multilevel model, permitting the estimation of separate average trajectories for each maternal education category. Of the 13,988 ALSPAC participants alive at one year, 12,246 were included in the analysis of ponderal index trajectories and 11,380 for the BMI trajectories.

For objective 2 (*Are there socio-economic inequalities in cardiovascular risk factors in childhood?*), the association between maternal education and each cardiovascular risk factor was assessed in children attending a research clinic at approximately age ten years (N=7,772), using multivariate multiple imputation to impute missing outcome data where necessary (approximately 35%, mostly because children who did not consent to a blood test). The slope index of inequality (Sergeant & Firth, 2006) was used to quantify the estimated mean difference between highest and lowest maternal education. Full details of the methodology have been presented elsewhere (Howe et al., 2010b).

For objective 3 (*Are there socio-economic differences in tracking of overweight/obesity across childhood?*), I calculated BMI status (underweight, normal weight, overweight or obese) for BMI measures from research clinics held at approximately seven years old (the youngest age for which there are comparable measures for a large number of children) and 15 years old (the oldest age for which there are comparable measures for a large number of children), using categories of BMI rather than the continuous measure, since interventions are often targeted based on these thresholds. I first cross-tabulated the BMI categories at each age separately for each category of maternal education, in order to examine in detail movement between all four categories of BMI between the two ages, and whether this differs by maternal education category. Subsequently, I assessed whether there are maternal education differences in the chances of i) children who are overweight/obese at age seven returning to a normal BMI by age fifteen, or ii) children of normal BMI at age seven becoming overweight/obese by age fifteen, using tabulations and logistic regression. Due to small numbers in the obese category, overweight and obese groups were combined. Children who were underweight at either age were excluded from this analysis. Gender differences in this association were assessed using tests for interaction. BMI measures at ages seven and fifteen are available for 4,243 children who also have data on maternal education.

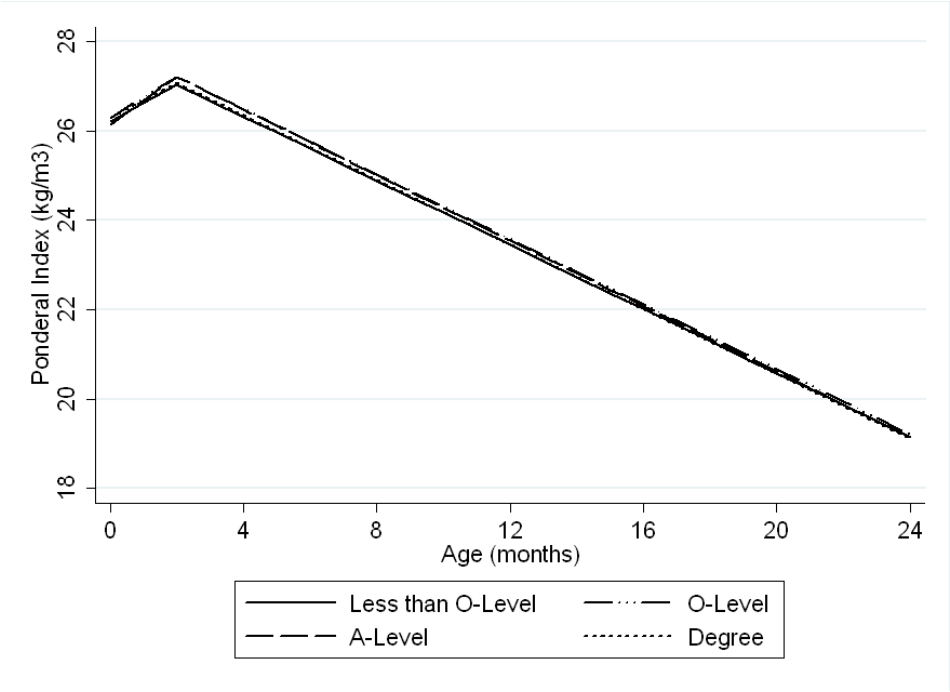
## 3. Socio-economic inequalities in childhood adiposity trajectories, cardiovascular risk factors, and the tracking of overweight/obesity

### 3.1. At what age do socio-economic inequalities in adiposity emerge?

The age at which socio-economic differences emerge in contemporary children and adolescents is unclear. A systematic review of cross-sectional studies, and a cross-national cross-sectional study not included in the review suggest that socio-economic differentials are present from at least age five (Shrewsbury & Wardle, 2008; Wang, 2001). The few studies that have used longitudinal data have explored trajectories from late childhood only. For example, one study explored differentials in trajectories from age eleven (Wardle, Henning Brodersen, Cole, Jarvis, & Boniface, 2006), a second from age nine (Wright, Parker, Lamont, & Craft, 2001), and a third from age seven (Braddon, Rodgers, Wadsworth, & Davies, 1986). Within the ALSPAC cohort, height and weight measurements are available from birth.

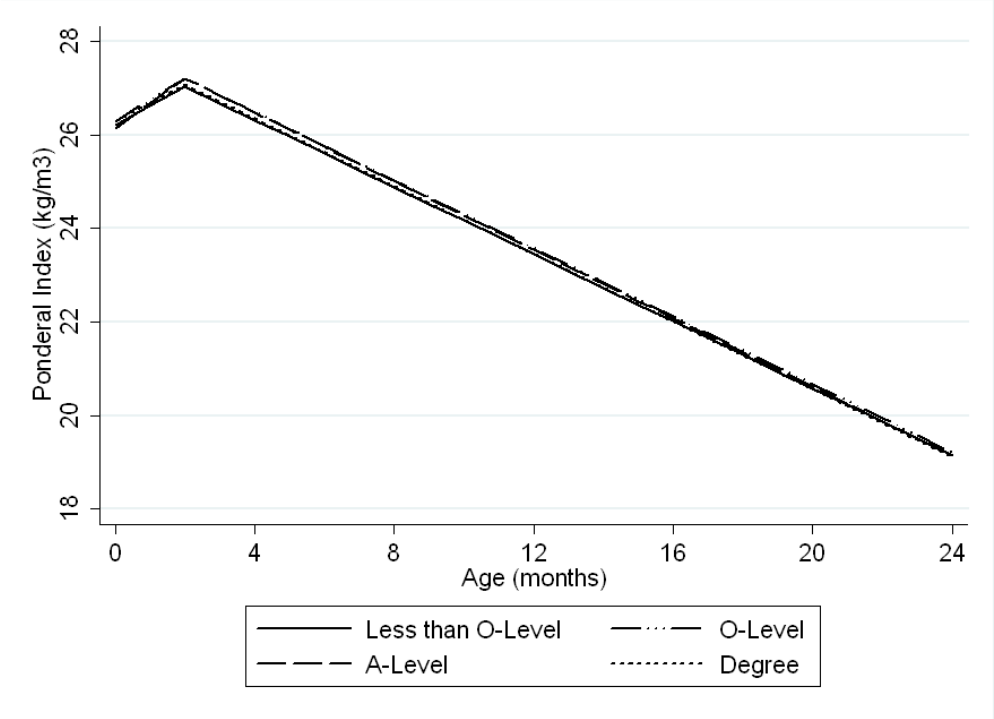
Within the ALSPAC data, there is no clear socio-economic patterning of PI between birth and age two (Figures 1 and 2). Amongst boys, all maternal education categories have similar BMI levels from two to four years (Figure 3). Between two and six

**Figure 1. Trajectories of ponderal index (kg/m3) from birth to age two by categories of maternal education**



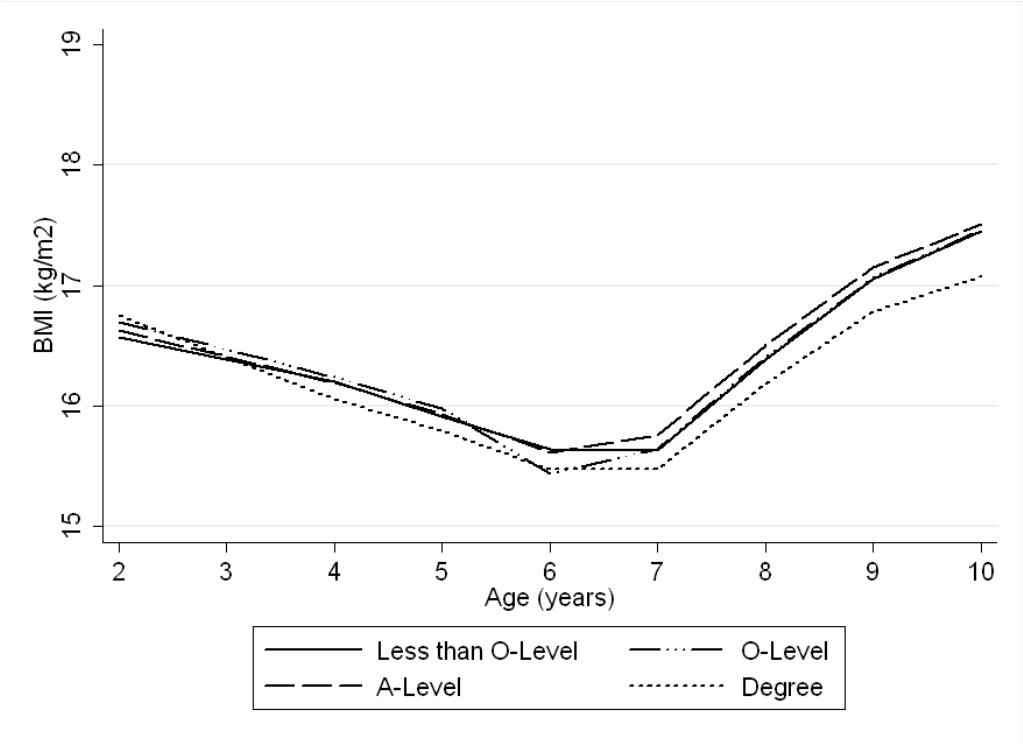

***Notes.*** *Boys, N=6,323. From Howe et al. 2010.*

**Figure 2. Trajectories of ponderal index (kg/m3) from birth to age two by categories of maternal education**



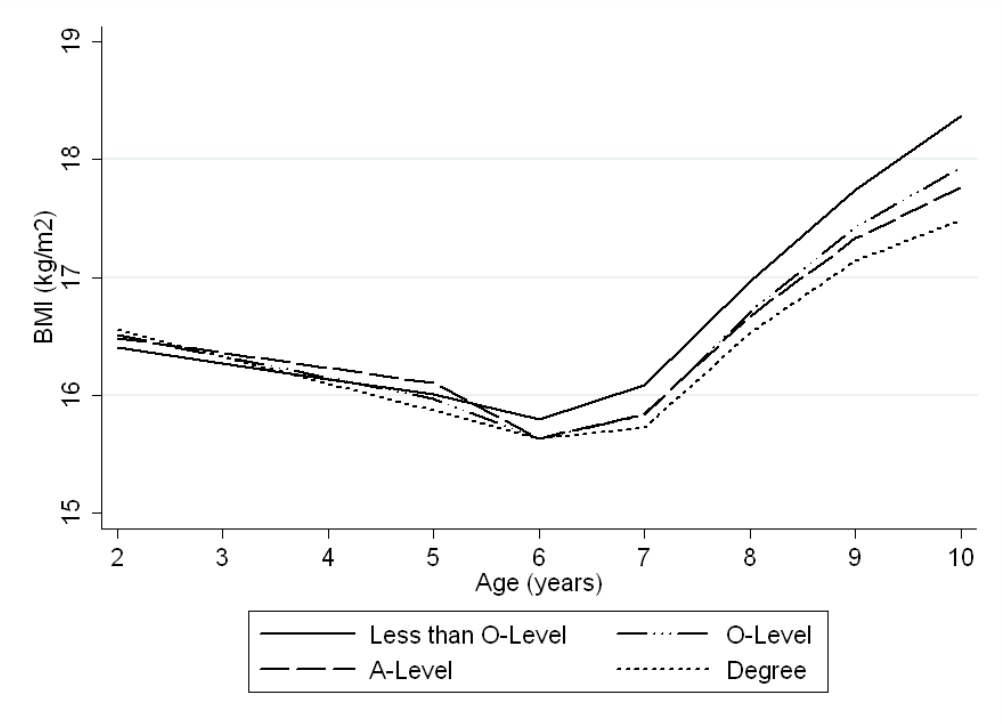

***Notes.*** *Girls, N=5,923. From Howe et al. 2010.*

**Figure 3. Trajectories of body mass index (kg/m2) from age two to age ten by categories of maternal education**




***Notes.*** *Boys, N=5,850. From Howe et al. 2010.*

**Figure 4. Trajectories of body mass index (kg/m2) from age two to age ten by categories of maternal education.**




***Notes****. Girls, N=5,530. From Howe et al. 2010.*

years, the BMI of boys with degree-educated mothers is decreasing at a faster rate than the other maternal education categories. By seven years, the socio-economic patterning of BMI in boys has stabilised, with sons of degree-educated women having lower BMI and a lower rate of BMI increase than the other three maternal education categories. The mean BMI trajectories of sons of the three lower maternal education categories remain similar. The magnitude of the BMI difference between sons of the degree-educated mothers and the other categories increases over time between seven to ten years. By ten years old, boys in the degree category of maternal education have on average a BMI 0.38kg/$m^2$ lower than boys in the less then O-Level maternal education category (note that the standard deviation of boys' BMI measures between 105-120 months of age is 2.54, so this difference represents approximately 15% of a standard deviation). Amongst girls, daughters of degree-educated women have slightly higher BMI at two years than the lower maternal education categories (mean BMI in degree group 16.55kg/$m^2$ compared with 16.40kg/$m^2$ in less than O-Level group) and their BMI decreases at a faster rate than the other maternal education categories between two and six years. By four years old, daughters of degree-educated women have lower BMIs than lower maternal education categories. From seven years onwards, the socio-economic differential in BMI across all categories of maternal education increases (Figure 4). By eight years old, there is a clear socio-economic gradient of BMI across all four categories of maternal education, with a stepwise decrease in mean BMI for each increasing category of maternal education. By ten years old, girls in the degree category of maternal education have, on average, a BMI 0.89kg/$m^2$ lower than girls in the less then O-Level maternal education category (note that the standard deviation of girls' BMI measures between 105-120 months of age is 2.68, so this difference represents approximately 33% of a standard deviation).

### 3.2. Are there socio-economic inequalities in cardiovascular risk factors in childhood?

There is evidence that levels of cardiovascular risk factors 'track' across the life course (de Swiet, Fayers, & Shinebourne, 1992; Webber, Srinivasan, Wattigney, & Berenson, 1991; Nicklas, von Duvillard, & Berenson, 2002; Bao, Srinivasan, & Berenson, 1993). In the Young Finns cohort study, levels of low-density lipoprotein cholesterol (LDL-c), body mass index (BMI), and systolic blood pressure measured in childhood (age 12-18 years) showed the same magnitude of association with carotid artery intima-media thickness (CIMT) measured 21 years later, as the same risk factors measured at the same time as CIMT assessment (Raitakari et al., 2003). In older generations, socio-economic inequalities in obesity were not generally seen in childhood (Batty & Leon, 2002). A review of studies published up to the year 2000 found little socio-economic patterning of blood pressure, cholesterol, C-reactive protein, homocysteine or fibrinogen during childhood or early adulthood, but most studies were small (Batty & Leon, 2002

). One study in Denmark (n=933), Estonia (n=1103) and Portugal (n=1153) demonstrated socio-economic differentials in BMI, waist circumference, lipids (high density lipoprotein, low density lipoprotein, and triglycerides) and circulating insulin (Lawlor et al., 2005). In Estonia and Portugal (relatively low-income countries), the socio-economic differential in BMI was the opposite (lower BMI and waist circumference in those from poorer and less well educated families) of that seen in Denmark, a high-income country, where findings were consistent with results from other high income countries (Shrewsbury & Wardle, 2008), i.e. BMI and waist circumference were higher in those from poorer and less well educated families. The socio-economic gradients in metabolic markers were in the directions that would be anticipated given the observed relationships between SEP and BMI, i.e. levels of low density lipoprotein, triglycerides and circulating insulin were higher amongst those of lower SEP in Denmark and lower amongst those of lower SEP in Estonia and Portugal, and vice versa for high density lipoprotein. Data from the 1992-2002 National Health and Nutrition Examination Survey from the USA showed that neither income nor education were associated with the metabolic syndrome in adolescents (based on having three or more extreme values for waist circumference, blood pressure, triglycerides, or fasting glucose, using national reference data) (Loucks et al., 2007). A study in Northern Ireland (N=509) found little socio-economic difference in biological risk factors for coronary heart disease at ages 12 or 15, but did find differences in behaviours such as physical activity, diet and smoking, leading

to the suggestion that socio-economic differences in risky behaviours are likely to emerge earlier than differences in physiological factors (van Lenthe et al., 2001).

By the age of ten, socio-economic inequalities in several cardiovascular risk factors are already present in the ALSPAC participants, with socio-economic differentials generally being wider in girls than boys. Weak associations were observed between maternal education and CRP, apolipoprotein B, leptin and IL6. Stronger associations were observed for systolic and diastolic blood pressure (inequalities in diastolic blood pressure were present only in girls). Children of less educated mothers had higher values of each of these risk factors (Table 1). There was little evidence of socio-economic differentials in triglycerides, apolipoprotein A1, adiponectin or HDL-C.

**Table 1. Inequalities in cardiovascular risk factors at ten years, quantified by the Slope Index of Inequality (SII) by maternal education**

| | Boys, N=3,809 | | Girls, N=3,913 | |
|---|---|---|---|---|
| | **SII** | **(95% Confidence Interval)** | **SII** | **(95% Confidence Interval)** |
| ***(difference in means comparing most to least deprived (null value = 0)*** | | | | |
| Cholesterol (mmol/l) | 0.094 | (-0.0059 to 0.19) | 0.098 | (-0.017 to 0.21) |
| Triglycerides (mmol/l) | 0.0016 | (-0.088 to 0.091) | 0.011 | (-0.092 to 0.11) |
| High density lipoprotein (mmol/l) | 0.017 | (-0.027 to 0.061) | -0.021 | (-0.066 to 0.024) |
| Apolipoprotein A1 (mg/dl) | 2.20 | (-0.66 to 5.05) | 0.60 | (-2.50 to 3.70) |
| Apolipoprotein B (mg/dl) | 2.57 | (0.88 to 4.26) | 3.53 | (1.55 to 5.52) |
| Adiponectin (mg/ml) | 0.41 | (-0.34 to 1.16) | -0.44 | (-1.35 to 0.47) |
| Systolic blood pressure | 2.63 | (1.52 to 3.73) | 2.82 | (1.69 to 3.94) |
| Diastolic blood pressure | 1.25 | (0.45 to 2.04) | 1.73 | (0.97 to 2.49) |
| ***(% difference comparing most to least deprived (null value = 0)*** | | | | |
| C-reactive protein (mg/l) | 27 | (3 to 57) | 43 | (20 to 70) |
| Leptin (ng/ml) | 10 | (-2 to 34) | 25 | (10 to 41) |
| Interleukin 6 (pg/ml) | 16 | (6 to 33) | 10 | (-4 to 27) |

***Notes.*** *N = 7,722 participants with multivariate imputation. SII represents the mean difference (or mean % difference for outcomes that were right-skewed and therefore analysed on the log scale) between the individuals of lowest and highest socio-economic position on the hypothetical underlying continuous distribution of maternal education. All analyses are adjusted for exact age at outcome assessment. Adapted from Howe et al (2010b).*

### 3.3. Are there socio-economic differences in tracking of overweight/obesity across childhood?

Adiposity is known to track relatively strongly across childhood and adolescence (Singh, Mulder, Twisk, Van Mechelen, & Chinapaw, 2008). A fairly low proportion of children who become overweight or obese will return to a healthy BMI. There is evidence, however, that those who do return to a normal BMI may also reduce their levels of cardiovascular risk factors to, or at least towards, those observed in children who have never been overweight or obese (Juonala et al., 2011; Lawlor et al., 2010). Examining which groups of overweight/obese children are more likely to return to a normal BMI is important, since if there are socio-economic differentials in this reversal of overweight/obesity, this could be an important focus for interventions. One small study (N=384) from Denmark examined socio-economic differences in the tracking (stability) of overweight/obesity across childhood and adolescence, and found that low SEP participants were twice as likely to maintain overweight between ages 8-10 years and 14-16 years compared with high SEP participants, and twice as likely to develop overweight between the two time points (Kristensen et al., 2006). Another study has looked at racial differences in overweight/obesity tracking between childhood and adulthood in a biracial cohort in the USA (Freedman et al., 2005). This study found that, despite initial BMI being similar in black and white children (aged five to 14 years), BMI increased more with age in black than white individuals, and overweight children were more likely to become obese adults (84% of black girls compared with 65% of white girls, with similar findings in males).

Of the 4,243 ALSPAC participants for whom BMI was measured at research clinics held at ages seven and fifteen, children from lower maternal education categories were more likely to be overweight or obese at age seven (Table 2). There were no clear maternal education differences in the proportion of overweight seven year-olds becoming obese by age fifteen (17% in the lowest maternal education category, 14%, 11% and 16% in each increasing category of maternal education) (Table 2). There was, however, some indication that normal BMI seven year olds were more slightly likely to become overweight by age fifteen if they were from lower maternal education categories (11% in the lowest maternal education category, 11%, 9% and 7% in each increasing category of maternal education) (Table 2). There was a stepwise decrease in the odds of moving from normal BMI at age seven to overweight/obese at age fifteen with each increasing category of maternal education; compared with the less than O-Level group, the degree or above maternal education category have half the odds of moving from normal BMI to overweight obese (odds ratio 0.54, 95% confidence interval 0.38 to 0.79) (Table 3). Similarly, there is evidence that children from higher maternal education categories are more likely to return from overweight/obese at age seven to a normal BMI at age fifteen compared with children from lower maternal education groups; compared with the less than O-Level group, the degree or above maternal education category have almost twice the odds of changing from overweight/obese at age seven to normal BMI at age fifteen (odds ratio 1.84, 95% confidence interval 1.00 to 3.36) (Table 3). No gender differences were observed for any of these associations (p values for interaction tests all ≥0.2 and no substantive differences in the magnitude or direction of associations).

**Table 2. Changes in BMI categories between ages 7 and 15 by category of maternal education**

| BMI status at 7 years by maternal education | Total N (%) in each category at 7 years | Underweight at 15 years | Normal BMI at 15 years | Overweight at 15 years | Obese at 15 years |
|---|---|---|---|---|---|
| ***Maternal education < O-level, N=736*** | | | | | |
| Underweight | 27 (3.7%) | 4 (14.8%) | 23 (85.2%) | 0 | 0 |
| Normal weight | 581 (78.9%) | 11 (1.9%) | 494 (85.0%) | 66 (11.4%) | 10 (1.7%) |
| Overweight | 92 (12.5%) | 0 | 29 (31.5%) | 47 (51.1%) | 16 (17.4%) |
| Obese | 36 (4.9%) | 0 | 3 (8.3%) | 13 (36.1%) | 20 (55.6%) |
| ***Maternal education O-level, N=1,464*** | | | | | |
| Underweight | 55 (3.8%) | 17 (30.9%) | 38 (69.1%) | 0 | 0 |
| Normal weight | 1,200 (82.0%) | 26 (2.2%) | 1,026 (85.5%) | 132 (11.0%) | 16 (1.3%) |
| Overweight | 167 (11.4%) | 0 | 64 (38.3%) | 80 (47.9%) | 23 (13.8%) |
| Obese | 42 (2.9%) | 0 | 5 (11.9%) | 14 (33.3%) | 23 (54.8%) |
| ***Maternal education A-Level, N=1,229*** | | | | | |
| Underweight | 34 (2.8%) | 10 (29.4) | 24 (70.6%) | 0 | 0 |
| Normal weight | 1,021 (83.1%) | 26 (2.6%) | 895 (87.7%) | 92 (9.0%) | 8 (0.8%) |
| Overweight | 133 (10.8%) | 0 | 59 (44.4%) | 59 (44.4%) | 15 (11.3%) |
| Obese | 41 (3.3%) | 0 | 6 (14.6%) | 17 (41.5%) | 18 (43.9%) |
| ***Maternal education degree or above, N=814*** | | | | | |
| Underweight | 20 (2.5%) | 9 (45.0%) | 11 (55.0%) | 0 | 0 |
| Normal weight | 715 (87.8%) | 16 (2.2%) | 645 (90.2%) | 51 (7.1%) | 3 (0.4%) |
| Overweight | 70 (8.6%) | 0 | 29 (41.4%) | 30 (42.9%) | 11 (15.7%) |
| Obese | 9 (1.1%) | 0 | 1 (11.1%) | 6 (66.7%) | 2 (22.2%) |

**Table 3. The association between maternal education and change from overweight/obese at age 7 to normal BMI status at age 15**

**Changes from overweight/obese at age 9 to normal BMI at age 15**

| ***Maternal education*** | *Number of children overweight/obese at age 7* | *Number (%) of these returning to a normal BMI at age 15* | *Odds ratio for returning to a normal BMI* | *95% confidence interval* | *P value* |
|---|---|---|---|---|---|
| **< O-Level** | 128 | 32 (25.0%) | 1 (ref) | | |
| **O-Level** | 209 | 69 (33.0%) | 1.48 | 0.90 to 2.42 | 0.12 |
| **A-Level** | 174 | 65 (37.4%) | 1.79 | 1.08 to 2.96 | 0.02 |
| **Degree or above** | 79 | 30 (38.0%) | 1.84 | 1.00 to 3.36 | 0.05 |

**Changes from normal BMI at age 9 to overweight/obese at age 15**

| ***Maternal education*** | *Number of normal BMI children at age 7* | *Number (%) of these becoming overweight/obese by age 15* | *Odds ratio for becoming overweight/obese* | *95% confidence interval* | *P value* |
|---|---|---|---|---|---|
| **< O-Level** | 581 | 76 (13.1%) | 1 (ref) | | |
| **O-Level** | 1,200 | 148 (12.3%) | 0.94 | 0.70 to 1.26 | 0.67 |
| **A-Level** | 1,021 | 100 (9.8%) | 0.73 | 0.53 to 1.00 | 0.05 |
| **Degree or above** | 715 | 54 (7.6%) | 0.54 | 0.38 to 0.79 | 0.001 |

## 4. Discussion and conclusions

Overweight and obesity is a global concern. As energy-dense diets become more accessible and sedentary lifestyles become more possible, obesity prevalence is increasing rapidly across low- and middle-income settings. Prevalence in both adults and children remains high across industrialised countries. Obesity in adulthood is associated with diabetes, cardiovascular disease, arthritis, some cancers (e.g. breast cancer and prostate cancer), infertility, and depression. In the UK alone, 30,000 people are estimated to die prematurely as a result of obesity-related conditions (NHS Information Centre, 2008). Children who are overweight are highly likely to go on to be overweight or obese adults (Singh et al., 2008), and have increased health risks in adulthood (Owen et al., 2009). Socio-economic inequalities in obesity mean that a disproportionate burden of both child (Shrewsbury & Wardle, 2008) and adult (McClaren, 2007) obesity and the resultant health, social, psychological and economic consequences is experienced by those from less advantaged socio-economic backgrounds. Addressing childhood obesity and socio-economic inequalities in it, is therefore a matter of extremely high social importance. In order to achieve reductions in obesity prevalence and reduce socio-economic inequalities, we need well-designed policies and interventions. Underpinning these interventions with high-quality research is essential in order to design and target the interventions optimally. Since obesity development across the life course is a dynamic process, longitudinal studies are essential.

