

Wellbeing change in response to work exit and lifecourse determinants of resilience in Europe

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DECLARATION OF ORIGINALITY

I, Sol Richardson, declare that the contents of this thesis are my own work. Where the work of others has been used, this has been indicated and appropriately referenced.

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ABSTRACT

Background and aims: ‘Resilience’ is positive adaptive process in the context of exposure to a risk factor or event. Its opposing term is ‘vulnerability’. Retirement, and exit from work in early old age in general, is an important age-graded transition and potential risk factor in terms of wellbeing and mental health. This transition, which varies substantially between individuals and different country contexts, is historically and socially embedded. Defining resilience in terms of wellbeing change following exit from paid work, this thesis aimed to examine its associations with individual-level variables at the time of work exit, country-level variables, and retrospective measures of adversity over the lifecourse.

Data sources: Data from 10,195 respondents were drawn from Waves 1–5 (2004–2013) of the Study of Health, Ageing and Retirement in Europe (SHARE) and Waves 1–6 (2002–2013) of the English Longitudinal Study of Ageing (ELSA) aged over 50 years who had two or more consecutive waves of observations and who had exited from work since the previous wave. Retrospective life history data were collected as part of ELSA Wave 3 (2006–2007).

Methods: Using CASP-12 change scores between waves as the outcome measure, individual-level factors, including institutionally-defined route and timing of work exit, were tested for associations with wellbeing change (Chapter 3). Welfare state regime, social protection spending and other country-level factors were then investigated for direct associations with wellbeing change using multilevel random intercepts models. The percentage of total variance explained by country differences and the proportion of these country differences explained by groups of country-level variables was estimated (Chapter 4). Finally, lifecourse adversity measures, specifically exposure to adverse events at different ages and cumulative socioeconomic disadvantage, were considered as determinants of wellbeing and wellbeing change (Chapter 5).

Results: Exit from work outside socially- and culturally-accepted norms is associated with a decline in wellbeing. When compared with on-time retirees, individuals leaving work over one year before or after their expected retirement age, or who exited work via receipt of unemployment, disability or sickness benefits, experienced more negative changes in wellbeing upon exiting paid work.

ABSTRACT

Wellbeing change following work exit also differed significantly between countries. Although between-country differences accounted for only 7% of total variance, welfare state regime explained over 60% of the country effect. Expenditure on social protection, in particular on non-healthcare services, was associated with more positive wellbeing change following work exit.

Exposure to adverse events over the lifecourse had an independent association with negative wellbeing change. This was driven by experiences in adulthood. Although lifecourse socioeconomic disadvantage was also associated with more negative wellbeing change, this was fully mediated by household income and wealth at the time of work exit. Finally, exposure to adverse events at all ages was independently and significantly associated with lower cross-sectional CASP-12 scores and higher odds of depression in old age.

Conclusions: There were associations between both individual and country-level variables and resilience following work exit. Adverse events over the lifecourse predicted poor resilience, or vulnerability, during transitions from paid work in early old age.

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List of abbreviations

95% CI: 95% Confidence Intervals

ACES-D: Center for Epidemiological Studies-Depression Scale (adapted version)

ANCOVA: Analysis of covariance

ANOVA: Analysis of variance

CAPI: Computer-Assisted Personal Interviewing

CASP: Control, autonomy, self-realisation and pleasure

CASP-12: 12-item CASP scale

CASP-19: 19-item CASP scale

CES-D: Center for Epidemiological Studies-Depression Scale

DSM-IV: Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition

DSM-IV-TR: Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision

ELSA: English Longitudinal Study of Ageing

EUR: Euro

EURO-D: European Depression Scale

GBP: British Pounds Sterling

GDP: Gross Domestic Product

GHQ: General Health Questionnaire

GHQ-12: 12-item General Health Questionnaire

GHQ-28: 28-item General Health Questionnaire

LIST OF ABBREVIATIONS

HDI: Human Development Index

HPA: Hypothalamic Pituitary Axis

HSE: Health Survey for England

ICC: Intraclass-Correlation Coefficient

ILO: International Labour Organization

ISCED-97: International Standard Classification of Education 1997

ISCO-88: International Standard Classification of Occupations 1988

MCMC: Monte Carlo Markov Chain

NS-SEC: National Statistics Socio-economic Classification

OECD: Organisation for Economic Co-operation and Development

ONS: Office for National Statistics

PPP: Purchasing Power Parity

PTSD: Post-Traumatic Stress Disorder

q-q: Quantile-quantile

se: Standard error

SHARE: Survey of Health, Ageing and Retirement in Europe

SIMANOVA: Simulation for ANOVA

SOC2000: Standard Occupational Classification 2000

SOCX: OECD Social Expenditure Database

t_0 : Time of baseline measure

t_1 : Time of follow-up measure

Preface

Derived from the Latin term *resilire*, translated as “to spring back” or “to rebound” (Concise Oxford Dictionary, Tenth Edition, 2000), the term ‘resilience’ has been used in a variety of fields and contexts, taking on a multiplicity of definitions in the process.

This thesis will consider resilience as it relates to the individual. As implied in this definition, resilience is a reaction in response to an external force or pressure. The force which will be investigated in this thesis is that of risks arising from the transition from work to non-work.

To this end, the study will use data from individuals in 16 European countries to characterise how wellbeing and mental health change in response to work exit and which factors are influential in allowing them to withstand the risks it entails. This issue is of growing importance as greater numbers reach retirement age and transition out of employment. Furthermore, while lifespans are increasing in length it is uncertain whether wellbeing is high in those additional years of life.

The thesis will address this question from multiple perspectives. First, it will identify what factors at the time of work exit, including age at work exit, socioeconomic factors and individual-level characteristics are associated with a positive or negative change in wellbeing. The thesis will then expand its scope to include multiple levels of analysis and consider factors at the country level. It will ask the question which of these factors at the country level best explain the differences between countries in how individuals’ wellbeing changes when they exit employment. Finally, the thesis will take a longitudinal perspective to investigate how exposures at different times over the individual’s lifecourse may impact upon their wellbeing and mental health

This thesis will comprise six chapters. A brief synopsis of the subsequent chapters is presented below.

- **Chapter 1** will review the concept of resilience and possible mechanisms through which exposure to risk over an individual’s lifecourse may influence wellbeing and mental health outcomes in later life. Research gaps and the aims and objectives of the thesis will be presented.

PREFACE

- In **Chapter 2**, the data sources, harmonisation methods and the characteristics of the analytic sample will be summarised. It will then outline the analytical challenges and methods employed in subsequent chapters.
- **Chapter 3** will present a preliminary analysis of the individual-level determinants of (CASP-12) wellbeing change following exit which will be expanded upon in subsequent chapters.
- In **Chapter 4**, the preliminary analysis will be extended by testing groups of country-level variables for their associations with wellbeing change outcomes following work exit.
- **Chapter 5** will include two parts. In Part I, the associations between cumulative exposure to adverse events and measures of CASP-12 wellbeing, subjective life satisfaction, depression caseness and psychological distress will be tested. In Part II, the associations of cumulative exposure to adverse events and cumulative lifecourse socioeconomic disadvantage with change in wellbeing following work exit will be investigated.
- In **Chapter 6**, the thesis' discussion section, the findings of each of the previous chapters will be summarised in brief and discussed individually. The overall findings of the thesis as a whole will then be synthesised from a resilience perspective and final conclusions will be drawn. The strengths and limitations of the thesis and policy implications will be outlined. Possible directions for future research will be proposed.

1 CHAPTER 1: Resilience

Chapter 1 comprises four sections. The first will review the concept of resilience at the individual level and characterise the theoretical development of the concept over time. In particular, this review will discuss resilience in response to the specific risk event which will be investigated in this thesis: exit from paid work in early old age. The second section will give an overview of the current gaps in the literature. The third and fourth sections will give an overview of the primary objectives of this thesis and its overall structure.

1.1 RESILIENCE

1.1.1 Background and development

While the present review will summarise the history of the term's *usage*, the historical development of resilience as a concept in relation to human psychological and physical health will be subsequently characterised in depth. It is necessary to describe the term's development across a number of fields, and, in particular, to characterise the relationships between the various definitions employed within these fields while placing them in their historical context.

The first use of the term can be attested to Thomas Tredgold (1818), who defined it as a property of certain types of timber to be able to withstand sudden and severe loads without breaking. Later, Mallett's (1856, p.44) 'modulus of resilience', defined as the energy required to rupture a material as a result of a force being applied, remains a core concept in engineering. More recent definitions include "the ability of a material to absorb and release energy, within the elastic range" (Gere and Goodman, 2009, p146). The scope of the term's use has since widened and resilience has since been introduced as a concept in a number of other fields of study (McAslan, 2010).

In ecology, 'ecological resilience' (Holling, 1973) refers to the capacity of an ecosystem to absorb changes, particularly in the context of disturbances caused by human activities and stochastic events such as fires, flooding and extreme climatic conditions. It refers to the probability of persistence of the existing interrelationships between populations of different species or state variables within a system, or alternatively, when referring to a given species, the negative probability of extinction. Resilience therefore describes the limits within which

a system can exist in its present configuration. These limits, however, can be overcome by events of sufficient magnitude or duration to cause catastrophic failure by breaking down the prevailing interdependencies between the different variables operating within the system; thereby resulting in what Folke et al. (2010) refer to as a 'regime shift', or a change in state from one 'stability domain' to another. This is closely related to the concept of 'stability', defined as the capacity of, and the speed at which a system returns to a state of equilibrium following a disturbance.

This initial concept has since been broadened to one of 'social-ecological resilience', which recognises the interrelationships between ecological and social-economic systems (Wilkinson, 2011) in which certain parameters are in continuous flux yet remain within critical thresholds (Folke et al., 2010). Similarly, in urban studies, 'urban resilience' conceptualises the city as a 'human ecosystem' within the perspective of metropolitan areas as integrated ecological-social systems (Pickett, Cadenasso and McGrath, 2003). These definitions have also been adapted to describe the effects of, and measures designed to mitigate, anthropogenic climate change in order to develop a concept of 'climate resilience' (Gaillard, 2010). Finally, 'organisational resilience', has been defined as the capacity of organisations embedded in complex, interdependent social systems to resist the impacts of adverse events, exercise situational awareness, manage key vulnerabilities and recover while enhancing adaptive capabilities (McManus et al., 2008).

1.1.2 Individual resilience: A panoply of definitions

The present study will seek to define resilience in relation to the individual. The Merriam Webster's Dictionary (2012) defines resilience, in the sense relevant to the present study, as "an ability to recover from or adjust easily to misfortune or change" while the Concise Oxford Dictionary (Tenth Edition) (2000) defines it as "the capacity to recover quickly from difficulties", or 'toughness'. These definitions, however, fail to encompass the term's various uses throughout the literature and refer solely to risk variables and outcomes. Furthermore, they fail to acknowledge the traits, characteristics, factors, processes, mechanisms, systems or protective resources which in common parlance would be considered to typify 'resilient' individuals.

While the history of the term is convoluted and characterised by change over time, a number of definitions have emerged around common themes. Discourses on resilience

developed from early observations that most adults (Paykel, 1978) and children (Rutter, 1979), even those exposed to extreme risk or stressful events, do not go on to develop psychiatric symptoms. Resilience is often contrasted with vulnerability, both within health literature and across other fields (McAslan, 2010).

1.1.3 Resilience and its definitions

Definitions of resilience typically describe three types of phenomena: a) positive outcomes despite an individual's high-risk status, b) sustained competence despite threat or stress, and c) recovery from trauma (Masten et al., 1990). It is commonly framed in terms of maintenance of normal functioning or a recovery from trauma (Staudinger, 1993), or, more specifically, hazards that normally predict unfavourable or maladaptive outcomes (Garmezy, 1991). Conversely, resilience has also been defined in terms of a better outcome than that seen in other individuals from a similarly disadvantaged or at-risk background (Rutter, 2012) or simply variability and unexpected "off-gradient" outcomes (Masten, 2007). A common definition of resilient individuals are those who are "flourishing despite their risk status" or "stress-resistant" (Masten, Best and Garmezy, 1990, p. 426).

Studies on resilience originated with the early observations that some individuals demonstrate positive adaptation despite experiences of adversity (Luthar, 2003; Rutter, 1987), and that stressful conditions or adverse events do not result in analogous effects in all individuals (Lazarus, 1993). One catalyst for the development of this approach was the introduction of longitudinal approaches. This is typified by Werner and Smith's (1982) study on a multi-racial prospective cohort of children born on the Hawaiian island of Kauai in which they studied associations between perinatal, family, psychological and social risk factors on the one hand and the emergence of behavioural and mental health problems on the other. Earlier studies of disadvantage took a retrospective approach and reconstructed life histories from those who had already developed behavioural or mental health problems, and used these histories to identify early-life risk factors. The longitudinal and prospective approach used by Werner and Smith was better able to identify other factors which mitigate early-life risk factors and predict positive developmental outcomes. In doing so, the study was able to identify both "casualties" and "survivors".

All of these perspectives emphasise universal human capacities and protective factors for development and avoidance of negative outcomes such as psychopathology (Masten et al.,

1990). Although the resilient outcomes (i.e. positive adaptation in response to a given risk) in question may be considered to deviate from the norm, Masten (2001, p.227) refers to resilience as commonplace “ordinary magic” arising from the “normative functions of human adaptational systems”.

The emergence of resilience research could be said to represent a move away from emphasis on deficits or exposures that lead to ill-health towards processes that lead to wellbeing; a perspective that questions medicine’s ‘pathogenic orientation’ or defect focus (Cicchetti and Garmezy, 1993; Masten, 2001). This view has its origins in Antonovsky’s (1979) concept of salutogenesis, which defines disease states as manifestations of maladaptation to a given environment, an unresolved disturbance of homeostasis and a prolonged failure to restore equilibrium (Antonovsky, 1972).

1.1.3.1 Resilience and vulnerability

Although the term ‘vulnerable’ has been applied to individuals with a high risk status and resilient to those who experience positive outcomes despite this high risk status (notably by Werner, 1989), a number of studies have categorised individuals as either ‘resilient’ or ‘vulnerable’ according to the outcomes they experience (e.g. Rutter, 1999; Schoon, 2006; Schoon, 2007; McAslan, 2010). Vulnerability will be considered the inverse of resilience for the purposes of this thesis.

1.1.4 Evolution of the term

The resilience concept has been increasingly adopted by lifecourse epidemiologists as a framework for understanding individuals’ adaptation to adverse life events or to new phases of life while recognising the historical and social embeddedness of these processes.

Richardson (2002) has observed that studies on resilience have changed their focus over time; moving away from phenomenological descriptions of resilience as fixed personal assets, qualities or attributes that are predictive of maintenance of wellbeing and towards resilience as a disruptive reintegrative process geared towards coping with adversity or change. More recently, Masten (2007) also explicitly divided resilience research into waves.

For the purposes of the present review, resilience studies will be considered to have taken place over three waves. The first two, identified by Richardson (2002), will be described as studies on resilience as individual attributes and resilience as a process respectively. The emerging third wave, or Masten's (2007) fourth wave, will be characterised as viewing resilience from an increasingly multidisciplinary perspective as an interplay between multiple processes at multiple levels of analysis. Although the temporal progression of these waves is not clear and studies of resilience cannot always be neatly categorised, studies in the first wave can be said to have taken place from the 1950s to the 1980s, the second from the late 1980s to the 2000s, and the third from the late 2000s onwards.

1.1.4.1 The first wave: Resilience as an innate characteristic

Many early studies on resilience attempted either to uncover associations between a given outcome and a limited number of personality traits or to describe behavioural dispositions associated with resilient outcomes. This view is typified by Flach's description (1989) of resilience as "the psychological and biological strengths required to successfully master change" (p. xi).

In the first wave, resilience was associated with a number of personality traits (Lazarus, 1993; Richardson, 2002). These include intelligence (Lazarus and Eriksen, 1952), optimism (Peterson, 2000), faith (Myers, 2000), wisdom (Baltes and Staudinger, 2000), excellence (Lubinski and Benbow, 2000), self-control (Baumeister and Exline, 2000), empowerment (Rappaport, 1987), gratitude (Emmons and Crumpler, 2000), forgiveness (McCullough, 2000), dreams (Snyder and McCullough, 2000), humility (Tangney, 2000), creativity (Simonton, 2000), constructive thinking (Epstein & Meier 1989), hardiness (Kobasa, 1979; Maddi and Kobasa 1984), learned resourcefulness (Rosenbaum 1990), self-efficacy (Bandura 1982), locus of control (Johnson and Sarason, 1979; Lefcourt, Martin and Saleh, 1984), arousal seeking (Johnson & Sarason, 1979), sensation seeking (Smith, Johnson, & Sarason, 1978), positive coping styles (Cohen and Lazarus, 1979) and sense of coherence (Antonovsky 1985; 1987).

Another perspective on the role of personality or temperament in successful adaptation to new situations or contexts is provided by the 'goodness-of-fit' model (Thomas and Chess, 1977). This model proposes that successful adaptive outcomes are not a directly a result of a person's characteristics, but rather are a function of the 'attribute-demand relation'. This

is defined by an individual's physical and psychological attributes and their suitability for meeting the demands of specific physical and developmental contexts (Lerner, 1983; Thomas and Chess, 1981).

1.1.4.2 The second wave: Resilience as a dynamic process

The second wave of resilience research stems from Rutter's (1987) characterisation of resilience as a mechanism rather than a trait. Studies in this wave typically emphasise that resilience is a continuous process by which individuals adapt to, recover or 'bounce back' from adversity (Tugade and Fredrickson, 2004). The former view is captured by Egeland et al (1993), who define it as a dynamic, 'transactional' process whereby individuals demonstrate adaptive functioning in adverse situations, and Luthar et al. (2000) who refer to "dynamic process encompassing positive adaptation within the context of significant adversity". Similarly, Masten (1990, p. 425) presents resilience as the "capacity for, or outcome of successful adaptation despite challenging or threatening circumstances". In sum, when compared to the first wave, the second paid greater attention to the processes that led to resilient outcomes while often incorporating a developmental perspective (Cicchetti and Garmezy, 1993).

Richardson (2002) identified a third wave of resilience research emphasising the identification of motivational forces which drive individuals towards self-actualisation and resilient reintegration following disruptions or adverse events. Although work in Richardson's third wave departs from the behaviourist interpretation of resilience seen in the second wave by incorporating postmodern multidisciplinary perspectives, for the purposes of this review it can be considered a continuation of the second wave owing to its emphasis on adaptive processes. In Richardson's third wave, resilience is conceptualised as the human capacity of all individuals to transform and change and as an innate "self-righting mechanism" (Werner and Smith (1992, p. 202). In *The Protean Self* (1994), Lifton emphasises the dynamic, multifaceted and malleable sense of self common to all individuals, their flexible imagination and open behavioural repertoire as the origin of resilience.

Masten (2007) also identified a third wave of resilience research which adopted prevention-oriented community psychology and multidisciplinary systems approaches to identify and evaluate interventions and their effectiveness at enhancing protective processes (e.g.

Luthar, 2006; Yates and Masten, 2004). As with the second wave, however, this too defined resilience as an adaptive process.

1.1.4.3 The third wave: Recent developments in resilience research

Resilience research has increasingly taken a systems perspective integrating the study of resilience across levels of analysis, across species, and across disciplines (Masten and Obradović, 2006; Rutter, 2006; Wright and Masten, 2005). This approach is nothing new, however, as Bronfenbrenner (1977) stressed the complex interrelationships between and across different domains of functioning (i.e. biological, psychological, social and cultural) and the progressive adaptation of the developing human organism to new roles and environments. Here, human development is defined as “progressive, mutual accommodation, throughout the life span, between a growing human organism and the changing immediate environments in which it lives... as well as the larger social contexts, both formal and informal, in which the settings are embedded” (p. 513). Egeland et al. (1993) have described resilience as a ‘transactional process’ determined by the interaction of genetic, biological, psychological, and sociological factors in the context of environmental support. What has changed in recent years, however, is the availability of techniques to effectively test hypotheses relating to resilience as a multi-level construct and the increasingly multidisciplinary nature of resilience research.

Although recourse to studying genetic determinants, in particular, may be seen as a return to a deficit-based approach or descriptions of resilience as an innate trait as in the first wave, it is increasingly considered vital in studies on resilience as part of a biological systems approach. This perspective recognises the pivotal role of plasticity in human development and resilience, and highlights that biological factors are constantly adapting and in dynamic flux rather than comprising fixed constitutional factors (Feder et al., 2009). Factors influencing functioning across different levels of analysis operate interactively rather than additively to influence one another’s trajectories.

This approach to resilience research has been referred to as the multiple-levels-of-analysis perspective, and acts as a framework through which environmental and contextual processes lead to resilience, and to explain the diversity of developmental outcomes even among resilient individuals (Cicchetti and Blender, 2006). Building on earlier attempts to operationalise diathesis-stress models (Metalsky and Joiner 1992), investigators in this wave

of research have attempted to integrate the role of genetic factors in explaining determinants of susceptibility to risk. In particular, Belsky and Pluess (2009) have reviewed the role of genetic factors in genetic interactions, concluding that, rather than determining whether a given individual is more vulnerable, and thus more likely to experience adverse outcomes in response to a given exposure, they are more likely to act as ‘plasticity factors’ which render individuals more susceptible to both positive and negative outcomes in response to environmental influences. These factors need not represent fixed characteristics, however, as psychosocial factors may influence gene expression via epigenetic mechanisms (Gottesman and Hanson, 2005).