In this analysis, I have reviewed two previously published studies focused on two important research questions – the age at which socio-economic inequalities in adiposity emerge, and whether there are socio-economic inequalities in cardiovascular risk factors in young children in a contemporary population. I have also presented new analysis on a third question – whether there are socio-economic differences in the tracking of overweight/obesity across childhood and adolescence.

My results show that there was very little socio-economic inequality in adiposity in the first few years of life; inequality in BMI began to emerge at approximately age four years and widened as the children got older. By ten years the mean BMI difference between the highest and lowest maternal education category was 0.38kg/$m^2$ for boys and 0.89kg/$m^2$ for girls. Previous cross-sectional studies have also demonstrated that inequalities in obesity start to emerge at a young age in contemporary high-income country populations (Shrewsbury & Wardle, 2008; Wang, 2001), but this was to our knowledge the first study to use detailed longitudinal measures of the development of obesity inequalities from early childhood.

By the age of ten, there was also evidence of socio-economic inequality in several cardiovascular risk factors. These risk factors are known to track across the life course (de Swiet et al., 1992; Webber et al., 1991), and childhood levels of such risk factors have even been shown to be associated with atherosclerosis in adulthood even after adjustment for the same risk factors measured in adulthood (Raitakari et al., 2003). Studies of older generations did not in general observe socio-economic inequalities in cardiovascular risk factors in children and young adults (Colhoun, Hemingway, & Poulter, 1998; Batty & Leon, 2002).

I observed wider inequalities in adiposity and cardiovascular risk factors in girls compared with boys. This is consistent with findings in adults (McClaren, 2007; Howe, Patel, & Galobardes, 2010c), but a systematic review of studies of children from developed countries published since 1989, showed no gender difference in inequalities in adiposity in over half of the 19 studies reporting associations separately for boys and girls, and mixed findings in the remaining studies (Shrewsbury & Wardle, 2008). The reasons for inequalities in adiposity being wider in girls are unclear. There is some evidence that boys are more likely than girls to participate in sport, regardless of their SEP (Fairclough, Boddy, Hackett, & Stratton, 2009) and that the inverse association between physical activity and adiposity tends to be stronger among boys than girls (Jimenez-Pavon, Kelly, & Reilly, 2009; Ness et al., 2007). However, there is little evidence of a socio-economic gradient in objectively measured physical activity within ALSPAC, although there is evidence that boys are more likely to participate in moderate to vigorous activity (Riddoch et al., 2007), which has been shown to be more strongly associated with reduced fat mass than total activity (Ness et al., 2007). In the context of adults, McLaren discusses the possibility that men place value on larger body size, associating it with power and dominance, whereas women value thinness, and proposes this as at least a partial explanation for the wider inequalities in adiposity in women compared with men (McClaren, 2007). The relevance of this to

young children is questionable, although there is some evidence from a study of 10-14 year-olds that girls wish to be thinner whereas boys wish to be larger (McVey, Tweed, & Blackmore, 2005).

Children with less educated mothers were more likely than their more socially advantaged peers to go from a healthy BMI in childhood to being overweight as adolescents. They were also more likely to move from being overweight to obese. The proportion of overweight/obese children at age seven who returned to a normal BMI by age fifteen was also lower in low maternal education categories. Thus there is a double burden for children from low socio-economic backgrounds – more likely to become overweight, and less likely to regain a normal BMI once they have become overweight. This is consistent with a small Danish study, which showed greater tracking of BMI between childhood and adolescence in low SEP participants (Kristensen et al., 2006), and reiterates the importance of ensuring that interventions are in place that effectively prevent BMI increases and facilitate BMI reductions in children from lower socio-economic backgrounds. One limitation of the tracking analysis we have presented is that the time frame between the two ages is relatively small (8 years); as the ALSPAC participants become adults, it will be interesting to assess whether there are socio-economic differentials in the persistence of overweight/obesity into adulthood. A second important limitation, albeit shared by the majority of studies assessing the tracking between categories of BMI, is that membership of BMI categories is defined on a single measurement for each time point, and some movement between categories will be due to small fluctuations around the thresholds used to define categories. Thirdly, these analyses are only possible for the just under one third of the original ALSPAC cohort members with BMI measures available at seven and fifteen years. It is possible that those lost to follow-up are more likely to be of lower SEP, and potentially also more likely to develop obesity or less likely to return from overweight/obese to a normal BMI. This could result in an underestimation of the inequalities (Howe, Tilling, Galobardes, & Lawlor, 2012).

In older cohorts, socio-economic differentials in adiposity were not observed during childhood and early adulthood (Batty & Leon, 2002). For example, a study of Glasgow students (attending the university health service between 1948 and 1968) did not find social patterning of early adult adiposity (mean age 23 years in men and 20 years in women), but in these same individuals, childhood SEP predicted later adult BMI (mean age 39 years in men and 36 years in women), despite little heterogeneity in their adult SEP (Okasha, McCarron, McEwan, & Davey Smith, 2003). In participants of the 1958 birth cohort study, there was little or no socio-economic inequality in childhood adiposity; by contrast amongst the participants' offspring (born between 1982 and 1987) higher SEP was associated with lower adiposity (Li, De Moira, & Power, 2009). Together with these other studies, my research provides compelling evidence that socio-economic inequalities in obesity and related cardiovascular disease risk are emerging at earlier ages in contemporary populations.

I observe the emergence of socio-economic inequalities in adiposity in children as young as four years old, with widening inequalities in BMI with increasing age, at least partially driven by inequalities in the likelihood of developing overweight and obesity and of returning to a normal BMI once overweight/obese. These inequalities in BMI are already generating inequalities in cardiovascular risk factors in children as young as ten. The inequalities we observe are greater than those seen in older generations, suggesting that these children may well suffer even wider socio-economic inequalities in adulthood obesity, cardiovascular diseases, diabetes and other adverse consequences than those already experienced by contemporary adults. It is well known that many interventions are initially taken up to a greater extent by more socially advantaged groups (Victora, Vaughan, Barros, Silva, & Tomasi, 2000), leading to a widening of socio-economic differentials. In order to reduce socio-economic inequalities in overweight and obesity, cardiovascular disease and diabetes, it will be necessary to either target interventions at disadvantaged groups, or to attempt to promote their greater participation in population-wide interventions, since obesity levels are high in all socio-economic groups, which calls for interventions that target the entire population. The results also highlight the need for early intervention. Given the low proportion of children overweight/obese at age seven who returned to a healthy BMI by age fifteen, prevention interventions are imperative.

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# Comprehensive education, social attitudes and civic engagement

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## Abstract

*The claims made for comprehensive secondary schooling in Britain have tended to invoke three kinds of rationale – relating to attainment, social mobility and the creation of an integrated or harmonious society. Much research attention has been given to the first of these, and in particular to whether comprehensive schooling reduces social inequalities of attainment and progression. Some attention, notably very recently (Boliver & Swift, 2011), has been given to the second, following from the work on attainment. The third has been somewhat neglected, and is the topic of this paper. Attempts are made to distinguish between general effects of education on civic-mindedness – in the sense that, for example, on the whole, better-educated people tend to be more liberal, respectful of diversity, and so on – and the effects specifically associated with having attended a non-selective school or non-selective system. As with the recent research on comprehensive education and social mobility, long-term effects are of greater relevance to the claims made for the consequences of comprehensive schooling than the effects in late adolescence or early adulthood. The data source is the British National Child Development Study.*

## Keywords

Comprehensive school; selective school; civic values; Britain; multiple imputation

## Introduction

The advocates of comprehensive schooling have offered three main arguments in favour of it – egalitarian, meritocratic, and integrative (Marsden, 1972, pp. 134-5; Ball, 1981, p. 6; Bellaby, 1977, p. 91). It is with the third of these aims that the present paper deals.

In its strong form, what Marsden and Ball meant by 'egalitarian' has long passed even as an aim: it refers to changes to teaching styles, the nature of knowledge and the ethos of the school. For example, from that comes the notion that competition and examination are inconsistent with comprehensive schooling. Such claims created intense controversy in the 1970s, but on the whole have vanished as goals. In a weaker form they now pervade the whole education system, as a mild student-centredness, but thus they no longer separate selective from non-selective approaches.

The meritocratic aim has dominated debate about comprehensive education, because it is about the extent to which comprehensive education can provide equal opportunities, or less unequal opportunities than other forms of schooling. This in turn has two versions, relating to attainment and to social mobility. On the whole, the conclusion has been that there is not much to choose between comprehensive and selective schooling in these respects.

The most extensive empirical work has been on attainment, and the recurrent finding has been that, in the words of Heath (2000, p. 328), 'reforms such as comprehensive reorganisation or the raising of the school leaving age have done little to reduce relative [social] class inequalities.' Kerckhoff et al. (1996), in their evaluation of comprehensive schooling in England and Wales using the British National Child Development Study, concluded that

'our comparison of student achievements at selective and comprehensive schools has suggested that there is no overall advantage of one system over the other' (p. 271). McPherson and Willms (1987) reached slightly more optimistic conclusions for comprehensive education in Scotland, but re-analysis by Heath (1990) suggested that this could be explained by attainment having risen generally to a point where lower classes were bound to start catching up, because the rise was beginning to reach a plateau in the advantaged classes. Comprehensive education may have contributed to this overall rise in attainment, but not directly to the reduction of inequality. Gray (1990, p. 135) summarised his review of the major studies of the meritocratic question concerning comprehensive education in Britain by noting that 'the series of sector comparisons which we have considered have failed to yield decisive patterns of differences in favour of one system or the other.'

The smaller amount of empirical work on the effects on social mobility has reached similar conclusions. The most detailed is recently by Boliver and Swift (2011), also using the National Child Development Study. They conclude that there is little to choose between selective and comprehensive systems in the capacity to foster mobility. Grammar schools did seem to enable more upward mobility than comprehensive schools, but, as Boliver and Swift point out, the obverse of academic grammar schools are non-academic secondary-modern schools, and they were less effective than comprehensive schools in this respect, so that, overall, the selective system was no different: 'comparing relevantly similar children, selective-system schools were no more conducive to mobility, whether upward or downward ... than were comprehensives' (p. 102). These authors infer from this analysis that comprehensive education does not harm the chances of social mobility, counter to some critics, but the results can be read the other way round too, as showing that the school system makes little difference. Something the same can be said from comparisons between the countries of the UK (Paterson & Iannelli, 2007): the school systems of Scotland and Wales have been more thoroughly comprehensive than that of England since the 1970s, and yet patterns of social mobility are the same among people who grew up in any of these three countries. The overall conclusion from many countries about the capacity of deliberate structural reform to bring about change in the social distribution of attainment or of opportunity is summed up by Blossfeld and Shavit (1993, p. 21): 'the impact of educational reforms on changes in educational stratification seems to be negligible'.

In the face of this evidence of a lack of meritocratic effect, many defenders of comprehensive education have fallen back on the third strand of the early advocates, what Ball labelled 'integrative', which he defined as the claim that a comprehensive system is better than a selective system at achieving what he called 'a tolerant and socially conscious society' (Ball, 1981, pp. 7-8). After all, as with the work of Boliver and Swift, the research on attainment and on social mobility may also be understood as showing that, despite claims by the severest critics of comprehensive education, it does not harm attainment and does not deny opportunities to working-class children. So perhaps, it might be claimed, comprehensive education offers a superior education in the civic virtues without harming any of the other major aims of schooling. That question is the subject of the present paper. As with the research on social mobility, the question requires long-term evaluation, and so we look at whether comprehensive education makes any contribution to people's social consciousness etc. many decades after they have left school.

The integrative aim was also firmly present from the start, in the 1960s and later, both among political campaigners for comprehensive education and among those academics who tried both to campaign for it and also to evaluate it. Thus, for example, Pedley (1963, p. 118), in a highly influential book, said that teachers in a comprehensive school ought to aim 'to produce an actively cooperating society': 'comprehensive schools', he added, ought to be 'vehicles of a communal culture'. Rowe, a headteacher, writing in 1972 on education for democracy, said that the new education needed to foster 'not trained intellects alone, but feeling intellects', intellect, in other words, 'allied to a new democratic concern for others': 'the prize of education is life itself' (pp. 23-4). Bellaby (1977, p. 110), in an early sociological study of comprehensive education in operation, wrote that '"social integration" was a self-conscious purpose of most of the early comprehensive schools'. Shaw (1983, p. 36) noted that comprehensive education was intended by many of

its proponents on the Left 'to prepare ... pupils to be members of a future socialist society'.

Many of the policy documents and the claims by prominent politicians arguing for comprehensive schools confirm that this purpose pervaded the movement. The Secretary of State for Education and Science in the 1960s Labour government, Anthony Crosland, argued that comprehensive schooling ought to be justified 'in terms of a sense of community, of social cohesion, of a nation composed of people who understand each other because they can communicate' (Crosland, 1974, p. 204). The 1947 report on secondary education by the Scottish Advisory Council on Education – a report that influenced people throughout the UK who were advocates of comprehensive education – said that the non-selective neighbourhood school 'promotes the success of the school as a community': 'all the raw materials of community life are there for an enlightened staff to work up into something fine and socially valuable', which would aid the school in 'inculcating the community virtues' (Scottish Education Department, 1947, p. 37). In 1925, the Labour Party, at its annual conference, resolved that a comprehensive school would 'seek to create amongst children the qualities and outlook essential to citizens of a cooperative commonwealth' (quoted by Marsden, 1972, p. 134). In this they were following upon the founding example of common schooling, the American. In the words of Spring (1990, p. 75), it was believed there that 'if children educated in common were taught a common social and political ideology, a decrease in political conflict and social problems would result.'

Moreover, we do know also that education is relevant to civic mindedness: the more educated people are, the more liberal, tolerant and enlightened they tend to become (Bynner, Schuller & Feinstein, 2003; Egerton, 2002; Nie, Junn & Stehlik-Barry, 1996). The connection is not wholly straightforward (Nie & Hillygus, 2001; Stubager, 2008; Paterson, 2009; van de Werfhorst & de Graaf, 2004): academic education has much stronger civic effects than vocational education; to stimulate civic mindedness the education has to encourage debate; and, although cross-sectionally the better educated are the most civically active, the rise in education levels over time has not led to more people becoming civically active: there is a limit on how many people can be secretaries and chairs of local tennis clubs or branches of political parties. On the whole, though, because education is relevant to civic values, there are reasons to suppose that making education widely available would indeed make society more harmonious, as the advocates of comprehensive education have claimed, and still claim. How education relates to political socialisation in the family is part of the question: any attempt to assess the effects of educational institutions will have to take account of influences from elsewhere (Phelps, 2012).

There have been a few studies of the topic of this paper, but none directly addresses the question of whether attendance by an individual pupil at a particular kind of school has any particular effect on that individual's civic values and actions in adulthood. Duru-Bellat, Mons and Bydanova (2008) showed from data in the Programme for International Student Assessment that students in comprehensive schools are more attached to the concept of the school as a community than students in other kinds of school. However, these data did not allow views beyond school to be investigated. Van de Werfhorst (2007), in a subtle comparative study using the International Adult Literacy Survey of the mid-1990s, found that people (aged 18-44) who followed vocational programmes had lower levels of participation and less interest in politics than people who followed general programmes, and that the differences were stronger in systems with more divided (or stratified) systems of schooling; but his data did not have a measure of individual institutional location. Likewise, Janmaat and Mons (2011, p. 56) used the IEA Civic Education Study of 1999, along with indicators of the extent of differentiation within national education systems in the early 1990s, to conclude that 'comprehensive schooling [is] associated with smaller disparities of ethnic tolerance and patriotism across ethnic and social groups', but they had no indicators of whether the individual respondents were in comprehensive or selective schools. Evans and Tilley (2011) found (from the British Social Attitudes Survey of 2010) that people who had attended independent schools were to the right politically of those who had not, but their data were cross-sectional and they had not controlled for cognitive ability.

The survey which is used here does have such individual-level identification, though concentrating on it comes at the price of being able to discuss Britain only, in contrast to Janmaat and Mons who had 28 countries, and to van de Werfhorst who had 17 countries for participation and 10 for political

interest. Like these authors, and like the advocates of comprehensive schooling, civic-mindedness here is defined to refer to actions as well as values – for example membership of civic organisations as well as views about civil liberties.

Full accounts of the shift in Britain between the mid-1960s and the late-1970s from a mainly selective to a mainly non-selective system of secondary schooling are provided by the works cited so far and by, for example, Gray, McPherson and Raffe (1983), Jones and Roderick (2003), Lawson and Silver (1973), McCulloch (2002) and Paterson (2003). The main distinction in the selective system was between courses offering a mainly academic curriculum lasting five to seven years, and those providing mostly three-year, mainly vocational courses leading to entry to the labour market at age 15. In England and Wales the schools providing mainly academic courses were called 'grammar schools', and the non-academic schools 'secondary modern schools'. These terms are used as shorthand in the present paper for the whole of Britain, although the terminology was different in Scotland. The main impetus to change came after 1965, when the Labour government strongly urged local authorities to end selection. By the late-1970s, selection among public-sector schools had ended in Scotland and nearly ended in Wales (McPherson and Willms 1987; Fitz 2000). However, about one in ten public sector schools remained selective in England. In each country, minorities of children continued to attend mostly selective independent schools – around a further one in ten in England, about 4% in Scotland and about 2% in Wales (Benn and Chitty 1996, p. 88).

## Data and methods

### Data

The data come from the National Child Development Study (NCDS), which started as a survey of all babies born in a single week in spring 1958 and which has followed them up on eight occasions. (This is the same survey as was used by Kerckhoff et al. (1996) and by Boliver and Swift (2011) in the work summarised above.) We use data from sweeps in 1969, 1974, 1981, 1991, 2000 and 2008. The type of secondary school attended was recorded in 1974 in a questionnaire to headteachers. The respondent's sex is that recorded at birth. From the 1969 sweep we use a measure of cognitive ability, scaled as IQ. Parental education, recorded at the 1974 sweep, is the average age at which the respondent's parents left full-time education. Parental social class uses the Goldthorpe scheme (Erikson & Goldthorpe, 1992), approximated by a condensed version of the Registrar General's socio-economic group as has been done by previous authors using this data set (Breen & Goldthorpe, 2001, p. 84) and then summarised by the higher of the status of father and of mother at the 1974 sweep.

The outcome variables are measures of social attitudes and of civic participation, as described in Table 1; they were measured in identical form in 1991, 2000 and 2008. The scales are constructed by scoring the questionnaire items shown in the table as consecutive integers, such that all the items contributing to a scale have positive correlations with each other, and then taking the mean across items. All the scales were standardised to have mean 0 and standard deviation 1 in the sample that was used in the analysis (before the imputation of missing data that is described below). The scales cover attitudes to socio-economic inequality (which we label the 'left-right' scale), to authority ('liberal-authoritarian'), to race ('racial tolerance'), to the family ('family values') and to the political system ('political cynicism'). On the first four of these, a fuller set of individual questionnaire items than is shown in the table would have been available from the 1991 and 2000 sweeps. To define outcome variables identically across the three sweeps, we use only the reduced sets of three items each, as shown in Table 1, but the correlations in 1991 and 2000 of the scales constructed from the reduced sets and the full sets were very high (the lowest being 0.87). The outcome variable which we label 'civic membership' is calculated by adding up the number of types of civic organisations (in the list shown in Table 1) of which the respondent reported being a member.

**Table 1. Questionnaire items contributing to outcome variables**

**Inequality (high = egalitarian)**
Ordinary people don't get a fair share of the nation's wealth.
There is one law for the rich and one for the poor.
Management get the better of employees.

**Liberal-Authoritarian (high = liberal)**
Give law breakers stiffer sentences.
Death penalty is appropriate for some crimes.
Schools should teach children to obey authority.

**Racial tolerance (high = tolerant)**
Wouldn't mind working with people from other races.
Wouldn't mind if family of different race moved next door.
Would not want person from another race to be my boss.

**Family values (high = liberal)**
Marriage is for life.
Couples with children should not separate.
Women should have the right to an abortion.

**Political cynicism (high = optimistic)**
No difference which political party is in power.
No political party would benefit me.
Politicians are in politics for their own benefit.

**Civic membership (high = member)**
political party, environmental organisation, other charity, school-related organisation, residents' association, trade union.

*Notes. The response options to the questionnaire items were: 'strongly agree', 'agree', 'neither agree nor disagree', 'disagree', 'strongly disagree'.*

The form in which we use the information about the categories of secondary school which respondents attended is shown in Table 2, along with the distribution of respondents in the sample into these categories. The information was obtained from the headteacher of the school, recording the selective status of the school in 1974. The categories shown in the table are groupings of categories offered on the questionnaire:

- Comprehensive: single category on questionnaire;
- Grammar: grammar school (senior secondary in Scotland) and technical school;
- Secondary modern: secondary modern (junior secondary in Scotland);
- Independent: independent and direct grant.

Grouping the questionnaire category 'technical school' with the secondary modern-schools instead of with the grammar schools barely changed the results, since only 0.4% of the original sample had attended technical schools. Because the 1974 sweep of the cohort was undertaken at the height of the period of reorganisation, conveniently for our purposes large groups of pupils were still in the selective system, as may be seen from the table. However, the allocation between systems was notrandom, and so account will have to be taken of selection bias, as explained below.

Schools in other questionnaire categories were omitted: these were mostly various kinds of school for children with special educational needs, and had been attended by 3% of all respondents. Also omitted are respondents for whom there is no information about school attended. Thus the sample of 12,372 described in Table 2 is the sample that is used in the analysis. This is 67% of all the original sample of 18,558. Other missing data were dealt with by multiple imputation, as described in the Methods section.

**Table 2. Categories of school**

| | Percentage within column in each survey |
|---|---|
| Comprehensive | 60.2 |
| Grammar | 11.4 |
| Secondary modern | 22.1 |
| Independent | 6.2 |
| Sample size | 12,372 |

## Methods

### Substantive models

The core part of the statistical models measures differences in the outcome variables according to type of school. These differences are estimated by converting the categorical variable recording school type into dummy indicator variables, comparing each type to the reference category of comprehensive school. A further dummy indicator combined the two categories of the public-sector selective system, following the approach of Boliver and Swift (2011), as explained in the Introduction. Two sets of models are shown below: those where there are no control variables, thus showing essentially only the descriptive mean differences among the school types, and those which control for the variables specified in the analysis tables below (and defined in the Data section above).

The controls are confounding variables which both predict the propensity to attend particular types of school and also are associated with social attitudes or civic participation. In the absence of random allocation of children to school sectors, using controls of this kind is an attempt to estimate the independent influence of sector on the outcomes. There are four such control variables – parental education, parental social class, respondent's sex, and respondent's cognitive ability at age 11. It would have been preferable to have had direct measures of parental values or civic activism, but education and class are reasonable surrogates, since they have repeatedly been found to be associated with values and activism (for example, Campbell, 2009; Cogan and Morris, 2001; Hall, 1999; Parry et al., 1992; van de Werfhorst & de Graaf, 2004). Sex is relevant, since women's levels of activism tend to be somewhat different from those of men (for example, Hall, 1999; Parry et al, 1992, pp.143-153). Measures of cognitive ability in childhood have been found to be associated with civic values or levels of activism by, for example, Deary et al. (2008) and Sturgis et al. (2010).

All the models are linear regressions, fitted by the function 'lm' in R. Although the modelling is of school types, it was not possible to allow for any clustering of respondents in schools, because membership of individual schools (as distinct from categories of school) is not recorded in the data sets. There is unlikely to have been much clustering, because the original sample was concentrated in one week of births. It would have been possible to have used a model of repeated measures – since the same outcome variables were measured on three occasions – but doing that caused barely any change in the regression coefficients or in their standard errors, and so the analysis reported here is of separate linear regressions for each age.

### Imputation

The major methodological complication arises from missing data, the extent of which for each variable is shown in the right margins of Tables 3 and 4 below. From the original sample of 18,558, only 3,189 cases have complete data on all the variables that are used here. Two variables have no missing data: one of these is school type since we have restricted attention only to those cases with full data on that variable; the other is sex. The amount of missing data ranges from 14% for

cognitive ability at age 11, to 45% for the attitudes measure at the oldest age. On the other hand, across the 12,372 cases that are used here, the median number of variables present was 6 out of 23. The missing information is thus potentially amenable to being completed through multiple imputation by chained equations (van Buuren & Groothuis-Oudshoorn, 2011). The essence of this procedure is that, for each variable $Y_j$ in turn, a regression is formed of its available values on all the other variables (beginning with starting values for the missing values that are drawn at random from the observed marginal distribution of each variable), and the estimated regression equation is then used to predict the missing values on $Y_j$, replacing the starting values. In the most commonly used imputation method, 'predictive mean matching', the imputed value is the observed value that is closest to the predicted value; this has the advantage of ensuring that all the predicted values are realistic, in the sense that they could have occurred empirically. These estimated values in $Y_j$ are used in the regression for the next variable, $Y_{j+1}$, and subsequent variables. The procedure can be iterated until convergence, and also can be repeated for different sets of random starting values, each such set giving a different chain. It is reported that this chained approach works well in many circumstances (van Buuren & Groothuis-Oudshoorn, 2011, p. 7), and the recommendation from simulation studies is to use 5 chains and 5-10 iterations in each (van Buuren and Groothuis-Oudshoorn, 2011, p. 40). Where a particular $Y_j$ has a non-linear relationship to the other variables, the regression equation can take a form appropriate to it.

Multiple imputation was applied to this data set using the package 'mice' in R (van Buuren and Groothuis-Oudshoorn, 2011). The variables shown in Tables 3 and 4 were used simultaneously, but the strongest predictive power came from the measure of cognitive ability: for the other variables, the cases with missing data had lower mean ability than the cases that were present. The imputation method was predictive mean matching for all but the variable recording family social class. For that variable, which is categorical, the imputation was by multinomial regression (referred to as 'polyreg' in the 'mice' package). For the substantive results reported here, 5 chains and 20 iterations were used. Results were combined across imputation using a technique by Rubin (1987, pp. 75-9) in which the pooled point estimate of the regression coefficient is simply the mean across the estimates from the separate imputations. The standard error of the pooled point estimate is based on a weighted average of the mean of the within-imputation variances and the variance between imputations (see also Schafer, 1999); the weight of the between-imputation variance is inversely proportional to the number of imputations. The implementation of Rubin's technique in the R package 'mice' is describe by van Buuren and Groothuis-Oudshoorn (2011, p. 5).