1.1.5 Resistance resources and resilience

Antonovsky introduced the concept of ‘generalised resistance resources’ (1972), which he later defined as “... a property of a person, a collective or a situation which, as evidence or logic has indicated, facilitated successful coping with the inherent stressors of human existence” (Antonovsky, 1996, p. 15). Put more simply, these factors reduce the impact of risk (Luthar et al., 2000). ‘Protective resources’ (Gilgun, 2005), ‘ameliorative factors’ (Luthar, 1993) or ‘protective factors’ (Masten, 1990; Rutter, 1987), henceforth referred to as ‘resilience resources’ for the purposes of the present study, have featured heavily in resilience research.

Resilience resources can refer to factors both intrinsic and extrinsic to the individual (Garmezy, 1985). Sroufe (1979) argues that a major determinant of resilience among children is the variation in their abilities to draw on personal and environmental resources, such as the presence of caregivers, when challenged. From this perspective both external material and social support and internal psychological resources could be viewed as essential determinants of resilience. Lazarus (1993), meanwhile, describes resilient individuals as being more capable of marshalling available resilience resources to aid in the adaptive process. These types of external resilience factors can be categorised in various ways. In a study of different types of interpersonal support and their role in promoting positive adaptation, Schaefer et al. (1981) made a distinction between emotional support (i.e. positive encouragement) and tangible support (i.e. services or material aid).

1.1.6 Resilience and risk

Resilience is a multifaceted concept whose meaning is dependent on context and cannot be described without reference to risk, adversity or stress. This can be a risk status or a risk event. Schoon (2006) describes resilience as a ‘two-dimensional’ construct balancing measures of risks and resources on the one hand with measures of functioning and adaptation on the other. As Masten and Coatsworth (1998, p. 206) explain: “to identify resilience, two judgments are required: first, that there has been a significant threat to the individual, typically indexed by high-risk status... or exposure to severe adversity or trauma... and second, that the quality of adaptation or development is good”.

Empirical research into resilience relies on the definition of an ‘at-risk’ group or exposure to stress, given that it is defined as adaptation following adverse events. Meanwhile, risk with regards to resilience to psychopathology has been defined by Masten (1990) as variables that are statistical correlates of poor or negative outcomes. In this sense, risk in relation to resilience is probabilistic rather than deterministic.

Attempts have been made to categorise risk. Baldwin, Baldwin and Cole (1990) have labelled risk factors as either ‘proximal’ or ‘distal’ in relation to whether these are mediated by other external factors. Baltes (1987) has categorised risks into three patterns according to their timing: a) age-graded, b) history-graded (or cohort-specific) and, c) non-normative. The former two have a strong relationship with chronological age and are driven by social and biological determinants associated with historical time. The relative impact of each type of risk is likely to vary at different points in the lifecourse in line with age-graded events and exposures. Non-normative risks, meanwhile, which are often specific to an individual, are unpredictable in their nature and timing.

Risk and resilience are described as two sides of the same coin (Ungar, 2004), implying that resilience must incorporate into its definition the interplay of risk factors. As Rutter (1987) has argued, manifestations of vulnerability or resilience are only apparent in the presence of a risk variable. This prevents discussions of resilience until this risk variable is identified. As with definitions of resilience in general, measures of risk or protective factors must be relevant to a respondent’s competence, age and societal context (Masten et al., 1995) and the developmental domain or unit ‘at stake’ (Staudinger, 1993).

1.1.6.1 Risk at different levels of analysis

In addition to factors at the individual level, institutional, cultural and organisational contexts in which, for example, exits from work occur are important in determining the cross-sectional associations between risk and resilience outcomes (i.e. outcomes measures describing either positive or negative adaptive outcomes in response to a given risk). While individual-level risk factors are likely to have more proximal relationships with adverse outcomes, relationships involving country-level factors are likely to involve more distal risk factors with more complex relationships with outcomes. Referring back to Baltes (1987), human development is patterned in accordance with historical and cultural conditions. These institutional influences, which occur at the country level, are another example of cohort-specific risk. Individuals residing in the same country are likely to share similar patterns of risk factors due to similarities in their context. This not only pertains to the characteristics of work exit, but also factors influencing development at different points in the lifecourse. Country-level cohort effects therefore have the potential to influence the type and degree of risk or adversity individuals may experience following work exit.

1.1.7 Resilience in old age

These commonalities can be seen in the definitions of resilience in old age offered by various investigators. While Rowe and Khan's definition (1997) emphasises recovery from adversity, describing resilience in old age "the rapidity and completeness with which people recover from [adverse events] and return to meeting the criteria of success", Baltes and Meyer (1999) draw attention to the development of coping strategies and demonstration of mastery of daily demands and tasks specific to old age with a view to maintaining, or preventing declines in, wellbeing and subjective satisfaction with life. Most recently, Ong et al. (2009) has characterised resilience in old age as a continuous adaptive process, which is potentiated by multiple protective pathways, and occurs in a daily context in which individuals react and adapt to recurring challenges. In addition to emphasising adaptive processes, definitions of resilience in old age, just as in childhood, can be couched in terms of meeting age-specific developmental tasks. These age-salient tasks relate to social roles and behaviours expected for people as they mature in a given society or culture (see Elder, 1998; Havighurst, 1961; Havighurst, 1972; Masten and Coatsworth, 1998).

1.1.7.1 Risk in old age, and specifically early old age

Conceptualisations of resilience in older individuals should be made not only with reference to outcomes but also the types of risk experienced. One important socially-constructed age-graded risk factor associated with significant changes in wellbeing, is retirement or exit from work in early old age (Pinquart and Schindler, 2007; Coursolle et al, 2010; Luhmann, 2012). With reference to Burgess' (1960) description of old age as a "roleless role" in which no further change is expected, Rowe and Khan (1998, p189) characterise the period following formal retirement as the final major lifecourse transition and "the end of age-grading". More recently, Pearlin (2010) has observed that the frequency of socially-constructed lifecourse transitions tapers off with age. In this context, risk in early old age may primarily stem from retirement and the social transitions it entails. Although individuals in early old age in industrialised economies are likely to retain a degree of good health and physical functioning, given the heterogeneity of this demographic group there is similarly likely to be a wide heterogeneity in health and physical functioning and exposure to non-normative risk. Notably, risks and resilience outcomes are likely to be influenced by socioeconomic status both in old age and over the lifecourse through cumulative disadvantage (Dannefer, 2003).

1.1.8 Risk and the lifecourse

Not only does age-graded risk operate in early old age, but throughout the lifecourse. A number of investigators have taken a lifecourse approach to risk and have reviewed the lifecourse determinants of wellbeing in early old age and following labour market exit. While some have identified a positive association between supportive early-life conditions and wellbeing in adulthood (e.g. Currie and Rosslin-Slater, 2015), others have found a negative relationship. In particular, Montgomery et al. (2007) concluded that individuals who had experienced early-life disadvantage were less likely to suffer negative health impacts following financial adversity in mid-to-late life. The influence of chains of risk has also been highlighted, with previous instances of unemployment increasing the risk of subsequent unfavourable exits from work and vulnerability to these events (Heckmann and Borjas, 1980; Kessler, Turner and House, 1988). These have been referred to as 'scarring' effects (Clark, Georgiellis and Sanfey, 2001). Given that such chains of risk from early life onwards likely involve mediation by subsequent factors or events, these can be defined as 'distal' risk factors (Baldwin, Baldwin and Cole, 1990).

Together, cumulative psychosocial and material factors over the lifecourse shape both risk profiles and outcomes in later life. Furthermore, these factors may influence one another through a variety of pathways, for example, with socioeconomic position in midlife influencing access to pension entitlements, which in turn may govern access to non-financial determinants of wellbeing following work exit (Blane et al., 2007) and route of work exit. Blane et al. (2004) conclude, however, that the influence of early and mid-life factors on wellbeing in early old age may be less marked than their influence on health status.

Finally, one recent attempt to characterise the influence of socioeconomic position over the lifecourse found a positive effect of cumulative socioeconomically advantaged positions on quality of life in early old age (Niedzwiedz et al., 2012). Furthermore, this relationship was modified by welfare state regime, suggesting that the welfare state may represent a lifecourse determinant of wellbeing (Niedzwiedz, 2014). Country of residence and welfare state factors may themselves determine risk exposures throughout the lifecourse within a given cohort. Country-level differences may therefore arise due to differential distributions of these factors between countries.

1.1.8.1 Environmental embeddedness and developmental contextualism

Sroufe and Rutter (1984) observed early on that links between earlier adaptation and later-life pathology are rarely direct, making it necessary to understand not only individual patterns of adaptation in specific domains of functioning with respect to current challenges, but also the role of prior adaptation, development and maturational change earlier in the lifecourse. Building upon Garmezy's (1985) description of development as the interplay between interdependent spheres of influence undergoing change over time, Staudinger (1993) characterises lifespan development as multidirectional and modifiable, with development occurring on multiple levels of analysis encompassing all areas of physical and cognitive functioning. Changes in adaptive resources over time are multidirectional and encompass gains, losses and maintenance. This is of particular relevance in old age, where plasticity or a high degree of functioning in one domain may compensate for a deficit in another to promote overall adaptation. Referring back to Egeland et al. (1993), resilience in childhood is described not as predetermined but rather developed over time in the context of complex person-environment interactions as part of

a transactional process within an organisational framework. In this context, development is defined as a hierarchical integration of behavioural systems in which earlier structures are incorporated into more complex forms as determined by a range of genetic, biological, psychological, and sociological factors. Such mechanisms of embodiment via neurobiological mechanisms feature prominently in the third wave of resilience research. For example, Cicchetti and Toth (2012) proposed that neural plasticity plays a major role in determining the development of vulnerability as adverse experiences early in the lifecourse may trigger cascade effects which influence brain development and the formation of aberrant neural structures which, in turn, contribute to abnormalities and poor adaptive outcomes through psychopathology.

Adopting a lifecourse perspective of the development of resilience also requires recognition of the environmental, historical and social embeddedness of these processes (Sroufe and Rutter, 1984); a position referred to as ‘developmental contextualism’ (Lerner, 1984, p23). A number of previous studies have described development over the lifecourse as the cumulative result of bi-directional person-environment interactions which are strongly embedded in social structures and historical change (Bronfenbrenner, 1995; Elder 1985, Elder 1998, Lerner 1984; Lerner and von Eye, 1992; Sameroff and Seifer, 1983). Caution should be taken in interpreting this framework, however, given that these lifecourse transitions are not universal and have the potential to vary between individuals, cultural groups and societies, and that some individuals may not experience a given transition at all (Rutter, 1989).

1.1.8.2 A lifecourse developmental perspective on risk and resilience

The lifecourse differs from concepts of the lifespan in that it reflects the intersection of social and historical factors with personal biography and development (Sroufe and Rutter, 1984; Elder 1985). Central to a lifecourse approach to resilience, therefore, is the recognition of the individual’s environmental embeddedness and exposure to individual, familial, and societal factors over time. One major aspect of resilience identified by Rutter (1993) is that these risk or protective influences often arise from experiences or exposures early in the lifecourse. Sroufe and Rutter (1984) identified the following mechanisms through which early experience of risk exposure and the extent of early adaptation might be associated with failures in adaptation later in life: a) experience leading to early disorders

which then persists, b) experience leading to biological changes which influence later functioning, c) an alteration in behavioural patterns which only later takes the form of disorder, d) early events leading to changes in family circumstances which later result in disorder, e) modification of sensitivities to stress or coping styles which later 'predispose' the individual to disorders, f) changes in the individual's self-concept or attitudes which influence future responses to risk situations, and g) changes in behaviour which influence selection of environments and, by extension, probability of future risk exposure or environmental mismatch.

Rutter (1987) emphasises the need to understand the mechanisms of risk and resilience at 'key turning points' in the lifecourse to prevent subsequent 'negative chain reactions' of risk events. Other work, meanwhile, has focused on early programming effects, or 'biological embedding', through which early experiences occurring in a 'critical' or 'sensitive' period engender a change in the nature of person-environment interactions throughout the remainder of the lifecourse (Hertzman et al., 2001; Kuh et al., 2003).

1.1.9 Risk exposure over the lifecourse and resilience in early old age: Causal mechanisms

In *A Theory of Human Motivation*, Maslow (1943) made the observation that that while, on the one hand, individuals who have been subject to a low degree of risk during the lifecourse and have succeeded in meeting previous developmental tasks are more likely to display resilience, those who have experienced continuing exposure to risk may demonstrate greater adaptation to similar adversities later in the lifecourse. These seemingly contradictory mechanisms need not work to the exclusion of the other. This is encapsulated in the following paragraphs (pp. 387–388):

People who have been satisfied in their basic needs throughout their lives, particularly in their earlier years, seem to develop exceptional power to withstand present or future thwarting of these needs simply because they have strong, healthy character structure as a result of basic satisfaction. They are the 'strong' people who can easily weather disagreement or opposition, who can swim against the stream of public opinion and who can stand up for the truth at great personal cost. It is just the ones who have loved and been well loved, and who have had many deep friendships who can hold out against hatred, rejection or persecution.

I say all this in spite of the fact that there is a certain amount of sheer habituation which is also involved in any full discussion of frustration tolerance. For instance, it is likely that those persons who have been accustomed to relative starvation for a long time, are partially enabled thereby to withstand food deprivation. What sort of balance must be made between these two tendencies, of habituation on the one hand, and of past satisfaction breeding present frustration tolerance on the other hand, remains to be worked out by further research. Meanwhile we may assume that they are both operative, side by side, since they do not contradict each other. In respect to this phenomenon of increased frustration tolerance, it seems probable that the most important gratifications come in the first two years of life. That is to say, people who have been made secure and strong in the earliest years, tend to remain secure and strong thereafter in the face of whatever threatens.

Specifically, in this section, I will outline three theories of adaptation which seek to explain Maslow's observations regarding relationship between exposure to risk over the lifecourse and resilience in early old age. These include 1) the theory of allostasis (McEwen and Stellar, 1993; McEwen, 1998), which would predict that individuals exposed to a high degree of risk over the lifecourse are more likely to experience negative outcomes to adverse events in early old age; 2) the phenotypic match/mismatch hypothesis which would predict the reverse; and 3) the biological sensitivity to context theory; which predicts that individuals with an intermediate risk exposure will experience the smallest decline in wellbeing.

1.1.9.1 The allostasis hypothesis

Variouly referred to as 'cumulative stress' or 'allostatic load', the theory of allostasis was proposed by McEwen and Stellar (1993) to describe the effects of chronic stress over the lifecourse and its role as a predisposing factor for the development of vulnerabilities which precipitate negative outcomes when individuals are exposed to challenges and adverse events. Allostasis, originally described as "the ability to achieve stability through change" (McEwan, 1998, p 171), is a multifaceted response to both internal and external stressors whereby a range of homeostatic systems are activated to precipitate a wide variety of neurochemical responses (Charney, 2004).

According to McEwen (1998), the drawback of this accommodation of stress is allostatic overload. This is defined as the cumulative result of an allostatic state which occurs as a result of detrimental over-activation of stress response systems (McEwen and Wingfield; 2003). Therefore, while allostasis is adaptive in the short term, allostatic overload can result

in the emergence of vulnerability to future stressors and maladaptive outcomes in the long term (McEwen and Gianaros, 2011).

McEwen (1998) has proposed four mechanisms through which this occurs, namely: a) frequent exposure to stressors inducing adverse, chronic effects on homeostatic systems, b) homeostatic adaptation to repeated stressors resulting in prolonged exposure to downstream factors such as stress hormones, c) an inability to deactivate stress response systems once the stressor has subsided and, d) inadequate responses by some adaptive allostatic systems leading to compensatory increases in others. McEwan and Wingfield (2003) have attempted to differentiate the mechanisms through which allostatic load occurs. They identified two categories of allostatic overload (Type 1 and Type 2). Type 1 allostatic overload describes the over-activation of allostatic responses in threatening, unpredictable environments characterised by nutritional scarcity. Type 2 allostasis, meanwhile, occurs in contexts where energy requirements are met but marked by high exposure to social conflict and psychosocial stress respectively. High allostatic load of both types over time is implicated in the development of predispositions to disease (McEwan, 2006; McEwen, 2007) and is a predictor of functional decline in ageing (Karlamanġla et al., 2002).

In sum, this theory would imply that those who had been exposed to a lower degree of risk, or allostatic load, over the lifecourse would be most likely to exhibit resilient outcomes following work exit in early old age.

1.1.9.2 The phenotypic match/mismatch hypothesis

The phenotypic match/mismatch or 'goodness-of-fit' (Thomas and Chess, 1977) hypothesis describes a mechanism through which resilient outcomes are a result of an appropriate match between the individual and their environment. Vulnerability or maladaptive outcomes, conversely, are considered to be as a result of mismatch. This hypothesis rests on the assumption that human development is characterised by a high degree of plasticity throughout the lifecourse (Gluckman et al., 2008), such that individuals' behaviour or phenotypic traits change over time to match the majority of environments in which they find themselves. Through this mechanism, phenotypic adaptation in during development in early life influences vulnerability to risks in maturity through a variety of mechanisms in a socially-constructed manner throughout the lifecourse (Gluckman et al.,

2005). Adverse outcomes in adulthood may arise as the result of mismatch between the anticipated environment and in the environment to which individuals are exposed to in maturity. This is a result of the fact that adaptive behaviours which are appropriate at an earlier point in the lifecourse likely to be maladaptive in following changes in the external environmental (Lerner, 1984; Rutter, 1993).

Rather than referring to genotypic effects (genomic change entailing evolution over many generations), this hypothesis relates solely to the match between the phenotype and the environment. The phenotype match/mismatch hypothesis can be compared with the 'thrifty phenotype' hypothesis for Type 2 diabetes mellitus (Hales et al., 1991; Hales and Barker, 1992). This states that predisposition to diabetes is as a result of programming effects of malnutrition *in utero* and poor early growth, which predict a nutrient-poor environment in later life. This, in turn, influences beta-cell development to increase diabetes risk in adulthood. This may be contrasted with Neel's (1962) earlier 'thrifty genotype' hypothesis for diabetes which proposes that environmental mismatch is a product of a genetically-determined predisposition to insulin resistance becoming maladaptive in industrialised societies.

With regards to the biological mechanisms which may explain the mismatch hypothesis, Gluckman et al. (2007) consider the developmental origins of health and disease paradigm (Gluckman et al., 2005), which describes a subset of processes that constitute developmental plasticity, to explain the mechanism through which early phenotypic adaptation influences morbidity risk in different environments in maturity. This process relies on developmental plasticity to allow the organism to shift its phenotype along the norm of reaction to optimise fit with the environment through epigenetic regulation of gene expression; thereby increasing fitness despite the fixed nature of the genotype within the individual. In particular, the intrauterine environment is considered to predict the organism's future environment and determine the direction of phenotypic plasticity. Adverse outcomes here are considered to be the result of mismatch between the anticipated environment and that in maturity and arise from environments that fall outside the organism's physiological homeostatic range. Finally, Frankenhuis and Del Giudice (2011) suggest two further mechanisms through which adaptive plasticity in early development can lead to environmental mismatch and adverse outcomes. This may occur when the organism moves from one environment to another with different risk exposures or when the external environment changes over time.

The phenotypic match/mismatch hypothesis would suggest that individuals who have been exposed to a greater degree of risk over the lifecourse would be more likely to have undergone greater adaptation to adverse circumstances, thereby displaying resilient outcomes and be less likely to experience a decline in wellbeing following an adverse event in early old age such as involuntary work exit.

1.1.9.3 Biological sensitivity to context as a result of early-life programming effects

Finally, a third hypothesis to describe the relationship between lifecourse exposure to risk and resilience is biological sensitivity to context. This hypothesis, which could be considered a generalisation or extension of the phenotypic match/mismatch hypothesis, originates from earlier work by Belsky (1997) who suggests that individuals display varying degrees of reactivity to different environmental exposures.

Building on this work, investigators have subsequently expanded this conceptualisation of biological sensitivity to incorporate programming effects during development such that early exposures calibrate stress response systems, which in turn are considered to possess considerable developmental plasticity to promote phenotypic match (Boyce and Ellis, 2005; Ellis and Boyce, 2005; Ellis et al., 2011). The difference vis-à-vis the phenotypic match/mismatch hypothesis, however, is that it proposes a curvilinear, U-shaped (or ‘bivalent’) relationship between degree of risk exposure in early development and stress reactivity. Both high and low risk exposure early in the lifecourse are considered to result in the development of a reactive phenotype with greater potential for positive outcomes in response to supportive environments and correspondingly negative outcomes in adverse environments. Such individuals can therefore be characterised as pursuing a ‘high-risk, high-payoff’ evolutionary strategy (Belsky, 1997). Belsky and Michael (2009) note that this view differs substantially from earlier ‘traditional’ diathesis-stress models in that the latter do not presuppose any effect of greater susceptibility to risk exposure among those individuals in supportive environments.

Given that Boyce and Ellis (2005) explicitly relate the unreactive phenotype with resilience outcomes due to a lack of adverse effects following risk exposure, in the context of this thesis this hypothesis would predict that those individuals showing lower stress reactivity in early old age are likely to have experienced an intermediate degree of risk over the lifecourse.