## Table 3. Means (and standard errors) of interval-level variables by school type

| | | Type of school | | | | % missing |
|---|---|---|---|---|---|---|
| | Age | Comprehensive | Grammar | Secondary modern | Independent | |
| Parental education | | 3.76 (0.015) | 4.56 (0.047) | 3.64 (0.022) | 5.85 (0.088) | 22 |
| Age-11 cognitive ability | | -0.09 (0.011) | 1.02 (0.014) | -0.30 (0.015) | 0.88 (0.031) | 14 |
| Left-right (high=left) | 33 | 0.10 (0.014) | -0.37 (0.031) | 0.12 (0.023) | -0.62 (0.043) | 32 |
| | 42 | 0.09 (0.014) | -0.35 (0.030) | 0.12 (0.022) | -0.55 (0.041) | 29 |
| | 50 | 0.09 (0.015) | -0.36 (0.032) | 0.16 (0.025) | -0.55 (0.045) | 45 |
| Liberal-authoritarian (high = liberal) | 33 | -0.07 (0.014) | 0.37 (0.035) | -0.17 (0.021) | 0.48 (0.047) | 32 |
| | 42 | -0.07 (0.013) | 0.39 (0.034) | -0.17 (0.020) | 0.46 (0.045) | 29 |
| | 50 | -0.06 (0.015) | 0.38 (0.036) | -0.22 (0.023) | 0.47 (0.049) | 45 |
| Racial tolerance (high = tolerant) | 33 | -0.03 (0.014) | 0.24 (0.030) | -0.12 (0.024) | 0.23 (0.042) | 32 |
| | 42 | -0.04 (0.014) | 0.30 (0.028) | -0.14 (0.023) | 0.26 (0.042) | 29 |
| | 50 | -0.04 (0.016) | 0.28 (0.029) | -0.16 (0.027) | 0.30 (0.041) | 45 |
| Family-values (high = liberal) | 33 | -0.01 (0.014) | 0.06 (0.032) | 0.03 (0.023) | -0.10 (0.043) | 32 |
| | 42 | 0.00 (0.014) | 0.04 (0.032) | 0.03 (0.023) | -0.17 (0.042) | 29 |
| | 50 | 0.00 (0.016) | 0.05 (0.033) | 0.00 (0.026) | -0.14 (0.048) | 45 |
| Political cynicism (high = optimistic) | 33 | -0.06 (0.014) | 0.27 (0.028) | -0.11 (0.023) | 0.42 (0.037) | 32 |
| | 42 | -0.04 (0.014) | 0.24 (0.029) | -0.11 (0.023) | 0.30 (0.041) | 29 |
| | 50 | -0.07 (0.016) | 0.28 (0.031) | -0.15 (0.025) | 0.48 (0.044) | 45 |

**Table 4. Distribution of categorical variables by school type**

| | | Type of school | | | | All | % missing |
|---|---|---|---|---|---|---|---|
| | | Comprehensive | Grammar | Secondary modern | Independent | | |
| Sex (% female) | | 49 | 54 | 49 | 47 | 49 | |
| | Sample size | 7,454 | 1,416 | 2,738 | 764 | 12,372 | 0 |
| Parental social class (% in each class) | I | 7.8 | 23.0 | 6.4 | 43.9 | 11.1 | |
| | II | 20.4 | 31.1 | 20.2 | 31.9 | 22.2 | |
| | III | 28.5 | 25.9 | 27.3 | 11.6 | 27.1 | |
| | IV | 4.4 | 3.5 | 5.4 | 6.7 | 4.6 | |
| | V,VI | 24.7 | 12.5 | 25.5 | 3.6 | 22.3 | |
| | VII | 14.2 | 4.0 | 15.2 | 2.3 | 12.6 | |
| | Sample size | 5,720 | 1,115 | 2,115 | 476 | 9,426 | 24 |
| Civic membership (% member) | Age 33 | 45 | 56 | 42 | 52 | 46 | |
| | Sample size | 5,268 | 1,096 | 1,915 | 565 | 8,844 | 29 |
| | Age 42 | 47 | 61 | 42 | 60 | 48 | |
| | Sample size | 5,232 | 1,089 | 1,918 | 578 | 8,817 | 29 |
| | Age 50 | 63 | 73 | 59 | 69 | 64 | |
| | Sample size | 4,442 | 1,000 | 1,625 | 515 | 7,582 | 39 |

## Results

### Imputation

Three variations on the imputations that underlie the results reported below were tried: with 10 chains and 10 iterations; with 5 chains and 10 iterations; and (with 5 chains and 20 iterations) using two extra prediction variables, cognitive ability measured at age 16 (modelled by predictive mean matching), and attainment at the end of secondary school (a categorical variable modelled by multinomial regression). The extent of correspondence between each of these variations and the results reported here was judged in two ways. One was to calculate the mean across the chains within each variation in the imputation, for each variable that appeared in the substantive analysis below, and then to calculate the Pearson correlations of that mean imputed variable with the analogous mean in the imputation used below. For example, the mean of the filled-in versions of the cognitive ability variable was calculated across the 5 chains in theresults reported below (5 chains and 20 iterations) and also across the 5 chains in the imputation with 10 iterations, and then the correlation of these two mean variables was calculated. For each of the three variations of the imputation, all of these correlations with the imputed data that underlie the report below were greater than 0.89, and indeed about four fifths were greater than 0.93. The other way in which the effect of varying the imputation was compared to the reported results was by replicating the substantive regression models explained below and calculating the Pearson correlations between these coefficients and the coefficients reported below: these correlations were all greater than 0.89, and nine tenths of them were over 0.99. (The lower correlations were for the models that compared independent schools and comprehensive schools, probably because the sample size for independent schools was lower than for the other sectors (Table 2).) We may conclude, therefore, that the approach adoped for the substantive analysis here is satisfactory.

**Substantive results**

Tables 3 and 4 show the distribution of the explanatory variables by school type. Type of school is strongly associated with respondent's cognitive ability, parental social class, and parental education, and to a lesser extent with respondent's sex. Using the imputed data sets, a multinomial logistic regression which had the type of school as the dependent variable and which had as explanatory variables parental class (as a categorical variable), sex, parental education (as a covariate) and cognitive ability (as a covariate) gave values of Nagelkerke's generalised $R^2$ of between 0.29 and 0.30 across the five imputed data sets, which is moderately high, and shows that these control variables are associated with type of school attended.

The dependent variables for the analysis are also shown in Tables 3 and 4 (five scales of social attitudes, and a measure of civic membership, each recorded at three ages), and they too are seen to vary by school sector. The extent of that variation is discussed below, in connection with the main analysis. The control variables were also associated with these dependent variables, as expected from the literature, but were certainly not the major source of variation in the dependent variables: in linear regressions of the dependent variables on the control variables in the imputed data sets, the values of $R^2$ ranged from around 0.13 for the left-right and liberal-authoritarian scales, through around 0.08 for the racial tolerance and political-cynicism scales, to 0.03 for the family-values scale and the measure of civic activism. It will be an empirical matter, therefore, whether these variables do in fact confound the association (seen in Tables 3 and 4) between school type and the dependent variables.

Thus we can now turn to the results of the main statistical models, using the imputed data. The results compare comprehensive schools with grammar schools (Table 5), with a combination of grammar schools and secondary-modern schools (Table 6) and with independent schools (Table 7). Although the details vary, the essential points in preliminary summary are that, before allowing for the controls, people who attended comprehensive schools, when compared to those who attended grammar schools, appear to be more left-wing on matters of economic inequality, less liberal, less racially tolerant, more politically cynical and less civically engaged. In all respects apart from being more left-wing, however, these differences with grammar schools were explained by the controls: even though, as we have seen, the association between the controls and the dependent variables is not strong, it is strong enough to explain most of the association between school type and the dependent variables. Something the same was true of comparing comprehensive schools with the publicly funded selective system as a whole. Independent schools resembled grammar schools in all these respects, but in addition were, when compared to either comprehensive schools or grammar schools, associated with holding more traditional views of the family, a difference that was not explained by the controls.

In more detail, consider first the position on the left-right scale, which is the least typical of the patterns. Table 5 shows a large difference between grammar schools and comprehensive schools, of just under 0.5 of a standard deviation (at the three ages, 0.48, 0.47 and 0.48). About three quarters of this difference was explained by the controls, mainly in fact (from details not shown) by cognitive ability at age 11: that is, more able people had on average more right-wing positions on the scale, and on average the people attending grammar schools had higher cognitive ability at age 11 than those attending comprehensive schools. Nevertheless, the evidence for a difference remains strong. Comparison with Table 6 shows, however, that this is a difference between comprehensive schools and only one part of the selective system of both secondary-modern and grammar schools: it is true that, without the controls, comprehensive schools appear to be associated with more left-wing positions than schools in the selective system, but that difference is explained by the controls since, in 1974, the average cognitive ability of children who were still in the selective sector was higher than the average cognitive ability of children in the comprehensive schools. For the comparison with independent schools, Table 7 shows that the pattern was somewhat stronger than that in grammar schools (-0.77 before controls, -0.32 after).

On the liberal-authoritarian scale, Table 5 shows that the apparent tendency for people who attended grammar schools to be more liberal than those who attended comprehensive schools is entirely explained by the controls. Table 6 shows the same to be true of the selective system, and Table 7 shows likewise for independent schools.

Something the same is true of the racial-tolerance scale, though the differences are not so strong. There is certainly no evidence that comprehensive schools cause people to be more liberal or more racially tolerant.

On family values, there are weak differences between comprehensive schools and grammar schools before the controls, but the controls explain these; there is no difference at all between comprehensive schools and the public selective system. However, Table 7 shows that people who attended independent schools tended to hold more traditional values than those who attended comprehensive schools, and that these differences are strengthened by adding the controls. The strengthening is because many of the other characteristics associated with attending independent schools are counter to traditional family values, notably having higher cognitive ability. So allowing for these makes the independent-school effect appear more traditional.

In attitudes to politics, people who attended grammar schools were more positive than those who attended comprehensive schools (Table 5), but that was wholly explained by the controls. The same was true, much more weakly, of the selective system (Table 6): grammar-school optimism just outweighed secondary-modern cynicism. Table 7 shows that the independent schools were similar to the grammar schools in this respect. Once more, therefore, there is certainly no evidence that the comprehensive system was associated with more positive attitudes to politics. Not surprisingly, perhaps, the same then can be said about membership of civic organisations: the somewhat stronger tendency to membership among people who attended grammar schools or independent schools than among those who attended comprehensive schools is explained by the controls, and there is no evidence that comprehensive schools were associated with any tendency to become more civically engaged.

As well as the checks of the imputations explained in the Methods section, a check of whether the controls adequately allowed for selection bias into comprehensive schools was made by grouping the respondents into four equal-sized classes according to their propensity to attend a comprehensive school, and then assessing whether the estimated effects of type of school varied across these classes. The rationale is that comparing school types for respondents who had similar such propensities might be closer to assessing the effects of random allocation. The propensity to attend a selective school was estimated by the linear predictor from a logistic regression of actual attendance at a comprehensive school (as opposed to any kind of selective school), with predictors as in the substantive model (namely, cognitive ability at age 11, sex, parental education, and parental social class). The logistic regression was carried out for each of the 5 imputed data sets, and respondents were then grouped into four quarters according to their mean propensity across the 5 imputed data sets. This four-category factor was included in a re-run of the pooled analysis from the imputed data, and the test of interest was whether there was any interactive effect of the indicator of school type with that factor. There was no evidence of any such interaction, and so this further test does not indicate any evidence of concealed selection bias.

**Table 5. Comparison of grammar schools with comprehensive schools[1]**

| Scale | Model | Age 33 | Age 42 | Age 50 |
|---|---|---|---|---|
| Left-right (high=left) | No controls | -0.48 (0.03) | -0.47 (0.03) | -0.48 (0.04) |
| | With controls[2] | -0.10 (0.03) | -0.08 (0.03) | -0.06 (0.04) |
| Liberal-authoritarian (high = liberal) | No controls | 0.44 (0.03) | 0.46 (0.03) | 0.45 (0.03) |
| | With controls[2] | 0.07 (0.04) | 0.06 (0.03) | 0.03 (0.03) |
| Racial tolerance (high = tolerant) | No controls | 0.28 (0.03) | 0.34 (0.03) | 0.32 (0.04) |
| | With controls[2] | -0.02 (0.03) | 0.02 (0.04) | 0.01 (0.04) |
| Family-values (high = liberal) | No controls | 0.11 (0.03) | 0.06 (0.03) | 0.07 (0.03) |
| | With controls[2] | -0.05 (0.04) | -0.10 (0.03) | -0.07 (0.04) |
| Political cynicism (high = optimistic) | No controls | 0.35 (0.03) | 0.30 (0.03) | 0.36 (0.03) |
| | With controls[2] | -0.03 (0.03) | -0.03 (0.03) | 0.01 (0.03) |
| Civic membership (high = member) | No controls | 0.13 (0.02) | 0.14 (0.02) | 0.10 (0.02) |
| | With controls[2] | 0.03 (0.02) | 0.01 (0.02) | -0.01 (0.02) |

*Notes. The table shows the difference: grammar schools minus comprehensive schools.*
[1] *Pooled results from multiple imputation: see text.The pooled standard errors are in brackets.*
[2] *The controls are: age-11 cognitive ability, sex, parental social class and parental education.*

**Table 6. Comparison of grammar schools and secondary modern schools with comprehensive schools[1]**

| Scale | Model | Age 33 | Age 42 | Age 50 |
|---|---|---|---|---|
| Left-right (high=left) | No controls | -0.15 (0.02) | -0.13 (0.02) | -0.14 (0.03) |
| | With controls[2] | -0.06 (0.02) | -0.04 (0.02) | -0.04 (0.02) |
| Liberal-authoritarian (high = liberal) | No controls | 0.08 (0.03) | 0.09 (0.02) | 0.07 (0.03) |
| | With controls[2] | -0.01 (0.03) | -0.01 (0.02) | -0.03 (0.02) |
| Racial tolerance (high = tolerant) | No controls | 0.04 (0.02) | 0.04 (0.02) | 0.03 (0.03) |
| | With controls[2] | -0.03 (0.02) | -0.03 (0.02) | -0.04 (0.03) |
| Family-values (high = liberal) | No controls | 0.05 (0.02) | 0.03 (0.02) | 0.01 (0.03) |
| | With controls[2] | 0.02 (0.02) | 0.00 (0.02) | -0.02 (0.03) |
| Political cynicism (high = optimistic) | No controls | 0.08 (0.02) | 0.05 (0.02) | 0.07 (0.02) |
| | With controls[2] | 0.00 (0.02) | -0.03 (0.02) | -0.01 (0.02) |
| Civic membership (high = member) | No controls | 0.02 (0.01) | 0.01 (0.01) | 0.01 (0.02) |
| | With controls[2] | 0.00 (0.01) | -0.017 (0.01) | -0.01 (0.02) |

*Notes. The table shows the difference: grammar and secondary-modern schools (combined) minus comprehensive schools.*
[1] *Pooled results from multiple imputation: see text.The pooled standard errors are in brackets.*
[2] *The controls are: age-11 cognitive ability, sex, parental social class and parental education.*

**Table 7. Comparison of independent schools with comprehensive schools[1]**

| Scale | Model | Age 33 | Age 42 | Age 50 |
|---|---|---|---|---|
| Left-right (high=left) | No controls | -0.77 (0.04) | -0.67 (0.05) | -0.68 (0.05) |
| | With controls[2] | -0.32 (0.04) | -0.22 (0.06) | -0.21 (0.05) |
| Liberal-authoritarian (high = liberal) | No controls | 0.55 (0.04) | 0.56 (0.04) | 0.57 (0.05) |
| | With controls[2] | 0.06 (0.04) | 0.05 (0.05) | 0.04 (0.05) |
| Racial tolerance (high = tolerant) | No controls | 0.28 (0.05) | 0.31 (0.04) | 0.34 (0.04) |
| | With controls[2] | -0.04 (0.05) | -0.01 (0.04) | 0.03 (0.05) |
| Family-values (high = liberal) | No controls | -0.09 (0.05) | -0.14 (0.04) | -0.12 (0.05) |
| | With controls[2] | -0.20 (0.05) | -0.24 (0.05) | -0.24 (0.05) |
| Political cynicism (high = optimistic) | No controls | 0.52 (0.04) | 0.35 (0.04) | 0.55 (0.05) |
| | With controls[2] | 0.10 (0.05) | 0.00 (0.05) | 0.12 (0.05) |
| Civic membership (high = member) | No controls | 0.08 (0.02) | 0.13 (0.02) | 0.06 (0.02) |
| | With controls[2] | -0.03 (0.03) | -0.01 (0.02) | -0.05 (0.02) |

*Notes. The table shows the difference: independent schools minus comprehensive schools.*
[1] *Pooled results from multiple imputation: see text.The pooled standard errors are in brackets.*
[2] *The controls are: age-11 cognitive ability, sex, parental social class and parental education.*

## Discussion

There are both methodological and substantive conclusions. Multiple imputation has provided a means by which to deal with the very large amount of missing data, a problem that is common in the long-term follow-up of longitudinal studies. The techniques of estimation by chained equations provided by van Buuren and Groothuis-Oudshoorn (2011) seemed to be robust to variation in the number of imputations, the number of iterations, and the set of predictors of missing data that were used: in each respect, the recommendations in the literature were vindicated (to use 5 imputations, around 10 iterations, and, as predictors, the variables that are included in the substantive analysis). Multiple imputation may thus be inferred to have increased the plausibility of the findings. Nevertheless, one further methodological point may be made: the results reported here do not in fact differ markedly from the results obtained by list-wise deletion – that is, the removal of all cases which had missing data on any of the variables of interest. The broad substantive conclusions were the same, that the controls removed most of any apparent effect of school type. Even at the level of individual regression coefficients, there was quite close agreement with the results reported here: the correlations between the coefficients calculated for the data after list-wise deletion and the coefficients reported in Tables 5, 6 and 7 were over 0.97 for the analysis without controls; with controls, these correlations were 0.86 for Table 5 (comprehensive schools compared to grammar schools), 0.69 for Table 6 (comprehensive schools compared to the public-sector selective system), and 0.91 for Table 7 (comprehensive schools compared to independent schools). This finding of broad agreement between the results based on multiple imputation and on list-wise deletion tends to confirm the conclusions of Nathan (1999) and Hawkes and Plewis (2006) that the main correlates of non-response in birth-cohort studies are low educational attainment, gender, and social class. Since all of these variables are included in the analysis, the substantive models in effect control for such bias.

The substantive conclusions here are somewhat analogous to those of Boliver and Swift (2011) on social mobility, insofar as, on the whole, we have not found much difference between types of school system. Also like Boliver and Swift, where we have found differences between comprehensive schools and the grammar schools or independent schools, these can mostly be explained by the prior characteristics of students who attended different

sectors. This conclusion is reached despite the fact that the control variables are only quite weakly associated with the dependent variables: even such loose exogenous factors are enough to account for most of the differences in attitudes and civic engagement between types of school.

Thus in the 1958 birth cohort – people who received their secondary schooling as the ending of formal academic selection for most secondary schools in Britain was underway – we have found that those who attended grammar schools or independent schools, as compared to those who attended comprehensive schools, tended in adulthood to be more liberal, tolerant, and engaged with politics, and to be more economically liberal – what has been called here right-wing – on questions of social inequality. That is also true, more weakly, of the public selective system as a whole: the tendency of secondary modern attendance in the opposite directions to these does not wholly outweigh the associations with attendance at grammar schools. But most of these differences are explained by selection: people who are of high ability tend to be more liberal and right wing, and that tendency explains most of the effect of school type.

Why then are these findings different from the expectations held by the advocates of comprehensive schools, and why are they different also from the findings of some other research? On the latter point – the comparison with the small body of other research which has looked at these questions – the explanation is likely to be in the combination of longitudinal data and data which has information about individual membership of types of school, rather than only on the nature of the system of schools.

Van de Werfhorst (2007), who concluded that comprehensive systems are more civic, based his definition of school sectors on information about student attainment, for example whether they had a vocational or a general qualification. That is likely to confound effects of at least two other things with the effects of school type – the tendency (noted in the Introduction) of academic education in general to be associated with more civic-minded views than vocational education, and the tendency for the overall attainment of students on academic tracks to be higher than those on vocational tracks, combined with the tendency also for higher overall attainment to lead to more civic-minded views. Moreover, his data are cross-sectional.

That absence of longitudinal measures is likely also to be a factor in the explanation of the results of Janmaat and Mons (2011) and of Evans and Tilley (2011). Janmaat and Mons record educational stratification only at the system level, and record outcomes only at age 14. Unlike van de Werfhorst (or here), they had no control for ability or for educational attainment. Above all, with only 28 countries, many other aspects of national political culture are confounded with the variable recording the extent to which the school system is stratified. For instance, their category of what they call the 'archetype of the comprehensive school concept' contains the four larger Scandinavian countries (as well as Poland and Russia), and their comparison group of countries with selective systems contains Germany, Belgium, the Czech Republic and Hungary. Even with controls for such matters as the longevity of democracy in each country, to attribute differences in civic values between these two groups to the characteristics of their school systems alone does not seem to be readily warranted. That problem arises essentially because they have no individual data on sector, and because the data are cross-sectional: it may be, for example, that the countries with the most liberal and tolerant cultures tend to be those that set up and maintain comprehensive systems, rather than that comprehensive systems make them liberal and tolerant.

Evans and Tilley (2011) did have data on the type of school attended by each respondent, but their data, too, was cross-sectional and had no control for cognitive ability. The importance of controlling for cognitive ability is probably indirectly shown by their further finding that differences between school sectors diminished after control for whether the respondent held a university degree.

In short, the conclusions from the results presented here might lead us to agree with Galston (2001, p. 231), writing about some recent findings that there are few consistent differences in the civic effects of public and private high schools in the USA, and that, where there are differences, they tend to show private schools to be more civic:

> *If future research confirms these results, we will be compelled to rethink some long-held beliefs about sources of civic unity in the United States, and to reflect anew on the relationship between the ethos of individual schools and the civic purposes of education.*

It is perhaps hardly surprising that school sector makes not much difference to people in adult life, and it is in that point that the explanation may lie for the difference between the results reported here and the hopes of campaigners for comprehensive schools. To the extent that social institutions do shape people's attitudes, it is attainment and occupational career that matter, in other words destination rather than origin (Paterson, 2008). So there is actually good reason to be sceptical that what happens in secondary school will be strong enough to shape adults' relationship to society. If comprehensives were able to give people higher attainment or to enable them to be more socially mobile than were other kinds of school, then they might by that means lead them to those civic-minded attitudes that tend to be associated with a good education and with occupying a professional position. Yet we know from all the other research on comprehensive education in Britain that it does not do these things either. If there are neither direct nor indirect effects on social attitudes or civic engagement, we have to conclude that the absence or presence of academic selection into different kinds of secondary school has little effect on whether people become civic-minded.

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# A lifetime of experience: modeling the labour market and family histories of older adults in Britain

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## Abstract

*In the context of the life course, it is difficult to understand outcomes and relationships among older adults independently from the experiences that precede them. In this paper, we use a latent class approach to model interdependent labour market and family experiences from late adolescence to retirement age among a group of older adults in Britain. We also assess how these experiences are related to economic resources and health at age 65. The data come from the retrospective life history files of the British Household Panel Survey, and our sample included older adults born between 1927 and 1940. A two-stage latent class model facilitates assessment of the most likely combinations of work and family roles at particular ages across the life course, and the pathways that link these experiences over time, incorporating the effects of gender and birth cohort. Model fit indices and theoretical considerations suggested that five latent life paths broadly characterized the work and family experiences of older adults in this sample. They were distinguished by gender, labour market and family care activities, marital status and the presence of children in the household. We noted better economic resource and mental health outcomes among the latent life pathways describing predominantly male experiences, but also note the heterogeneity of women's experiences and their implications for economic and health outcomes at retirement age. We discuss the applicability of the latent class approach for modeling work and family histories for future research.*

**Keywords**: labour market histories; family roles; life course; welfare state; latent class models

## Introduction

Understanding the dynamic interaction between individual biography, structural context, and historical time is fundamental to the life course perspective (Dannefer, 2003; Elder, 1985; O'Rand, 1996). Trajectories that unfold over time and the transitions that punctuate them are shaped not only by individual choices and preferences, but also by the structural opportunities and constraints (social policies, safety nets and other events) that contextualize them. The complexity, heterogeneity, and dynamic nature of the life course has rendered its empirical assessment complex, due to both the limited availability of longitudinal data addressing life course issues and appropriate analytical approaches. Yet, a better understanding of how individual trajectories in multiple life course domains unfold over the life course has the potential to address numerous issues in the field of life course research, such as how holistic life course experiences differ across social groups and across time, the extent to

which particular contexts shape life course experiences, and how life course experiences influence important outcomes in later life, such as health and economic resources.

The central aim of this paper is to apply a latent class approach to model interdependent experiences in the labour market and the family, from late adolescence to retirement age among a group of older adults in Britain. The relationship of these experiences to economic and health outcomes at retirement age is also assessed. In what follows, we provide a brief overview of the conceptual underpinning of the analysis—the life course in context—before moving on to discuss the latent class approach adopted in this work.

## The life course in context

The study of trajectories in multiple life course domains, and the transitions that shape them, is central to life course research (Elder, 1985; George, 1996). Trajectories do not unfold in isolation; rather, the various social roles that individuals occupy as workers, partners and parents are interwoven to create what Elder and colleagues refer to as 'social pathways' (Elder, Kirkpatrick Johnson, & Crosnoe, 2003). This idea is reflected in the study of the interdependencies of various roles (e.g., parenthood, labour market activity, marital status) during developmental periods, such as the transition to adulthood (Amato, Landale, Havasevich-Brooks, & Booth, 2008; Macmillan & Copher, 2005; Schulenber & Schoon, 2012), demonstrating the implications of role occupancy in particular domains for experiences in others. For example, early parenthood for women is often accompanied by early school leaving and more limited labour market opportunities (Macmillan & Eliason, 2003). Life course scholars also acknowledge the interdependencies within the family—the idea of 'linked lives'– recognizing that decisions about work and family life are most often made in tandem with those of spouses, and in response to care giving responsibilities for children or other dependants (Elder et al., 2003).