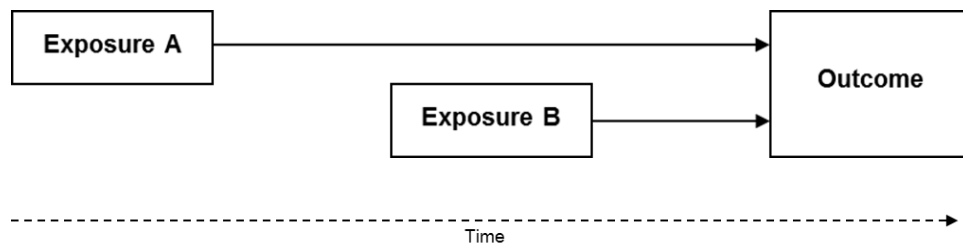
1.1.10 Risk exposure over the lifecourse and resilience in early old age: Three types of association

Besides the three causal mechanisms described above, there have also been various models suggested to describe the nature of these associations regarding how the patterning of exposure to risk over time influences outcomes later in the lifecourse.

Studies on the impact of risk over the lifecourse typically refer to three models: accumulation of risk, critical or sensitive period effects, and chains of risk (Rutter, 1989). These models are non-mutually exclusive, and, when their looser definitions are used, they may be operating concurrently in response to the same risk exposure to influence an individual's later-life outcomes. They also do not necessarily rule out and of the causal mechanisms described in Section 1.9.

1.1.10.1 Accumulation of risk

The accumulation of risk model, based on Riley's (1989) concept of 'insult accumulation'; conceives the association between lifecourse adversity and outcomes in later life as a lifelong dose-response relationship (Hertzman et al., 2001; Cohen et al., 2010). Damage accrues over the lifecourse as the number, duration and severity of exposures to adversity increases, and as compensatory systems lose efficacy over time (Kuh et al., 2003). In the strictest interpretation of this model individual events are assumed not to be clustered and each event independently influences later-life outcomes. Importantly, associations between events and outcomes are neither mediated nor moderated by subsequent events or exposures to adversity. Figure 1.1 gives a pictorial representation of associations between lifecourse exposure to adversities and later-life outcomes according to this model.

Figure 1.1. Accumulation of risk hypothesis (strict interpretation)

Notable examples of this in previous work include the associations between accumulation of disadvantage at earlier points in the lifecourse, for example through exposure to lifetime exposure to residential damp, exposure to air pollution, lack of job autonomy, inadequate nutrition during childhood and exposures in adulthood such as tobacco use and later increased blood pressure, higher body mass index, impaired lung function (Holland et al., 2000) and respiratory disease (Mann et al., 1992).

1.1.10.2 Latent risk (critical and sensitive periods)

Latency factors or ‘programming effects’ are those which exert lasting influences throughout the subsequent lifecourse. When an exposure elicits a given programming effect only if it occurs at a particular time in the lifecourse, this can be considered an example of a critical period. Risk factors present during a critical period may induce ‘programming effects’ or ‘biological embedding’, through which early experiences engender a change in the nature of person-environment interactions throughout the remainder of the lifecourse (Kuh et al., 2003). As such critical period effects are often present where the adverse outcome of interest has developmental origins (Hertzmann et al., 2001). The key feature of a critical period, however, is that it represents a limited time window in which a given exposure (or lack of an exposure) can produce adverse or protective effects on subsequent development and later-life outcomes (Ben-Schlomo and Kuh, 2002).

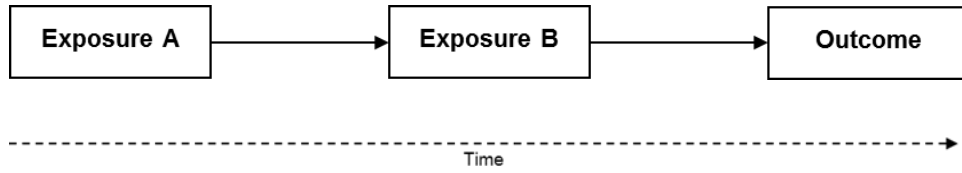
A sensitive period, meanwhile, is one in which a given exposure has a stronger effect on subsequent development than the same exposure in a different period. The timing of these periods depends on both the exposure and outcome of interest (Cohen et al., 2010). More recently, investigators have attempted to integrate these perspectives within a single ecobiodevelopmental framework (Shonkoff et al., 2009; Shonkoff and Garner, 2011). This framework accounts for the complexity of early childhood stress by attempting to identify

the biological mechanisms through which constant risk exposure over time, which displays a strong socioeconomic gradient, becomes biologically embedded via epigenetic effects to influence gene expression over the lifecourse, emerging brain development and physical health trajectories. Behavioural mediators may also play a role, and it has been suggested that stressful events influence the development of temperament during a sensitive period between the ages of 11 and 16 years, thereby affecting future behaviour and coping strategies (Laceulle et al., 2012; Laceulle et al., 2013). While Hertzman et al. (2001) emphasise that critical and sensitive period effects occur independently of intervening experience, Rutter (1987) emphasises the need to understand the mechanisms of risk and resilience at “key turning points” in the lifecourse to prevent or reduce “negative chain reactions”. Adverse events may not only precipitate maladaptive development outcomes, but these events and their outcomes may also subsequently predispose the individual to experiencing greater adversity later in the lifecourse.

1.1.10.3 Chains of risk

The chains of risk model describes how early-life exposures set individuals onto trajectories which eventually lead to an adverse outcome later in time via a causal chain of events or exposures (Hertzman et al., 2001). A looser interpretation is that while each risk exposure increases the probability of the next event or exposure in the causal chain occurring, they can also independently influence outcomes at the end of the chain irrespective of later events or exposures. As such, the effects of earlier exposures on later ones are probabilistic rather than deterministic. This loose interpretation of the chains of risk model has some overlap with the accumulation of risk model in that events or exposures have an additive effect on outcomes while at the same time influencing other risk variables. Risk variables can therefore be said to be ‘clustered’ due to their reciprocal associations (Kuh et al., 2003). A stricter interpretation of this risk model, however, is that earlier events or exposures have no independent effect on the outcome measure without a final link or ‘trigger event’ in the causal chain. Their effects are therefore fully mediated, as shown in Figure 1.2.

Figure 1.2. Chains of risk hypothesis (strict interpretation)



In sum, the models outlined above describe possible types of association between exposure to risk over the lifecourse and resilience outcomes. They are neither mutually exclusive nor are they associated with a specific causal mechanism underlying these associations.

1.2 RESEARCH GAPS

A number of gaps in the current literature can be identified:

- a) While previous studies have investigated the wellbeing impacts of unemployment and retirement separately, very few have attempted to directly compare the relative impacts resulting from different types of transition (Hepworth, 1980; Flint, et al., 2013).
- b) Measures of wellbeing following work exit employed by previous studies do not incorporate both hedonic and eudaemonic aspects of wellbeing.
- c) While an extensive literature exists on the determinants of resilience in early adulthood, resilience in early old age, and, in particular, resilience or adaptation in response to labour market transitions, has received relatively little attention.
- d) Although country-level institutional factors have been considered as determinants of wellbeing (Niedzwiedz et al., 2012), previous work has not investigated whether, and to what extent, these modify change in wellbeing in response to different routes of exit from work.
- e) No attempt has been made to relate exposure to different types of risk or adversity over the lifecourse to wellbeing outcomes following exit from work.

1.3 AIMS AND OBJECTIVES OF THE DOCTORAL PROJECT

1.3.1 Study aims

The overarching aim of this doctoral project is to investigate the determinants of resilience to labour market transitions in early old age.

It will address this topic from two different perspectives. First, it will consider the associations between institutional, cultural and organisational contexts in which exits from work occur and resilience outcomes in cross-section. Within Baltes' (1987) framework these can be considered to represent types of history-graded or cohort-specific factors which individuals grouped within countries share with one another. Second, it will investigate the associations between exposures to adversity over the lifecourse and resilience outcomes in later life in longitudinal perspective.

To meet these two aims the thesis will address three primary objectives:

1.3.2 Study objectives

- a) To characterise the risk to wellbeing experienced by individuals undergoing labour market transitions in early old age to elucidate the characteristics of the risk event against which resilience will be measured.
 - Specifically, to compare the impacts of different types of labour market events (defined by type of benefit received upon leaving work) on wellbeing in early old age.
- b) To investigate the country-level determinants of resilience outcomes to labour market transitions in early old age.
 - The role of country-level effects (e.g. welfare state typologies and characteristics, country-level development indices) in explaining country differences in these resilience processes will be analysed.
- c) To characterise the associations between exposure to adversity over the lifecourse and resilience outcomes.

CHAPTER 1: Resilience

- The study will analyse two measures of lifecourse adversity as resilience or vulnerability determinants: adverse lifecourse events and cumulative socioeconomic disadvantage.
- The types of association between these types of adversity and resilience outcomes will then be discussed in terms of their patterns of association (e.g. accumulation of risk, latent risk or chains of risk) from a lifecourse perspective. Once these associations are characterised it is possible to hypothesise which of the three causal mechanisms (allostasis, phenotypic match/mismatch or biological sensitivity to context) may underpin these associations in light of the study's results.

Chapter 2 will present the data sources and characteristics of the statistical samples which will be employed in the analyses of subsequent chapters. It will also outline the relevant variables which will be analysed and the methodological challenges to be addressed.

2 CHAPTER 2: Data Sources and Methods

2.1 INTRODUCTION

This chapter outlines the data sources, variables analysed, and statistical methods used in this thesis. It will be divided into three parts. The first (Sections 2–6) will describe the data sources used, the procedure employed for data harmonisation and how variables are operationalised. The second (Section 7) will give a brief description of how the data samples were defined for subsequent analyses. The third (Section 8) will outline the methodological challenges associated with the studies outlined in the previous chapter and the types of data structure outlined in the previous section. These challenges specifically relate to analyses involving grouping of respondents by country and repeat measures over time for the same individual.

2.2 DATA SOURCES

The present study used data from the Survey of Health, Ageing and Retirement in Europe (SHARE) and the English Longitudinal Study of Ageing (ELSA). These datasets were selected for the present study due to the availability of suitable variables describing route of exit from work, appropriate measures of wellbeing and mental health, and a range of other potential covariates. Furthermore, the cross-national nature of SHARE permits international comparisons, allowing for the investigation of country-level determinants of wellbeing change following exit from work.

2.2.1 The Survey of Health, Ageing and Retirement in Europe (SHARE)

First released in autumn 2004, SHARE is a longitudinal panel survey created with the objective of providing an infrastructure to facilitate research on the economic, health, and social factors that determine the quality of life of older people in Europe. It allows multidisciplinary, cross-country comparisons using comparable measures of respondents' health and sociodemographic characteristics. The survey combines objective functional

measurements with a wide range of harmonised social, economic and demographic data across 19 countries (Börsch-Supan, Hank and Jürges, 2005; Börsch-Supan et al., 2013).

The survey includes individuals born in 1960 or earlier together with their current partners regardless of age. The eligibility criteria excluded respondents who were living in institutions, out of the country during the entire survey period, unable to speak an official language of their respective country or had moved to an unknown address. SHARE currently comprises six waves occurring at approximately two-year intervals. Wave 3 (SHARELIFE) was dedicated solely to collecting retrospective lifecourse data. Data were collected by trained interviewers via personal face-to-face computer-assisted personal interviewing, during which physical measurements were taken and supplementary paper and pencil drop-off questionnaires provided.

Although decentralised to the national level, data collection is coordinated in Germany at the Munich Center for the Economics of Aging (MEA), based at the Max Planck Institute for Social Law and Social Policy, while data distribution is managed by CentERdata at the University of Tilburg. The SHARE data collection has been primarily funded by the European Commission through the 5th framework programme (project QLK6-CT-2001-00360 in the thematic programme Quality of Life), through the 6th framework programme (projects SHARE-I3, RII-CT- 2006-062193, COMPARE, CIT5-CT-2005-028857, and SHARELIFE, CIT4-CT-2006-028812) and through the 7th framework programme (SHARE-PREP, 211909 and SHARE-LEAP, 227822). Additional funding was provided by the U.S. National Institute on Aging (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, Y1-AG-4553-01 and OGHA 04-064, IAG BSR06-11, R21 AG025169) as well as from various national sources.

2.2.2 The English Longitudinal Study of Ageing (ELSA)

ELSA was first released in March 2005 and currently has seven waves of data available (UK Data Archive, 2005). Participants were considered eligible for inclusion in ELSA if they resided in a household with at least one member over the age of 50 in one of three waves (1998, 1999 and 2001) of the Health Survey for England (HSE) (Steptoe et al., 2013).

HSE, an annual repeat cross-sectional survey conducted by the Joint Health Surveys Unit of the National Centre for Social Research and the Department of Epidemiology and

CHAPTER 2: Data Sources and Methods

Public Health at University College London since 1994, is itself designed to give a nationally-representative sample of all people over the age of 16 residing at private residential addresses in England (excluding individuals living in institutions). Sample selection involved a stratified random probability sample of households using a two-stage process. In the first, primary sampling units were randomly selected based on postcode sectors and the probability of a given unit being sampled in a given year was proportional to the number of addresses it contained. In the second stage, primary sampling units were stratified by local authority and then by the percentage of households in the last census with a head of household in a non-manual occupation. Households were then selected from these strata to yield a nationally-representative sample by geography and socioeconomic position.

Like SHARE, ELSA is a longitudinal cohort panel survey with a particular focus on the social and health implications of the ageing process. Its purpose is to yield a nationally-representative sample of people aged 50 and over (born before 1st March 1952 in the case of Wave 1) living in private households in England and partners residing in the same household irrespective of age. Data are available from seven waves and these occur at every two years. In Wave 3 (2006–2007), retrospective life history data were collected using a Life History Calendar as in SHARE administered as a dropoff questionnaire. Unlike SHARE, however, this was collected along with other routine variables included in other waves.

The study design was undertaken by a team of researchers from the Department of Epidemiology and Public Health at University College London, the Institute for Fiscal Studies, the University of Manchester and the National Centre for Social Research with additional support from researchers at other universities on specific aspects of the study such as cognitive function and health care utilisation. These included the Universities of Cambridge, East Anglia, Nottingham, Exeter and Oxford (Steptoe, Breeze, Banks and Nazroo, 2013). The data were made available through the UK Data Archive. Funding for the study was provided by the National Institute on Aging in the USA (grants 2RO1AG7644-01A1 and 2RO1AG017644) and a consortium of UK government departments co-ordinated by the Office for National Statistics.

2.2.3 Data quality, strengths and limitations

Combined, the strengths of the SHARE and ELSA surveys include their coverage of multiple countries, large samples, the wide range of variables included (including lifecourse data collected as part of SHARELIFE and the ELSA Wave 3 Life History Questionnaire) and the comparability of data between the two surveys allowing harmonisation of variables. Another strength of SHARE was the good consistency of quality in interviewing thanks to the development of a standardised train-the-trainer programme. This provided centralised training of local survey agency trainers in order to facilitate standard training of interviewers and standardisation of the data collection processes across participating countries (Börsch-Supan and Hendrik, 2005).

The SHARE survey had some limitations, however. One was that it was infeasible to impose a uniform sampling design for all countries. This resulted in a variety of sample frames across different countries, which were chosen according to the available frame resources in each country. For example, while population registers in some countries (e.g. Germany and the Netherlands) are administered at a regional level, thereby requiring a two-stage or multi-stage sample design, other (e.g. Denmark and Sweden) drew samples from national registers. Sampling units also differed between countries. For example, three countries (e.g. Denmark) used telephone directories to approach respondents and used households as the final sampling unit, while others used individuals as the final sampling unit. The SHARE dataset provides sampling weights to compensate for the resulting unequal selection probabilities of the various sampling units (Börsch-Supan and Hendrik, 2005).

Another limitation of SHARE was that response rates were relatively low. While household response rates in Wave 1 of SHARE were around 62%, response rates for new countries in Wave 2 were similar to Wave 1 at 61%. Response rates for subsequent refreshment samples were slightly lower at 54%. The average retention rate between waves was 81% (Börsch-Supan et al., 2013).

In ELSA the household response rate was 70%, with an individual response rate of 67%. Attrition rates were relatively low. Of the original Wave 1 respondents, 82% participated in Wave 2, 73% in Wave 3, 74% in wave 4 and 78% in wave 5. It has been noted, however, that people lost to follow-up tended to be older, and have lower household wealth and level of education. Furthermore, the proportion of ethnic minority participants was low

and no attempt was made to oversample ethnic minority groups due to cost constraints. One additional limitation is that ELSA's scope is limited to England and does not cover other parts of the UK (Steptoe et al., 2013). As such, findings from ELSA cannot necessarily be applied to the entire UK.

Overall both SHARE and ELSA had relatively low response rates and moderate attrition rates. These compare favourably, however, with other comparable European and US panel surveys (Börsch-Supan et al., 2013). The degree of nonresponse and attrition has the potential, however, to generate sample selection bias and limit the representativeness of the dataset generalisability of the study's results. Finally, both studies are general purpose panel studies and do not offer the level of detail in the questions relating to specific variables or outcomes as would be expected from more focussed hypothesis-driven investigations (Steptoe et al., 2013).

2.2.4 Ethical considerations

Further ethical approval was not required for the studies included in this thesis as ethical clearance was already obtained for the SHARE and ELSA surveys and data were anonymised.

2.3 MEASURES OF POSITIVE FUNCTIONING IN EARLY OLD AGE: THE CASP SCALE

In order to measure resilience following exit from work, it is necessary to define a relevant wellbeing outcome measure. There exist two models of wellbeing in old age: the biomedical model and the psychosocial model (Bowling and Dieppe, 2005). In the biomedical model, wellbeing is measured according to freedom from disease, disability, and decline in cognitive function (Bowling and Iliffe, 2006) or quality-adjusted life-years (Higgs et al., 2003). In the psychosocial model, subjective meanings of quality of life, social engagement and psychological resources to adapt to change such as self-efficacy and autonomy are emphasised (Vanhoutte, 2012a).

2.3.1 The CASP scale

To address the need for a measure of wellbeing adapted to older individuals, Hyde et al. (2003) devised the CASP (control, autonomy, self-realisation and pleasure) scale. This theory-based scale, which has previously been used as a marker of resilience (Blane et al., 2013), comprises four sub-domains. CASP includes a pleasure domain and thereby evaluates both hedonic and eudaemonic aspects of wellbeing. In addition to recognising the role of both positive and negative affect (Vanhoutte 2014; Waterman, 1993, Waterman, Schwartz and Conti, 2008), it also meets Diener's three hallmarks for defining a measure of subjective wellbeing in that it resides in individuals' experiences, includes measures of positive functioning and constitutes a global assessment of multiple domains (Diener, 1994; Diener, Saptya and Suh, 1998). As such, the CASP scale therefore measures wellbeing from a psychosocial perspective rather than a biomedical perspective.

2.3.1.1 *Psychometric properties*

Although differences exist between studies in English-speaking countries with regards to the number of sub-domains (Sexton et al., 2013; Lima et al., 2014; Sim, Bartlam and Bernard, 2011; Vanhoutte, 2014), initial exploratory (Higgs et al., 2003; Hyde et al., 2003) and confirmatory (Sexton et al., 2013) factor analyses of CASP-19, in addition to CASP-12 (Wiggins et al., 2008), have given strong support evidence for a single underlying quality of

life factor. These results point to the validity of using a summary score of the scale as an outcome measure for quality of life.

2.3.1.2 Validation and cross-cultural comparisons

A number of analyses have tested the applicability of the CASP scale in different populations. While initial work supported a four-factor structure, two studies in English-speaking countries have diverged from these findings to support a two factor structure for CASP-12 (comprising control and autonomy and self-realisation and pleasure) (Sexton et al., 2013) and a three-factor solution for CASP-19 (with the first comprising control and autonomy and the others pleasure and self-realisation respectively) (Vanhoutte, 2014). Analyses using an Eastern European dataset, meanwhile, found support for a two-factor structure for CASP-19 (comprising control and autonomy and self-realisation and pleasure) (Kim et al., 2015).

2.3.1.3 Predictors of CASP scores in European cohorts

The individual-level predictors of CASP scores have been investigated using European datasets. One notable feature of CASP scores is the wide disparity between and within countries. For example, using data from Waves 2 and 3 of the Survey of Health, Aging and Retirement in Europe (SHARE), Niedzwiedz et al. (2014b; 2015) identified wider within-country variations in CASP-12 scores in Mediterranean and Post-Communist welfare regimes than in countries with a Bismarckian welfare state (see Chapter 4, Section 1.2). Regarding individual-level determinants, previous studies have pointed to poor pension adequacy, poor health, the sense of living in a deprived locality, having experienced a recent life event (Wiggins et al., 2004), and socioeconomic disadvantage (Blane, Netuveli and Bartley, 2007) as factors leading to lower scores. Conversely, engagement in socially-useful activities (Siegrist and Wahrendorf, 2009), particularly those with a high degree of reciprocity (Wahrendorf et al., 2006) have been found to predict higher scores in SHARE. Furthermore, one study aimed at characterising the lifecourse determinants of CASP wellbeing in early old age using data from the National Child Development Study (1958 British birth cohort) (Blane et al., 2012) found that parental socioeconomic disadvantage, material deprivation and psychosocial stress (measured by family conflict) in childhood were linked to lower CASP-19 scores at age 50 by path analysis. Finally, an analysis using

data from Waves 1 and 2 of the English Longitudinal Study of Ageing (ELSA) found that self-perceived change in social status, depression scores, self-reported physical pain and markers of functional disability were associated with changes in CASP scores following retirement (Howell, 2012).

2.3.2 Other outcome measures

Three other outcome measures were employed in Chapter 5. These were operationalised as cross-section outcomes (as opposed to change scores) to investigate the associations between adverse events over the lifecourse and adaptation in later life. These variables were defined for ELSA respondents only.

2.3.2.1 Subjective life satisfaction

Life satisfaction was measured in ELSA using a 7-point scale and measures were available from Waves 2–7. Although information on subjective life satisfaction was collected as part of Wave 1, this measure were not comparable with those of other waves due to anchoring effects arising from differences in question wording and the numerical scale used. Higher values indicate higher subjective life satisfaction. As with CASP-12, responses had a near-normal distribution and were operationalised as a continuous outcome measure for the purposes of analysis.

2.3.2.2 CES-D

Depressive symptoms were measured using the 8-item Centre of Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). A score of 3 or more was used to define depression caseness as per standard practice (Turvey et al., 1999). Measures of CES-D were available from Waves 1–7 of ELSA and were expressed as binary outcomes (0=not depressed, 1=depressed).

2.3.2.3 GHQ-12

The abbreviated 12-item version of the General Health Questionnaire (GHQ-12) (Goldberg and Hillier, 1979), used in previous studies as a single unidimensional screening tool to assess symptoms of psychological distress (Hankins, 2008), was available in Waves 1 and 3 of ELSA. In ELSA interviews, responses for each of the 12 items were given on a four-point Likert scale. As performed in previous studies (e.g. Puustinen et al., 2011), these were dichotomised, with responses of “more than usual” and “much more than usual” considered to denote caseness for a given symptom. Respondents were considered to be experiencing psychological distress when they reported three or more symptoms. A review by Cano et al. (2001) found this to be the most commonly-used cutoff. This outcome measure was operationalised as a binary variable for psychological distress (0=low psychological distress, 1=high psychological distress).

2.4 OUTCOME MEASURES

2.4.1 CASP-12 wellbeing scores

The CASP-12 scale was used to derive wellbeing change outcome measures. Although the full 19-item version of the scale is available in ELSA, only the 12-item version, CASP-12, is available in SHARE. The present study therefore used the latter as these items were common to both surveys. CASP-12 items were coded as Likert variables scored from one (indicating strong disagreement) to four (indicating strong agreement). CASP-12 wellbeing scores were derived by summing the relevant 12 items in both datasets (Table 2.1). Items indicative of lower wellbeing were reverse-coded as appropriate

Table 2.1 CASP-19 and CASP-12 scale items and domains

Item	CASP Domain
How often do you think your age prevents you from doing the things you would like to do? ¹	Control
How often do you feel that what happens to you is out of your control? ¹	
*How often do you feel free to plan for the future?	
How often do you feel left out of things? ¹	
How often do you think that you can do the things that you want to do?	Autonomy
How often do you think that family responsibilities prevent you from doing what you want to do? ¹	
*How often do you feel you can please yourself?	
*How often do you feel that your health stops you doing the things you want to do? ¹	
How often do you think that shortage of money stops you from doing the things you want to do? ¹	
How often do you look forward to each day?	Pleasure
How often do you feel that your life has meaning?	
*How often do you enjoy the things you do?	
*How often do you enjoy the company of others?	
How often, on balance, do you look back on your life with a sense of happiness?	Self-realisation
How often do you feel full of energy these days?	
*How often do you choose to do things you have never done before?	
*How often do you feel satisfied with your life?	
How often do you feel that life is full of opportunities?	
How often do you feel that the future looks good for you?	

*Item not included in CASP-12 scale

¹Items were reverse-coded to ensure that higher CASP-12 scores were indicative of a higher degree of wellbeing

CASP-12 scores were generated for all t_0 (baseline) and t_1 (follow-up) waves and these ranged from +12 to +48. Scores in the preceding wave were used to obtain a measure of wellbeing before exit from work.

2.4.1.1 CASP-12 change scores

To generate a continuous change score, CASP-12 in the previous wave (t_0) was subtracted from that in the current wave (t_1). Change scores were centred on zero. Although change scores could range from -36 to +36, the range among the study sample was -29 to +25. Values of <0 indicate a decrease in wellbeing while values of >0 indicate an increase. Both

CASP-12 measures at t_0 and t_1 , and change in CASP-12, were found to be near-normal in their distributions (Appendix Figure A2.1).

2.5 PRIMARY EXPOSURE MEASURES

The primary exposure measures, and risk variables against which resilience will be measured, are route and timing of exit from work.

2.5.1 Operationalising route of exit from work

Route of exit from work was categorised according to type of public benefit received at t_1 . In SHARE, benefit types included public old age pension benefits, public early retirement pension benefits, public unemployment benefits, public sickness benefits, public disability insurance benefits, public social assistance or none of these. In the case where more than one of these applied to a given participant, the following hierarchy was used to generate a categorical variable for type of labour market event: (1) disability pension, (2) unemployment, (3) sickness, (4) social assistance, (5) early retirement, (6) old age pension, and (7) none of these, according to the scheme proposed by Robroek et al. (2013).

In ELSA, UK-specific responses were given as opposed to the general categories included in SHARE and these were matched with responses from the latter (see Appendix Table A.1). The option of early retirement pension was not available in ELSA.

2.5.2 State retirement age and timing of work exit

To determine whether participants had experienced exit from work before, at, or after the normal state retirement age, comparable OECD data were obtained to define the relevant 'typical' pensionable age for each country according to gender and year of exit from work (Appendix Tables A.2 and A.3) (OECD, 2011). 'Normal' or 'typical' retirement age was reckoned according to OECD definitions. Although in the majority of countries a specific age is set out in legislation, in others a range of ages may be specified or retirement before the statutory age may be possible without an actuarial reduction in entitlements (e.g. Belgium). In these cases the typical pension age was generally considered the earliest point

at which an individual can draw full pension entitlements based on a ‘normal career’ (defined as starting work at age 20 and contributing in each year until retirement).

Full OECD data for Estonia and Slovenia, which acceded to the OECD in 2010, were not available over the entire study period. Pensionable ages for men and women in Estonia were obtained from the Estonian Social Security Fund website (Sotsiaalkindlustusamet, 2015) and data for Slovenia were obtained from a later OECD publication (2013) and cross-referenced with another analysis (Majcen and Verbič, 2008).

2.5.2.1 *Timing of event relative to state retirement age*

In SHARE, a continuous measure of age at each wave in years and months (expressed as a decimal number) was derived by subtracting the date of birth from the date of the interview. For each respondent, the difference between date of exit from work and the official retirement age in months was calculated. Allowance was made for the respondent’s gender and change in official retirement ages over time. Timing of exit from work was determined in one of two ways depending on which data were available. For respondents who had information on date of work exit, age at exit could be calculated by subtracting the difference in months between date of exit and t_1 . In the case of those respondents who had not provided the date of work exit, timing of exit was considered to be the midpoint between t_0 and t_1 with dates of t_0 and t_1 were converted into integers of months since January 2000. Date of work exit was calculated using the following formula:

$$Date_{exit} = \left(Date_{t_1} - ((Date_{t_1} - Date_{t_0})/2) \right) \quad (1)$$

Using these derived dates, time before or after the official retirement age was calculated as shown below

$$Official\ retirement\ age - \left(Age_{t_1} - (Date_{t_1} - Date_{event}) \right) \quad (2)$$

with negative values representing time before the official retirement age.

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The official retirement age pertaining to each respondent was dependent on both the respondent's gender and the year in which the event took place. Taking a similar approach to Robroek et al. (2013), when multiple work exit events occurred between t_0 and t_1 , the year in which work exit took place was determined using the date of the event which occurred first.

A categorical variable with three levels was defined, with respondents categorised as having exited work >12 months before the retirement age, within 12 months of the official retirement age, and >12 months since the official retirement age.

In ELSA respondents were questioned on the year and month of exit from work. In addition to the specific month, respondents were also given the option of stating the season: winter (end of year), winter (start of year), spring, summer or autumn. These were coded as December, January, April, July and October respectively to approximate the seasonal midpoints. Where these data were not provided the midpoint between t_0 and t_1 was used. Month of birth was not provided in ELSA order to maintain the anonymity of respondents and only year of birth was available. Respondents were therefore assumed to be their self-reported age in years (calculated by subtracting the year of exit from work from year of birth) plus six months.

Appendix Figures A2.2 and A2.3 show the distribution of ages of exit among the sample for each country; both in absolute terms and with age centred on the state retirement age. Absolute ages of work exit tended to be bimodal in distribution reflecting the fact that many countries have different retirement ages for men and women. Most of these distributions were unimodal after centering on the state retirement age as this corrected for this male-female difference. There was a wide range in the variances of the distributions between different countries for both of these variables.

As an example of how this was calculated, a woman resident in Italy who was born in March 1946 and exited from work in September 2003 would be 57 years and six months of age at the time of exit. As the retirement age in Italy in 2003 (as determined using OECD standard definitions) was 57 years and three months, this individual would have exited from work three months (or 0.25 years) after her official retirement age. This individual would have been categorised as having exited work within 12 months of the official retirement age for the purposes of analysis.

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Similarly, a woman born seven years later in 1953 and who left work at the same age in 2010 would have been categorised as having exited work >12 months before the retirement age. This is because the retirement age for women in Italy had risen to 59 years and zero months by 2010.

2.6 COVARIATES

This section will review the covariates included in the analyses in subsequent chapters, outline how they were operationalised as variables and give the procedures for harmonising data between SHARE and ELSA.

A number of covariates were identified for inclusion in the analysis. In addition to health status (Crowley, 1986), previous work has identified partnership status (Seccombe and Lee, 1986), participation in social activities (Atchley, 1971), work stress before exit (Laine et al. 2008; Siegrist et al., 2007), household income (e.g. Winkelmann and Winkelmann, 1988) and financial strain (Ullah, 1990) as determinants of wellbeing change following retirement or unemployment. These variables could therefore be considered possible confounders for the association between route or timing of work exit and wellbeing change.

2.6.1 Health status: Operationalising a physical frailty scale

Health status has been identified as a determinant of an individual's route of exit from employment (Robroek et al., 2013), with poor health in particular predicting exit via disability pension and unemployment. Health status was therefore considered as a potential confounder for the relationship between route of work exit and change in wellbeing.

Frailty can be summarised as a state characterised by poor overall health and heightened vulnerability to external stressors due to cumulative declines across multiple physiologic systems (Fried, 2001). Despite the growing volume of research on this topic, and the plethora of frailty measures in the literature (Sternberg et al., 2011), a strong consensus on measurements of frailty between studies has yet to emerge.

Although some conceptualisations of frailty have given consideration to the psychosocial dimension of frailty, particularly in relation to dependence on others and social participation (Rockwood et al., 1994, Brockelhurst, 1985), a reductionist approach which limits its definitions of frailty to individuals' physical characteristics can be considered more suitable for the purposes of quantitative studies on ageing and adverse outcomes due to its relative parsimony, ease of measurement and ability to discriminate between different degrees of frailty (Fisher, 2005).

2.6.1.1 Models of frailty: The deficit accumulation model

The frailty measure employed in the present study was based on the deficit accumulation model, for which a standard method for determining degree of frailty in a clinical context has been proposed by Searle et al. (2008). This has been implemented in a number of studies employing panel data; including SHARE (Romero-Ortuno et al., 2010; Harttgen et al., 2013; Romero-Ortuno, 2013; Romero-Ortuno and Soraghan, 2014) and ELSA (Marshall et al., 2010) among others.

This model of frailty is typically operationalised as a scale from 0 to 1, representing the proportion of deficits present. These deficits are recommended to include symptoms, signs, disabilities and diseases, and the greater number included the greater the accuracy of the scale at predicting adverse outcomes. Rockwood and Mitnitski (2007) and Ferrucci et al. (2004) have concluded that such frailty scales are strongly predictive of risk of mortality, institutionalisation and adverse health events when 30 or more variables are included, and that estimates become unstable particularly when 10 or fewer are included. In addition, items included should be representative of an individual's health status over as wide a range of functional domains as possible and not saturate at too early an age (i.e. deficits included in the scale must not be near-universal at too young an age) (Harttgen et al., 2013). This is particularly important when applying scales to data from the general population and across wider age ranges. One key assumption of the deficit accumulation model, with regards to its relationship with chronological age, is that deficits accumulate over time at a non-linear 'characteristic' rate for each individual (Rockwood and Mitnitski, 2007; Mitnitski, Song and Rockwood, 2013).

2.6.1.2 Implementation of a harmonised frailty scale in SHARE and ELSA

A physical frailty index was specified using a standard method proposed by Searle et al. (2008), with the objective of including at least 30 items covering as wide a range of functional domains as possible (see Rockwood and Mitnitski, 2007). The index was operationalised using all items relating to medically-diagnosed conditions, medical symptoms, functional activities, activities of daily living and physical measurements previously included in studies of frailty indices in SHARE (Harttgen et al., 2013) and ELSA (Marshall et al., 2010)

While the scale initially included 40 items, 27.7% of responses in ELSA had missing values for diagnosis of a hip or femoral fracture. This item was therefore removed from the scale as performed by Mitnitski and Rockwood (2007), Romero-Ortuno and Kenny (2012) and Song, Mitnitski and Rockwood (2010) in previous studies. Furthermore, grip strength measures were not considered for inclusion in the scale as these were not available in all waves of ELSA. This could potentially have resulted in a large loss of sample size and statistical power if this measure were included.

The items included in the scale are shown in Appendix Table A2.4. Frailty scores were rescaled to give a continuous variable from 0 to 1.

2.6.2 Gender

Participants were categorised according to self-reported gender using a binary variable. Male gender was the reference category.

2.6.3 Equivalised household net worth and household income

One important marker of socioeconomic position in later life is that of equivalised total household non-pension net worth. In SHARE and ELSA this was calculated using the sum of different wealth components assessed at t_i . In cases where any of these components were missing, information obtained through imputation carried out by the SHARE and ELSA study teams was used (Brugiavini et al. 2005; Paccagnella and Weber, 2005).

Total household non-pension net worth in SHARE was adjusted for inflation and purchasing power parity (PPP) with prices in Germany in 2005 as the reference. In ELSA, the inflation-adjusted figures were used. These household figures were then equivalised using OECD standard methods dividing by the square root of the number of residents in each household (OECD, 2009). Individuals were then assigned to country-specific quartiles of household wealth using cross-sectional survey weight.

All financial variables including country-level expenditure measures were expressed in PPP-adjusted Euros using the relative price level for actual individual consumption in Germany in 2011 as the baseline. Data were obtained from the Prices and Purchasing Power Parities database (OECD, 1996). For countries not part of the Euro currency area during the study

period, adjusted financial variables were converted to Euros using year-average nominal exchange rates provided by EUROSTAT.

Comparisons between years were made by extrapolating annual consumer price index (CPI) inflation terms for all consumer items (e.g. $PPP(2009) = [Relative\ price\ level\ for\ actual\ individual\ consumption\ relative\ to\ Germany\ in\ 2011] * [CPI\ inflation\ between\ 2009\ \&\ 2010] * [CPI\ inflation\ between\ 2010\ \&\ 2011] * [Nominal\ exchange\ rate\ in\ 2009]$).

All household-level financial variables were equivalised by dividing by the square root of the household size (or benefit unit size in ELSA) as per standard OECD methods. Equivalised household income was log-transformed by taking the natural logarithm before inclusion in the analytic model given the right skew in its distribution in the sample populations. This standard method was appropriate as a method to reduce this skewness and normalise the distribution (ONS, 2016).

2.6.4 Level of education

Respondents were categorised according to their level of education using ISCED-97 (International Standard Classification of Education 1997) codes (UNESCO, 2006). Although the measure of educational attainment provided in ELSA was not exactly equivalent, data were harmonised using the revised ISCED-97 coding scheme for UK qualifications proposed by Schneider (2008; 2009) (Appendix Table A2.5). Respondents were grouped into three categories by level of education achieved according to ISCED-97 major groups: 0–1 (pre-primary and primary), 2–4 (lower secondary, upper secondary and post-secondary) and 5–6 (first and second stage tertiary education). Participants whose level of education did not conform to the standard ISCED-97 categories or were still in education were placed in a separate fourth category.

2.6.5 Occupational position

In SHARE, participants' occupations were categorised using International Labour Organization (ILO) International Standard Classification of Occupations 1988 (ISCO-88) major groups (ILO, 1990). Data from ELSA contained a different categorisation of occupation, namely the Standard Occupational Classification 2000 (SOC2000) devised by

the Office for National Statistics (ONS, 2000). Although the major groups in each coding scheme were not entirely equivalent despite efforts to improve their alignment, occupational grade was operationalised as a three-level categorical variable by mapping SOC2000 major groups onto their ISCO-88 equivalents using a method suggested by the OECD (Elias, 1997) (Appendix Table A2.6). Respondents were grouped into four categories by last-known occupational position according to ISCO-88 major groups: 1–2 (senior officials, managers and professionals), 3–5 (technicians, associate professionals, clerks and service workers), 6–7 (skilled agricultural workers, fishery workers, craft and trade workers), and 8, 9 and 0 (plant and machine operators, elementary occupations and armed forces).

2.6.6 Housing tenure

Housing tenure can be considered a material marker of socioeconomic position (Galobardes et al., 2006). It represents a multifaceted indicator of socioeconomic position in the sense that housing represents not only an asset and major component of household wealth but also an important component of household expenditure and a source of financial liabilities. As such, housing tenure may be difficult to interpret in terms of whether it is a measure or determinant of socioeconomic position.

SHARE and ELSA respondents were placed into the following categories according to their housing tenure: outright ownership or usufruct (French respondents only), private rent, housing collective, social rent or rent-free without ownership. Additionally, participants who reported that they were the owners of the property they occupied were further sub-categorised according to whether mortgage payments were outstanding.

2.6.7 Participation in socially productive activities

Respondents were categorised according to whether they had engaged in socially-productive activities within the previous month (although it was possible to determine the frequency of participation in these activities in SHARE) and a binary variable was operationalised (0=no, 1=yes). In SHARE, the relevant types of socially-productive activities included performing voluntary or charity work, attending an educational or training course, attending a sport, social or other kind of club or participating in a political

or community-related organisation. In ELSA, participants were considered to engage in socially-productive activities if they reported being a member of a political party, trade union or environmental group, tenant group, resident group or neighbourhood watch, charitable association, education, arts or music group, a social club, or sports club, gym or exercise class.

2.6.8 Partnership status

Respondents were categorised according to whether or not they were in a partnership at t_1 using a binary indicator variable (0=not in a marriage or partnership, 1=in a marriage or partnership). SHARE respondents who were married or in a civil partnership arrangement similar to that of marriage and ELSA respondents who were married, cohabitating or in a civil partnership were considered to be in a partnership.

2.6.9 Work contract type

Individuals' part-time or full time employment status could be considered a potential confounder of the relationship between route or timing of exit from work and change in wellbeing following work exit in early old age. This is substantiated given the significant univariate association between transitioning from partial retirement (as opposed to exit from full-time employment) to full retirement and self-reported wellbeing found in previous work (Calvo, Haverstick and Sass, 2009).

Although there is no universal definition of part-time work, contract type was operationalised as a binary variable to denote whether a respondent was a full-time worker at t_0 . Respondents were categorised according to self-reported number of hours worked per week at t_0 , with those reporting fewer than 30 hours considered part-time employees to allow comparability between countries (Bastelaer, Lemaitre and Marianna, 1997) (0=full time, 1=part time).

2.6.10 Birth outside country of residence

Data on ethnicity was not available in SHARE. A question on birth outside current country of residence was available in both SHARE and ELSA and used as a proxy for ethnicity (0=born in current country of residence, 1=born outside current country of residence). In ELSA respondents were asked whether they were born in England, another part of the UK (Wales, Scotland or Northern Ireland), or outside the UK. ELSA respondents who were born in another part of the UK were considered to have been born in their current country of residence for the purposes of analysis.

2.6.11 Work stress: Effort/reward imbalance

Effort-reward imbalance at t_0 in both SHARE and ELSA was determined using seven survey items, measured on four-point Likert Scales, to generate ratio scores in a manner consistent with previous work (Reinhardt et al., 2013). To calculate effort-reward ratios, effort and reward items, represented by two and five variables respectively, were summed to generate two scores. These were then used in the following formula:

$$ERI = \left(\frac{Effort}{2} \right) / \left(\frac{Reward}{5} \right) \quad (3)$$

Respondents were considered to experience effort-reward imbalance if this ratio was >1 .

2.6.12 Financial stress

Financial stress, which need not be related to household wealth (Hirokawa, 2012), has been identified as a determinant of psychological wellbeing independent of household income (Ullah, 1990). In SHARE, respondents were questioned as to the ease with which their household could “make ends meet”. In ELSA, meanwhile, the question referred to how well respondents and their partners were able to manage financially. Financial stress was hypothesised as a binary variable with participants reporting any degree of difficulty considered to be experiencing financial stress.

2.7 DEFINITION OF THE ANALYTIC SAMPLE

2.7.1 Chapters III and IV: Exit from work and resilience

The present analysis included data from Waves 1, 2, 4 and 5 of SHARE and Waves 1–6 of ELSA. Although Waves 1, 2, 4 and 5 of SHARE include 19 European countries, some of these could not be included in the analysis. Some countries had only one wave of data available (Ireland, Hungary and Luxembourg). In the case of Portugal, multiple waves of data were available but were not consecutive. At the same time, data were limited for some countries which joined after Wave 1, or, in the case of Greece, where data collection was suspended in Wave 4 due to insufficient funding because of the ongoing economic crisis (Börsch-Supan et al., 2013).