The life course perspective is also cognizant that individual experiences unfold within a set of opportunities and constraints defined, in part, by social policies and provisions (Elder et al. 2003; Leisering 2003; Marshall and Mueller 2003). This does not trivialize individual agency, but seeks to understand the very institutions that give rise to and constrain individual experiences. Doing so recognizes the role of the welfare state in shaping life course outcomes, and emphasizes how various welfare state regimes differ with regard to life course policy, reflected in varying levels of state intervention and protection, and diverse configurations of state and private responsibility. This includes, but is not limited to, the ways in which institutional or structural contexts create gendered opportunities with respect to work and family roles (Lewis 1992; O'Connor, Orloff, & Shaver, 1999).

Current cohorts of older adults in Britain lived out their working years in the decades following World War II – a period of history that was, at least until the mid-1970s, characterized by strong support for the male breadwinner / female homemaker family model. This model positioned men as primary wage-earners for the household and women as primary care providers (Creighton 1999; Lewis 2001; O'Connor et al. 1999; Pedersen 1993), firmly entrenching the gender division of labour within and outside the formal labour market. State support for these arrangements included legislated minimum wage rates and family (i.e., male) wages, taxation policies that discouraged women's employment, and government subsidies for the household to supplement the family wage (Creighton, 1999). Policy pertaining to public child care was limited and wage replacement rates for care absences from the labour market were meagre or non-existent (O'Connor et al. 1999), making it difficult for women with caring responsibilities to participate in the labour market on an equal footing with men. The social policies and provisions of post-World War II Britain contextualize observed patterns of work and family involvement over time and provide insight as to how experiences may differ by gender.

The life course perspective provides a conceptual framework for bridging individual experiences and the contexts in which they occur. It is the empirical assessment of these experiences that, until more recently, has been less developed. Indeed, considerable methodological advances in life course research have been made in the last 10-15 years, including the application of latent class models to assess the multi-dimensionality, heterogeneity and

dynamic nature of life course experiences (Amato et al., 2008; Macmillan & Eliason, 2003; Macmillan & Copher, 2005). A longitudinal latent class approach conceptualizes individual life course experiences as probabilistically interlocked trajectories that unfold over time. This is accomplished through the identification of latent social role configurations at various ages across the life course and the latent life paths that link these configurations over time (Macmillan & Eliason, 2003). Unlike other analytical approaches commonly used in life course research, such as event history models, latent class models do not require the specification of independent and dependent variables or assume a homogenous trajectory from which individuals deviate (Aisenbrey & Fasang, 2010; Feldman, Masyn, & Conger, 2009).

Latent class models have been used previously to model work and family transitions into adulthood (mid-adolescence to early thirties) (Macmillan & Eliason, 2003), the timing of childbearing and women's transitions to adulthood (Macmillan & Copher, 2005) and in cross-sectional comparative research on role configurations in young adulthood (e.g., Maggs, Jager, Patrick, & Schulenberg, 2012; Räikkönen, Kokko, Chen, Pulkkinen, 2012), but have not yet been applied to the study of multiple life course domains over more substantial periods of time. Moreover, although previous work has stratified its analyses to look at role configurations among particular social groups (e.g., Macmillan & Copher, 2005), group membership (e.g., gender) has not been considered as a predictor of the social role configurations that comprise life course experiences. Given the centrality of gender, as well as birth cohort, to roles in the labour market and the family, and the ability for latent class models to incorporate covariates, their inclusion is important.

In this paper, we first use a two-stage latent class model and retrospective life course history data from the British Household Panel Survey to model interdependent work and family experiences. This extends the work of Macmillan and Eliason (2003) in two important ways: (1) we consider a much longer period of the life course (age 19-64) to capture the interlocked trajectories of labour market involvement, occupational class, marital/partner histories and childbearing from late adolescence to retirement age; and (2) we include gender and birth cohort as covariates in the first stage of the analysis. Covariates not only improve the classification of individuals (Magidson & Vermunt, 2004), but also allow us to see how gender and birth cohort shape life course experiences in these domains. We next assess the relationship between the derived life course experiences and outcomes of interest at retirement age (health, economic resources). In what follows, an overview of latent class models is provided, followed by a discussion of the two-stage approach applied in this work.

## Latent Class Analysis and the Two-Stage Model

Latent class analysis (LCA) is a type of mixture modelling where, similar to factor analysis, unobserved latent classes account for the relationships between observed categorical (dependent) variables (Lazarsfield & Henry, 1968). However, unlike factor analysis, a latent class approach classifies individuals rather than variables. Observed categorical variables are used to estimate the parameters of a measurement model, including item parameters and class probability parameters. Item parameters refer to the conditional item probabilities that are class-specific and provide information on the probability of an individual in that class endorsing a particular item. Class probability parameters, or the unconditional probabilities, specify the relative prevalence of each class (Nylund, Asparouhov, & Muthén, 2007). For example, four (observed) nominal latent class indicators A, B, C, and D, would produce the following model:

$$\pi_{ijklt} = \pi_t^X \pi_{it}^{A|X} \pi_{jt}^{B|X} \pi_{kt}^{C|X} \pi_{lt}^{D|X},$$

where $\pi_{ijklt}$ represents the likelihood function where $\pi_t^X$ denotes the unconditional probability of being in latent class $t$ = 1, 2, ...,$T$ of latent variable $X$; $\pi_{it}^{A|X}$ represents the conditional probability of obtaining the $i$th response to observed variable $A$ (where possible response categories include i=1, 2, ...I) given membership in latent class t. Similarly, $\pi_{jt}^{B|X}$, $\pi_{kt}^{C|X}$, and $\pi_{lt}^{D|X}$, $j$=1, 2, ...,$J$, $k$=1, 2, ..., $K$, and $l$=1, 2, ..., $L$, denote the corresponding conditional probabilities for items $B$, $C$, and $D$ respectively (Macmillan & Eliason, 2003). In short, these conditional probabilities indicate the distribution of the observed

variables within each latent class. LCA assumes that each observation is a member of one, and only one, of T latent classes. This assumption of local independence suggests that conditional on latent class membership, the observed variables are mutually independent of each other (Magidson & Vermunt, 2004).

One of the goals of LCA is to determine the smallest number of classes that fit the data well and account for the associations among the observed variables. Typically, a baseline one-class model is first assessed. Assuming that the null model does not provide a good fit to the data, a model with two classes is next assessed. The number of classes is increased by one in each successive model until adequate model fit is obtained. Observed covariates can be used to predict latent class membership, and are expressed as a multinomial regression of the categorical latent variable X on the covariates, in comparing each class (T-1) to a reference class in an T-class model.

The two-stage LCA extends the traditional latent class model described above. Applied to modeling life course experiences in the labour market and the family, the two-stage approach begins by modeling the dominant (latent) role configurations of work and family life at selected ages across the life course. Role configurations refer to the constellation of roles that individuals occupy at any one point in the life course (Macmillan & Eliason, 2003). Using the results from the first stage, the second stage involves running a second LCA to determine how these role configurations at selected ages are linked over time (Macmillan & Eliason, 2003). The resulting latent pathways represent the progression of individuals through a number of role configurations across the life course.

More formally, in the two-stage LCA, observed roles that individuals occupy at various points or ages (*t*) in the life course, denoted as *i*(t), are embedded in unobserved, or latent role configurations, denoted *m*(t). These latent role configurations further constitute latent life pathways, denoted *j*. As specified by Macmillan and Copher (2005), the joint probability of experiencing transitions through age-graded observed role configurations *i*(1) to *i*(T) given age-graded latent role configurations *m*(1) to *m*(T) (where t=1, 2, …T), and latent life pathways *j* is given by:

$$\pi_{i(1)\ldots i(T)m(1)\ldots m(T)j} = \pi_{i(T)|m(T)}\pi_{m(1)|j}..\pi_{m(T)|j}\pi_{j}$$

where $\pi_{i(1)\ldots i(T)m(1)\ldots m(T)j}$ is the joint probability, $\pi_{i(t)|m(t)}$ is the conditional probability of observed role configuration *i*(*t*) given latent role configuration *m*(*t*) at each age *t*, $\pi_{m(t)|j}$ is the conditional probability of latent role configuration *m*(t) given pathway *j*, and $\pi_j$ is the probability of pathway *j* within the population.

Estimation of these probabilities using traditional LCA is not feasible. Obtaining full information maximum likelihood (FIML) estimates would require the construction of the full transition matrix for all observed role configurations over the entire set of age points (Macmillan & Eliason, 2003). In this work, ten age points with four detailed nominal latent class indicators are assessed. This would produce a matrix that would be unacceptably large with many empty cells. Thus, the two-stage LCA offers an alternative by first articulating latent role configurations from the observed roles that individuals occupy in multiple domains at various points across their life course. Once this is accomplished, traditional LCA assumptions are modified to restrict the observed role configurations and latent life paths to interact exclusively through the latent role configurations, rather than estimating latent life pathways using the observed roles in the various life course domains (Macmillan & Eliason, 2003). That is, the latent life paths are based entirely on the latent role configurations articulated in the first stage of the analysis.

Using Mplus(v.5) software, the first stage of the two-stage model uses traditional LCA to calculate the FIML estimates for the conditional probabilities of observed roles and positions given latent role configuration (or latent class) membership at 5-year age intervals beginning at age 19. In these models, gender (female) and birth cohort are included as predictors of role configuration membership (Figure 1). For each latent class model, we specified 2000 random sets of starting values and 50 optimizations for the final stage. This ensures that the best log likelihood is replicated and that solutions are not derived from local maxima. At each age point, Mplus calculates individual posterior probabilities for

each class and uses probabilistic assignment to classify each respondent to their appropriate latent role configuration. Simulation studies regarding the assignment of individuals to their most likely class for use in subsequent analyses support the approach when the entropy (discussed below) is high (greater than 0.80) (Clark & Muthén, 2009), which was the case in this study. In the next stage, a second LCA is run that estimates the conditional maximum likelihood estimates of latent pathway probabilities of role configurations over time (Figure 2).

**Figure 1. Traditional LCA with covariates to model latent role configurations (LRC) in four life course domains [labour market activity (LMA), occupational class (OC), marital status (MS), and parenting status of dependent children (CH)] at various points across the life course**

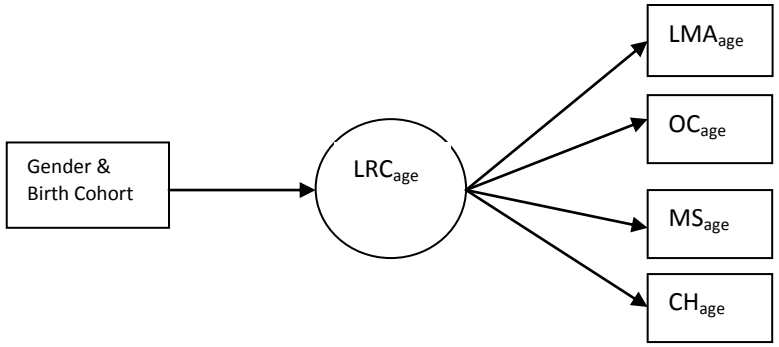
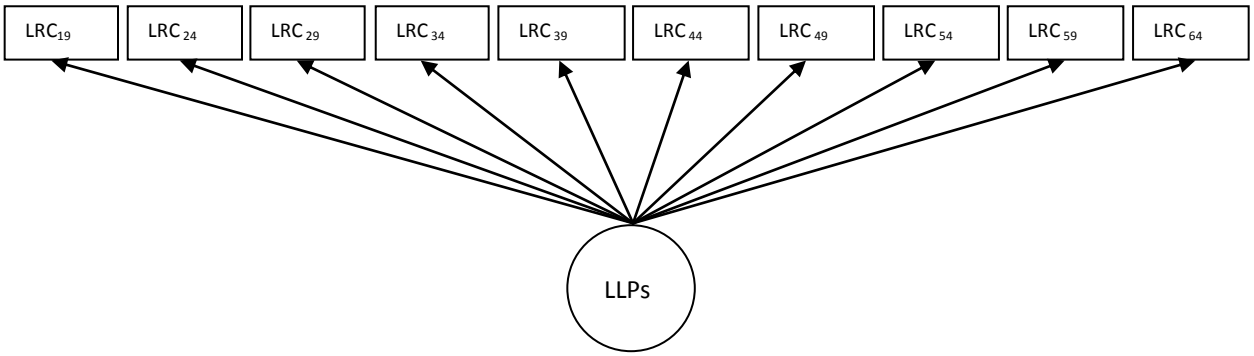



**Figure 2. Modeling latent life paths (LLPs) in the second stage from the latent role configurations (LRC) derived in the first stage**




## Assessment of model fit: determining the number of classes

There is not a commonly accepted fit statistic for deciding on the optimal number of classes in LCA (Nylund et al., 2007). Rather, this decision must be made on the basis of theoretical and substantive knowledge and a number of commonly accepted fit statistics. Here, the Bayesian Information Criterion (BIC) and an alternative likelihood ratio test (LRT) – the Lo-Mendell-Rubin LRT (Lo, Mendell, & Rubin, 2001) – were used to assess the fit of nested models at both stages of the analysis. While not an index of model fit, the adequacy of model classification as indicated by the entropy index is also used in selecting the optimal number of latent role configurations and latent life paths.

***BIC***. The BIC calculated in Mplus is defined as 2*loglikelihood + r*log n, where "r" is the number of parameters in the model and "n" is the sample size (Muthén & Muthén, 2010). The model with the

lowest BIC value is thought to provide the best fit while penalizing for model complexity.

***Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT).*** The LMR-LRT compares an estimated (*t*-class) model with its neighbouring model with one less class (*t*-1 class model) and provides a *p*-value that can be used to determine if the inclusion of an additional class provides an improvement in model fit (Lo et al., 2001). The LMR-LRT uses an approximation of the distribution for the difference between the two log likelihoods rather than the chi-square distribution (Nylund et al., 2007). The calculated *p*-value represents the probability that the data could have been generated by the model with one less class. A low *p*-value suggests that the *t*-1 model is rejected in favour of the *t*-class model (Muthén & Muthén, 2010).

***Entropy index*.** While not an indicator of model fit, the entropy index provides an indication of classification quality. While specific cut-points do not exist to indicate good classification, an entropy value that approaches 1.0 is favourable (Celeux & Soromenho, 1996).

### Assessing the relationship between latent life paths and outcomes in later life

To address the second aim of this paper—to determine whether economic and health outcomes in later life differ across the latent life path groups—we ran a series of Anovas (Analyses of variance), testing mean differences in three measures of income and two measures of health (described below).

## Data

The data come from the British Household Panel Survey (BHPS), an ongoing, nationally- representative sample of approximately 5,500 households and 10,000 individuals from over 250 areas of Great Britain. The survey began in 1991 and households were selected using a two-stage stratified systematic sampling method. Household members over the age of 16 are re-interviewed annually, providing 18 waves of data to date (Taylor, Brice, Buck, & Prentice-Lane, 2010). Panel members who were born between 1927 and 1940 were included in the sample (N=1,552). Health and income data were collected prospectively during the annual interviews. Retrospective data collected at Waves 2 and 3 (1992 and 1993) supplemented the annual files and included details on labour market activities, occupational class, partnerships and children from when respondents first left full-time education. In this work, retrospective data from age 19-64 were used). For labour market and occupational class spells, we used the work-life history file that corrected for any date inconsistencies (Maré, 2006).

***Labour Market Histories & Occupational Class*** Respondents were asked about all employment spells since first leaving full time education. The start and end dates, and duration of each spell were recorded. Distinct spells are defined by a change in type of labour market activity (Taylor et al., 2010). Using the start and end dates, spells of the following activities were constructed: (1) self-employment; (2) full-time employment; (3) part-time employment; (4) unemployment; (5) retirement; (6) family care (including maternity leave); and (7) involvement in an "other" activity. The latter included returning to full-time education, participating in a government training program, or being on sick leave. The modal monthly labour market activity for any given year was assigned to the entire year.

The data included the 1990 Standard Occupational Classification (SOC) codes for each labour market spell, but did not contain the newer National Statistics-Socio-Economic Classification (NS-SEC) now commonly used as an occupation-based measure of socioeconomic position in Britain (Rose & Pevalin, 2002). To overcome this, the 1990 SOC code was converted to the NS-SEC using the guidelines provided in the "Reduced Method NS-SEC Analytic Classes" derivation table (Office for National Statistics, 2005). The final variable for occupational position was the three-class version of the NS-SEC, which distinguished between: (1) managerial and professional occupations; (2) intermediate occupations; and (3) routine and manual occupations. A carry-over imputation was used to assign an occupational class to periods of labour market absence and the modal occupational class in any given year of age was assigned to the entire year.

***Marriage and Cohabitation Spells*** The month and year of the start of each legal marriage, and where applicable, the month and year of divorce, separation, or widowhood for each union were used

to construct marital spells. Cohabitation spells were similarly constructed. The "marriage/cohabitation" status reported at the time of the respondent's birthday each year was applied to the entire year. Limitations in the data precluded using the modal monthly marital / cohabitation status to define respondents' status for the entire year. The possible categories included: (1) never married; (2) married or cohabiting; and (3) separated, divorced, or widowed.

***Dependent Children in the Household*** Dependent children were defined as being younger than 16 years old. The year of birth or the date at which the child joined the household, and either the date at which the child left the household or the date of his/her 16th birthday (whichever occurred first), were used to define their presence in the household (coded 1=yes, 0=no). The presence or absence of children at the time of the respondent's birthday each year was assigned to the entire year. Limitations in the data precluded a more detailed analysis of the age at which children actually left home, as well the use of the modal monthly status to classify the presence of children for the entire year.

***Covariates*** Gender and birth cohort were included in the first stage of the analysis as covariates. Females were compared to males, and year of birth was coded as a series of dummy variables: (1) born 1932-1936 (coded 1=yes, 0=no); and (2) born 1937-1940 (coded 1=yes, 0=no). Respondents born between 1927 and 1931 served as the reference birth cohort.

In the second stage of the analysis, we analyze the relationship between the latent life paths and a number of economic and health outcomes.

***Economic Resources*** *Benefit Income* measured total income from all state benefits, including the Basic State Pension, received during the previous year. *Pension Income* included income from all non-state pensions, savings and investments, and rental income from boarders and lodgers received during the previous year. Finally, *labour income* was the total of all labour income earned during the previous year. We opted to use income collected at age 66, since these figures reflect income over the previous (65th) year. All income measures were converted to pound sterling values in 2005 using the Consumer Price Index (Office for National Statistics, 2012).

***Health*** We assessed two measures of health: mental health and an index of chronic health problems. Mental health was assessed using the 12-item General Health Questionnaire (GHQ-12) (Goldberg & Williams, 1988; Pevalin, 2000). Possible scores range from 0 to 36, with higher scores indicating greater mental health problems. Respondents were also asked whether or not they had been diagnosed with ten health problems (arthritis, visual impairment, hearing impairment, chest / breathing problems, heart problems or high blood pressure, stomach problems, diabetes, epilepsy, migraine headaches or an 'other' health problem). Positive responses to items were summed to form an index of co-morbid health problems (range = 0 to 10). We examine these health outcomes at age 65.

## Results

A total of 1,552 respondents contributed information to the retrospective life course histories. Just over one half (52%) were women, and the average age of the respondents at the time when their retrospective information was collected was 57 years (s.d.= 4 years). Table 1 provides the distribution of the labour market activities, occupational class, marital status and parenthood status of respondents at selected ages (ages 19-59 in 10-year intervals).

The first step in the analysis was the assessment of the fit of the latent role configurations (LRCs) of work and family life at each five-year age interval (Table 2). Gender and birth cohort were included as covariates to predict membership in the LRCs. Since the inclusion of covariates requires a model with a minimum of two latent classes, one-class models were not considered. The model that provided the best fit and adequately captured the configurations of work and family roles at each age is presented in bold type.

**Table 1. Distribution of Observed Labour Market Activities, Occupational Class, Marital Status and Dependent Children at ages 19-59, N=1,552**

| | Age 19 | Age 29 | Age 39 | Age 49 | Age 59 |
|---|---|---|---|---|---|
| Labour Market Status: | | | | | |
| Self-employed | 0.01 | 0.06 | 0.08 | 0.10 | 0.10 |
| Full-time | 0.79 | 0.58 | 0.58 | 0.57 | 0.31 |
| Part-time | 0.01 | 0.07 | 0.16 | 0.15 | 0.14 |
| Unemployed | 0.00 | 0.01 | 0.01 | 0.03 | 0.03 |
| Retired | 0.00 | 0.00 | 0.01 | 0.02 | 0.26 |
| Family care | 0.04 | 0.28 | 0.15 | 0.10 | 0.08 |
| Other | 0.14 | 0.01 | 0.02 | 0.04 | 0.09 |
| Occupational Class: | | | | | |
| Professional | 0.08 | 0.16 | 0.21 | 0.23 | 0.24 |
| Intermediate | 0.34 | 0.32 | 0.28 | 0.27 | 0.25 |
| Routine | 0.58 | 0.53 | 0.52 | 0.50 | 0.51 |
| Marital Status: | | | | | |
| Never married | 0.95 | 0.20 | 0.09 | 0.08 | 0.07 |
| Married / Cohab | 0.05 | 0.79 | 0.86 | 0.83 | 0.78 |
| Prev. married | 0.00 | 0.02 | 0.05 | 0.10 | 0.15 |
| Dep. Children | | | | | |
| No | 0.98 | 0.38 | 0.24 | 0.78 | 0.98 |
| Yes | 0.02 | 0.62 | 0.76 | 0.22 | 0.02 |

**Table 2. Assessment of model fit for Latent Role Configurations across the life course using BIC, the Lo-Mendell-Rubin Likelihood Ratio Test, and Entropy Index**

| Age | N | Number of Latent Classes | Log likelihood | BIC | Lo-Mendell-Rubin Likelihood Ratio Test p-value | Entropy Index |
|---|---|---|---|---|---|---|
| 19 | 1552 | **2** | **-2239.901** | **4656.138** | **0.000** | **0.899** |
| | | 3 | -2121.712 | 4522.611 | 0.732 | 0.802 |
| | | 4 | -2106.457 | 4594.973 | 1.000 | 0.792 |
| 24 | 1552 | 2 | -3890.975 | 7972.979 | 0.000 | 0.937 |
| | | **3** | **-3726.796** | **7754.831** | **0.000** | **0.935** |
| | | 4 | -3683.412 | 7778.273 | 0.000 | 0.793 |
| 29 | 1552 | 2 | -4059.455 | 8309.940 | 0.000 | 0.928 |
| | | **3** | **-3808.464** | **7918.167** | **0.000** | **0.869** |
| | | 4 | -3780.751 | 7972.950 | 0.000 | 0.853 |
| | | 5 | -3757.029 | 8035.716 | 0.506 | 0.874 |
| 34 | 1552 | 2 | -4008.146 | 8207.322 | 0.000 | 0.916 |
| | | **3** | **-3804.879** | **7910.997** | **0.000** | **0.857** |
| | | 4 | -3774.705 | 7960.860 | 1.000 | 0.776 |
| 39 | 1552 | 2 | -4155.759 | 8502.547 | 0.000 | 0.909 |
| | | **3** | **-3985.305** | **8271.847** | **0.000** | **0.856** |
| | | 4 | -3955.506 | 8322.461 | 0.000 | 0.751 |
| | | 5 | -3941.790 | 8405.238 | 1.000 | 0.748 |
| 44 | 1552 | 2 | -4571.290 | 9333.610 | 0.000 | 0.910 |
| | | **3** | **-4480.107** | **9261.454** | **1.000** | **0.769** |
| | | 4 | -4438.736 | 9288.921 | 1.449 | 0.672 |
| 49 | 1552 | 2 | -4570.384 | 9331.797 | 0.000 | 0.779 |
| | | **3** | **-4511.911** | **9325.060** | **0.954** | **0.864** |
| | | 4 | -4473.047 | 9357.544 | 0.386 | 0.691 |
| 54 | 1506 | 2 | -4442.539 | 9075.326 | 0.000 | 0.705 |
| | | **3** | **-4383.790** | **9067.585** | **0.000** | **0.770** |
| | | 4 | -4347.987 | 9105.737 | 1.000 | 0.805 |
| 59 | 1373 | **2** | **-4155.460** | **8498.764** | **0.000** | **0.960** |
| | | 3 | -4107.998 | 8512.211 | 0.031 | 0.908 |
| | | 4 | -4065.240 | 8535.066 | 0.000 | 0.839 |
| 64 | 1191 | **2** | **-3295.397** | **6774.940** | **0.000** | **0.973** |
| | | 3 | -3268.453 | 6827.291 | 0.025 | 0.823 |
| | | 4 | -3247.278 | 6891.178 | 0.000 | 0.747 |

The following decision-making process was undertaken in deciding upon the number of LRCs at each age. Model selection was based on the log likelihood, BIC, LMR-LRT, entropy and interpretation of the conditional probabilities in each class. When disagreement occurred, the following guidelines were applied: we did not select any *t*-class solutions where a LRC contained fewer than 5 percent of the sample *or* where the difference between the BIC of the selected model and its neighboring *t*-1 class model was greater than 1 percent. Where the LMR-LRT did not agree with the BIC, we used entropy and model interpretation to balance these indicators. In early adulthood (age 19), the 3-class model had a non-significant LMR-LRT, which suggested the 2-class model provided a good fit. This was confirmed by the high entropy (Table 2) and the observation that the 3-class solution included an LRC describing only 4 percent of the sample. Between the ages of 24 and 54, the three-class model had the lowest BIC value and good entropy, and although the LMR-LRT did not always agree with the BIC and entropy, model interpretation suggested the 3-class models provided a good fit to the data. For example, at ages 29 and 39, the LMR-LRT indicated that a 4-class model might be preferable; however, interpretation of the LRCs at these ages suggested that the addition of a fourth LRC added little to our understanding of the combinations of work and family roles. Notably, the fourth class resulted from the division of one of the LRCs from the 3-class model, where the only distinguishing feature was a difference in occupational class. Since no other differences between the 3- and 4-class models were evident, the more parsimonious 3-class LRC was retained. As individuals approached retirement age (ages 59 and 64), the 2-class models had the lowest BIC values and the highest entropy. The LMR-LRT did not discriminate between the 2, 3 and 4-class models, but model interpretation confirmed that the 2-class models provided a good fit.

The conditional and unconditional probabilities of the LRCs identified in Table 2 are presented in Appendix A. The conditional probabilities of each LRC specify the likelihood of endorsing the possible categories of each life course domain given membership within that particular LRC, while the unconditional probabilities indicate the proportion of the sample in each LRC. For example, at age 19, the first LRC described the experiences of 7 percent of the sample. This group had a nearly equal probability of providing family care (0.497) or working full-time (0.412), a high likelihood of being in a routine occupational class (0.716), a moderately high likelihood of being married (0.612), but were unlikely to have children (0.698). The second LRC, capturing the experiences of the majority of the sample (93%) at this age, was characterized by a high likelihood of full-time employment (0.828), work in a routine occupational class (0.567), and being single (0.994) with no children (1.00). Given the greater propensity of the first LRC to be providing family care, it is not surprising that this group was comprised almost exclusively of women (92 percent), while the second, larger group had a nearly equal gender distribution (49.2 percent female and 50.8 percent male).