Data from sixteen countries were therefore available for analysis: Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Czech Republic, Poland, Slovenia Estonia and England. The survey waves included in the present study and years of coverage are shown in Figure 2.1.

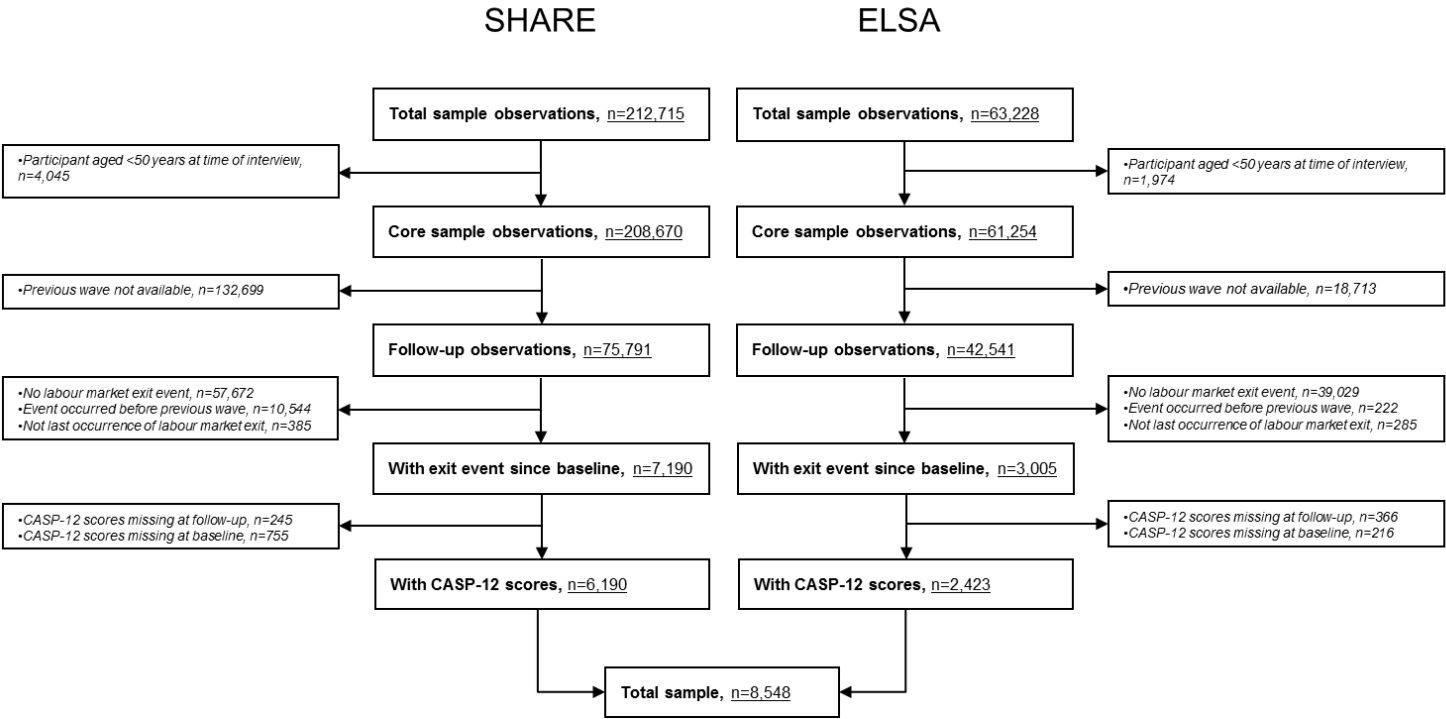
Figure 2.1. Years of coverage of SHARE and ELSA survey waves

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria			1		2					4		5
Belgium			1		2					4		5
Czech Republic					2					4		5
Denmark			1		2					4		5
Estonia									4			5
France			1		2					4		5
Germany			1		2					4		5
Greece			1		2							
Italy			1		2					4		5
Netherlands			1			2				4		5
Poland					2						4	
Slovenia										4		5
Spain			1		2					4		5
Sweden			1		2					4		5
Switzerland			1		2					4		5
England	1		2		3		4		5		6	

Dark grey areas indicate the years in which survey waves took place. Light grey areas indicate periods between waves for which labour market events were covered by the present analysis.

Only data from core SHARE and ELSA participants and their partners aged ≥ 50 years at follow-up with two or more consecutive waves of observations were included in the analysis. Respondents were included in the analysis if they had experienced a change in labour market status between any two waves, and this was considered to have occurred where at least one of the following conditions was satisfied. The first was self-reporting their job situation as employed or self-employed at baseline (t_0) and as any other response in the following wave (t_1). The second was that, for those individuals for whom data on their labour market status was missing at t_0 , timing of exit from work was given and the date of this event was subsequent to the date of the t_0 baseline interview. In cases where an individual had reported multiple exit events between multiple pairs of waves over the entire period covered by SHARE or ELSA, only data from the waves following and preceding the last event were used. In cases where multiple events had occurred between t_0 and t_1 , the most recent was used when determining the effective date of work exit. Finally, CASP scores were required to be available at both t_0 and t_1 to calculate scores for change in wellbeing. A total of 8,548 respondents from both SHARE and ELSA were therefore eligible for inclusion in the analysis. The sample flow diagram is shown in Figure 2.2.

Figure 2.2. Sample flow diagram for work exit respondents



2.7.2 Chapter 5: Lifecourse determinants of adaptation and resilience

In Chapter 5 analytic samples were drawn from Waves 1–7 of ELSA to investigate lifecourse determinants of adaptation and resilience in later life in Parts I and II respectively. Data from SHARE respondents were not used as the dataset did not contain appropriate variables on adverse events over the lifecourse. The procedures for defining the analytic samples depending on which measure of lifecourse adversity was being used (adverse events and cumulative socioeconomic disadvantage) and the different outcomes for measuring adaptation (CASP-12, subjective life satisfaction, CES-D depression caseness and GHQ-12 psychological distress) and resilience (CASP-12 change scores) being investigated, are outlined in full in Chapter 5.

It is convenient to outline the sample selection procedure for Parts I and II separately. In brief, Part I investigated the associations between adverse lifecourse events and the four measures of adaptation. Of the 9,771 respondents who participated in ELSA Wave 3, 9,208 were core respondents aged 50–90 years at the time of interview. Of these, 4,521 returned the ELSA Wave 3 Life History Questionnaire and 4,208 had full data for all covariates. Four separate analytic samples were then defined for each of the outcome measures and observations were dropped if data was missing for the outcome measure in question (See Chapter 5, Section 4.4).

In Part II, the associations between two measures of lifecourse adversity (adverse events and cumulative socioeconomic disadvantage) and change in CASP-12 scores were investigated. A total of 3,317 unique respondents had exited from work between baseline (t_0) and the following wave (t_1) in Waves 1–7 of ELSA. Of these, 1,477 and 2,902 respondents had full data on adverse lifecourse events and cumulative socioeconomic disadvantage respectively. After dropping observations with missing data on covariates and CASP-12 change scores this resulted in analytic samples comprising 1,126 and 1,965 individuals respectively (see Chapter 5, Section 5.5)

2.8 METHODOLOGICAL CONSIDERATIONS

2.8.1 Regression to the mean

One issue relating to the use of change scores between two time points is that of regression towards the mean. First identified by Galton (1886; 1889; Bland and Altman, 1994a), this phenomenon occurs when a particularly high or low baseline measure appears to return to within the normal range when a subsequent repeat measurement is taken from the same individual (Bland and Altman, 1994b).

To remedy this, as suggested by Barnett, van der Pols and Dobson (2005), ANCOVA models, a type of linear regression method incorporating features of ANOVA models was implemented by including a continuous independent variable for CASP-12 at t_0 centred on the sample mean into each linear regression model (Frison and Pocock, 1992; Vickers and Altman, 2001).

2.8.2 Multilevel analysis

Multilevel models are regression models with parameters at multiple levels. This type of model assumes a hierarchical structure in which individuals' observations are grouped clustered within higher level units. In the case of the present analysis, individual respondents exiting from work can be considered to cluster within countries. Multilevel models comprise a fixed effects and a random effects part. In the fixed effects part, the model parameter outputs (i.e. regression coefficients and standard errors) are considered to apply to all observations regardless of their grouping structure. In the random effects part of a random intercepts model, scores on the dependent variable for each observation allowed to vary according to which group (or level-2 unit) they belong.

Chapters III and IV will utilise multilevel random intercepts models in which individuals are grouped by country of residence. The specific application of multilevel modelling in the context of this thesis is outlined in further detail in Chapter 3, Section 4.3. In Chapter 5, multilevel random intercepts models will be employed for repeated measures for the same individuals over multiple waves. As these repeated observations are grouped because they belong to the same unique individual respondent, the use of a random intercepts model allows scores on the dependent variable to vary by respondent (See Chapter 5, Section 4.5).

2.8.3 The use of country data in multilevel analyses

Multilevel modelling provides a framework for investigating both the relative influence of country of residence and the extent to which country-level variables explain country differences using partitioning of variance. Their assumptions include normality of variances, homogeneity of variance (homoscedasticity) and independence of observations at all levels. The issue of independence of observations is inherent in datasets covering multiple countries. Where individuals are nested in countries observations within countries can be considered non-independent if the outcome measure shows dependence on clustering (or within-cluster correlation). When this occurs, the assumptions of ordinary least squares regression will be broken as model residuals will be non-independently distributed and the type-I error rate for significance tests of regression coefficients may be inflated (McNeish and Stapleton, 2016).

In this instance standard multilevel modelling to allow random intercepts (or variation in the outcomes on the dependent variable according to the grouping structure) is an appropriate method of overcoming this violation of regression assumptions. The small sample of level-2 units poses as a new problem, however. Maas and Hox (2005) find that although standard multilevel models including 50 or fewer level-2 units are likely to yield biased estimates of second-level standard errors, fixed effects regression coefficients and standard errors are accurate and unbiased. Various studies have shown that at least 20–30 clusters are needed (Snijders and Bosker 2012; Kreft, 1996) for random intercepts models. Furthermore, for random slope models with cross-level interactions, 50–100 are needed to avoid biased estimates of level-2 standard errors (Hox 1998; 2010).

Although frequentist and Bayesian approaches give similar results for large analytic samples with a high number of level-2 units (Li et al., 2011), Bayesian Markov Chain Monte Carlo (MCMC) modelling has been shown to provide unbiased estimates of variance components even when samples sizes are small and the number of clusters is as low as 10 since it does not carry the same assumptions and properties (McNeish and Stapleton, 2016).

To overcome the limitations inherent in the use of data drawn from 16 countries, namely non-independence of observations and the small number of level-2 units, the analysis contained in Chapter 4 will make use of MCMC multilevel models for random intercepts using the Gibbs sampling algorithm.

2.8.3.1 The MCMC algorithm

The MCMC algorithm takes multiple random draws from the joint posterior distribution of each parameter and uses these to compile a summary of their underlying distributions. The Gibbs sampler generates a Markov chain of sampled parameter estimates by simulating a new value of each parameter in turn from its full conditional distribution from the previous chain iteration holding all other parameters constant and assuming the latter are the correct values. This process yields joint estimates for all model parameters. Prior distributions for each variable, which may be informative or uninformative, must be specified from which to draw values for the first iteration in the chain. After burn-in, a portion of the chain in which posterior parameter estimates are discarded to allow a degree of model convergence towards a more stationary posterior distribution, the means and standard deviations of model parameters based on subsequent estimates are used to calculate regression coefficients, their implied standard errors, Bayesian 95% credible intervals and Bayesian p-values. The latter are comparable to 95% confidence intervals and are estimated from the 2.5th and 97.5th centiles of each model parameter's posterior distribution. Given the use of a Markov chain, which generates successive samples using a random walk process, successive parameter distributions are likely to be correlated. This in turn reduces the number of effective number of independent samples taken and increases the number of samples needed for model convergence.

2.8.3.2 Variance components: Proportion of country effects explained

One advantage of multilevel modelling is that residual variation in the response variable is partitioned by level; thereby allowing for the percentage of this variation attributable to each level to be estimated (Goldstein, Brown and Rasbach, 2002). This is accomplished by calculating the Intraclass-Correlation Coefficient (ICC), which can be defined as “the proportion of the variance explained by the grouping structure in the population” (Hox, 2002, p.15).

For a two-level model the ICC is calculated using the following formula:

$$\text{Var}Y_{ij} = \text{Var}(u_{0j} + r_{ij}) = \tau_{00} + \sigma^2 \quad (4)$$

$$ICC = \frac{\text{Var}(u_{0j})}{\text{Var}(u_{0j} + r_{ij})} = \frac{\tau_{00}}{(\tau_{00} + \sigma^2)} \quad (5)$$

Where r_{ij} is the incremental effect of individual i in country j (level-1 error term), u_{0j} represents the level-2 residuals (level-2 error), τ_{00} represents between-country variance, and σ^2 within-country variance.

This not only allows the proportion of variance due to country effects to be determined, but it is also feasible to use ICCs for the ‘unconditional’ null model (without adjustment) and compare them with those from ‘conditional models’ (adjusted for individual and country-level covariates) to calculate the percentage of level-2 variance explained by groups of (or individual) level-2 variables (Rabe-Hesketh and Skrondal, 2012). To achieve this, estimates of random effects parameters from the null model were used to calculate the ICC for country effects. Conditional models are then fitted and their ICCs calculated. ICCs from the conditional models are divided by the ICC estimated from the null model to calculate the proportion of country-level variance explained by the addition each country-level variable (or group of country-level variables).

2.8.4 Repeat measures over time

When measures of wellbeing and mental health are repeated for the individual over multiple time points (as in Chapter 5, Part I), the assumption of independence of observations may be broken as the scores on outcome measures may correlated within individuals. This means that model residuals will be non-independently distributed and type-I error rates for significance tests of regression coefficients may be inflated. Multilevel modelling may therefore also be an appropriate method for analysing associations between different types of lifecourse adversity and wellbeing and mental

health in later life. Instead of grouping responses within countries, responses at different time points can instead be grouped by individual respondents.

2.9 CONCLUSIONS

This chapter outlined the data sources used in this thesis, the procedure employed for harmonising data between SHARE and ELSA, how variables were operationalised, and how the analytic samples were defined. It then described some of the methodological challenges the analyses in subsequent chapters will seek to overcome.

Chapters III and IV, will investigate the associations between route and timing of work exit on the one hand, and change in CASP-12 wellbeing on the other. They will both employ the variables described in Sections 4–6 and same sample of SHARE and ELSA respondents defined in Section 7.1. While Chapter 3 will be solely concerned with individual-level variables and effects, Chapter 4 will expand on the analysis by adding a range of country-level welfare state variables. It will also explore the use of MCMC modelling to overcome some of the methodological challenges inherent in using data from individuals grouped within a relatively small number of countries to analyse welfare state effects.

3 CHAPTER 3: Work Exit and Wellbeing Change

3.1 INTRODUCTION

Chapter 1 provided a review of the literature on resilience to inform an operational definition of resilience for use in the present study. Work exit via non-normative routes such as unemployment or disability, which have both been shown to be associated with negative wellbeing and mental health outcomes, is the risk event against which resilience will be tested. Using the methods described and variables outlined in Chapter 2, this chapter will investigate the risks to wellbeing experienced by individuals undergoing labour market transitions in early old age. Although these may vary according to individuals' characteristics, the associations of different routes and timings of work exit with change in CASP-12 following work exit are of particular interest. The introductory section of this chapter will primarily be devoted to a review on the determinants of wellbeing change following work exit and the possible mechanisms by which this may occur. A preliminary analysis of individual-level determinants of wellbeing change following work exit will then be presented. This analysis will provide the basis for analyses which will be expanded upon in Chapter 4.

3.2 EXIT FROM WORK AND WELLBEING

The majority of studies examining the associations between different routes of work exit and wellbeing or psychopathology outcomes have investigated these routes separately and have tended to focus on either unemployment or retirement.

3.2.1 Unemployment in context

Early studies on change in labour market status and wellbeing took place in the context of mass unemployment in the wake of the Great Depression. While emphasising the impacts of material insecurity among unemployed respondents (Hall, 1933), these underscored the

potential of job loss to precipitate affective reactions such as anxiety-type symptoms (Israeli, 1935; Zawadski and Lazarsfeld, 1935).

3.2.1.1 Mental health impacts of unemployment

Unemployment has long been considered a stressful life event (Hamilton et al., 1990). A number of studies have found positive cross-sectional associations between being unemployed and a range of psychopathologies such as depression (Feather and Barber 1983), anxiety (Linn, Sandifer and Stein, 1985; Kessler, Turner and House, 1988; Hamilton et al., 1990; Montgomery et al., 1999) and General Health Questionnaire (GHQ-12) psychological distress scores (Warr and Jackson, 1983; Jackson et al., 1983; Banks and Jackson, 1982; Clark and Oswald, 1994; Shams and Jackson, 1994; Flint, et al., 2013). Financial strain following unemployment has also been associated with psychological distress and depressive symptoms (Ullah, 1990; Vinokur, Price and Caplan, 1996).

3.2.1.2 Wellbeing impacts of unemployment

Relatively few studies have sought to assess the impact of unemployment on wellbeing while dissociating this from the development of psychopathology. Unemployed individuals generally report lower subjective wellbeing than their employed counterparts (Hepworth, 1980; Feather, 1990; Lahelma, 1989; Warr, 1987; McKee-Ryan, Wanberg and Kinicki, 2005). These negative wellbeing impacts persist even after adjustment for measures of net household income (Winkelmann and Winkelmann, 1988), pointing to non-pecuniary costs of unemployment. Financial strain has been suggested as a possible moderator for the association between unemployment and subjective life satisfaction (Feather, 1997).

3.2.2 Retirement in context

With the normalisation of retirement as a lifecourse stage in industrialised economies, the determinants and effects of retirement have received greater critical attention. The two most common perspectives on retirement can be referred to as either sociological or institutional. Although Atchley (1982) characterises retirement as a gradual process of transition and adjustment occurring via multiple pathways and spanning a large portion of the lifespan, the institutional perspective views retirement as a discrete, instantaneous event

(Bonsang and Klein, 2012) and an arbitrary status change predicated on national welfare policy (Higgs, 1999).

Retirement is embedded in social and organisational policies, creating norms regarding its timing and legitimacy (Moen, 1996; Dannefer, 2011). The institutional context and social patterning and perceptions of retirement have themselves adjusted over time to the diversification of labour market exit routes following deindustrialisation and the shift in retirement from a discrete event to a series of job transitions ending in labour market exit (Hardy, 2002).

3.2.2.1 Mental health impacts of retirement

In contrast with unemployment, the implications of retirement for mental health have received relatively less attention. While some studies report no significant effect (e.g. Latif, 2013), others have reported negative (Dave et al., 2008) and positive effects (Reitzes, Mutran and Fernandez, 1996; Mein et al., 2003). In others, these positive impacts have been found only to pertain to particular groups such as those experiencing high work stress (Coursolle et al., 2010). Negative effects have been found for younger retirees when compared with workers (Butterworth et al., 2006).

3.2.2.2 Wellbeing impacts of retirement

Retirement also has mixed effects on subjective wellbeing, with various studies reporting positive (Ekerdt et al. 1985; Gall et al. 1997; Reitzes and Mutran 2004; Latif, 2011), negative (Richardson and Kilty 1991; Howell, 2012) or inconclusive (Halleröd, Örestig and Stattin, 2013; Luhmann et al. 2012) outcomes. These wellbeing effects may be subject to confounding, however, with Beck (1982) observing that the significant negative bivariate relationship between retirement and wellbeing was no longer statistically significant after adjustment for other covariates. The same study reported that poor health, low income, and earlier-than-expected retirement were associated with negative evaluations of retirement. Reported determinants of subjective wellbeing in retirement also include partnership status (Seccombe and Lee, 1986), health status (Crowley, 1986), participation in social and leisure activities (Atchley, 1971; Van Praag and Ferrer-i-Carbonell, 2002; Nimrod, 2007) and involvement in care of family members (Bonsang and Soest, 2012).

Gender and socioeconomic position have also been identified as moderating factors for this association (Kim and Moen, 2001; Jaeger and Holm, 2004; Pinguart and Schindler, 2007).

3.2.3 Theories explaining the wellbeing effects of unemployment and retirement

3.2.3.1 Unemployment

The impacts of unemployment on wellbeing cannot be reduced to loss of income. Previous reviews have therefore attempted to account for the non-pecuniary losses resulting from unemployment (Ezzy, 1993). While the explicit purpose or manifest function of work is financial gain, itself a determinant of wellbeing, Jahoda, (1981, 1982, 1997) proposed that additional latent functions, namely time structure, collective purpose, social contact, status and activity also accounted for the positive wellbeing impacts and lower odds of psychological distress attributable to work. Another proposed framework is the 'vitamin model' (Warr, 1978; Warr, 1994), in which opportunities for control, skill use, externally generated goals, variety, environmental clarity, financial reward, physical security, interpersonal contact and social position are considered protective of wellbeing.