Between the ages of 24 and 54, three LRCs best captured the most common configurations of work and family roles and begin to illustrate the gendered nature of role configurations. For instance, there was an all-female role configuration characterized by a high likelihood of marriage and of having dependent children through their mid- to late-forties. Here, the predominant labour activity varied across the age groups; family care was most likely for these women in their twenties, but the probability of working part-time increased in their mid- to late- thirties, continuing until the age of 54 at which time retirement or working in a full- or part-time capacity were the most probable activities. At all ages, these women were most likely to report being in a routine occupational class.

Strong attachment to the labour market was a consistent feature of the remaining two LRCs between the ages of 24 and 54. Occupational class, marital status, and the likelihood of having children distinguished these two LRCs over the respondents' mid-twenties to their late-forties. One of the two LRCs at these ages predominantly reflected the experiences of men who combined full-time work and a nearly equal probability of being in a routine or non-routine (professional or intermediate) occupational class (ages 24-34) or non-routine class (ages 39-44) with marriage and children. The remaining LRC, which captured the work and family roles of men and women, was distinguished by a low likelihood of marriage before mid-life, and a very low likelihood of

ever having children. Here too respondents were more likely to report being in a non-routine occupational class by age 44.

From later mid-life to retirement age (age 59-64) two LRCs described the work and family life experiences of respondents in this sample. An all-male LRC was characterized by ongoing strong labour market attachment through either full-time work or self-employment (although retirement was also likely by age 64), a nearly equal probability of being in a routine or non-routine class and high probability of being married. The second LRC predominantly described the experiences of women (99.9%) who were likely to report a mix of retirement, full or part-time employment, or family care. They also had a nearly equal probability of being in a routine or non-routine occupational class and a high likelihood of being married.

LRCs provide snapshots of the interconnected work and family experiences of men and women at various moments across the life course, allowing us to discern the most common combinations of roles in an efficient, but meaningful way. The LRCs also begin to delineate the gendered nature of life course experiences. Women who were married with children were much more likely to be providers of family care or work part-time from early- to mid-adulthood compared to their female counterparts who did not marry young or have children. In contrast, men who were married with children showed strong labour market attachment.

### Stage Two – Latent Life Pathways

Latent life paths (LLPs) are the pathways or trajectories that connect role configurations from young adulthood to retirement age. They provide us with a picture of how the LRCs at different ages are linked together to represent experiences over time. The probabilities of moving between various role configurations as individuals age outline the key life course patterns of labour market attachment, occupational class, and family life over the entire span of 'working' years.

In this stage, the LRCs from the first stage were used as the observed variables at each age point across the life course (see Figure 2). A number of models were compared on the basis of goodness-of-fit indices and model interpretability (Table 3). While the LMR-LRT suggested that the 2-class model provided the best fit, the declining BIC in the 3-, 4-, and 5-class models, the high entropy and theoretical interpretation of the latent pathways, suggested that a 5-class model was most appropriate. On the basis of their defining labour market and family experiences over the life course, the five pathways are referred to here as: (1) *Career Focused Females*; (2) *Career Focused Males*; (3) *Career Transition*; (4) *Family Carers and Part-time Workers*; and (5) *Workers with Families*.

The unconditional and conditional probabilities for the five LLPs are presented in Table 4. The unconditional probabilities indicate the proportion of the sample best described by that particular path, while the conditional probabilities specify the likelihood of transitioning to and from role configurations given membership in that particular pathway. Since the LLPs modeled in this work begin at age 19, the conditional probabilities at this age represent a starting point. For example, individuals in the *Career Focused Females* group had a high likelihood of being in the second LRC (0.983) at age 19 and were likely to transition to the third LRC at age 24 (0.969), followed by the second LRC at age 29 (0.979). For ease of interpretation, expected role probabilities within each latent life path are presented in Figures 3a-e. For simplicity, we present only the expected role probabilities for the most common labour market activities (full-time, part-time, family care and retirement) and family roles (single, married/cohabiting, presence of children in the household). These probabilities are the product of the conditional probability of a LRC within a latent life path and the conditional probability of a role within a LRC, summed over the LRCs at each age (Macmillan & Eliason, 2003). In what follows, the five latent life pathways are briefly described.

**Table 3. Assessment of model fit for Latent Life Paths using BIC, the Lo-Mendell-Rubin Likelihood Ratio Test, and Entropy Index**

| Number of Latent Life Paths | Log likelihood | BIC | Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT) *p*-value | Entropy Index |
|---|---|---|---|---|
| 1 | -13199.330 | 26523.563 | -- | -- |
| 2 | -8501.617 | 17260.390 | 0.000 | 0.997 |
| 3 | -7922.161 | 16233.730 | 0.295 | 0.968 |
| 4 | -7540.588 | 15602.835 | 0.944 | 0.964 |
| 5 | **-7254.142** | **15162.194** | **0.740** | **0.971** |
| 6 | -7039.206 | 14864.572 | 0.594 | 0.943 |

**Table 4. Unconditional and Conditional Probabilities for Latent Life Paths across the life course**

| Age: | | Unconditional Probabilities of the 5-Class Latent Life Paths: ***Career Focused Women*** **0.08** | ***Career Focused Men*** **0.11** | ***Career Transition*** **0.16** | ***Family Care Providers and P/Time Workers*** **0.29** | ***Workers with Families*** **0.37** |
|---|---|---|---|---|---|---|
| | | Conditional Probabilities: | | | | |
| 19 | 1-Family care or full-time work; routine class; married; no children | 0.017 | 0.003 | 0.155 | 0.125 | 0.013 |
| | 2-Full-time work; routine class; never married; no children | 0.983 | 0.997 | 0.845 | 0.875 | 0.987 |
| 24 | 1- Full-time work; routine class; married; children | 0.000 | 0.128 | 0.000 | 0.000 | 0.199 |
| | 2- Family care; routine class; married; children | 0.031 | 0.000 | 0.688 | 0.596 | 0.000 |
| | 3-Full-time work; equal probability of being in routine or non-routine classes; never married; no children | 0.969 | 0.872 | 0.312 | 0.404 | 0.801 |
| 29 | 1-Full-time work; routine class; married; children | 0.000 | 0.155 | 0.231 | 0.044 | 0.655 |
| | 2-Full-time work, nearly equal probability of being in routine or non-routine classes; never married; no children | 0.979 | 0.845 | 0.068 | 0.135 | 0.345 |
| | 3-Family care; routine class; married; children | 0.021 | 0.000 | 0.701 | 0.821 | 0.000 |
| 34 | 1-Full-time work; nearly equal probability of being in routine or non-routine classes; never married; no children | 0.946 | 0.518 | 0.003 | 0.005 | 0.027 |
| | 2-Full-time work; nearly equal probability of being in routine or non-routine classes; married; children | 0.008 | 0.482 | 0.016 | 0.000 | 0.973 |
| | 3-Family care or part-time work; routine class; married; children | 0.046 | 0.000 | 0.981 | 0.995 | 0.000 |
| 39 | 1-Family care or part-time work; routine class; married; children | 0.135 | 0.000 | 0.269 | 0.943 | 0.000 |
| | 2-Full-time work; nearly equal probability of being in routine or non-routine class; nearly equal probability of being married or single; no children | 0.802 | 1.000 | 0.172 | 0.031 | 0.027 |
| | 3-Full-time work or self-employment; professional or intermediate class; married; children | 0.063 | 0.000 | 0.559 | 0.026 | 0.973 |

*(Table 4 cont'd)*

| | | | | | | |
|---|---|---|---|---|---|---|
| 44 | 1-Part-time work or family care; routine class; married; children | 0.267 | 0.000 | 0.059 | 0.985 | 0.000 |
| | 2-Full-time work or self-employment; professional or intermediate class; married; children | 0.063 | 0.027 | 0.374 | 0.009 | 0.717 |
| | 3-Full-time work; intermediate or professional class; married; no children | 0.670 | 0.973 | 0.566 | 0.006 | 0.283 |
| 49 | 1-Full-time work or self-employment; routine class; married; children | 0.066 | 0.000 | 0.092 | 0.039 | 0.334 |
| | 2-Part-time work or family care; routine class; married; no children | 0.273 | 0.000 | 0.095 | 0.908 | 0.000 |
| | 3-Full-time work; intermediate or professional class; married; no children | 0.661 | 1.000 | 0.813 | 0.053 | 0.666 |
| 54 | 1-Full-time work; routine class; married; no children | 0.000 | 0.632 | 0.000 | 0.000 | 0.547 |
| | 2-Full-time work or self-employment; professional or intermediate class; married; no children | 0.192 | 0.368 | 0.206 | 0.051 | 0.453 |
| | 3-Part-time work, full-time work, or family care; routine class; married; no children | 0.808 | 0.000 | 0.794 | 0.949 | 0.000 |
| 59 | 1-Full-time work, retirement, self-employment or other; nearly equal probability routine/non-routine class; married; no children | 0.000 | 1.000 | 0.000 | 0.000 | 0.998 |
| | 2-Retired, part or full-time work, or family care; equal probability of routine or non-routine class; married; no children | 1.000 | 0.000 | 1.000 | 1.000 | 0.002 |
| 64 | 1-Retired, full-time work or other activity; routine class; married; no children | 0.000 | 1.000 | 0.000 | 0.000 | 0.998 |
| | 2-Retired, part-time work or family care; equal probability of routine/non-routine class; married; no children | 1.000 | 0.000 | 1.000 | 1.000 | 0.002 |

***Career Focused Females*** The first LLP, referred to here as *Career Focused Females,* described 8 percent of the sample and was nearly exclusive to the experiences of women (99%). Full-time work was the predominant labour market activity for this group until their mid- to late-forties, at which time there was a slight increase in the probability of working part-time, providing family care, or being retired (Figure 3a). Occupational class was fairly stable across the span of working years, with a nearly equal probability of reporting a routine or non-routine occupational class. In terms of family life, the *Career Focused Females* had a low probability of marriage before their mid- to late-thirties and a low likelihood of ever having children. Just under half of those characterized by these work and family experiences (47 percent) were from the oldest cohorts (born 1927-1931), 34 percent were born in the middle cohorts (born 1932-1936), and only 19 percent were from the youngest cohorts (born 1937-1940).

***Career Focused Males*** The second LLP, entitled *Career Focused Males* (Figure 3b), was nearly exclusive to the experiences of men (99%). This group had a high probability of working full-time for much of their lives and the decline in the likelihood of full-time employment in their later mid-life coincided with an increase in the likelihood of self-employment (not shown) and retirement (by age 64). Being in a routine occupational class was commonplace in early adulthood, but there was a modest increase in the probability of being in a professional class over the span of working years. Marriage was less common before their mid- to late thirties and with the exception of a slight increase in the likelihood of having children between their late twenties and mid-thirties, their likelihood was otherwise quite low. Nearly half (44 percent) of this group was from the oldest birth cohorts (born 1927-1931), one quarter from the middle cohorts (born 1932-1936) and 31 percent from the youngest cohorts (1937-1940).

***Career Transition*** The third LLP, the *Career Transition* group, captured the experiences of 16 percent of this sample and was comprised exclusively of women (Figure 3c). Their high likelihood of working full-time as young adults declined in their 20s and 30s as the probability of providing family care increased. This transition was temporary though, with an increased probability of working full-time evident again from their mid- to late-thirties until their mid-fifties. By their mid-fifties, a mix of retirement and part- and full-time work characterized the labour market activity of this group, with retirement becoming increasingly likely as they moved into their later fifties and early sixties. Although this group was likely to report being in a routine occupational class as young adults and during their years as caregivers, the likelihood of being in a professional occupational class rose slightly through mid-life. These women had a high probability of being married for much of their working years, with only a slightly higher likelihood of being previously married by their mid-sixties (not shown), and were likely to have dependent children in the household between their mid-twenties and late thirties. The cohort distribution of this group was fairly even across the three birth cohorts, with 31, 36 and 33 percent of the sample born in the oldest, middle, and youngest cohorts, respectively.

***Family Carers and Part-Time Workers*** The fourth LLP—the *Family Carer and Part-Time Workers* group—was also exclusive to the experiences of women, and captured the work and family life of 29 percent of the sample (Figure 3d). Family care was the dominant labour market activity of this group in their 20s and 30s, followed by an increase in the probability of working part-time. By age 54, the probability of retirement began to increase. Given their more limited formal labour market attachment, this group was likely to be in a routine occupational class for most of their working years, although there was a slight increase in the probability of being in a professional occupational class as they neared retirement age. The *Family Carers and Part-Time Workers* were likely to be married by age 24 and remain married, as well as to have dependent children in the household from their mid-twenties to mid-forties. Again, the birth cohort distribution was quite even across the three groups: 31, 37, and 32 percent of this group belonged to the oldest, middle, and youngest birth cohorts.

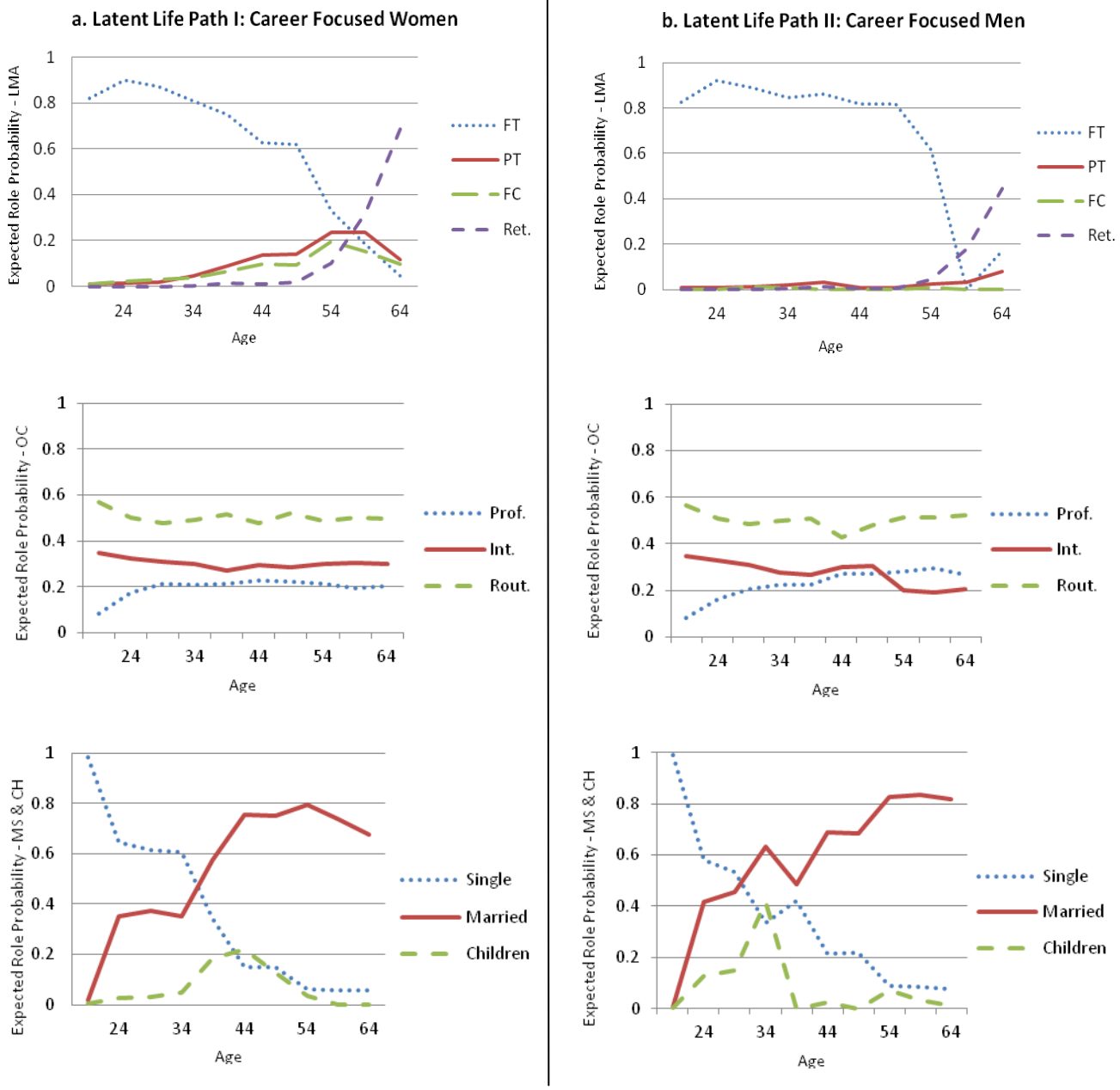
***Workers with Families*** The final pathway, *Workers with Families* characterized the experiences of 37 percent of the sample (Figure 3e), most of whom were men (99 percent). Consistent full-time work, including self-employment from their mid-40s to late 50s, characterized much of the working lives of this group, with retirement, an 'other' activity or full-

time work being most common by age 64. In terms of occupational class, these men had a nearly equal probability of being in the routine or non-routine classes across the life course, although the likelihood of being in a professional occupational class showed a modest increase with age until their mid-fifties. Unlike males in the '*Career Focused Males*' group, the consistent, full-time labour market attachment characteristic of this group was coupled with a high likelihood of being married by age 29 and remaining married, as well as having children in the household between their late 20s and mid-40s. Thirty-two percent of this group was born between 1927 and 1931, while 35 and 33 percent were born in the middle and youngest cohorts, respectively.

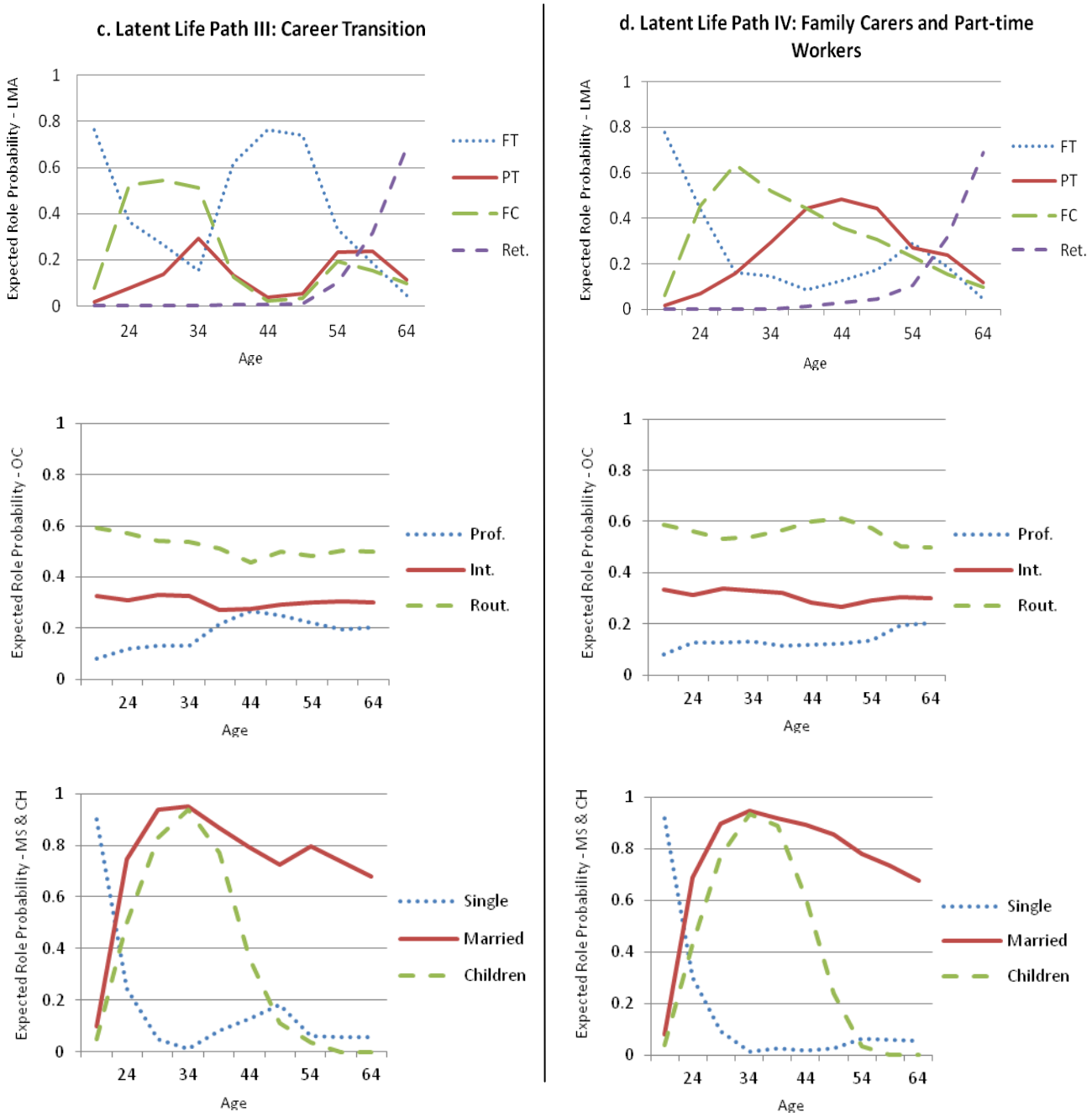
LLPs provide an innovative way of summarizing the multi-dimensional trajectories of men and women from early adulthood to retirement age through probabilistic pathways. The two-stage approach not only captures the interdependencies between work and family roles, but also highlights the gendered nature of life course experiences for these cohorts of older adults. With the exception of one opposite sex individual in three of the life paths (*Career Focused Females, Career Focused Males, and Workers with Families*), the life paths were distinctly gendered. For women, only a small proportion (8% - the Career Focused Females) participated in full-time work continuously, most likely owing to their very low likelihood of having children. For women with families, a combination of family care and part-time work was most common when dependent children were still in the household. Conversely, men's strong labour market attachment was unaffected by marriage or the presence of children.

In terms of the birth cohort composition among the life paths, there was a fairly even distribution of birth cohorts in all life paths, with the exception of the two *Career Focused* groups, who were comprised of a larger proportion of the older cohorts (47 and 44 percent). Members of the oldest cohorts reached young adulthood in the years immediately following the end of the Second World War. Women may have been less likely to marry young because of high war-related mortality, resulting in fewer eligible partners, and men may have delayed family formation or not had children at all due to other war-related factors, such as ongoing demobilization, war-related disability, etc. Also, policies that discouraged women's labour market participation, consistent with recommendations outlined in the Beveridge Report (Beveridge, 1942), would have had a greater impact on women in the younger birth cohorts because they reached working age in the years following their implementation. Thus, in light of social policies and provisions that inhibited women from being career-oriented, it follows that fewer of the women in these younger cohorts reported strong labour market attachment relative to their older counterparts.

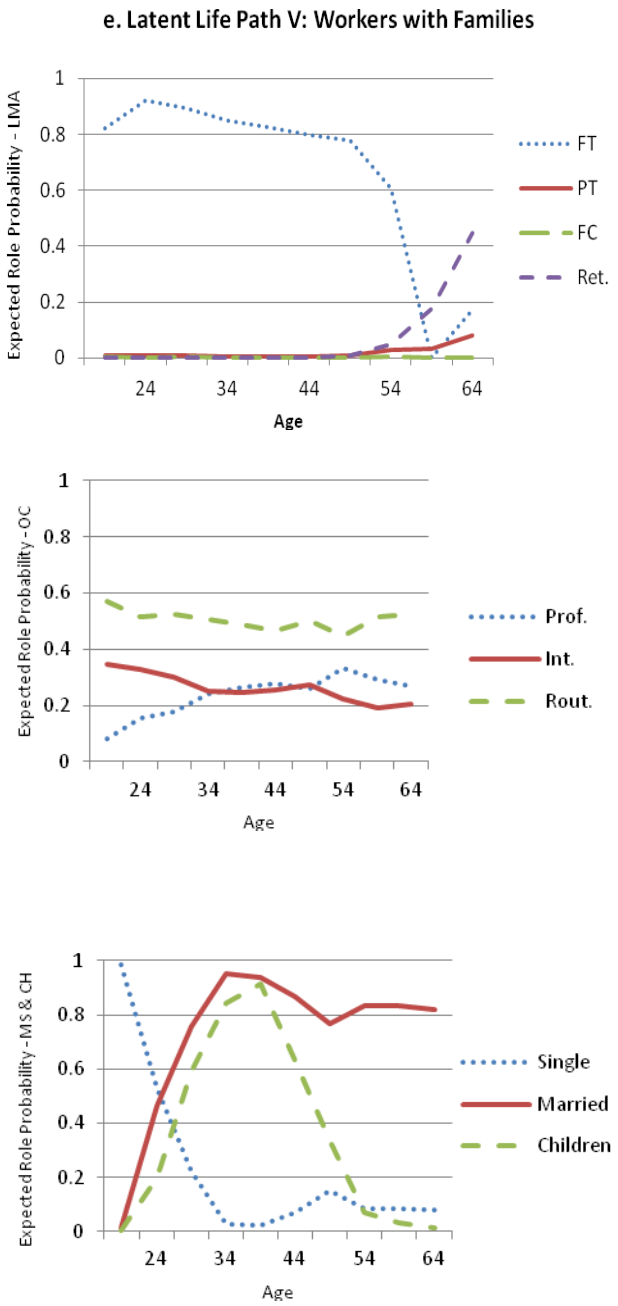
**Figure 3. Expected role probabilities by Latent Life Path**



*(Figure 3 cont'd)*



*(Figure 3 cont'd)*




*Note. LMA – labour market activity; OC – occupational class; MS – marital status; CH – children*

## Latent Life Paths and outcomes in later life

In the final part of the analysis, we assess the relationship between the LLPs identified here and economic and health outcomes at age 65 (Table 5). Significant mean differences in all three types of income were evident, with the *Workers with Families* faring the best in all cases, followed by the *Career Focused Males.* Among the three LLPs describing women's work and family experiences, the *Career Focused Females* reported the highest income levels, followed by the *Career Transition* LLP and the *Family Carers and Part-time Workers.* Overall differences in pension income were particularly marked, with men in the *Workers with Families* latent path reporting more than four times the amount reported by women who were primarily caregivers and part-time workers (*Family Carers and Part-time Workers)*.

In terms of health at age 65, significant differences by the latent life paths were noted for mental health only. The *Career Transition* group reported the greatest mental health problems, followed by the women in the *Family Carers and Part-Time Workers* and *Career Focused Females* groups. Men in the *Career Focused Males* and the *Workers with Families* groups reported significantly fewer mental health problems overall.