3.2.3.2 Retirement

Social roles are considered an important psychosocial determinant of wellbeing change following work exit, particularly in retirement. Jaeger and Holm (2004) suggest that the decrease in wellbeing experienced by males in particular upon retirement may be as a result of the loss of these roles, and identify two competing hypotheses for the mechanisms through which this occurs. Role theory emphasises the individual's relationship to the labour market, where work exit leads to loss or undermining of social roles (George 1993). The alternative, continuity theory, on the other hand, places emphasis on preservation and reinforcement of social roles in retirement through recreation, voluntary work or caring for family (Athchley, 1971, Athchley 1989).

3.2.4 Characteristics of exit and wellbeing

Unemployment and retirement have been considered distinct events and studied separately in much of the literature. However, greater awareness has recently emerged that the distinction between retirement and unemployment is indeterminate (e.g. Clark and Oswald, 1994) and that it is rather the features of exit events from work which determine their effects.

While Howell (2012) has reported that departure from work in general is associated with declines in CASP-19 wellbeing scores (the outcome measure of interest) among participants of the English Longitudinal Study of Ageing (ELSA), a number of other studies employing other outcomes have attempted to disaggregate these effects according to the features and circumstances of work exit. One major feature of exit from work studied extensively has been referred to variously as ‘voluntariness’ or control. Other characteristics include reason for work exit, timing, abruptness and planning.

3.2.4.1 Voluntariness

Involuntary retirement predicts adverse mental health outcomes (Dave et al., 2008) and increased GHQ-12 psychological distress scores (Isaksson and Johansson, 2008). Voluntary retirement, meanwhile, has been positively associated with self-reported satisfaction with retirement (Gall, Evans and Howard, 1997), subjective wellbeing (Crowley, 1986), physical health, life satisfaction (Herzog, House, and Morgan, 1991) and perceived physical and mental health (Shultz, Mortonb, Weckerlea, 1998). Involuntary work exit in general also predicts increased depression scores and the risk of functional disability (Gallo, Bradley, Siegel and Kasl, 2000).

3.2.4.2 Abruptness

Abruptness of retirement is related to control or voluntariness with regard to the degree to which worker can transition gradually to retirement. While Calvo, Haverstick and Sass (2009) found a significant univariate association between transitioning from partial retirement to full retirement and higher self-reported wellbeing post-retirement, this association was no longer significant after adjusting for voluntariness of retirement. Vaus et

al. (2007) also found that control over retirement decisions was a stronger independent determinant of self-reported adjustment to retirement than abruptness.

3.2.4.3 Timing

The results of previous studies on the impact of work exit timing have been mixed. A number of these found that early retirees are more likely report better adjustment to retirement compared to on-time retirees (Quick and Moen, 1998; Warr et al., 2004) and experience better self-rated health (Westerlund et al., 2009). Other studies, by contrast, have found that later retirement is predictive of improved subjective wellbeing and mental health outcomes (Dave et al., 2008; Jaeger & Holm, 2004), and that early retirees report worse adjustment to retirement (Beck, 1982; Wang, 2007). Others still have found no significant effect (van Solinge, 2007). Finally, Calvo, Sarkisian and Tamborini (2013) have found that retirement around the normal retirement age has the greatest positive effect on subjective physical and emotional health when compared with early retirement.

3.2.4.4 Planning

Previous work has shown that engagement in retirement planning activities such as self-reported preparations and attendance of structured advice sessions is associated with greater subjective satisfaction with retirement (Elder and Rudolph, 1999; Quick and Moen, 1998).

3.2.5 Synthesis: Work exit features and wellbeing changes

In relation to retirement planning, Bonsang and Klein (2011, 2012) have attempted to explain decline in wellbeing following involuntary work exit with reference to the classic life cycle model. This postulates that individuals maximise the discounted sum of utilities through time by consumption (Ando and Modigliani, 1963). Typically, this is smoothed throughout the lifecourse through accumulation of wealth in earlier stages of life as income from labour exceeds consumption and drawing down savings on retirement. In the case of voluntary, planned retirement, both income and consumption fall rapidly on leaving work as this is a discrete event. This is attenuated by pension income and drawdown of savings.

In the case of sudden, involuntary retirement before the expected date, income falls more steeply on leaving work due to a reduction in planned retirement savings or entitlement to benefits. This, in turn, is likely to result in a greater-than-anticipated fall in consumption as retirement savings and benefits are not compensated by receipt of unemployment or sickness benefits. This hypothesis is substantiated by Blau (2008), who concludes that individuals who experienced a decline in consumption upon retirement were more likely to have left work because of a shock such as sickness or unemployment.

Another feature of retirement is an increase in leisure time, which contributes to an increase in utility either via the use of free time to engage in production of services within the household, or a drop in the levels of consumption needed to attain the same level of utility (since the utility lost through additional hours of work is compensated for by increased consumption). In both cases, however, the quantity of leisure time gained is the same for both voluntary and involuntary retirees.

This is consistent with the findings of Coe and Zamarro (2011) that involuntary retirement leads to greater falls in overall life satisfaction and satisfaction with income. However, Winkelmann and Winkelmann (1988) have found this same effect even after adjusting for household income and health, suggesting that involuntary retirement entails further non-pecuniary costs to wellbeing. One further explanation for the wellbeing impact of involuntary retirement is that involuntary retirees may actually be unemployed and willing to work but do not self-report as such (Bender, 2012). The detrimental impacts of unemployment, as previously enumerated, may therefore also pertain to this group (Clark and Oswald, 1994). Osberg (1993) observed that older workers in particular face significant constraints on finding new employment.

With regards to timing, another effect may arise due to the age-related cultural, institutional, material or psychosocial aspects of work exit. Calvo, Sarkisian and Tamborini (2013) summarise four possible theories regarding the relationship between timing of exit and health and wellbeing effects. These include the psychosocial-materialist hypothesis, which suggests that later retirement is associated with increased capacity to acquire savings resulting in greater material advantage and associated benefits for health and wellbeing in retirement; the psychosocial-environmental hypothesis, in which early retirement is considered beneficial as it results in decreased exposure to psychosocial and health risks resulting from work in early old age; and the biopsychological hypothesis, in which retirement age is assumed not to impact on health and wellbeing as these outcomes are

already determined by intrinsic factors such as health status, genetic predispositions and personality traits. The authors found support for the fourth theory, the cultural-institutional hypothesis, which predicts that ‘on-time’ retirements at socially and institutionally accepted ages are associated with the best post-retirement wellbeing outcomes. According to this theory, social norms and institutional policies are key to shaping the health and wellbeing impacts of work exit timing (Dannefer, 2011). Early retirement transitions deviating from standard age norms are therefore more likely to elicit psychosocial stress due to low social support (Van Solinge and Henkens, 2007), and, as such, may be perceived as involuntary (Szinovacz and Davey, 2005). Among workers above the statutory retirement age in particular, timing of eventual exit itself may be influenced by others’ normative attitudes regarding an appropriate age for retirement, age discrimination or lower social support for continued work; thereby undermining voluntariness of exit (Feldman and Beehr, 2011).

3.2.6 Route of exit

It may be hypothesised that different routes of exit are associated with varying degrees of voluntariness or value in terms of maintaining an individual’s social role and allowing compliance with social norms. The mental health and wellbeing effects of different routes of exit have only been directly compared in a few studies. Hepworth’s (1980) comparison of wellbeing outcomes by self-reported reason for work exit concluded that unemployed individuals who self-reported becoming redundant due to termination of contract had significantly higher subjective wellbeing in addition to GHQ scores indicative of lower psychological distress than those who reported being dismissed. More recently, Flint et al.(2013) analysed the effects of transitions between different labour market states and changes in GHQ-12 scores and found that transitions from employment and unemployment to permanent sickness and from employment to unemployment increased psychological distress.

3.2.7 Determinants of characteristics, route and timing of exit from work

3.2.7.1 Probability and intention of transitioning from work to retirement

Fonseca et al. (2014) have shown that being above the full or early retirement age, female gender, disability and chronic health conditions increased the probability of transitioning

into retirement between two time points while being partnered and having a higher level of education had the inverse effect. A number of studies have also associated age, health status before work exit, self-perceptions of ability to adjust to retirement, poor relations with work supervisors and perceived unfair working conditions with planned early retirement (Krokstad, Johnsen and Westin, 2002; Taylor and Shore, 1995; Sutinen, et al., 2005).

3.2.7.2 Route and voluntariness of exit

A positive association has been reported for less than good self-rated health and exit via disability, unemployment and retirement (van den Berg et al., 2010). Furthermore, lifetime diagnosis of chronic diseases is a predictor of unemployment and retirement (Karpansalo et al., 2004). Meanwhile, others have found that generalised job strain predicts subsequent receipt of disability pension (Laine et al., 2008). Poor self-rated health, obesity and low physical activity predict disability pension uptake and low job reward predicts exit through both disability and unemployment (Robroek et al., 2013). Finally, partnership status, ethnicity, household wealth, job tenure, and off-time retirement have been reported as factors influencing whether individuals perceive their retirement as involuntary (Szinovacz and Davey 2005).

3.2.7.3 Timing of exit

Using data from 11 countries, Van den Berg, Schuring and Avendano (2010) concluded that while self-rated ill health strongly predicted early exit from work among respondents aged 50–63, factors such as low education, obesity, low job control and effort-reward imbalance were associated with ill health and independently predicted exit. Siegrist et al. (2007) also found similar results. Furthermore, a review of early exit concluded that disadvantaged socioeconomic position is likely to be a major predictor of early exit from the workforce due to a higher risk of encountering chronic illness and risk of skills mismatch (Stattin, 2005).

Members of the Danish Nurse Cohort Study who had poor self-rated health and lower gross incomes were significantly more likely to avail of the 'Post-Employment Wage' (a form of early retirement) (Friis et al., 2007). Meanwhile, an analysis of car plant workers

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found uptake of a voluntary early retirement scheme to be positively associated with age, being partnered, household wealth, skill level, overtime work and plant closures and negatively associated with income, years of service and ethnic minority status (Hardy and Hazelrigg, 1999).

3.3 OBJECTIVES AND HYPOTHESES

3.3.1 Objective

- To characterise the individual-level determinants of wellbeing change following work exit.

3.3.2 Hypotheses

- a) Exit at times other than the normal state retirement age results in a reduction in wellbeing between baseline and follow-up.
- b) Non-normative labour market exit events, which are likely to be involuntary in nature (e.g. exit through unemployment or sickness), will similarly result in reduced wellbeing.

3.4 METHODS

3.4.1 Analytic sample

Only data from core SHARE and ELSA participants and their partners aged ≥ 50 years at follow-up with two or more consecutive waves of observations were included in the analysis. Respondents were included in the analysis if they had experienced a change in labour market status between any two waves, and had CASP scores available at both t_0 and t_1 (see Chapter 2, Section 7.1).

3.4.2 Descriptive analysis

3.4.2.1 Individual-level data

In order to compare the characteristics of participants included in the final combined sample with the wider SHARE and ELSA samples, mean age, frailty index scores and change in CASP-12 were calculated with 95% confidence intervals for those who had left work since t_0 ($n=3,894$), were in work at both t_0 and t_1 ($n=9,922$), and who were not in work in either wave ($n=28,937$) for the last two available waves in each country. For ELSA

respondents, this included those with CASP-12 measures in Waves 5–6, while data from SHARE respondents were taken from Waves 4–5 (with the exception of Greece and Poland where data were taken from Waves 1–2 and 2–4 respectively).

Finally, mean frailty scores and CASP-12 change scores were calculated for SHARE and ELSA respondents, and for the combined sample respectively.

3.4.2.2 Between-country differences

The Chi-square test was used to determine whether each of the model covariates was differentially distributed according to route of exit and timing of exit. Chi-square tests were then used to test whether timing and route of exit were differentially distributed according to country of residence. Mean CASP-12 change scores with 95% confidence intervals are then given for each level of the categorical variables. Mean change scores with confidence intervals for each country are displayed in a figure.

3.4.2.3 ANOVA tests for between-country differences in CASP-12 change scores

To determine whether differences in CASP-12 scores between countries were statistically significant overall, an omnibus test must be used. It is necessary, however, to consider the implications of testing for differences between countries with samples of varying sizes and the resulting inequality of sample variances. ANOVA tests were therefore carried out on the full combined analytic sample to investigate whether there were statistically significant differences in CASP-12 change scores between countries.

A one-way ANOVA analysis was carried out to determine whether there were significant overall differences in mean CASP-12 change scores between countries. In addition to the assumptions of normality and independence of observations, the ANOVA test assumes homogeneity of group variances. This was investigated using Bartlett's test and the null test hypothesis was rejected ($p < 0.001$); thereby suggesting group variances were unequal (Krutchkoff, 1988). While ANOVA is generally robust to this violation of assumptions, this is not the case, as in the present study, when group sizes are unequal. When largest-sized groups have the lowest variances (as was the case), standard ANOVA is likely to overestimate the significance of between-group differences and thereby produce type-I

errors. To overcome this and correct for this over-sensitivity, a SIMANOVA analysis, using the `simanova` command in Stata (Mitchell, 2014), was undertaken with 10,000 repetitions. This could be used to determine the extent to which the significance of these differences was overestimated and whether the outputs of the ANOVA were robust.

The SIMANOVA command runs Monte Carlo simulations of completely randomised designs for group sizes and variances under the assumption that the group means are equal. It then performs an ANOVA test for each simulation and counts the number of simulations for which the simulated p-value exceeds that of the standard ANOVA test. In doing so, SIMANOVA allows for a comparison between p-values estimated using standard ANOVA with those from the simulations. It indicates the extent to which violation of the assumptions of ANOVA may have inflated the type-I error rate. The output shows the nominal p-value from the standard ANOVA and the simulated p-value with 95% confidence intervals. It also shows the hypothetical simulated p-value had the p-value for the standard ANOVA been equal to the specified alpha level (0.05).

3.4.3 Statistical analysis

Multilevel linear ANCOVA regression models for continuous outcomes with random intercepts using the `xtmixed` command in Stata version 13.1 were specified to test the determinants of change in CASP-12 scores between t_0 and t_1 . Models were run using the iterated generalised least squares (IGLS) algorithm. Individuals at level-1 are nested within country of residence as a level-2 variable. Results were expressed as regression coefficients for the effect of each variable on CASP-12 change scores. Variables were considered to have a statistically significant effect on the outcome if $p < 0.05$.

A number of models were then specified using complete case analysis. Firstly, using a standard linear ANCOVA model, the effect of country on change in wellbeing scores, where country was defined as a nominal variable with German respondents as the reference group, was tested. Then, each of the hypothesised covariates were initially tested against change in CASP-12 individually one at a time while simultaneously adjusting for CASP-12 at t_0 using a multilevel ANCOVA linear model with country of residence as a level-2 variable. The hypothesised confounding variables (reviewed in Chapter 2, Section 6) included gender, health status, work contract type and work stress at baseline, housing tenure, partnership status, participation in reciprocal social activities and financial stress at

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follow-up, as all were considered to be likely to correlate with both the primary exposures (route and timing of exit) and the outcome (change in wellbeing). Markers of socioeconomic position, including household income, occupation and level of education, were also included.

A multivariable model was then built initially including all covariates, which were then eliminated using backward stepwise selection to yield a final model. The alpha-level for retention of variables was specified at 0.05. The regression equation for the final multilevel linear ANCOVA model is shown below with Y (change in CASP-12 between t_0 and t_1) as the outcome variable. I refers to the level-one unit (individual respondents), j indicates the level-two unit (country). For each observation the term β_{0j} represents the random intercept for the individual's country of residence and ε represents the error residual.

$$\begin{aligned} Y_{ij} = & \beta_{0j} + \beta_1(\text{Old age pension})_{ij} + \beta_2(\text{Disability pension})_{ij} \\ & + \beta_3(\text{Sickness benefit})_{ij} + \beta_4(\text{Social assistance})_{ij} \\ & + \beta_5(\text{Early retirement})_{ij} + \beta_6(\text{Early exit})_{ij} + \beta_7(\text{Late exit})_{ij} \\ & + \beta_8(\text{Wealth Q2})_{ij} + \beta_9(\text{Wealth Q3})_{ij} + \beta_{10}(\text{Wealth Q4})_{ij} \\ & + \beta_{11}(\text{Frailty})_{ij} + \beta_{12}(\text{Activities})_{ij} + \beta_{13}(\text{Income})_{ij} \\ & + \beta_{14}(\text{No partnership})_{ij} + \beta_{15}(\text{Born abroad})_{ij} + \beta_{15}(\text{CASP}_{t_0})_{ij} + \varepsilon_{ij} \end{aligned} \tag{6}$$

3.4.3.1 Sensitivity analysis

There were two points of uncertainty surrounding the exposure variable representing route of exit from work. Firstly, this variable was defined according to type of benefits received at any time since the previous wave. In SHARE, data were available to determine type of benefits received since the previous wave and those currently received (at the t_1 interview). It is possible that benefits received since the previous wave may have a stronger association with wellbeing change as they could better represent the type of benefits received immediately after work exit. Second, although the method used in the present study to generate a categorical variable for type of labour market event when an individual received multiple benefit types has been employed in previous work by Robroek et al. (2013) (see Chapter 2, Section 5.1), the choice of hierarchy could still be considered arbitrary as it was not selected using objective criteria relating to the actual analytic sample.

A sensitivity analysis was therefore carried out to test whether the results of the main analysis were sensitive to whether the variable for route of work exit was specified using benefits received since the previous wave or those currently received, and whether a different hierarchy was used to define route of exit when an individual received multiple benefit types. Using only the sample of respondents from SHARE, the fully-adjusted multilevel ANCOVA model was re-specified using a categorical variable for type of benefits received since the previous wave (t_0) to assess differences in results compared with those obtained using type of benefits currently received. The model was also re-specified with route of exit categorised such that the hierarchy applied for respondents in receipt of multiple benefit types was reversed (see Section 4.4). Specifically, respondents in receipt of multiple benefit types were re-categorised using the following hierarchy: (1) old age pension, (2) early retirement, (3) social assistance, (4) sickness, (5) unemployment, (6) disability pension.

3.5 RESULTS

3.5.1 Descriptive analyses

Table 3.1 shows the number of respondents per country in the combined analytic sample of SHARE and ELSA respondents. A summary of the respondents' characteristics in SHARE, ELSA and the combined sample is shown in Table 3.2.

The combined analytic sample comprised 8,613 respondents who had exited from paid work between two consecutive survey waves. Although SHARE respondents represented the majority of the sample, the country with the largest number of respondents was England with 28% of observations.

Table 3.1. Number of respondents by country in the combined analytic sample

Country	N	%
Total sample	8,613	100
Austria	416	4.83
Germany	365	4.24
Sweden	540	6.27
Netherlands	571	6.63
Spain	386	4.48
Italy	366	4.25
France	543	6.30
Denmark	513	5.96
Greece	66	0.77
Switzerland	427	4.96
Belgium	670	7.78
Czech Republic	511	5.93
Poland	235	2.73
Slovenia	145	1.68
Estonia	436	5.06
England (ELSA)	2,423	28.13

Table 3.2 shows the characteristics of sample respondents. While only 32% of SHARE respondents had left work without receiving any government benefit, the proportion was 63% for ELSA respondents. Furthermore, a greater proportion of ELSA respondents left work before the official pension age than SHARE respondents (68% vs. 44%).

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Table 3.2. Characteristics of the SHARE, ELSA and combined analytic samples

Variable	Categories	SHARE		ELSA		Combined	
		n	%	N	p	N	%
Total sample		6,190	100	2,423	100	8,613	100.00
Route of exit from work	Old age pension	3,006	48.56	675	27.15	3,681	42.74
	Disability pension	275	4.44	158	6.52	433	5.03
	Unemployment benefit	320	5.17	30	1.24	350	4.06
	Sickness benefit	109	1.76	10	0.41	119	1.38
	Social Assistance	37	0.60	12	0.50	49	0.57
	Early retirement pension	603	9.74	0	0	555	6.44
	None	1,972	31.86	1,538	63.48	3,330	38.66
	Missing	48	0.78	0	0	48	0.56
Age at exit from work	>1 year before	2,709	43.76	1,655	68.30	4,364	50.67
	Official pension age \pm 1 year	1,841	29.74	389	16.05	2,230	25.89
	>1 year after	1,640	26.49	379	15.64	2,019	23.44
	Missing	0	0.00	0	0	0	0.00
Gender	Male	2,979	48.13	1,131	46.68	4,110	47.72
	Female	3,211	51.87	1,292	53.32	4,503	52.28
	Missing	0	0.00	0	0	0	0.00
Country-specific quartile of household net worth	1 (poorest)	1,222	19.74	297	12.26	1,519	17.64
	2	1,496	24.17	485	20.02	1,981	23.00
	3	1,748	28.24	680	28.06	2,428	28.19
	4 (wealthiest)	1,724	27.85	902	37.23	2,626	30.49
	Missing	0	0.00	59	2.43	59	0.69
Level of education (ISCED category)	Primary (0 and 1)	2,090	33.76	442	18.24	2,532	29.40
	Secondary (2, 3 and 4)	2,525	40.79	1,169	48.25	3,694	42.89
	Tertiary (5 and 6)	1,493	24.12	528	21.79	2,021	23.46
	Other/Still in education	25	0.40	274	11.31	229	2.66
	Missing	57	0.92	10	0.41	57	0.66
Occupational level (ISCO Category) at t_0	Elementary manual (8 and 9)	3,136	50.66	351	14.49	3,487	40.49
	Skilled manual (6 and 7)	300	4.85	280	11.56	580	6.73
	Skilled non-manual (3, 4 and 5)	187	3.02	669	27.61	856	9.94
	Professional (1 and 2)	72	1.16	496	20.47	568	6.59
	Missing	2,495	40.31	627	25.88	3,122	36.25
Contract at t_0 (hours/week)	Full-time (\geq 30 hours/week)	5,638	91.08	1,129	46.60	6,767	78.57
	Part-time (<30 hours/week)	507	8.19	1,214	50.10	1,721	19.98
	Missing	45	0.73	80	3.30	125	1.45
Frailty index*	Available	5,656	91.37	2,070	85.43	7,726	89.70
	Missing one or more items	534	8.63	353	14.57	887	10.30
Participation in social activities	Yes	2,970	47.98	1,494	61.66	4,464	51.83
	No	3,218	51.99	849	35.04	4,067	47.22
	Missing	2	0.03	80	3.30	82	0.95

Table 3.2 (continued). Characteristics of the SHARE, ELSA and combined analytic samples

Variable	Categories	SHARE		ELSA		Combined	
		n	%	N	%	N	%
Partnership status	Married	4,674	75.51	1,981	81.76	6,655	77.27
	Separated	75	1.21	32	1.32	107	1.24
	Divorced	595	9.61	180	7.43	775	9.00
	Never Married	361	5.83	92	3.80	453	5.26
	Widowed	433	7.00	138	5.70	571	6.63
	Missing	52	0.84	0	0.00	52	0.60
Housing tenure	Outright ownership	2,176	35.15	1,742	71.89	3,918	45.49
	Ownership with repayment	1,026	16.58	433	17.87	1,459	16.94
	Private rent	735	11.87	69	2.85	804	9.33
	Housing collective	26	0.42	0	0.00	26	0.30
	Social rent	151	2.44	151	6.23	302	3.51
	Rent-free, no ownership	138	2.23	22	0.91	160	1.86
	Missing	1,938	31.31	6	0.25	1,944	22.57
Effort-reward ratio	≤1	2,668	43.10	1,097	45.27	3,765	43.71
	>1 (effort-reward imbalance)	1,674	27.04	477	19.69	2,151	24.97
	Missing	1,848	29.85	849	35.04	2,697	31.31
Financial stress	Yes	1,398	22.58	578	23.85	1,976	22.94
	No	2,845	45.96	1,637	67.56	4,484	52.06
	Missing	1,947	31.45	208	8.58	2,153	25.00

*Frailty index expressed as a continuous variable scaled from 0 to 1. The proportion of respondents with nonmissing frailty index scores is shown.

The results of the chi-square tests showing the distributions of timing of work exit by country, the distributions of individual-level variables according to timing of work exit, the distributions of route of work exit by country and the distributions of individual-level variables by route of work exit are displayed in Appendix Tables A3.1–A3.4. The analysis showed that the distributions of participants according to both route and timing of exit also differed significantly by country of residence. These results indicate that there are differences in patterns of work exit in early old age between countries (Appendix Tables A3.1 and A3.3).

The results show that the distributions of participants according to their gender, quartile of household net worth, level of education, occupational position, work contract type, participation in social activities, housing tenure, effort-reward imbalance at t_0 and financial stress differed significantly across categories of both route and timing of exit.

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Notably, only 21.9% of respondents who had experienced early exit from work were in receipt of an old age pension while the proportions were 62.12% and 67.5% for those with on-time and late exits respectively (Appendix Table A3.2). While 10.3% of early exiters had availed of an early retirement pension, 4.0% of those exiting on time and 3.4% of those experiencing late exit had received one without receiving a standard old age pension. This latter group in receipt of an early retirement pension who had exited over one year after the official retirement age may have arisen either due to measurement error or discrepancies between the definition of the 'normal' retirement age used in the present study and individuals' actual age of entitlement to a state pension due to specific individual circumstances. The results also show that males comprised the majority of early exiters and the minority of on-time and late exiters. Additionally, the proportions of participants who experienced early, on-time and late exit from work differed significantly according to route of exit.

With regards to route of exit, while the majority of respondents receiving state pension had exited either at or after the statutory retirement age (37.4% and 36.8% respectively), over 70% of respondents exiting in receipt of all other benefits did so before the statutory retirement age (including 74.0% of those receiving an early retirement pension) (Appendix Table A3.4). Notably, 63.3% of respondents in receipt of social assistance were in the bottom quartile of wealth. Respondents in the bottom quintile of wealth represented only 16.0% and 12.8% of those leaving work via old age pension and early retirement pension respectively, and it could be hypothesised that these individuals were less likely to be eligible for these public benefits due to low household income during their working lives. Furthermore, while the majority of respondents exiting via disability benefit were male (53.4%), the majority of those in receipt of sickness benefit were female (54.6%).

Table 3.3 shows mean CASP-12 change scores according to respondents' characteristics and the features of their exit from work. Respondents exiting from work via all routes except old age pension and early retirement pension, in addition to those who exited over one year before or after the statutory retirement age, experienced a decline in wellbeing scores. Declines in CASP-12 scores were greatest for those exiting via sickness benefits (-1.56 points). Respondents exiting work within one year of the official pension age, on average, experienced an increase in CASP-12 wellbeing scores (0.56 points). Meanwhile, there were discernible gradients in change scores according to household wealth, level of

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education and occupational class with respondents possessing markers of higher socioeconomic position experiencing the most favourable wellbeing change outcomes.

Table 3.3. Mean change in CASP-12 scores between t_0 and t_1 by respondent characteristics

Variable	Categories	Mean	95% CI
Total sample		0.09	-0.02, 0.19
Route of exit from work	Old age pension	0.28	0.21, 0.44
	Disability pension	-0.75	-1.32, 0.20
	Unemployment benefit	-0.63	-1.22, 0.05
	Sickness benefit	-1.56	-2.57, -0.56
	Social Assistance	-0.78	-2.56, 1.01
	Early retirement pension	0.94	0.56, 1.32
	None	-0.02	-0.18, 0.15
Age at exit from work	>1 year before	-0.04	-0.19, 0.10
	Official pension age \pm 1 year	0.56	0.35, 0.76
	>1 year after	-0.15	-0.37, 0.08
Gender	Male	0.09	-0.06, 0.25
	Female	0.08	-0.06, 0.23
Country-specific quartile of household net worth	1 (poorest)	-0.17	-0.48, 0.13
	2	0.01	-0.23, 0.26
	3	0.21	0.01, 0.41
	4 (wealthiest)	0.20	0.04, 0.36
Level of education (ISCED category)	Primary (0 and 1)	0.05	-0.16, 0.26
	Secondary (2, 3 and 4)	0.03	-0.13, 0.19
	Tertiary (5 and 6)	0.24	0.05, 0.44
	Other/Still in education	0.06	-0.45, 0.56
Occupational level (ISCO Category) at t_0	Elementary manual (8 and 9)	0.21	0.04, 0.38
	Skilled manual (6 and 7)	0.13	-0.29, 0.56
	Skilled non-manual (3, 4 and 5)	0.07	-0.24, 0.37
	Professional (1 and 2)	0.13	-0.17, 0.44
Contract at t_0 (hours/week)	Full-time (\geq 30 hours/week)	0.15	0.02, 0.27
	Part-time (<30 hours/week)	-0.14	-0.34, 0.06
Participation in social activities	Yes	-0.19	-0.37, 0.02
	No	0.39	0.26, 0.52
Partnership status	Partnered	0.08	-0.03, 0.20
	Non-partnered	0.11	-0.13, 0.35
Housing tenure	Outright ownership	0.04	-0.12, 0.19
	Ownership with repayment	-0.05	-0.27, 0.17
	Private rent	0.03	-0.35, 0.42
	Housing collective	1.62	-0.60, 3.83
	Social rent	-0.38	-1.00, 0.25
	Rent-free, no ownership	-0.29	-1.08, 0.49
Effort-reward ratio	\leq 1	-0.04	-0.18, 0.11
	>1 (effort-reward imbalance)	0.27	0.04, 0.51
Financial stress	Yes	0.41	0.28, 0.54
	No	-0.90	-1.16, -0.65

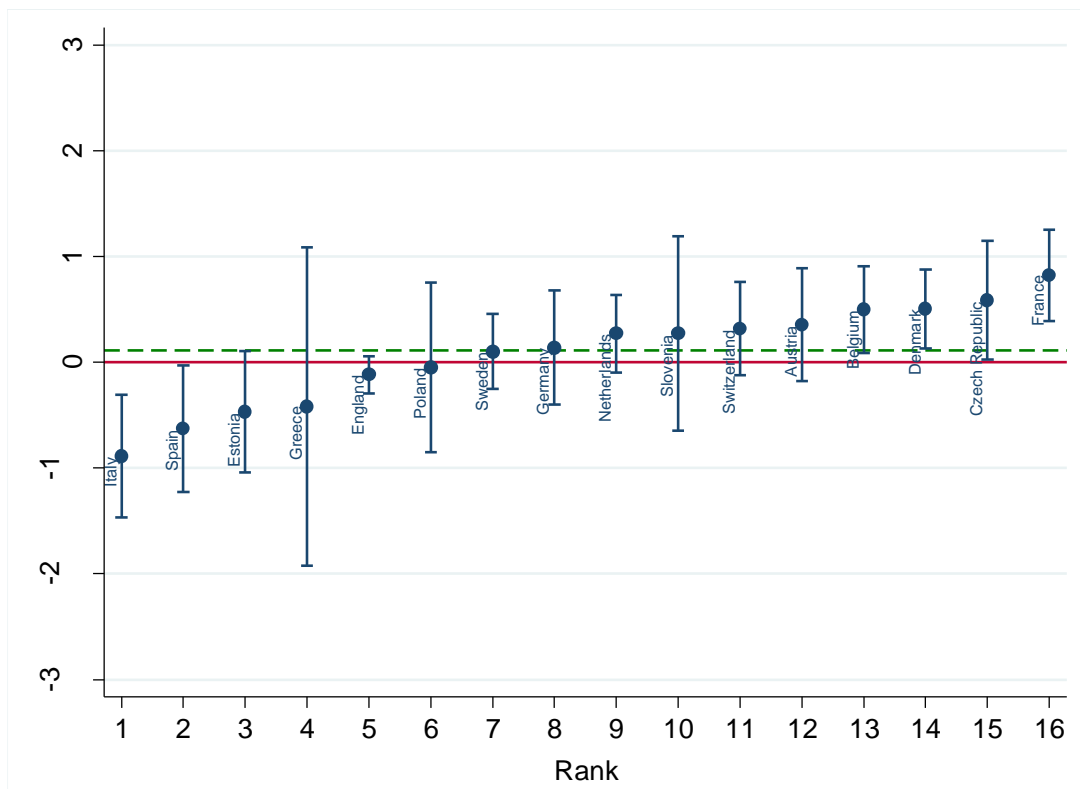
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Mean changes in CASP score were 0.15 (95% CI: -0.01, 0.32) for respondents who had left work since t_0 , 0.31 (95% CI: 0.21, 0.40) for those who were in work at both t_0 and t_1 , and -0.10 (95% CI: -0.16, -0.04) for those who were not in work at either wave. Participants who had exited work had a lower mean age (62.91 years, 95% CI: 62.75, 63.10) than those in the remainder of the wider SHARE and ELSA samples who remained out of work (71.45 years, 95% CI: 71.35, 71.54) but tended to be older than those who had remained in work (58.51 years, 95% CI: 58.42, 58.60). Those in the group leaving work had mean frailty scores (0.09, 95% CI: 0.09, 0.09) between those of workers (0.07, 95% CI: 0.06, 0.07) and non-workers (0.14, 95% CI: 0.14, 0.14).

3.5.1.1 Between-country differences in mean CASP-12 change scores

Figure 3.1 shows the mean change in CASP-12 scores overall, and mean change scores by country with 95% confidence intervals. The dashed green line shows the grand mean for CASP-12 scores for the entire combined sample (n=8,613). Overall, without adjustment for confounding variables or consideration of regression towards the mean, sample respondents experienced, on average, a small increase in CASP-12 wellbeing following exit from work. There were wide differences between countries, however. While the mean change scores for respondents resident in France, Czech Republic, Denmark and Belgium were significantly above zero, respondents resident in Italy or Spain experienced decline in wellbeing on average as evidenced by negative mean change scores which were significantly below zero.

Figure 3.1. Mean CASP-12 scores by country



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Figure 3.2 shows the outputs of ANOVA and SIMANOVA tests for differences in CASP-12 change scores following work exit between countries. F-values from standard ANOVA tests are shown followed by nominal omnibus p-values which denote the overall significance of between-group differences.

Nominal p-values are shown for the results of the standard ANOVA (top) and, for comparison purposes only, for the ANOVA based on the hypothesis that the p-value was equal to the alpha level of 0.05 (bottom). Simulated p-values generated for each nominal p-value after correction for inequality of variances using SIMANOVA are shown followed by their 95% confidence intervals. As shown in the top row, the nominal p-values given by the standard ANOVA test (second column) for differences in CASP-12 change scores between countries was <0.001 , showing that these were highly significant. The simulated p-values for the model estimates (third column, top) and the alpha level of 0.05 (bottom) were found in both cases to be higher than their respective nominal p-values. This suggests that the standard ANOVA model was biased by inequality of variances. This is shown by the result that had the nominal p-value for differences in CASP-12 change scores between countries equalled the alpha level of 0.05 the simulated p-value from SIMANOVA would have equalled 0.09. The simulated p-values for ANOVA estimates (fourth column, top) show that between-group differences were significant even after accounting for violation of test assumptions as the simulated p-values and their upper 95% confidence intervals remained below the alpha level of 0.05.

Figure 3.2. ANOVA and SIMANOVA p-value for differences in CASP-12 change scores between countries

	ANOVA F value	Nominal p-value	Simulated p-value	Simulated p-value 95% CI
ANOVA estimate	4.428	<0.001	<0.001	0.000, 0.004
$\alpha=0.5$		0.050	0.090	0.084, 0.095

The results of the SIMANOVA analysis showed that there were statistically significant differences in mean CASP-12 change scores between countries even after correction for inequality of variances.

3.5.2 Multilevel regression analyses

The analysis of associations between country of residence and change in CASP-12 wellbeing scores between t_0 and t_1 found that while respondents resident in the Netherlands, Denmark and Switzerland had significantly more favourable changes in wellbeing following work exit than German respondents, those resident in Spain, Italy, Greece, the Czech Republic, Poland, Estonia and England experienced significantly more negative changes in CASP-12 (Table 3.4).

Table 3.4. Results of a standard linear ANCOVA analysis of the association between country of residence and change in wellbeing scores between t_0 and t_1 (n=8,037)

Country	Country-level Associations*	
	Coefficient (95% CI)	p
Austria	0.50 (-0.14, 1.13)	0.127
Germany	ref	
Sweden	0.11 (-0.49, 0.71)	0.720
Netherlands	0.70 (0.10, 1.29)	0.022
Spain	-1.49 (-2.14, -0.84)	<0.001
Italy	-2.80 (-3.46, -2.14)	<0.001
France	0.01 (-0.61, 0.59)	0.974
Denmark	0.94 (0.34, 1.55)	0.002
Greece	-2.22 (-3.41, -1.03)	<0.001
Switzerland	0.68 (0.04, 1.31)	0.036
Belgium	-0.28 (-0.85, 0.30)	0.344
Czech Republic	-1.29 (-1.90, -0.68)	<0.001
Poland	-1.35 (-2.09, -0.61)	<0.001
Slovenia	0.49 (-0.38, 1.36)	0.270
Estonia	-1.60 (-2.23, -0.97)	<0.001
England	-0.56 (-1.05, -0.06)	0.027

The results of the ANCOVA models for each independent variable (adjusted for CASP-12 at t_0) and the final model obtained using backwards stepwise selection are shown in Table 3.5. Following the selection procedure, covariates for equalised household net worth, financial strain at t_1 , health at t_0 and participation in social activities were retained in the final model.

Table 3.5. Univariate and multivariable models for the determinants of change in wellbeing scores between t_0 and t_1 (post labour market exit) in SHARE and ELSA

Variable	Categories	Individual Associations*		Full Model* (n=8,037)	
		Coefficient (95% CI)	p	Coefficient (95% CI)	p
Route of exit from work	Old age pension	ref		ref	
	Disability pension	-2.14 (-2.59, -1.68)	<0.001	-1.26 (-1.81, -0.70)	<0.001
	Unemployment benefit	-1.59 (-2.08, -1.09)	<0.001	-0.65 (-1.26, -0.04)	0.038
	Sickness benefit	-2.66 (-3.48, -1.84)	<0.001	-1.87 (-2.88, -0.86)	<0.001
	Social Assistance	-3.00 (-4.26, -1.73)	<0.001	-1.47 (-2.91, -0.03)	0.045
	Early retirement pension	0.68 (0.27, 1.09)	0.001	0.85 (0.35, 1.36)	0.001
	None	-0.28 (-0.50, -0.06)	0.014	-0.12 (-0.39, 0.15)	0.376
Age at exit from work	>1 year before	-0.65 (-0.89, -0.41)	<0.001	-0.35 (-0.64, -0.05)	0.021
	Official pension age \pm 1 year	ref		ref	
	>1 year after	-0.50 (-0.78, -0.22)	0.001	-0.56 (-0.89, -0.24)	0.001
Gender	Male	ref			
	Female	-0.14 (-0.33, 0.05)	0.147		
Country-specific quartile of household net worth	1 (poorest)	ref		ref	
	2	1.09 (0.79, 1.40)	<0.001	0.57 (0.22, 0.92)	0.001
	3	1.47 (1.18, 1.77)	<0.001	0.74 (0.39, 1.08)	<0.001
	4 (wealthiest)	2.07 (1.78, 2.37)	<0.001	1.12 (0.77, 1.48)	<0.001
Level of education (ISCED category)	Primary (0 and 1)	ref			
	Secondary (2, 3 and 4)	0.34 (0.10, 0.58)	0.005		
	Tertiary (5 and 6)	0.83 (0.55, 1.11)	<0.001		
	Other/Still in education	0.43 (-0.14, 0.99)	0.141		
Occupational level (ISCO Category) at t_0	Elementary manual (8 and 9)	ref			
	Skilled manual (6 and 7)	-0.10 (-0.54, 0.34)	0.653		
	Skilled non-manual (3, 4 and 5)	0.52 (0.11, 0.94)	0.014		
	Professional (1 and 2)	0.99 (0.51, 1.48)	<0.001		
Contract at t_0 (hours/week)	Full-time (\geq 30 hours/week)	ref			
	Part-time (<30 hours/week)	-0.00 (-0.28, 0.27)	0.988		
Frailty index	Frailty Index	-8.11 (-9.42, -6.79)	<0.001	-5.29 (-6.76, -3.82)	<0.001
Participation in social activities	Never	ref		ref	
	Yes	1.17 (0.97, 1.38)	<0.001	0.86 (0.63, 1.10)	<0.001
Partnership status	Partnered	ref			
	Non-partnered	-1.56 (-0.79, -0.33)	<0.001		
Housing tenure	Outright ownership	ref			
	Ownership with repayment	-0.50 (-0.80, -0.20)	0.001		
	Private rent	-1.18 (-1.55, -0.82)	<0.001		
	Housing collective	-0.26 (-2.01, 1.49)	0.767		
	Social rent	-1.41 (-1.93, -0.89)	<0.001		
	Rent-free, no ownership	-0.90 (-1.64, -0.15)	0.018		
Effort-reward ratio	\leq 1	ref			
	>1 (effort-reward imbalance)	-0.67 (-0.92, -0.43)	<0.001		
Financial stress	Yes	-2.80 (-3.05, -2.55)	<0.001	-2.21 (-2.48, -1.94)	<0.001
	No	ref		ref	

*Results of multilevel regression models expressed as coefficients for continuous outcomes showing change in CASP-12 score between t_0 and t_1 post labour market exit. All models adjusted for score at t_0 to correct for regression towards the mean.

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The results of the final model show that respondents with a higher equivalised household net worth and those who reported participation in social activities experienced significantly more favourable changes in wellbeing following work exit. Meanwhile those with higher frailty scores and who reported financial strain had significantly worse outcomes. Regarding features of exit, respondents leaving work more than one year before or one year after the retirement age in their country of residence experienced significant declines in CASP-12 scores of -0.35 (95% CI: -0.64, -0.05) and -0.56 (95% CI: -0.89, -0.24) respectively compared with those exiting on-time. Finally, while respondents who exited work via early retirement pension experienced a significantly more favourable change in CASP-12 scores (0.85, 95% CI: 0.35, 1.36), those in receipt of disability pension (-1.26, 95% CI: -1.81, -0.70), unemployment benefit (-0.65, 95% CI: -1.29, -0.36), sickness benefit (-1.87, 95% CI: -2.88, -0.86) and social assistance (-1.47, 95% CI: -2.91, -0.03) had significantly worse outcomes than those exiting with an old age pension in the fully-adjusted model.

3.5.3 Sensitivity analysis

The comparison of the two alternative specifications of exit route firstly shows that, while these do not differ substantially, a number of respondents (n=309) initially received other types of benefit but subsequently, when considering benefits currently received at t_1 , moved to the old-age pension category (Appendix Table A3.5). Of these, 92 (29.8%) were below the age of eligibility for a state pension at the time of exit from work but were at or above this age by t_1 . Presumably these respondents stopped receiving these working-age benefits as they became eligible for an old age pension.