**Table 5. F-Tests of Mean Differences in measures of income and health at age 65 by Latent Life Paths**

| **Income at Age 65:** | | **Mean (Std. Deviation) (Income in £2005)** | **Difference Test** |
|---|---|---|---|
| Benefit income: | Full Sample | 3,886 (2,270) | |
| | Career Focused Females | 3,499 (1,841) | |
| | Career Focused Males | 4,324 (2,050) | |
| | Career Transition | 3,293 (2,102) | F=45.32***, df=4 |
| | Family Carers & Part-time Workers | 2,877 (2,080) | |
| | Workers with Families | 4,886 (2,193) | |
| Pension income: | Full Sample | 3,568 (6,261) | |
| | Career Focused Females | 3,639 (4,147) | |
| | Career Focused Males | 4,878 (6,170) | |
| | Career Transition | 2,359 (3,218) | F=25.98***, df=4 |
| | Family Carers & Part-time Workers | 1,169 (2,244) | |
| | Workers with Families | 5,546 (8,642) | |
| Labour income | Full Sample | 1,431 (6,200) | |
| | Career Focused Females | 882 (3,656) | |
| | Career Focused Males | 2,241 (9,051) | |
| | Career Transition | 804 (2,721) | F=5.46***, df=4 |
| | Family Carers & Part-time Workers | 433 (1,849) | |
| | Workers with Families | 2378 (8,467) | |
| GHQ (Mental health problems†): | Full Sample | 10.6 (4.8) | |
| | Career Focused Females | 10.8 (4.1) | |
| | Career Focused Males | 10.3 (4.6) | |
| | Career Transition | 11.5 (5.8) | F=8.53***, df=4 |
| | Family Carers & Part-time Workers | 11.4 (5.0) | |
| | Workers with Families | 9.6 (4.2) | |
| Count of chronic health problems | Full Sample | 1.5 (1.2) | |
| | Career Focused Females | 1.7 (1.4) | |
| | Career Focused Males | 1.4 (1.2) | |
| | Career Transition | 1.5 (1.2) | F=1.28, df=4 |
| | Family Carers & Part-time Workers | 1.5 (1.2) | |
| | Workers with Families | 1.4 (1.2) | |

*† Higher GHQ scores indicate greater mental health problems*.

## Discussion

The potential combinations of labour market and family roles over the span of 'working' years were numerous, reflecting the complexity and diversity of individual experience in these domains. Yet, capturing this complexity may be instructive for assessing differences across cohorts, social contexts and various social groups, as well as for understanding later life outcomes, such as health and economic resources. Empirically, the task of summarizing the detailed roles and experiences of individuals in multiple life course domains over considerable periods of the life course has presented particular methodological challenges stemming from the movement into and out of roles, and the importance of simultaneously considering experiences in multiple life course domains. The latent class approach applied here facilitated understanding the most common configurations of work and family roles at particular ages, and over the entire span of 'working' years, providing a picture of the most likely work and family experiences for this group of older adults. To our knowledge, this is the first study to model life course experiences in multiple domains over such a substantial portion of the life course using latent class models.

Consistent with the normative and institutionally supported gender division of labour during this period of time in Britain, the LRCs and LLPs demonstrated distinctly gendered patterns of work and family life. The LLPs derived here also confirm the strong interdependencies between family roles and formal labour market participation, particularly for women. Indeed, only a small proportion of women (8%) exhibited the strong labour market attachment (the *Career Focused Females*) that was characteristic of men's 'working' years, most likely owing to this particular group's tendency to marry later and not ever have children. Conversely, men's working lives were uninterrupted by marriage and the presence of children in the household. To be sure, the findings reported here are relevant to the cohorts of British older adults under study. In particular, these individuals entered the labour market during a period of time characterised by growth in part-time labour market opportunities for married women as well as high fertility. Cohorts preceding the groups considered here might have had more interrupted labour market experiences owing to World War II. Likewise, the higher educational attainment of later cohorts would have been likely to shape the work and family experiences differently. For women in particular, the postponement of motherhood for longer initial periods of full-time work, as well a higher likelihood of combining motherhood with continuous work, would be expected in later cohorts. Despite these anticipated differences, the approach applied here would generalise across cohorts and contexts and represents an ideal method for cohort comparisons of men's and women's work and family lives over time. Foregrounding observed life course experiences with the social policy context is important for understanding the opportunities and constraints placed on individual choices, and for addressing the tension between agency and structure that the life course perspective aims to understand.

LLPs also provide a promising means by which life course researchers can begin to ask more detailed questions concerning the influence of life course experiences on outcomes in later life. Mean differences in health and economic outcomes by the latent life paths confirm well-known gender differences in economic resources (Dex et al. 2000; Mumford & Smith 2004; Rake 2000) and add to the mixed findings regarding the relationship between gender and health (Arber & Cooper 1999; Suen 2011). However, this approach goes one step further by not assuming homogeneity within men's and women's experiences. Indeed, our findings indicate that there is heterogeneity among the experiences of women, and that these differences have implications for health and economic resources in later life. For example, women with stronger labour market attachment and fewer caregiving responsibilities fared significantly better financially than women who were married with children and whose primary labour market activity was a combination of family care and part-time work. Differences were also evident between women who returned to the labour market on a full-time vs. part-time basis following periods of family care, with the former group reporting greater benefit, pension and labour income. In terms of health, women who left the formal labour market for a period of time to provide care for their families and returned in their late thirties (women in the *Career*

*Transition* group) had more mental health problems than women without children who had stronger ties to the labour market (*Career Focused Females*). Interestingly, there were not significant differences between the two groups that characterized the experiences of men (*Career Focused Males* or *Workers with Families*), suggesting that family circumstances do not matter for men's economic circumstances and health at retirement age to the same extent that they do for women. The noted differences among the LLPs describing women's work and family lives warrant further explanation to determine how these experiences shape economic and health outcomes, as well as what intermediary factors might help account for these associations.

Advancing research in this area would also benefit from a comparison of the findings presented here with other methodological approaches. One such method is sequence analysis, which has increasingly been applied to the study of life course trajectories (e.g., Abbott 1995; Abbott and Tsay 2000; Aisenbrey & Fasang 2010).

Although studies of the life course are certainly not novel, the challenges associated with summarizing or modeling life course experiences in multiple domains has meant that analyses have often been restricted to particular phases of the life course, such as the transition to adulthood (Aassve, Billari, & Piccarreta, 2007; Macmillan and Copher 2005; Pollock 2007), or the progression through various stages of only one life course domain, such as career development (e.g., Scherer 2001). Fortunately, the detailed life course history data collected in the second and third waves of the BHPS afforded the opportunity to look at life course experiences from late adolescence to early old age. However, the findings reported here should be considered in light of the limitations of the approach. First, we were limited by the availability of the observed data used in the latent class models. For example, dependent children were defined as being younger than 16 years because of limitations in the data. However, the presence of older children may also influence men's and women's labour market involvement. Additionally, more detailed occupational data might have resulted in more detailed LRCs at the selected ages across the life course.

A second consideration involves our decision to model LRCs at 5-year intervals in the first stage of the analysis, a decision that was made with the aim of striking a balance between capturing key life course transitions and feasibility in terms of model estimation. While we anticipate that a shorter interval would have very little effect on the longer term LLPs derived here, it remains an empirical question. Similarly, the use of modal labour market and occupational class to classify the entire year may have overlooked short-term changes, such as brief spells of unemployment. Again, while we would not expect to see considerable differences in our findings, future work might examine trajectories using monthly rather than yearly intervals.

Notwithstanding these limitations, given the challenges associated with empirically summarizing life course histories, the approach adopted here represents an important methodological contribution to the study of life course processes and their association with late life outcomes. Importantly, modeling life course experiences in a latent variable framework facilitated the identification of meaningful subgroups or configurations of experience, and as such, addresses one of the key challenges associated with this type of analysis – the issue of how to deal with the very large number of possible observed role combinations and life pathways. To our knowledge, this is the first study to simultaneously examine experiences in multiple social roles over a substantial period (46 years) of the life course, while incorporating the influence of gender and birth cohort. Moreover, by considering the observed labour market and family experiences in the social policy context in which they unfolded, this study provides insight into the ways in which the policies and provisions of particular historical periods shape men's and women's experiences differently, as well as the heterogeneity of experiences among groups of women and men. Accordingly, this research bridges theoretical concerns with respect to the life course—the notion of linked lives, the importance of context, and the tension between agency and structure—with appropriate analytical methods for tackling such questions.

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# Trajectories of life satisfaction and the financial situation in the transition to adulthood

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## Abstract

*The aims of this study were (1) to investigate young adults' life satisfaction changes during the transition to adulthood, (2) to identify possible life satisfaction developmental trajectories during the transition, and (3) to examine how individuals' agency and personal financial situations are related to the identified life satisfaction trajectories in the contexts of life-span and life course theories of development. The present study is part of the longitudinal Finnish Educational Transitions (FinEdu) study, in which a total of 372 (278 female and 94 male) young adults filled in questionnaires at four measurement points, that is, twice before (at 18 and 19 years of age) and twice after (at 20 and 22 years of age) the transition from upper secondary high school to tertiary education and/or employment. Growth Mixture Modelling revealed five trajectories of life satisfaction: low-stable (8%), moderate-stable (41%), high-stable (27%), moderate-increasing (17%), and high-decreasing (7%). The vast majority (76%) of young adults had a stable life satisfaction trajectory throughout the transition. High levels of achievement approach strategies at age 19 were somewhat related to high-decreasing and high-stable life satisfaction trajectories. In turn, those using achievement avoidance strategies at age 19 were more likely to have low-stable or moderately-increasing life satisfaction trajectories. Positive life satisfaction trajectories were related to being in a positive financial situation at age 22. The two largest trajectories indicated better objective and subjective financial situations than did the other trajectories.*

**Keywords***:* young adulthood, life satisfaction, agency, developmental trajectories, longitudinal study, financial situation, person-oriented approach, Growth Mixture Modelling

## Introduction

Financial situation and employment have been seen as some of the most important correlates of life satisfaction and sources of self-confidence, life management and capability in young adulthood (Cunnien, MartinRogers, & Mortimer, 2009). However, the diverse transitions and individual changes taking place in this life course phase may alter both the development of life satisfaction as well as the personal financial situation. Additionally, macro-economic changes in society, such as during an economic crisis, may lead to changes in mental health due to perceived economic pressure (Stein et al., 2011). Both of these reasons highlight the importance of examining individuals' life satisfaction in relation to their financial situation. Although a large body of research has been conducted on young adults' and adolescents' financial situation, with topics including consumer

behaviour motivation and purchasing power (e.g., Noble, Haytko, & Phillips, 2008), disposable income and parental financial support (e.g., West, Sweeting, Young, & Robins, 2006), relatively less research has examined the role of individuals' financial situation in this crucial and demanding life course phase from late adolescence to early adulthood in relation to their life satisfaction.

As societies prosper, differences in life satisfaction are less frequently due to differences in income. High life satisfaction does, however, often have positive outcomes, including economic ones relating to higher income and better job performance, rather than the other way around (Diener & Seligman, 2004). In turn, financial well-being, that is, having a stable economic situation with little debt and greater financial satisfaction, does seem to positively affect overall life satisfaction in this particular life course phase of young adulthood (e.g., Shim, Xiao, Barber, & Lyons, 2009). However, regarding change in overall life satisfaction, only a few studies have focused on its development or heterogeneity across an *educational transition*, which often involves distinct changes that are either positive or negative and which also might change the related quality of life satisfaction (e.g., Salmela-Aro & Tuominen-Soini, 2010; Salmela-Aro & Tynkkynen, 2010) and well-being (e.g., Haase, Heckhausen, & Silbereisen, 2012).

In this study, we examine — through longitudinal research — whether young adults' life satisfaction changes, and what kinds of life satisfaction trajectories can be found across the challenging developmental transition in young adulthood, after upper secondary high school, into tertiary education and/or employment, between ages 18 and 22. Secondly, we examine young adults' financial situation and agency in relation to their life satisfaction.

## Financial challenges and life satisfaction

The phase of young adulthood is, according to Rindfuss (1991), demographically "dense" in that a great number of changes and demographic events occur simultaneously, such as moving out of the childhood home and taking part in further education and/or employment. These demographic markers of the transition to adulthood are also linked to financial independence (Lee & Mortimer, 2009). Graduation and the beginning of employment foster financial independence, which may affect other markers of adulthood and life course events relating to education, employment, moving out of the childhood home and establishing a family (Billari, 2001; Lee & Mortimer, 2009; Modell, Furstenberg, & Hershberg, 1976).

These transitionary life events which initiate long-term changes and a reorganisation of one's life (Cowan, 1991) may have a profound effect on overall life satisfaction, either through stimulated personal growth, or dysfunction and stress (Perren, Keller, Passardi, & Scholz, 2010). Success in dealing with life course transitions and the relatively early completion of adult transitions in the education and work domains, for example, as evidenced by various transitional pathways, may contribute to young adults' subsequent life satisfaction and well-being (Räikkönen, Kokko, Chen, & Pulkkinen, 2012; Salmela-Aro, Ek, Taanila, & Chen, 2012; Schulenberg, Sameroff, & Cicchetti, 2004). Instability in life satisfaction and its relation to contextual circumstances have also been witnessed in a study by Lucas and Donnellan (2007). Evidently, some young adults find difficulty in adapting to the changes and challenges taking place during the major life course phase of the transition to adulthood, and the inherent instability of the transition may make this life course phase confusing and unsettling, characterised by individuals' ill-health and unhappiness (Hendry & Kloep, 2007a), anxiety (Hendry & Kloep, 2007b), maladaptive functioning leading to precarious trajectories (Côté & Bynner, 2008), and negative self-esteem and depressive symptoms (Luyckx, De Witte, & Goossens 2011). On the other hand, on the basis that the majority of young adults face no severe problems in their youth, many other researchers see late adolescence as a prime time for a wide range of opportunities (Eccles et al., 1993; Graber & Brooks-Gunn, 1996; Powers, Hauser, & Kilner, 1989) and the transition also as a turning point for positive personality trait change, as in a study by Lüdtke, Roberts, Trautwein and Nagy (2011) where high school (upper secondary) students were found to be "more agreeable, conscientious and emotionally stable" after the transition from high school to college.

Success in developmental tasks, such as in forming stable employment careers in this life course phase, demands active behaviour and agentic strivings from young adults (Vuolo, Staff & Mortimer, 2012). According to the life-span model

of motivation (Heckhausen, Wrosch, & Schulz, 2010; Nurmi, 2004; Salmela-Aro, 2009), individuals follow and regulate their personal developmental paths by choice and selection. This is related to adapting and pursuing developmental and personal goals that reflect changes in life course opportunities. This agentic process does not, however, occur independently from changing social contexts: social structure, culture and historical life context (Freund & Riediger, 2006; Salmela-Aro & Little, 2007). The life-span model of motivation is guided by the sociological life course approach to human development (Bronfenbrenner, 1979; Elder, 1998a), which states that human development is shaped by a set of interacting spheres of influence and principles, not only including individual agency but also the timing of events, linked lives and the embeddedness of development in its socio-historical context.

During a transition period, individuals need to negotiate their lives according to the constraints and opportunities imposed on individual agency (Elder, 1998a). As regards agency, the focus is on the individuals' ability and power to act in a way that is different to what has been spelled out for her or him (Giddens, 1991). During the transition from school to work, personality and psychological orientations fostering achievement and indicating agentic striving, may also help young adults to cope with economic turbulence and the current structural changes in working life, uncertain labour markets and tougher economic conditions that may challenge young adults' passage into adulthood (Mortimer & Larson, 2002), life management and school-to-work transitions (Furlong & Cartmel, 2007; Marks, 2005). An unfortunate life event, such as unemployment, within an important life course transition, may have an impact on the individual's life satisfaction. On the other hand, individuals with better psychological readiness may be more capable of meeting the challenges of such a concurrent life event and life course transition. In this study, agency is operationalised in terms of achievement strategies, to assess how young adults approach challenging life situations. These strategies are usually operationalised as being either approach optimistic (functional) or avoidant (dysfunctional) (Eronen, Nurmi, & Salmela-Aro, 1997; Nurmi, Aunola, Salmela-Aro, & Lindroos, 2003).

Prior studies (e.g., Roberts, Osadchaya, Dsuzev, Gorodyanenko, & Tholen, 2003) have shown that economic reforms and tougher labour market conditions have not influenced young adults' life course transitions relating to housing and family formation as much as new individual lifestyle options and choices. Young adults seem to be able to accommodate their consumption to their individual income level as they conduct individual comparisons to others (Roberts, Osadchaya, Dsuzev, Gorodyanenko, & Tholen, 2003). A recent study by Stein et al. (2011) showed that in accounting for variation in levels of psychological distress among 21 year-old college students, greater personal financial strain of the economic crisis — specifically on personal, individual lifestyles — was much more salient compared to felt family economic pressure, as seen in a study by Conger and colleagues (1999). Nevertheless, in the prolonged transition to adulthood, young adults are increasingly financially dependent on their parents (Johnson and Benson, 2012) in times of youth unemployment, this financial dependency can have a profound risk on self-efficacy (Mortimer, 2012). Family social class background and income do need to be considered as factors affecting the possibilities for independence and options for deciding on taking a break from developmental tasks in young adulthood, as wealthy young middle-class adults with supportive parents tend to have an advantage in this regard (Furlong & Cartmel, 2007).

Perren et al. (2010) have noted that studying changes in well-being over time requires time-consuming longitudinal study designs, with several measurement points that start before the transition. In the present study, life satisfaction development is viewed across the transition to adulthood, and more specifically, during the transition from upper secondary high school to employment and/or further education. The study has a longitudinal perspective, reflecting the recent emphasis on the need for such longitudinal multi-wave studies, rather than cross-sectional ones, in order to understand different developmental processes (Diener & Seligman, 2002). Another limitation concerning earlier studies on life satisfaction among young adults, is their focus on the developmental course of life satisfaction solely at the mean level (e.g., Costello, Swendsen, Rose, & Dierker, 2008), not addressing the possibility that individual trajectories could be different. In line with Salmela-Aro and Tynkkynen (2010), a possible approach is to use person-oriented (Bergman,

Magnusson, & El-Khouri, 2003) trajectory analysis (Nagin, 1999; Nagin & Land, 1993; Nagin & Tremblay, 1999), or Growth Mixture Modelling (GMM; Muthén, 2004; Muthén & Muthén, 2000; Muthén & Shedden, 1999), which may be more fruitful methods for examining human development.

### Transition to adulthood in Finland

The focus of this study is on young adults' (aged 18 to 22) transition to adulthood, from completing upper secondary high school education to beginning their tertiary education and/or employment in Finland. In addition to the educational transition taking place, young adults gain legal adult status in Finland on becoming 18 years of age, which includes the right to marriage, leaving church membership, buying mild alcoholic drinks and cigarettes, obtaining a driving licence, and the right to vote; and for men, the responsibility to serve in the army or civil service.

The welfare regulations, social policies and legislation of the Scandinavian countries emphasise societal universal support systems and individual rights to state-granted economic incentives and benefits (Esping-Andersen, 1990; Furlong & Cartmel, 2007). The universal support of the Nordic welfare state provides a good example of how the socio-economic and political context and its structures interact with personal aspirations and accomplishments regarding developmental tasks. Buchmann and Kriesi (2011) argue that this socio-political welfare system is related to the observed patterns in early home-leaving and non-traditional family formation. Such regulations and policies may reduce the negative impact that global and national economic uncertainty has on individuals and their life course transitions (see also Ranta, Punamäki, Tolvanen, & Salmela-Aro, 2012). As a result, structural changes in the economy may not have as dramatic an impact on young adults' economic situation in Finland as in countries without welfare programs (Blossfield, Klijzing, Mills, & Kurz, 2005).

The impact of governmental financial aid is also strongly evident in educational patterns. Education in Finland, at all levels, is state-provided and tuition is free of charge. This, as well as the fact that students are provided with state benefits, supports equal opportunities for all young adults irrespective of family background. Students attending upper secondary school, a vocational institute or higher education institute, receive government financial aid, which consists of a study grant, a housing supplement and a government guarantee of a student loan. Study grants and housing supplements are cash benefits from the state and they do not need to be paid back. The student loan is a normal bank loan granted by all Finnish banks upon application (EUROSTUDENT, 2005–2008). Before the recession of the national economy in the early 90s, the student financial aid system was mainly based on subsidised student loans. The system was reformed in 1992 with the abolition of government loans as subsidies for students, but the study grant amount was more than doubled. This resulted in the unpopularity of student loans and shifted students' interest from loan-based to employment-based income (Häkkinen, 2004; Häkkinen & Uusitalo, 2003). Consequently, according to recent Statistics Finland data (2011a), more than half (55%) of Finland's students are employed whilst studying.

The participants of this study were students who attended upper secondary high school, which approximately 50% of Finnish young adults attend (Official Statistics of Finland, 2011). After a three- to four-year period in upper secondary school, graduates may (among other options) apply for tertiary education and/or enter working life. A special problem of the Finnish educational system is the issue of late entry into higher education after upper secondary school (Ministry of Education and Culture, 2005). Because competition for admission to higher education is extremely tough, only roughly half of those completing the final matriculation examination move into higher education in the same year as their earlier graduation from secondary level, as is also the case regarding the transition from secondary education to employment (Statistics Finland, 2009, 2010b).

Even though young Finnish adults move out of their childhood home relatively early compared to others in the European Union member states, there is a significant gender gap present. In the European Union countries in 2008, about 76% of young adults aged 18–24 still lived with their parents in their childhood home (71% of women, 81.5% of men). Finland and Lithuania shared the second-widest gender gap for this measure (21 percentage points (pp)), below Bulgaria's gender gap of 23 pp (Eurostat Statistics, 2010). Leaving the childhood home is often related to financial security as factors involved include receiving financial support from

parents, labour market conditions, and the cost of housing (Eurostat, 2009). In the European Union in general, 44% of 15-30 year olds consider that young adults cannot afford to leave their parental home and 28% agree that not enough affordable housing is available. In Finland, however, it is fairly easy to rent an apartment and the housing supplement of the student financial aid package promotes early transitions.

### Aims and hypotheses

The overall aim of this longitudinal study was to bring forward comprehensive information concerning the role of economic determinants acting on life satisfaction during the transition to adulthood, by using a person-oriented approach. Specifically, our research questions were:

(1) How does young adults' life satisfaction change during the transition to adulthood?

(2) What are the possible types of life satisfaction trajectories emerging during the transition to adulthood? Do these trajectories differ according to gender or family socio-economic status, parental financial support, living situation or life situation?

(3) How are achievement strategies (i.e., agency), associated with the identified life satisfaction trajectories?

(4) How is the financial situation of young adults', during the transition to adulthood, associated with the identified life satisfaction trajectories?

Based on previous studies, we tested the following hypotheses: (H1) life satisfaction remains fairly stable during the transition to adulthood for the majority of young adults (Eccles et al., 1993; Graber & Brooks-Gunn, 1996; Powers, Hauser, & Kilner, 1989); (H2) due to differences between young adults, and as seen in the studies by Perren et al. (2010) and Salmela-Aro and Tynkkynen (2010) concerning normative educational transitions, different trajectories of life satisfaction can be found as some individuals experience an increase and some a decrease in life satisfaction, while most do nevertheless encounter stability; (H3) active agency and the use of achievement approach strategies (see Perren et al., 2010; Eronen, 2000) are significantly associated with life satisfaction; and (H4) a positive financial situation is related to high life satisfaction (Ervasti & Venetoklis, 2010; Jorgensen, Jamieson, & Martin, 2010; Shim et al., 2009). As can already be identified from the theoretical introduction, our perspective on the transition to adulthood attempts to integrate the sociological life course transition approach with the psychological markers of agency, in examining life satisfaction development and the financial situation in the transition to adulthood.

## Method

### Data

The empirical data of the present study was taken from the ongoing longitudinal Finnish Educational Transitions (FinEdu) Studies, gathered using written self-report questionnaires addressed to all upper secondary high school students (6 schools, 28 classes) living in the same mid-sized Finnish city (population = 105,000). During their transition to adulthood, participants filled in questionnaires for data collection twice in upper secondary school *before* the transition (in their second and third years, at 18 and 19 years of age, referred to as Time 1/2004 [T1] and Time 2/2005 [T2]), and twice *after* the transition (at 20 and 22–23 years of age, referred to as Time 3/2006 [T3] and Time 4/2008-2009 [T4]), from upper secondary high school to the commencement of higher education and/or employment. At the first measurement point, 614 (response rate 80%; 376 female and 237 male, 1 unreported), at the second measurement point 636 (83%; 425 female and 211 male), at the third measurement point 449 (61%; 327 female and 122 male), and at the fourth measurement point 422 (59%; 287 female and 132 male, 3 unreported) young adults answered the questionnaire. Because the focus of our study is on the educational transition period, the measurement taken immediately after graduating from high school (upper secondary school) (i.e., T3) was of special interest. Therefore, only those respondents who provided responses to at least one item on life satisfaction at T3 were included in the final sample of the study ($N$ = 372; 278 female [75%] and 94 male [25%]).

### Measures

*Life satisfaction* was measured using the Satisfaction with Life Scale (SWLS) by Diener, Emmons, Larsen and Griffin (1985). Participants rated five items (for example, "*I am satisfied with*

*my life",* and "*The conditions of my life are excellent"*) on a 7-point Likert-type scale ranging from 1 *(totally disagree)* to 7 *(totally agree)*. A mean score was calculated for all items. The Cronbach's alpha reliabilities ranged from .85 to .88 across the four measurement points, indicating a high level of internal consistency with respect to the life satisfaction variable.

*Achievement strategies* were assessed in relation to achievement *approach* and achievement *avoidance* strategies measured at T1 and T4 by four-item scales taken from the Strategy and Attribution Questionnaire (SAQ; Nurmi, Salmela-Aro, & Haavisto, 1995). *Achievement approach strategies* measured the extent to which people expect to succeed in a task and are not overly apprehensive of failure, e.g., "*When I get ready to start a task, I am usually certain that I will succeed in it*". *Achievement avoidance strategies* measured the extent to which people tend to behave in ways that prevent them from carrying out a task, e.g., "*What often occurs is that I find something else to do when I have a difficult task in front of me*". Responses were given on a scale from 1 *(strongly disagree)* to 7 *(strongly agree)*. The Cronbach's alpha reliabilities at T1 were .81 for achievement approach and .82 for achievement avoidance.

*Financial situation* was measured by two questions with regard to participants' subjective and self-reported objective financial situation at Time 4 (T4). Participants' *subjective financial situation* was measured by examining perceived income sufficiency in terms of personal consumption habits, with a 5-point Likert scale ranging from 1 *(poorly)* to 5 *(extremely well)* corresponding to the question, *"Do you think your income covers your expenses at the moment?"* Participants' self-reported *objective financial situation* was measured with the question, *"How much money do you have for use monthly?"* The participants were asked to report the amount of their monthly income, including salary (EUR), financial support (e.g., student/housing financial aid from the state), support from parents and relatives, loans (including mortgage/study loans, consumer credit), and other types of income. In the analyses, these amounts were summed. T*he income distribution* of the respondents varied. 44% of respondents received a salary (*M* = 518 EUR monthly, *SD* = 520), 57% received financial support from the state (*M* = 405 EUR monthly, *SD* = 119), 42% received financial support from family or other relatives (*M* = 99 EUR monthly, *SD* = 105), 20% had a loan (*M* = 150 EUR monthly, *SD* = 218), and 12% indicated receiving money from other sources (*M* = 254 EUR monthly, *SD* = 662). The relative contribution of these different sources to total income at age 22 was as follows: 40% was received as a salary, 41% as financial support from the state, 7% as financial support from family or other relatives, 5% as a loan, and 5% from other sources. These descriptive data are comparable to figures for the majority of young adults in Finland. As in most European Union countries, employment and one's own earnings are the main source of students' income, along with financial support from the state (Orr, Gwosć, & Netz, 2011). Parental financial support was minor in comparison, as was the popularity of loans, as discussed earlier. The findings thus concur with the general trend in Finland of a shift in responsibility for financial security away from the parents and toward the state and the individuals themselves (Ranta et al., 2012).

## Background information

Respondents' *gender* was asked at the initial measurement time (T1). *Family socio-economic status (SES)* was measured by asking the participants to report their parents' occupations. In cases where this information was not available at the initial measurement (T1), this data was used from T2. Answers were classified into five socio-economic categories using a standard classification system (Statistics Finland, 1989). The five categories were: 1) *not in employment,* 2) *self-employed,* 3) *blue-collar occupation*, 4) *lower white-collar occupation*, and 5) *higher white-collar occupation*. Out of those who replied, the occupational distribution of participants' fathers was as follows: 7% were not in employment (students, retired or unemployed, all seen as having a low income), 13% were self-employed, 25% worked in blue-collar occupations (e.g., construction workers, mechanics), 16% worked in lower white-collar occupations (e.g., secretaries, salespersons, nurses), and 39% worked in higher white-collar occupations (e.g., physicians, teachers, lawyers, managers). For mothers, the occupational distribution was as follows: 7% were not in employment, 6% were self-employed, 13% worked in blue-collar occupations, 47% worked in lower white-collar occupations, and 27% worked in higher white-collar occupations.

Applying the household reference person definition (HRP; Department for Commmunities and Local Government 2011; Statistics Finland 2011b), we have used the person with the highest occupation as a reference for family socio-economic status. In the case of self-employment, the occupation of the other parent was taken into account, except if the other parent was not in employment or the information was missing. As a result, the household socio-economic status was as follows: 2% not in employment, 5% self-employed, 11% blue-collar, 35% lower white-collar, and 47% higher white-collar.

In terms of *living situation*, at the age of 22, most of the respondents had moved from their childhood homes into independent living: only 2% lived with their parent/s, 20% lived with a friend or roommate, 33% lived alone, 42% lived with a boyfriend/girlfriend or husband/wife, and 3% had some other living arrangement. In terms of *life situation*, the majority of participants were still studying at the age of 22, mostly in university (34%) or at a polytechnic institute (25%). Many participants were in a life situation characterised by combining different tasks, as 42% were simultaneously studying and working.

## Attrition analyses

As noted earlier, the final sample comprised those participants who provided responses to at least one item on life satisfaction at T3 ($n$ = 372). A series of $t$-tests was conducted with respect to these 372 participants in order to compare their life satisfaction scores with those who participated at all measurement points ($n$ = 200) and those with missing data at some measurement points ($n$ = 172). No significant differences were found. By using the missing data procedure (see next section for more details), we were able to supply data on all of the participants in the analyses.

With regard to gender, the majority (64%) of participants in our entire sample of 733 respondents were female, which reflects the overall distribution of high school (upper secondary) students in Finland as 57% of these constituted women in 2009 (Statistics Finland, 2010a). The $t$-test showed a significant selection effect favouring female respondents, $t(400) = -3.96$, $p < .001$. This is a limitation of the study and will be discussed further in the Discussion section. However, a parallel $t$-test confirmed that there was no selection effect [$t(717) = -.06$, $p = .95$, ns] in terms of family socio-economic status (see above).

## Analysis strategy

Analyses were conducted in three phases. First, to answer our first research question on how life satisfaction changes during the transition to adulthood, Latent Growth Curve Modelling (LGCM; Duncan, Duncas & Strycker, 2006; Muthén & Muthén, 1998–2007) was conducted to estimate the average initial level and slope of life satisfaction among the participants.

The goodness-of-fit of the estimated LGCM was evaluated according to the following indicators: (1) $\chi^2$-test; (2) Comparative Fit Index (CFI; Bentler, 1990) with a cut-off value of ≥.95; (3) Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) with a cut-off value of ≤.08; and (4) Standardized Root Mean Square Residual (SRMR; Hu & Bentler, 1998) with a cut-off value of ≤.09.

To answer our second research question on whether different types of life satisfaction trajectories emerge during the transition to adulthood, the analyses of this longitudinal data set were extended into Growth Mixture Modelling (GMM; Muthén, 2001, 2004; Muthén & Muthén, 2000; Muthén & Shedden, Muthén & Shedden,1999). GMM can be used to examine unobserved heterogeneity in the development of an outcome over time, by identifying homogeneous subpopulations that differ with respect to their developmental trajectories within the larger heterogeneous population. GMM is exploratory by nature, which means that there are no specific a priori assumptions regarding the number of latent classes to be found. Typically, in running GMM, a series of models are specified. The best-fitting model is then selected based on a list of criteria, including the goodness-of-fit indices and conceptual considerations. In this study, the following goodness-of-fit indices were used to evaluate the models: Akaise's Information Criteria (AIC), Bayesian Information Criteria (BIC) and Adjusted Bayesian Information Criteria (aBic) of the alternative models. Entropy values were also examined, with values close to 1 indicating a clear classification. Following Marsh, Lüdtke, Trautwein,and Morin (2009) and Bowen, Lee and Weller (2007), groups of ≥5% of the sample were considered the smallest to give an acceptable solution. Practical usefulness, theoretical justification and interpretability of the latent group

solutions were also taken into consideration (see also Bauer & Curran, 2003; Marsh et al., 2009; Muthén, 2003). The analyses were controlled for gender and SES.

Both LGCM and GMM analyses were conducted with the Mplus 5.0 statistical software programme (Muthén & Muthén, 1998–2007), using the *missing-at-random* (MAR) approach to missing data, which uses all of the available observations in the data set when estimating the parameters of the models. This model does not assign values for data that are missing but it uses all of the data that are available to estimate the model using the full information *maximum likelihood ratio* (MLR). Because the variables were skewed, the parameters of the LGCM and GMM analyses were estimated using the default MLR estimator (Muthén & Muthén, 1998–2007).

Finally, to answer the third and fourth research questions, we used One-Way Analysis of Variance (ANOVA) to examine if the life satisfaction trajectory groups differed in terms of their achievement strategies and financial situation. Post hoc comparisons using the Games–Howell test were used to examine the differences between groups. Missing data was handled by applying listwise deletion in these ANOVA analyses.

## Results

### Descriptive results

The sample correlation matrix, scales, means (*M*), standard deviations (*SD*) and Cronbach α reliabilities for the key variables are shown in Table 1.

### Development of life satisfaction

The first research question was concerned with the longitudinal change in young adults' life satisfaction during the transition to adulthood. To answer this question, we specified a Latent Growth Curve Model with a linear slope for change in life satisfaction across the four measurement points. The model fit the data well [$\chi^2$ = 15.79(5), $p$ < .01; CFI = .97; RMSEA = .08; SRMR = .06].

The intercept (i.e., initial level) of life satisfaction was statistically significant, but the linear slope was not [*Intercept M* = 4.90, *SE* = 0.06, $p$ < .001; *Slope M* = 0.01, *SE* = 0.02, $p$ = ns]. This indicated that, on average and as hypothesized (H1), there was no significant longitudinal change in life satisfaction across the four measurement points. Interestingly, the variances of both the intercept and the slope were significant (variances = 0.92, $p$ < .001 and 0.04(0.01), $p$ < .01, respectively), indicating significant individual variances both in the initial levels and in the rate of change. Consequently, although the model showed no linear change in life satisfaction development on average, supporting our hypothesis (H2), there was significant heterogeneity among individuals. This indicated that a single latent trajectory was not able to sufficiently capture the heterogeneity of the changes in life satisfaction. Therefore, we aimed to identify different classes of life satisfaction trajectories in the next phase of analysis.

**Table 1. Correlations, scales, means, standard deviations, and reliabilities for the variables used**

| Variables | Scale | *M* | *SD* | α | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Life satisfaction T1 | 1–7 | 4.83 | 1.20 | .85 | - | | | | | | |
| 2. Life satisfaction T2 | 1–7 | 5.01 | 1.22 | .88 | .58** | - | | | | | |
| 3. Life satisfaction T3 | 1–7 | 4.89 | 1.21 | .88 | .52** | .58** | - | | | | |
| 4. Life satisfaction T4 | 1–7 | 5.00 | 1.11 | .86 | .44** | .46** | .58** | - | | | |
| **Financial situation** | | | | | | | | | | | |
| 5. Objective financial situation T4 | - | 834 | 498 | - | .13 | .11 | .15* | .04 | - | | |
| 6. Subjective financial situation T4 | 1–5 | 3.27 | 1.19 | - | .16* | .19** | .20** | .19** | .45** | - | |
| **Achievement strategies** | | | | | | | | | | | |
| 7. Achievement approach T1 | 1-7 | 4.96 | .88 | - | .40** | .51** | .36** | .23** | .16* | .10 | - |
| 8. Achievement avoidance T1 | 1–7 | 3.58 | 1.27 | - | -.23** | -.29** | -.20** | -.19** | -.07 | -.07 | -.42** |

*Notes.* * $p < .05$, ** $p < .01$

*T1 = Time 1/2004, at 18 years; T2 = Time 2/2005, at 19 years; T3 = Time 3/2006, at 20 years; T4 = Time 4/2008-2009, at 22–23 years of age*

### Identifying life satisfaction trajectories

GMM procedures were employed to identify the different life satisfaction trajectories. Two- to six-class models were tested. Similar to the LGCM procedures, the loadings for T1 (age 18), T2 (age 19), T3 (age 20) and T4 (age 22) were fixed to 0, 1, 2, and 4. Table 2 shows the fit indices and class frequencies for different growth mixture solutions. All of the entropy values were acceptable, ranging from .677 to .779. The six-class solution was considered unsatisfactory because it included a trajectory with a very small class (2%). Both the aBIC and AIC favoured the five-class model over the four-class model. The BIC index of the four-class solution was lowest (BIC = 3,735.69), but it did not differ substantially from that of the five-class solution (BIC = 3,736.84). As a result, the five-class model was considered to be optimal.

To further confirm whether this five-class model with a linear slope fit the data better than an alternative model with a nonlinear slope, we ran a model with loadings for T1, T2, T3 and T4 as being respectively: 0, 1, 2, and *. The loading for T4 was set as free, allowing non-linear change. The results for this alternative model were: BIC = 3,739.84, aBIC = 3,679.56, and AIC = 3,665.38. Compared to the five-class model with a linear slope (BIC = 3,736.84, aBIC = 3,679.73, and AIC = 3,666.30), this alternative model did not fit the data better. Moreover, this alternative model included a class consisting of only 1% of the sample, which was unsatisfactory.

Finally, we conducted a quadratic model with loadings for T1, T2, T3 and T4 as 0, 1, 4 and 16, respectively. The results of this quadratic alternative were: BIC = 3,737.15, aBIC = 3,708.59, and AIC = 3,701.88. This alternative model did not fit the data better, and further confirmed the five-class model with a linear slope as optimal. Having tested these alternative models, we concluded that the five-class model with a linear slope yielded the best fit. The subsequent analyses were based on this five-class model.

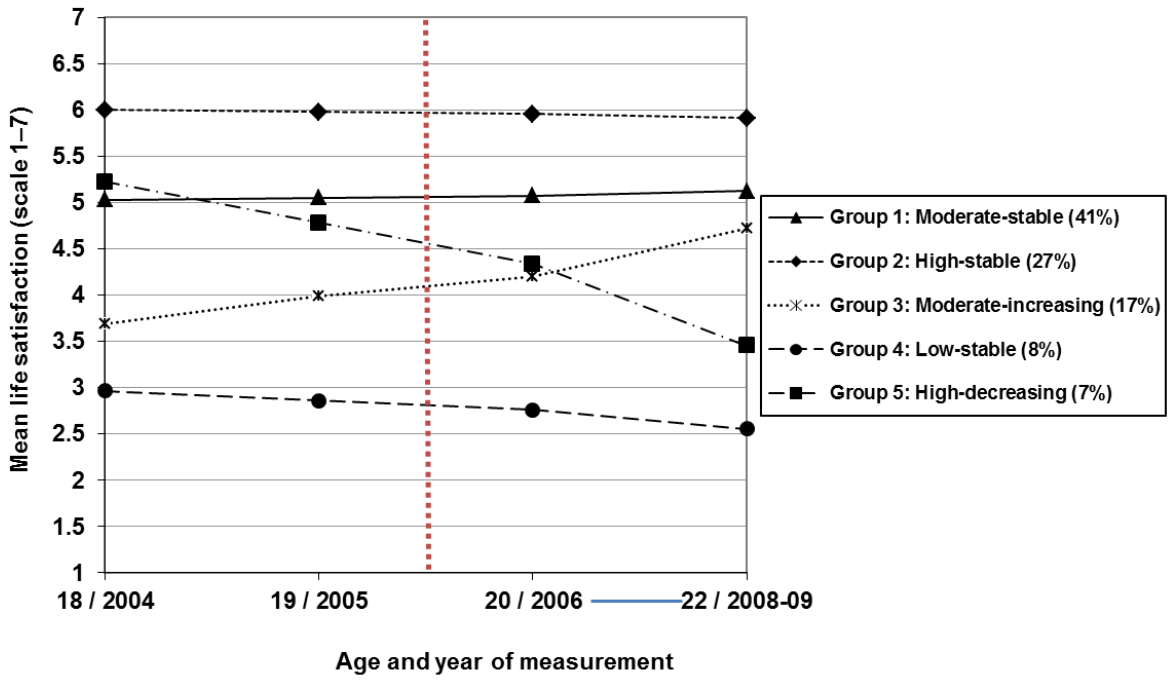
**Table 2. Fit indices and class frequencies based on estimated posterior probabilities for growthmixture models of life satisfaction with different numbers of latent trajectory groups**

| Number of groups | BIC | aBIC | AIC | Entropy | Number of estimated parameters |
|---|---|---|---|---|---|
| 1 | 4,133.52 | 4,114.49 | 4,110.01 | - | 6 |
| 2 ($n_1$ = 27%, $n_2$ = 73%) | 3,841.17 | 3,812.61 | 3,805.90 | .779 | 9 |
| 3 ($n_1$ = 47%, $n_2$ = 44%, $n_3$ = 9%) | 3,743.47 | 3,705.40 | 3,696.45 | .752 | 12 |
| 4 ($n_1$ = 14%, $n_2$ = 33%, $n_3$ = 8%, $n_4$ = 45%) | 3,735.69 | 3,688.10 | 3,676.91 | .697 | 15 |
| **5 ($n_1$ = 7%, $n_2$ = 27%, $n_3$ = 17%, $n_4$ = 8%, $n_5$ = 41%)** | **3,736.84** | **3,679.73** | **3,666.30** | **.677** | **18** |
| 6 ($n_1$ = 2%, $n_2$ = 26%, $n_3$ = 18%, $n_4$ = 7%, $n_5$ = 6%, $n_6$ = 41%) | 3,737.07 | 3,670.45 | 3,654.78 | .702 | 21 |

*Notes. BIC = Bayesian Information Criteria; aBIC = Adjusted Bayesian Information Criteria; AIC = Akaike Information Criteria. The chosen option is marked in bold.*

Figure 1 displays the estimated growth curves for the different latent trajectories of life satisfaction across the transition to adulthood, and the results of the final Growth Mixture Model are presented in Table 3. The latent trajectories of life satisfaction were labelled *low-stable* (8%), *moderate-stable* (41%), *high-stable* (27%), *moderate-increasing* (17%), and *high-decreasing* (7%). The *low-stable* trajectory had a low initial level of life satisfaction and this condition remained stable over time. The largest trajectory, *moderate-stable*, showed a moderate level of life satisfaction that remained stable over time. The *high-stable* trajectory showed a very high initial level of life satisfaction that remained stable over time. The *moderate-increasing* trajectory was characterised by a moderate initial level of life satisfaction that increased over time. The smallest trajectory, *high-decreasing,* was characterised by a high initial level of life satisfaction that showed a significant decrease over time. The results showed that most of the young adults —over three-quarters (76%) — followed a stable trajectory of life satisfaction, while the minority (24%) followed a trajectory characterised by change.

**Figure 1. Life satisfaction trajectories**




*Note. The red dotted vertical line on the horizontal axis refers to the time of the transition to adulthood, i.e., to tertiary education and/or employment*

**Table 3. Estimation results of the final Growth Mixture Model with five latent classes (unstandardised estimates; standard errors in parentheses)**

| | Low-stable (*N* = 30; 8%) | Moderate-stable (*N* = 153; 41%) | High-stable (*N* = 100; 27%) | Moderate-increasing (*N* = 64; 17%) | High-decreasing (*N* = 25; 7%) |
|---|---|---|---|---|---|
| **Mean structure** | | | | | |
| Level | 2.96 (0.19)** | 5.03 (0.23)** | 6.00 (0.13)** | 3.69 (0.26)** | 5.22 (0.30)** |
| Linear change | -0.10 (0.10) | 0.02 (0.04) | -0.02 (0.03) | 0.26 (0.08)** | -0.44 (0.13)** |

*Notes. Variance is kept equal across the different latent groups.*
** $p < .001$

As part of the second research question, the aim was to investigate whether the life satisfaction trajectories differed according to gender and family socio-economic status as background information, and parental financial support, living situation and life situation at the age of 22 (T4). The trajectories differed slightly according to family socio-economic status (SES) [$\chi^2(16, N = 370) = 30.03$, $p < .05$] and life situation [$\chi^2$ =12, $N$ = 268 = 22.15, $p < .05$]. However, post hoc tests did not identify specific statistically significant differences between the trajectories. Gender [$\chi^2(4, N = 372) = 5.30$, $p = .26$, ns], parental financial support [$\chi^2(104, N = 252) = 100.19$, $p = .59$, ns], and living situation [$\chi^2(20, N = 369) = 17.12$, $p = .65$, ns] did not differ significantly between trajectories.

The third research question investigated the relationship between achievement strategies and the identified life satisfaction trajectories in the transition to adulthood.

All effects and pairwise mean comparisons between the life satisfaction classes are summarised in Table 4. At age 19, the pairwise comparisons of means revealed initially rather high achievement approach strategies in two life satisfaction trajectories, namely, the *high-stable* and *high-decreasing* trajectories, and relatively high achievement avoidance strategies in the *low-stable* trajectory. Because a statistically significant result was found in both, post hoc comparisons using the Games–Howell test were computed and these indicated that the differences in achievement approach strategies, for example, between the *high-decreasing*, *moderate-increasing,* and *low-stable* trajectories, between the *high-stable* and *moderate-increasing* trajectories, and between the *low-stable* and *moderate-stable* trajectories were statistically significant ($p$ < .05). Moreover, statistically significant differences in achievement avoidance strategies were found, for example, between the *high-stable, moderate-increasing* and *moderate-stable* trajectories.

In terms of the achievement strategies at T4, at the age of 22, pairwise comparisons of means further revealed relatively high achievement approach strategies in the *high-stable* and *moderate-stable* life satisfaction trajectories, and rather high achievement avoidance strategies again in the *low-stable* trajectory. Post hoc comparisons using the Games–Howell test indicated that the differences in achievement approach strategies between the *high-stable* and *moderate-increasing,* between the *high-stable* and *low-stable* trajectories, and between the *low-stable* and *moderate-stable* trajectories were statistically significant ($p$ < .05). Moreover, a statistically significant difference in achievement avoidance strategies was found between the *high-stable* and *low-stable* trajectories.

As shown in Table 4, the highest mean levels in achievement avoidance strategies were present in the same trajectories over time, the *low-stable* and the *moderate-increasing.* However, for achievement approach strategies, the levels at age 19 were highest in the *high-decreasing* and the *high-stable* trajectories, but at age 22, the second highest level was in the *moderate-stable* trajectory instead of the *high-decreasing*.

## The role of the financial situation

The fourth aim of the study was to investigate how the subjective and objective financial situation of participants would be associated with the identified life satisfaction trajectories.

As noted above, all effects and pairwise mean comparisons between the life satisfaction classes are summarised in Table 4. The pairwise comparisons of means revealed rather high levels pertaining to individuals' subjective financial situation at the fourth measurement point in two life satisfaction trajectories, namely, the *high-stable* and *moderate-stable* trajectories. The post hoc comparison using the Games–Howell test indicated that the difference in individuals' subjective financial situation between the *high-stable* and *moderate-increasing* life satisfaction trajectories was statistically significant ($p$ < .05). Moreover, the differences in objective income level at Time 4 between the *moderate-stable* and *moderate-increasing* trajectories as well as between the *moderate-stable* and *low-stable* trajectories, were statistically significant. The extension of analyses from statistically non-significant correlations shown in Table 1, to the need for complex trajectory analyses, is also supported.

**Table 4. Mean differences in achievement strategies and self-reported objective and subjective financial situation between life satisfaction classes**

| | Moderate-stable | | High-stable | | Moderate-increasing | | Low-stable | | High-decreasing | | *F* | *p* | $\eta^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ***M*** | ***SD*** | ***M*** | ***SD*** | ***M*** | ***SD*** | ***M*** | ***SD*** | ***M*** | ***SD*** | | | |
| *T2 Achievement strategies* | | | | | | | | | | | | | |
| Approach | $4.90_{ef}$ | .77 | $5.56_{cde}$ | .68 | $4.45_{ac}$ | .82 | $4.31_{bdf}$ | .96 | $5.07_{ab}$ | .96 | $F(4, 348) = 26.74$ | 0.000 | .24 |
| Avoidance | $3.70_{c}$ | 1.25 | $3.04_{abc}$ | 1.14 | $3.85_{a}$ | 1.25 | $4.33_{b}$ | 1.26 | 3.35 | 1.13 | $F(4, 348) = 8.55$ | 0.000 | .09 |
| *T4 Achievement strategies* | | | | | | | | | | | | | |
| Approach | $5.30_{c}$ | .68 | $5.54_{ab}$ | .89 | $4.99_{ac}$ | .65 | $4.44_{bc}$ | 1.01 | 4.98 | .98 | $F(4, 244) = 8.60$ | 0.000 | .12 |
| Avoidance | 3.21 | 1.11 | $2.77_{a}$ | 1.28 | 3.40 | 1.15 | $4.03_{a}$ | 1.32 | 3.07 | 1.41 | $F(4, 244) = 4.64$ | 0.001 | .07 |
| *T4 Financial situation* | | | | | | | | | | | | | |
| Subjective | 3.36 | 1.11 | $3.56_{a}$ | 1.15 | $2.87_{a}$ | 1.06 | 2.76 | 1.25 | 2.80 | 1.61 | $F(4, 247) = 3.90$ | 0.004 | .06 |
| Objective | $890_{ab}$ | 498 | 882 | 628 | $645_{a}$ | 318 | $662_{b}$ | 241 | 882 | 353 | $F(4, 245) = 2.51$ | 0.042 | .04 |

*Note. Class means in a row sharing the same subscripts are statistically different at the $p < .05$ level according to the Games–Howell test.*

## Discussion

The first aim of this four-wave longitudinal study was to investigate the level and change in life satisfaction during the major transition to adulthood. The second aim was to examine whether there was evidence of differing life satisfaction trajectories during the longitudinal course of the transition to adulthood. Thirdly, we were interested in whether achievement strategies (i.e., agency) at ages 19 and 22 were associated with the identified life satisfaction trajectories. The final aim was to examine whether the financial situation of young adults was associated with these trajectories.

Based on results from similar studies, it was expected that most young adults would show high and stable life satisfaction (H1) (Salmela-Aro & Tynkkynen, 2010). Because of the significant differences among individuals, the present study called for a person-oriented approach to studying individual development (Bergman et al., 2003; Bergman & Andersson, 2010). A single growth trajectory would have oversimplified the heterogeneity of the changes in young adults' life satisfaction during the transition, as some individuals experience an increase and some a decrease in life satisfaction (H2), although most pass the stage with significant stability (Salmela-Aro & Tynkkynen, 2010). In this study, it was possible to identify meaningful latent *classes* of individuals according to the initial levels and the longitudinal changes in their life satisfaction across the four measurement points. Adopting this multiple trajectories approach resulted in a model of five developmental trajectories. In regard to the role of financial factors, in accordance with our hypothesis (H4), an association of positive life satisfaction trajectories with positive subjective and objective financial situations was identified to some degree in this transitional life course phase of young adulthood. The results also showed that the subjective perception of income is by far more important than the actual income, and this constitutes one of the key findings of our study. Evidently, the subjective perception is related to other personal and situational background factors, such as those relating to one's living situation which is a strong indicator of financial independence.

A multi-disciplinary framework fits well into the theme of young adulthood as a life course phase, with both life satisfaction and participants' financial situation in focus. The psychological life-span approach focuses on trajectories, continuity and developmental change, and often requires longitudinal studies (Cobb, 2010; Settersten, 2003). The sociological life course approach, on the other hand, focuses on the developmental implications of historical variation which indicate that human development and individual lives are shaped by a set of principles including individual agency, timing of events, linked lives and age-graded social pathways, as well as by the embeddedness of development in socio-historically changing contexts (Elder, 1998a; Settersten, 2003). The interaction of developmental psychology and the life-span approach with life course sociology has received little attention in previous research. Nevertheless, an increasing number of researchers are starting to integrate these perspectives in their research, for example in a recent study by Vuolo et al. (2012) examining how individuals with different psychological features react to the current recession.

As is often the case in life course research, this study is also concerned with the transition from one life stage to another (e.g., Settersten, 2003). Young adulthood is viewed as a staging ground for adulthood, when decisions affecting subsequent development are made (Crockett & Crouter, 1995). In this study, the achievement strategies reflecting notions of agency were measured before the transition from upper secondary school to further education and/or employment. The strategies were closely linked to life satisfaction, both in regard to initial level and development, supporting our hypothesis (H3). Achievement approach strategies (having the belief of being able to succeed in challenging tasks), were at age 19 related to high life satisfaction trajectories (*high-decreasing* and *high-stable*). Similarly, achievement avoidance strategies were untypical for participants in the *high-stable* trajectory but related significantly to those in the *low-stable* trajectory. Interestingly, the *moderate-increasing* trajectory also showed a slightly higher level of achievement avoidance strategies. These results indicate that life satisfaction and achievement strategies go hand in hand, as individuals with a high level of achievement approach strategies tend to have a high level of life satisfaction, and on the contrary, a high level of achievement avoidance strategies was somewhat related to a low level of life satisfaction.

Interestingly, the differences between classes remained similar from ages 19 to 22, although overall, the means of achievement avoidance strategies decreased within time in all of the classes. A closer look revealed that individuals in the *moderate-increasing* life satisfaction trajectory showed an increase in the mean level of achievement approach strategies, indicating that for this class achievement approach strategies and life satisfaction increase in parallel. However, the relation between agency - conceptualised as a high level of achievement approach strategies with a low level of achievement avoidance strategies - and life satisfaction is not entirely clear. In the *moderate-stable* life satisfaction trajectory, even though achievement approach strategies increase, life satisfaction remains rather stable (although high). Furthermore, participants in the *high-decreasing* life satisfaction trajectory had a decreasing level of life satisfaction even though the level of their achievement approach strategies remained high and fairly stable. This indicates that although, in average, personal strivings and strategies have a significant effect on life satisfaction development, they cannot be entirely seen as protective factors against an evident decrease in life satisfaction.

Where these agentic attributions refer to the psychological dimension of this study, it is important to note that development does not solely occur in one particular type of context and individual developmental progress cannot be understood by merely focusing on the individual in isolation (Salmela-Aro & Schoon, 2009). Youth sociologists must develop multi-disciplinary and international collaborations, and address the new research themes from the angle of a rapidly changing society with regard to events that have far-reaching implications for young adults (Furlong, 2011). For example, the economic downturn and changes in the labour market have led researchers and policymakers to believe that the transition to employment is highly problematic, and historically this can be seen as a repetitive and global phenomenon, at least in light of studies concerning Australia in the early 1980s and 1990s (Marks, 2005) and the United States in the late 2000s (Vuolo, Staff, & Mortimer, 2012).

In this study, the link between participants' financial situation and life satisfaction is viewed within the framework of the important transitions that take place during the phase of young adulthood, when financial issues arise as a new concern in everyday life during the shift to independent living and working life. Research concerning young adults' overall financial well-being can be seen as a topic of much current societal debate pertaining to directing the critical eye of research at fundamental questions about students financing their studies, the role of parents in their children's financial situation, and youth in working life, to name but a few. Such research of socio-political significance, concerning both the economic and social structures of the society in addition to individual factors, is important.

Since the research data of our study was collected during times of economic difficulties in Finnish society in the late 2000s, this study also provides some insight into youth development and young adults' financial situations during such a time. Most individuals in different life course phases and transitions absorb greater economic tensions without long-term damage, but they survive societal and individual crises in different ways (Roberts, 2001). According to Finnish statistics (Wilska, 1999; Ylitalo, 2009), young adults' income and consumption levels decreased dramatically during the national recession of the early 1990s. At the same time, the status of young adults as consumers had not met the standards of other types of households: young adults under 30 years of age dropped their consumption levels by a fifth, while the decrease in other households was about 13%.

Accordingly, our study aimed to provide useful information in face of the present, most recent economical downturn. The data sets' fourth measurement point was gathered during the peak of the present economic recession in 2008, which gives additional significance to the factor of participants' financial situation being featured in this particular data set. The present study links human development not only to the individual's life course, but also to the historical time and place, thus having a wider socio-historical context (Elder, 1998b; Settersten, 2003). In general, more life course studies that consider the social context of human development are needed, and large data sets allow developmental trajectory analyses within such a context (Settersten, 2003). The life course theory demonstrates that social contexts are more than behavioural settings — the social forces of

time and place do shape individual pathways (Settersten, 2003).

The present study has the following main limitations that should be considered. First, one should be careful when generalising the findings to young adults of other countries. The study has been conducted in Finland, where young adults are able to profit from extensive financial support given by the state. It is also vital to bear in mind that even though our study includes data collected during an important educational transition, the data covered a short time period only. The validity of the overall link between financial situation and life satisfaction is therefore limited, even though this link has also been identified in numerous other studies. A further limitation of this issue is that in the self-reported scales of the questionnaire, the same reporter provided information on the different topics — life satisfaction, financial situation, and agency — and this may have influenced the observations of the associations between these factors. Additionally, only participants living in one city were given the chance to participate in this study and the retention rate could have been higher. Concerning the issue of attrition, we cannot be sure whether those who dropped out of the longitudinal research setting differed in their life satisfaction trajectories or their financial situation from those who participated until the end, although attrition was examined. Participants about whom information was missing for at least one of the measurement points were most likely to be male, which is also a clear limitation of our study. Additionally, the young adults being studied all had an upper secondary high school background which might explain the homogeneity of the life satisfaction trajectories across genders. Further studies are needed to examine the life satisfaction trajectories of young adults from other educational backgrounds and in other educational transitions.

Despite these limitations, the present study contributes to the understanding of human development by having longitudinally analysed the role of young adults' financial situation in relation to their life satisfaction. Methodologically and with respect to the data set used, our study's major advantage is its focus on developmental and life satisfaction trajectories pertaining to normative youth samples. The data of the study has been gathered both before and after the educational transition from upper secondary high school to further education and/or employment and is therefore of special interest as this transition often also encompasses other distinct changes in the transition to adulthood. Furthermore, using a multiple trajectories approach, this study has added value to existing research by providing a new multi-disciplinary perspective on the topic of young adults' financial situation and changes in life satisfaction. The complexity of addressing participants' financial situation has been acknowledged in this study by examining it as a multi-dimensional construct, including both objective and subjective factors. What is *objective*, i.e., real and concrete, is the monetary income received monthly from various resources, but how each individual reflects upon it and estimates whether it is sufficient to support their personal consumer habits, is highly *subjective.* Additionally, because of greatly varying consumption habits, what one person considers to be a low income may be considered a fortune by someone else.

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RESEARCH NOTE

# Gender, justice and domestic work: life course transitions and perceptions of fairness

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## Abstract

*This paper investigates changes in perceptions of housework fairness as men and women make the transition from cohabitation to marriage and experience the birth of a child. Using four waves of data from the Negotiating the Life Course project in Australia, we assess how marriage and parenthood alter perceptions of housework fairness. Consistent with previous research we find that the majority of men and women report that the division of labour at home is fair, despite women spending twice as much time on housework as men. Our results show no changes in perceptions of fairness in relation to marital transitions and only weak evidence of changes in relation to parenthood transitions. We conclude that perceptions of housework fairness are not based on an equal sharing of tasks, but are better understood in terms of distributive justice.*

## Introduction

Previous research on perceptions of fairness in relation to household labour has typically used cross-sectional data and examined associations between individual characteristics and perceptions at the same point in time (Lennon & Rosenfeld 1994; Sanchez & Kane 1996; Baxter, 2000). We extend this work to examine how perceptions of fairness change as a result of two key life course transitions, marriage and parenthood. With these life course transitions, divisions of household labour typically become more gendered, with women increasing their time on unpaid work (Baxter, Hewitt, & Haynes 2008). We examine whether men's and women's perceptions of housework fairness also change with transitions to marriage and parenthood.

If perceptions of fairness are based on an equal sharing of household labour between men and women, life course transitions that result in women spending more time on domestic work and less time in paid work may lead to greater perceptions of unfairness. On the other hand, such perceptions of fairness could be driven by a broader set of factors including time in paid work, economic contributions to the household and beliefs about gender roles, all of which might be characterised as a 'distributive justice' approach to fairness. In this approach, housework fairness is not evaluated solely in relation to the division of housework tasks, but encompasses other kinds of household contributions, preferences and entitlements. Drawing on broader liberal philosophical traditions (Rawls, 1971), researchers interested in gender and justice in family life (Okin, 1989; Major, 1993; Thompson, 1991) have argued that perceptions of fairness in relation to housework are based on more than rules of exchange and equity, and are based on a social process that incorporates both justice and

care and is gendered; that is, what is considered a fair distribution of tasks may be different for men and women (Thompson 1991).

A distributive justice approach implies that we expect little change in perceptions of fairness with entry to marriage and birth of a child, even if these life course transitions are associated with more unequal gender divisions of labour at home (Thompson 1991). For example, many studies have shown that men experience a marriage premium in earnings (Loh, 1996; Western, Hewitt, & Baxter, 2005). If marriage leads to an increase in men's economic contributions to the household relative to their wives, both men and women may justify men's lower involvement in housework because of their greater earnings in the labour market.

Perceptions of fairness in the division of household labour may also change as a result of the transition to marriage. One of the most valued outcomes for married couples may be to make the marriage a success and to demonstrate care and commitment to the relationship by taking on additional care work. Under these circumstances both men and women may be less likely to perceive unequal housework arrangements as unfair.

A distributive justice approach would predict similar patterns with the birth of a child. Economic contributions to the household may change after the birth of a child if women withdraw from paid work to care for the infant. Similarly, perceptions might change if men and women prioritise women's time with children over women's time in other activities such as paid employment. For men, the birth of a child may lead to greater prioritisation of their role as economic provider, rather than their contribution to housework. Hence, men's and women's time allocation to paid and unpaid work may change after the birth of a child, but they may be less likely to define this division of labour as unfair compared to prior to the birth.

To investigate change in perceptions of fairness in relation to household labour with marriage or birth transitions, we use four waves of data from an Australian panel study (1996 – 2009). For transitions into marriage we examine men and women who transition from cohabitation to marriage, since our focus here is on perceptions of fairness within couple households. We also consider changes in perceptions of fairness after first and higher order births.

## Data

The data come from four waves (1996/97, 2000, 2003, 2006) of an Australian national longitudinal panel study, Negotiating the Life Course: Gender, Mobility and Career Trajectories (Baxter, McDonald, & Mitchell, 2003; McDonald, Jones, Mitchell, & Baxter, 2003). Wave 1 data was collected in late 1996 and early 1997 with a sample comprising 2,231 respondents aged between 18 and 54. Wave 2 data was collected in 2000 (N=1,768); wave 3 data was collected in 2003 (N=1,192); and wave 4 data was collected in 2006 (N=1,138). We include all people who were married or in a cohabiting relationship with the same partner for at least two waves out of the four. The final analytic sample comprises 1,189 men and women.

## Variables

The dependent variable is the participant's response to a question asking "Overall do you think you do your fair share around the house?" The response to the question is measured on an ordinal scale with five categories: 1 = I do much more than my fair share; 2 = I do more than my fair share; 3 = I do my fair share; 4 = I do less than my fair share; 5 = I do much less than my fair share. This variable will be denoted "housework fairness" throughout the remainder of this paper. Combining categories 1 and 2 and categories 4 and 5, the distribution of responses in wave 1 shows that 23 percent of respondents perceive that they do more than their fair share, while only about half this figure, 14 percent, perceive that they do less than their fair share of housework. Across all waves, over 60 percent of respondents report that they do a fair share of housework.

Since we are interested in how birth and the transition from cohabiting to marriage influence change in the perception of housework fairness, the dependent variable for the regression analyses is dichotomised so that 1 = I do more than my fair share (values 1 and 2 on the original variable) and 0 = I do my fair share or less (responses 3, 4 and 5). Conceptually this variable measures whether the division of labour is perceived to be unfair or fair to the respondent. Table 1 shows the distribution of this variable for all waves by gender. The results show that across all waves, approximately 40 percent of women report doing more than their fair share of housework compared to less than 1 percent of men.

**Table 1. Perceptions of housework fairness by wave and gender** (column percentages)

| | Wave 1 | | Wave 2 | | Wave 3 | | Wave 4 | |
|---|---|---|---|---|---|---|---|---|
| | Men | Women | Men | Women | Men | Women | Men | Women |
| **Housework fairness** | | | | | | | | |
| I do more than my fair share | 0.04 | 0.38 | 0.03 | 0.37 | 0.07 | 0.40 | 0.07 | 0.38 |
| I do my fair share or less | 0.96 | 0.62 | 0.97 | 0.63 | 0.93 | 0.60 | 0.93 | 0.62 |
| N | 1,084 | | 1,064 | | 771 | | 792 | |

The two primary independent variables measure marital status and birth transitions between two consecutive waves. The marital status transition measure has three categories: 1 = Married at previous wave and still married at current wave; 2 = cohabiting at previous wave and married at current wave; and 3 = cohabiting at previous wave and still cohabiting at current wave. Married at both waves is the reference group.

Birth transition has four categories: 1 = no child at previous wave and no child at current wave; 2 = no child at previous wave and a birth prior to current wave; 3 = at least one child at previous wave and no birth prior to current wave; and 4 = at least one child at previous wave and a birth prior to current wave. Respondents with no children were the reference group.

We also include a number of measures identified as important correlates of perceptions of housework fairness by previous research, with which any effects of the transition variable might be confounded. These include:

- Partner's gross income (logged). Income is a continuous measure of gross (ie before tax) financial year income received and is logged to normalize the distribution.
- Respondent and partner's hours per week in paid employment. Time in paid employment is a continuous measure of hours per week.
- Gender attitudes: "It is better for the family if the husband is the principal breadwinner and the wife has responsibility for home and children." Responses ranged from 1 = strongly agree to 5 = strongly disagree. A higher score corresponds to a more liberal attitude.
- Respondent's weekly hours spent undertaking household tasks, including meal preparation, doing dishes, shopping, laundry, vacuuming and cleaning.
- Relative share of housework tasks including: indoor tasks (cooking, cleaning, washing); outdoor tasks (repairs around the house, gardening); and other tasks (taking care of pets, keeping in contact with friends and relatives). The scores ranged from 0 to 100.
- Education coded 1 = Bachelor degree or higher.
- Relationship duration grouped into three categories: partnered for 3 years or less (the reference group); partnered 3-7 years; and partnered for more than 7 years.
- Age coded into four groups: 18-29 years; 30-39 years (the reference group); 40-49; and 50-59.
- Pre-school child measures whether there is a child aged under 5 in the household (coded 1 = yes).

## Analyses

We estimate binary logistic regression models with random intercepts to examine the association between the perception of "doing more than my fair share of housework" and marital transitions, birth transitions and other variables of interest, accounting for both between and within individual variation over four waves of data. As the data include repeated measures on the same individuals, observations over waves are not independent. Rather, the responses are correlated, because factors that predispose individuals to self-report their perception of fairness with share of housework in a particular way, at the first wave of participation and while in a partnership, are likely to

encourage similar responses over time. Due to this temporal dependence, a standard binary logistic regression model that assumes independent observations is not appropriate. We employ an alternative method of analysis that assumes an individual represents a cluster of repeated observations over time, and the variation in the data can be separated into two components measuring both the variation between clusters of observations (between individuals) and the variation within clusters (or individuals) (Johnson, 1995; Singer & Willett, 2003).

We utilize this approach with random effects rather than the fixed effects model, because we are interested in the between-individual variation associated with time-invariant variables such as gender, which is an important predictor of perceptions of housework fairness, as well as the within-individual variation associated with a marital or birth transition. Both time-invariant and time-variant variables are permitted in the random-effects model, but time-invariant variables are excluded from (additive) fixed effects models.

Data for some of the covariates in the model are missing due to participant non-response for one or more waves and so, for the purpose of comparing model fit and results, the sample is restricted to the 1,094 individuals who have data recorded for all variables. Unstandardized coefficients from these models are reported in Table 2. Model 1 includes the primary independent variables for the marital and birth transitions and the primary control variable for gender. Model 2 includes all of the control variables, except respondent's and partner's housework hours, but these are included as an extension in Model 3. The addition of housework hours to the model enables an assessment of whether any effects relating to marital and birth transitions, on the perception of fairness of housework share, are in addition to the effects of respondent's and partner's housework hours. In Model 4, we introduce the interactions of selected variables with gender and show interaction effects in Table 2. Model 5 is an extension of Model 3 with no gender interactions but with separation of the within- and between-individual covariate effects. The final model, Model 6, is an extension of Model 5 with the significant within- and between-individual gender interactions included.

Since we are primarily interested in gender differences and changes in perception of fairness with share of housework, we examine models that include gender interacted with covariates. In preliminary analyses, all interactions with gender were included in the model, however, for parsimony, non-significant interactions were excluded from the final models. We estimate six models in the development of the most correctly specified final model. Estimated coefficients for the interactions included in Models 4 and 6 are shown in the regression results presented in Table 2. The Akaike Information Criteria (AIC) statistic is used as a measure of model comparison, and shows that Model 6 is the best fitting model.

## Results

Table 2 shows that while there are several significant effects in these models, overall there is little evidence that a transition from cohabiting to marriage or birth of a child changes perceptions of fairness. As shown in Model 6 for each of the primary independent variables, the results indicate that the transition from cohabiting to married is not associated with statistically significant changes in perceptions of fairness, nor is there a significant difference between the effects of consistently cohabiting and remaining married on perception of housework fairness.

The variable representing the birth of a first child in Model 6 has a between-individual regression coefficient that is approaching significance ($b < 1.43$, $p=0.07$) even when time on housework is included in the model. Although this evidence is not conclusive at the $p<.05$ level due to the small number of respondents in this category (74 at Wave 2 and 23 at Wave 4), the result indicates that individuals who experienced the birth of their first child since the previous wave were more likely to perceive their share of housework was unfair relative to those who have no children. We are confident that a different approach to dealing with missing data, such as imputation of missing data or weighting to adjust for attrition, would have resulted in a statistically significant finding here.

**Table 2. Mixed effects binary logit models for perceptions of housework fairness over four waves**

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|---|---|---|---|---|---|---|
| **Primary independent variables** | | | | | | |
| Still married (ref) | - | - | - | - | - | - |
| Cohabiting-married | 0.04 | 0.19 | 0.04 | -0.004 | 0.35 | 0.22 |
| Still cohabiting | -0.05 | 0.13 | 0.29 | 0.22 | 0.39 | 0.34 |
| No child-no birth (ref) | - | - | - | - | - | - |
| No child-first birth | 0.13 | 0.50 | 0.62 | 0.60 | 1.31† | 1.43† |
| Child-no birth | 0.56*** | 0.50* | 0.35 | 0.38 | 0.02 | 0.13 |
| Child-higher order birth | 0.44 | 0.54 | 0.44 | 0.44 | 0.79 | 0.82 |
| *Controls* | | | | | | |
| Female (1=yes) | 3.79*** | 3.51*** | 1.69*** | 0.64 | 1.15*** | -0.79 |
| Age Group | | | | | | |
| 18-29 | | -0.16 | -0.25 | -0.28 | 0.55 | 0.59 |
| 30-39 (ref) | | - | - | | - | - |
| 40-49 | | 0.02 | -0.15 | -0.14 | 0.05 | 0.003 |
| 50-59 | | 0.02 | -0.23 | -0.27 | -0.63 | -0.64 |
| Bachelor degree | | 0.07 | 0.20 | 0.19 | 0.34 | 0.35 |
| Respondent work hours | | -0.008 | 0.005 | 0.008 | 0.03** | 0.03*** |
| Partner work hours | | 0.003 | -0.005 | -0.004 | -0.01 | -0.009 |
| Respondent income (log) | | 0.11 | 0.24* | 0.19 | 0.09 | 0.03 |
| Partner income (log) | | 0.14 | 0.03 | 0.01 | -0.08 | -0.11 |
| Relationship duration | | | | | | |
| 3 years or less | | - | - | - | - | - |
| 4 to 7 years | | 0.41 | 0.37 | 0.35 | 3.48* | 3.12* |
| Greater than 7 years | | 0.73 | 0.54 | 0.49 | 3.20* | 3.09* |
| Preschool child | | -0.23 | -0.26 | -0.09 | -0.70 | -0.62 |
| Paid help | | 0.10 | 0.04 | 1.01* | 0.39 | 1.78*** |
| Share of indoor tasks | | -0.001 | -0.003 | -0.002 | 0.005 | 0.005 |
| Share outdoor tasks | | -0.005 | -0.005 | -0.02*** | 0.009 | -0.02 |
| Share of other tasks | | 0.007 | 0.004 | 0.005 | 0.04*** | 0.04*** |
| Gender attitudes | | -0.09 | -0.02 | -0.42* | 0.05 | -0.49* |
| Housework hours | | | 0.08*** | 0.15*** | 0.12*** | 0.22*** |
| Partner's housework hours | | | -0.13*** | -0.13*** | -0.15*** | -0.15* |
| *Two-way interactions: with gender* | | | | | | |
| Female x paid help | | | | -1.15* | | -1.66* |
| Female x outdoor task | | | | 0.02** | | 0.03* |
| Female x housework hours | | | | -0.09*** | | -0.11** |
| Female x gender attitude | | | | 0.44* | | 0.62* |
| *Within-person effects (models 5 & 6)* | | | | | | |
| Still married (ref) | | | | | - | - |
| Cohabiting-married | | | | | -0.63 | -0.66 |
| Still cohabiting | | | | | -0.79 | -0.90 |
| No child-no birth (ref) | | | | | - | - |
| No child-first birth | | | | | 0.02 | 0.07 |
| Child-no birth | | | | | 0.20 | 0.28 |
| Child-higher order birth | | | | | -0.02 | 0.09 |
| Age 18-29 | | | | | -0.84 | -0.83 |
| Age 40-49 | | | | | -0.003 | -0.07 |
| Age 50-59 | | | | | 0.23 | 0.04 |
| Bachelor degree | | | | | -0.14 | -0.15 |
| Respondent work hours | | | | | -0.001 | 0.001 |
| Partner work hours | | | | | -0.007 | -0.006 |

*(Table 2 cont'd)*

| | | | | | | |
|---|---|---|---|---|---|---|
| Respondent income | | | | | 0.17 | 0.14 |
| Partner income | | | | | 0.05 | 0.05 |
| Relationship duration | | | | | | |
| 3 years or less | | | | | - | - |
| 3 to 7 years or less | | | | | -0.05 | -0.08 |
| greater than 7 years | | | | | 0.01 | -0.10 |
| Preschool child | | | | | -0.15 | 0.02 |
| Paid help | | | | | -0.22 | 0.40 |
| Share of indoor tasks | | | | | -0.002 | -0.002 |
| Share outdoor tasks | | | | | -0.009** | -0.02** |
| Share of other tasks | | | | | -0.002 | -0.001 |
| Housework hours | | | | | 0.05*** | 0.10** |
| Partner's housework hours | | | | | -0.11*** | -0.11*** |
| Gender attitudes | | | | | -0.08 | -0.51* |
| *Two-way within-person interactions* | | | | | | |
| Female x paid help | | | | | | -0.74 |
| Female x outdoor task | | | | | | 0.02* |
| Female x housework hours | | | | | | -0.06 |
| Female x gender attitude | | | | | | 0.49 |
| Constant | -4.94 | -5.90 | -4.46 | -3.55 | -10.07 | - 8.27 |
| Number of individuals | 1094 | 1094 | 1094 | 1094 | 1094 | 1094 |
| Number of person years | 2769 | 2769 | 2769 | 2769 | 2769 | 2769 |
| Between-person heterogeneity (proportion of unexplained variance) | 0.55 | 0.55 | 0.48 | 0.47 | 0.47 | 0.45 |
| AIC statistic | 2380 | 2386 | 2220 | 2198 | 2197 | 2182 |

*Notes* $^{\dagger}p<0.10$, *$p<.05$, **$p<.01$, ***$p<.001$

We also find significant within-individual effects for share of outdoor tasks in Model 6 (b = -0.02, p = 0.003) and the gender interaction for outdoor tasks (b = 0.02, p = 0.038). Gender attitudes (b = -0.51, p = 0.041), respondent housework hours (b = 0.10, p < 0.001) and partner's housework hours (b = -0.11, p < 0.001) are also statistically significant in Model 6. Thus, for both men and women, perceptions of unfairness in housework share vary directly with respondent housework hours, and inversely with partner's housework hours. The within-individual gender attitude interaction is not statistically significant in model 6, but this is partly a function of low statistical power. The magnitude and direction of this coefficient imply that women's attitude changes are not related to their perceptions of fairness, but that as men become more (less) liberal, they view their share of domestic labour as becoming less (more) unfair. For men, fairness perceptions also vary inversely with their share of outdoor tasks. This association with outdoor tasks does not hold for women.

Additionally, the results for Model 6 show that men and women who worked longer paid hours than average, were in a relationship for more than three years, had a higher share of "other" tasks or whose partners did less than average housework hours, were more likely to perceive that their share of housework was unfair. The gender interactions show that men were more likely than women to perceive that their share of housework is unfair when they had paid help with housework, and were less likely than women to perceive that their share of housework was unfair when they had more liberal gender attitudes on average. Women who did more than an average share of outdoor tasks were more likely to perceive that their share of housework was unfair; and, both men and women who did more housework hours are more likely to perceive that their share of housework was unfair. However, the perception of unfairness was greater for men at a given length of housework time.

## Conclusions

This paper used four waves of data from a nationally representative panel study to investigate perceptions of housework fairness in relation to two key life course transitions, moving from cohabiting to married and the birth of a child. No research that we are aware of has examined perceptions of fairness using large scale longitudinal data. But such data provide important insights into how fairness perceptions change or do not change in relation to life course transitions, and enable us to better understand the basis of fairness perceptions. We argued that if equality is the basis of perceptions of housework fairness, marriage and parenthood would exacerbate perceptions of unfairness as both transitions lead to more time for women on housework. Alternatively, if distributive justice underlies perceptions of housework fairness, marriage and parenthood would lead to few changes, or a decline in perceptions of unfairness.

Given the amount of time that women spend on housework, over twice as many hours per week compared to men, if equality in housework distribution and time on housework is the key factor underlying perceptions of fairness of housework, we would expect the majority of men and women to report that housework arrangements are unfair. But, on the contrary, the majority of men and women report that housework arrangements are fair.

Our regression results show some evidence that the birth of a child increases perceptions of unfairness, but there is no support for the notion that this is more likely for women than for men. There is no evidence that the transition from cohabitation to marriage changes men's or women's perceptions of housework fairness. These results indicate that equality, defined as a 50/50 split of time and tasks, is not the main basis of either men's or women's perceptions of housework fairness. In contrast, a distributive justice approach defines perceptions of fairness of housework in relation to a broader range of factors that include, but are not restricted to housework contribution, for example paid work hours, earnings and preferences. Our results indicate that perceptions of housework fairness vary in relation to gender attitudes, work hours and relationship duration, as well as housework contribution. Overall then, our findings provide most support for distributive justice as the basis of perceptions of housework fairness.

Our paper has a number of limitations that may be addressed by further research. First, we have not used methods of data imputation or weighting to adjust for survey attrition and missing cases. Such techniques may provide more robust estimates of the relationships between life course transitions and perceptions of fairness. Second our data are limited to only 4 waves of observations. A longer period of observation may lead to different conclusions and enable examination of whether perceptions of fairness converge over time to levels similar to those observed prior to a life course transition. Third we have only examined two life course transitions, marital status change and parenthood. Examination of other kinds of transitions, such as changes in employment status, may also provide important insights into the bases of perceptions of housework fairness.

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