The results shown in Table 3.6 indicate that when the fully-adjusted model was respecified such that route of exit was determined according to all benefits received since the previous wave (left column), the effect sizes for each route of exit were similar to those of the original fully-adjusted model (see Table 3.5). Also, when the hierarchy applied for respondents in receipt of multiple benefit types was reversed (right column), the statistical associations and effect sizes for each route of exit remained similar with those found when Robroek et al.'s (2013) original hierarchy was applied. This implies that the study's findings were robust to changes in the methods used for specifying the variable representing route of work exit.

Table 3.6. Results of a sensitivity analysis of different specifications of route of work exit and their impact on change in wellbeing scores between t_0 and t_1 among SHARE respondents (n=6,142)

Variable	Categories	Benefits received since t_0 wave*		Benefits currently received*	
		Coefficient (95% CI)	P	Coefficient (95% CI)	p
Route of exit from work	Old age pension	ref		ref	
	Disability pension	-1.57 (-2.09, -1.05)	<0.001	-1.83 (-2.41, 1.25)	<0.001
	Unemployment benefit	-1.57 (-1.97, -1.16)	<0.001	-1.59 (-2.13, -1.05)	<0.001
	Sickness benefit	-2.49 (-3.08, -1.89)	<0.001	-2.83 (-3.73, -1.94)	<0.001
	Social Assistance	-2.32 (-3.63, -1.01)	0.001	-3.26 (-4.78, -1.75)	<0.001
	Early retirement pension	0.50 (0.10, 0.89)	0.014	0.63 (0.20, 1.07)	0.004
	None	-0.41 (-0.74, -0.09)	0.013	-0.47 (-0.75, -0.19)	0.001

*Results of multilevel ANCOVA models expressed as coefficients for continuous outcomes showing change in CASP-12 score between t_0 and t_1 post labour market exit. All models adjusted for score at t_0 to correct for regression towards the mean.

3.6 DISCUSSION

In line with the study's hypotheses, features of exit from work which may suggest exits occurred involuntarily or in a non-normative fashion (e.g. exit outside the normal window for retirement or via receipt of social assistance, unemployment, or health-related benefits) were associated with declines in wellbeing from t_0 in both the univariate and multivariate models.

The descriptive results show that distributions of timing and route of exit differed significantly by country. Given the impacts of these variables on wellbeing change following work exit in old age, it is possible that these may at least partially account for the wide differences in wellbeing change following work exit between countries (Table 3.4).

Although voluntariness of work exit could not be ascertained directly from participants, the findings are consistent with the 'cultural-institutional hypothesis' on the relationship between retirement timing and health and wellbeing outcomes in which work exit at a culturally and institutionally expected age is considered to elicit less stress and more peer support than 'off schedule' transitions (Calvo, Sarkisian and Tamborini, 2013). According to this hypothesis, social norms and institutional policies are key to shaping the health and wellbeing impacts of work exit timing (Dannefer, 2011). Early retirement transitions deviating from standard age norms are therefore more likely to elicit psychosocial stress due to low social support (Van Solinge and Henkens, 2007), and, as such, may be perceived as involuntary (Szinovacz and Davey, 2005). Among workers above the statutory retirement age in particular, timing of eventual exit itself may be influenced by others' normative attitudes regarding an appropriate age for retirement, age discrimination or lower social support for continued work; thereby undermining voluntariness of exit (Feldman and Beehr, 2011).

Physical health was a powerful predictor of change in wellbeing following work exit and had the largest estimated effect size of all model variables. Although the method used for constructing the frailty index has been validated and strongly predictive of risk of mortality, institutionalisation and adverse health events when 30 or more items are included and these cover a wide range of functional domains (Rockwood and Mitnitski, 2007; Searle et al., 2008), it did carry some limitations. First, as described in Chapter 2 (Section 6.1), although the scale initially included 40 items, two of these were dropped due to high missingness in ELSA. Furthermore, other potential items were not considered for inclusion as they

appeared in only one of the two surveys. For example, an item for ‘difficulties getting out of the home’ were available in SHARE but not ELSA, and items for self-reported abnormal heart rhythm, congestive heart failure and angina were available in ELSA but not SHARE. Second, the index may have omitted important health items (in relation to work exit and wellbeing which were not covered by either the SHARE and ELSA surveys. As such, the frailty index employed in this study may not have fully adjusted for possible confounding of the association between route or timing of work exit and wellbeing change by physical health. Third, some specific medical problems may have had a potential greater impact on wellbeing or wellbeing change than others (see Chapter 6, Section 4). As all items were given equal weight in the index, some may not have been sufficient weight. Although weighting of items in frailty scales has the potential to improve their predictive power, application of weights can also carry disadvantages such as limiting the scale’s generalisability (Rockwood and Mitnitski, 2007). Finally, all items were based on self-response, which may have been subject to recall bias or reluctance on the part of respondents to disclose conditions.

Another limitation was that negative change in CASP-12 scores attributable to work exit via disability and sickness benefits may be partially due to specific health conditions, which may have been progressive in nature, or a sudden deterioration in health from t_0 to t_1 . This potential confounding may not have been fully adjusted for by the frailty measure employed. Although a further avenue of investigation might have been to include a covariate to adjust for change in health from t_0 to t_1 (or health at t_1), this would have resulted in a substantial loss of sample size as all items included in the physical frailty index would have needed to be available and non-missing at both baseline and follow-up.

A number of previous studies have made cross-sectional comparisons between unemployed individuals and their employed counterparts (Hepworth, 1980; Feather, 1990; Feather, 1997; Lahelma, 1989; Warr, 1987; McKee-Ryan, Wanberg and Kinicki, 2005; Winkelmann and Winkelmann, 1988) (see Section 2.1), and between those still in work and retirees (Ekerdt et al. 1985; Gall et al. 1997; Reitzes and Mutran 2004; Latif, 2011; Richardson and Kilty 1991; Howell, 2012; Luhmann et al. 2012) (see Section 2.2). The novelty of this study is that it considered different routes of work exit (i.e. Hepworth, 1980) and change in wellbeing as individuals transitioned from work to non-work (i.e. Flint et al., 2013). In contrast with Hepworth’s (1980) study, this study considered change in wellbeing between two time points according to route exit rather than comparing individuals who

had left work through different routes in cross-section. Flint et al. (2013), meanwhile, considered four states (secure work, insecure work, sickness and unemployment) and changes in psychological distress scores as individuals transitioned between them or remained in the same state between two time points. While the present study did only investigate one-way transitions between work, it did consider a wider range of work exit routes in a cross-national context based on institutional definitions of individuals' labour market status. One limitation of the present study was that the present study did not include individuals who had remained in work from t_0 to t_1 as a comparison group. This did not allow the changes in wellbeing as a result of different routes of work exit to be compared against those occurring among individuals who remained in the same state as a comparison group (see Chapter 6, Section 2.1). This limits the interpretation of this study's results to a comparison of routes of work exit and their associations with wellbeing change.

3.7 CONCLUSIONS

Chapter 3 characterised the individual-level determinants of change in wellbeing following exit from paid work and provides a basis upon which to investigate the determinants of resilience to transitions out of paid work in Chapters IV and V. The results show that route of exit from work, along with equalised household net worth, and age of exit from work relative to the state retirement age were significant determinants of change in wellbeing following exit from work. Furthermore, while those reporting financial strain and worse health in the wave post work exit experienced significantly more negative changes in wellbeing, participation in social activities had a protective effect.

In Chapter 4, the analysis will be extended to include a range of country-level variables. The effects of country-level variables representing three different approaches to describing country-level welfare state characteristics will be investigated for their associations with wellbeing change following work exit at the individual level. In addition, the extent to which each of these variables explain differences between countries will be analysed.

4 CHAPTER 4: Country-Level Determinants of Resilience to Work Exit

4.1 INTRODUCTION

The previous chapter addressed individual-level determinants of wellbeing change following work exit. The results showed that individuals who left paid employment outside the normal window for retirement or via receipt of social assistance, unemployment, or health-related benefits experienced significantly more negative changes in wellbeing from t_0 to t_1 . While country-level determinants of CASP-12 change following work exit have not previously been investigated, studies have highlighted that disparities in cross-sectional CASP scores exist both between and within countries (Niedzwiedz et al., 2014a). To account for this, both country- and individual-level variables should be employed to explain differences in subjective wellbeing (Helliwell, 2003).

Although country-level institutional factors have been considered as determinants of wellbeing (Niedzwiedz et al., 2012), previous work has not investigated whether, and to what extent, these modify change in wellbeing in response to different routes of exit from work. Referring back to Baltes (1987), human development is patterned by historical and cultural conditions. These institutional influences, which can occur at the country level, are therefore another example of historical, cohort-specific risk. Retirement, and work exit in general, is embedded in social and organisational policies, creating norms regarding the timing and legitimacy of retirement (Moen, 1996; Dannefer, 2011).

Building on the previous chapter, Chapter 4 will address country-level differences in, and country-level determinants of, wellbeing change. These determinants will be analysed to identify both their direct effects on individual-level outcomes and the degree to which these explain country-level differences.

In doing so, this chapter responds to criticisms of previous cross-national studies on wellbeing determinants that they have generally focused on hedonic concepts of wellbeing while ignoring eudaemonic measures (Jorm and Ryan, 2014). This is achieved through the use of the CASP-12 scale which provides a global assessment of multiple domains of

wellbeing (Diener, 1994; Diener, Sapta and Suh, 1998). It will also address the effects of country-level measures on change in wellbeing in response to a specific risk (exit from work) and test the degree to which welfare state design and policy measures mitigate this risk.

Multilevel models can be used to estimate both the proportion of variance in an outcome measure explained by country effects and the proportion of the country effects explained by a given country-level variable. Chung and Muntaner (2007) found that 21% of variation in the infant mortality rate and 25% of variation in low birth weight rate between OECD countries can be explained by country effects. They also concluded that 20% and 10% of these country effects respectively could be explained by welfare regime. This can be compared to the results found in Chapter 3, in which country effects accounted for 6.4% of the change in CASP-12 scores when analysed within a generalised least squares framework. These methods of determining variance explained using partitioning of variance have yet to be applied to wellbeing change following exit from work, an outcome which could be considered to represent one of the primary risks welfare states are designed to mitigate.

4.1.1 Conceptualising country-level welfare state effects

In a systematic review of welfare state effects on health and health inequalities, Bergqvist et al. (2013) identified three approaches previously employed in studies investigating welfare state characteristics:

- a) Regime approach (focusing on classifications of countries according to welfare objectives, ideology, policy or political traditions)
- b) Expenditure approach (focusing on welfare state generosity)
- c) Institutional approach (focusing on the design of welfare institutions and policies, characteristics of specific welfare programmes, welfare metrics and outcome measures).

The expenditure approach shall subsequently be referred to as the ‘spending approach’ for the remainder of this thesis.

These approaches have also been reflected in studies of wellbeing, with Lapinski et al. (1998) discussing the role of welfare state regimes, and Veenhoven (2000b) examining the role of spending on social protection on changes in life satisfaction over time across several countries.

Using Bergqvist et al.’s schema, country-level wellbeing determinants can be ordered by type and how they relate to the welfare state. The country-level variables to be discussed will therefore fall under three categories corresponding to Bergqvist et al.’s schema:

- I. Regime approach: Welfare state regime
- II. Spending approach: Quantitative country-level measures of social protection spending by policy area
- III. Institutional approach: Measures of the social and economic environment including economic development, inequality, measures of social capital and welfare state *outcomes*. Institutional variables describe how welfare institutions and specific social policies are designed, and their effects on population-level welfare indicators.

It should be noted that the effects of variables representing the spending and institutional approaches could be considered to overlap as some institutional welfare state measures could be a direct or indirect result of the design, objectives and scope of welfare states and welfare spending.

4.1.2 Regime approaches: Welfare regime theory and typologies

Before elaborating on the functions and effects of welfare states it is necessary to define their three primary features according to Esping-Andersen’s ‘Three Worlds of Welfare Capitalism’ typology (1990). *Decommodification* can be defined as “the extent to which individuals and families can maintain a socially-acceptable standard of living regardless of their market performance” (Esping Andersen, 1987, p.86). This is contrasted with

commodification, which describes the extent to which workers are reliant upon the market sale of their labour and engenders risk following work exit. *Defamilisation*, similarly, refers to the extent to which adults can maintain a socially-acceptable standard of living independently of family relationships. *Stratification* describes how welfare states distribute welfare transfers and services and their consequences for existing social and economic hierarchies. In doing so, welfare states organise social relations through decommodification, modification of market forces, disparities in provision of social welfare to different groups (Eikemo and Bambra, 2008) and varying degrees of emphasis on redistributive policies (Navarro and Shi, 2001). In Esping-Andersen's typology these features not only differentiate welfare states, but also justify their classification under different welfare regimes. The state, alongside the market and the family, comprises one of the three pillars of a welfare regime. Welfare regimes are characterised by their patterns of state, market and household provision of social goods, the degree to which labour is decommodified or shielded from market forces by state intervention, market structures or the family, and the different stratification outcomes that result (Esping-Andersen, 1990; Gough, 2013). The present study will only consider the role of the state, however.

Esping-Andersen's typology comprised three regimes based upon their historical development, decommodification and the degree to which these upheld existing social hierarchies. Welfare states classified under a given regime are considered to show a degree of similarity in their features and pattern of historical development. In the Bismarckian welfare regime, social protection benefits are primarily financed through worker contributions and disbursed through stratified, often occupationally-differentiated schemes prioritising consumption smoothing over the lifecourse and status maintenance following exit from work. The Social Democratic regime is characterised by generous, redistributive and universal social transfers alongside high expenditure on public services, active intervention in the labour market and commitment to full employment. Under the Liberal (or 'Anglo-Saxon') welfare regime, private-sector welfare schemes are subsidised and social transfers are modest, stigmatised and means-tested to ensure only a basic safety net (Esping Andersen, 1990; Eikemo and Bambra, 2008). Esping Andersen (1990) identifies Social Democratic welfare states as the most decommodifying followed by Bismarckian and Liberal regimes.

4.1.2.1 Extensions to Esping-Andersen's typology

A number of extensions to, and variations on, Esping-Andersen's original typology have been proposed to include a wider range of countries or a greater number of welfare state regimes (Appendix Table A4.1). Some of these are also based on different criteria or focus on different policy areas. In addition to features such as decommodification, other welfare typologies have been formulated with reference to the family, the market, and countries' historical patterns of development. Castles (1994) discussed the role of Catholicism or delayed secularisation in the development of welfare states. Influences of Catholicism can include funding of welfare schemes through employee contributions and reliance on the family or the voluntary sector as the primary providers of social goods. Furthermore, Castles argues that these influences lead to curtailed welfare expenditure and lower female workforce participation than in contemporary Bismarckian welfare states. Similarly, although Esping-Andersen's original typology was defined solely in terms of welfare state organisation and decommodifying effects, he subsequently speculates whether, on the dimension of the family, Southern European countries may comprise a separate welfare regime distinct from the Bismarckian model given their high degree of familialism in provision of social goods (Esping-Andersen, 1997).

Ferrera's typology (1996), based solely on welfare states' qualitative features, was the first to explicitly characterise the institutional features and historical development of the 'Southern' or 'Mediterranean' welfare model. Foremost among their features was the presence of an extreme 'transfer centred' model of welfare provision focused on cash payments based on age and labour market status (Kohl, 1981; Esping-Andersen, 1990). Although sharing some similarities with Bismarckian welfare states, this model is notable for the mixture of public and non-public actors participating in welfare institutions, generous protection and income maintenance for regularised labour market 'insiders', minimal protection for uninsured or irregular workers participating in the large informal sector, and the fragmentation of welfare schemes along the lines of occupation and social status. Finally, southern welfare states are characterised by a low degree of state power in welfare institutions, clientalism and susceptibility to political pressure and manipulation (Ascoli, 1984).

None of these typologies, however, include former socialist countries of Eastern Europe. Two reasons for this may be the 'unsettled', dynamic nature of their structures (Ebbinghaus, 2012) and the fact that complete data on such countries have only recently been available following accession of many of these to the OECD. This lack of data

prevents clear conclusions to be drawn as to the path of their development and whether convergence with Western European countries is occurring (Fenger, 2007). The common features of Eastern and Central European welfare states, which share experiences of economic disruption, decentralisation, marketisation and reform following the end of communism, are considered to include low state provision of services, a large informal economy and informal provision of social goods outside official state mechanisms (Eikemo and Bambra, 2008; Ferge 1997; Polese et al., 2014). While several authors consider this model to be unique, comprising either a single group or multiple sub-clusters with distinct features (Fenger, 2007; Beblavy, 2008; Castles and Obinger, 2008; Lendvai, 2009), others reject this notion based on the high degree of variety between Eastern European countries and lack of coherent contrasts with other welfare state types (Rys, 2001). For example, Adam et al. (2009) contrast the liberal-market model pursued by Estonia with that of Slovenia, whose ‘nearly conservative’ approach (Beblavy, 2008) is closer to the Bismarckian welfare model based on income maintenance through substantial cash transfers.

4.1.2.2 Welfare regimes in relation to health and wellbeing outcomes

The influence of welfare regime on measures of health and physical functioning has been evaluated by a number of studies (Bergqvist et al., 2013). They have modelled welfare regimes both as nominal variables for direct effects and as having interaction effects with individual-level variables such as socioeconomic position. These studies have tested the degree to which welfare regimes influence socioeconomic gradients in physical functioning, self-perceived health (Martikainen et al., 2004; Richter et al., 2012; Chauvel and Leist, 2015), disability and self-reported ill-health (Högberg, 2014), mortality (Popham et al., 2012), depression (Chung et al., 2013) and oral health (Sanders et al., 2009).

Wellbeing outcomes have received less attention than health outcomes, however. Earlier work by Lapinski et al. (1998) found differences in mean life satisfaction between different welfare states among both employed and unemployed individuals. Lower mean life satisfaction scores were found among unemployed individuals in countries with a Liberal or Bismarckian welfare regime than those in countries with a Social Democratic regime. Samuel and Hadjar (2016) found that life satisfaction was highest in social democratic and Bismarckian and lowest in Mediterranean and post-socialist countries. The same study found that gradients in wellbeing by an index of occupational status were lower in the

former two and higher in the latter. Niedzwiedz et al. (2014b; 2015) found the same differences in life satisfaction and CASP-12 wellbeing by regime type and in the gradients of these outcome measures by childhood socioeconomic position and level of education using data from individuals aged 50–75 in 13 European countries collected as part of SHARE.

Institutional frameworks have been identified as an important determinant of wellbeing outcomes. Previous work has highlighted wide disparities in CASP scores both between and within countries (Niedzwiedz et al., 2014a). Furthermore, further studies have emphasised the role of institutional frameworks and welfare policy as a significant modifying factor for the effect of household wealth on wellbeing outcomes (Niedzwiedz, 2014; Niedzwiedz et al., 2014b).

4.1.3 Spending approaches: Quantitative measures of social protection and their definitions

Despite a long history of attempts to measure the extent of welfare programmes using quantitative measures of spending (Cutwright, 1965), it is only relatively recently that comparative data have become available to facilitate cross-country comparisons.

Furthermore, few studies have considered the role of welfare spending at the country level on measures of wellbeing and only measures of welfare spending as a percentage of Gross Domestic Product (GDP) have been employed. Of those which have, Okulicz-Kozaryn et al. (2014) found some positive effect of overall welfare spending as a percentage of GDP on subjective life satisfaction at the individual level while Veenhoven (2000b) found no such effect on average life satisfaction at the county level.

Since Esping-Andersen's original typology was published, a greater variety of country-level data can now be employed for measuring welfare state expenditure across different policy domains. This trend has accelerated since the release of the earliest iteration of the OECD Social Expenditure Database, also referred to as SOCX (OECD, 1996), which employs the common European System of Integrated Social Protection Statistics reporting standards (Eurostat, 2000, and ESSPROS, 1997). This methodology allows for spending to be differentiated according to its intended recipients and whether this was disbursed via cash transfers or used to provide goods and services (or benefits in-kind) (Adema et al., 2011).

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The full OECD definitions for the relevant terms used in this work are provided in Table 4.1.

Table 4.1. Full OECD social protection definitions

Term	Definition
Social expenditure ¹	The provision by public (and private) institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer. Such benefits are 'unrequited': it does not include 'market transactions', i.e. payments in return for the simultaneous provision of services of equivalent value cash transfers, and can take the form of cash transfers or direct ('in-kind') provision of goods and services.
Social benefits ²	Current transfers received by households intended to provide for the needs that arise from certain events or circumstances, for example, sickness, unemployment, retirement, housing, education or family circumstances.
Social benefits in kind ³	These consist of (a) social security benefits, reimbursements, (b) other social security benefits in kind, (c) social assistance benefits in kind; in other words they are equal to social transfers in kind excluding transfers of individual non-market goods and services.
Social security benefits in cash ⁴	Social insurance benefits payable in cash to households by social security funds; they may take the form of sickness and invalidity benefits, maternity allowances, children's or family allowances, other dependants' allowances, unemployment benefits, retirement and survivors' pensions, death benefits or other allowances or benefits.
Old-age cash benefits ⁵	These provide an income for persons retired from the labour market or guarantee incomes when a person has reached a 'standard' pensionable age or fulfilled the necessary contributory requirements. This category also includes early retirement pensions: pensions paid before the beneficiary has reached the 'standard' pensionable age relevant to the programme. Excluded are programmes concerning early retirement for labour market reasons which are classified under unemployment.
Pension replacement rate ⁶	The ratio of an individual's (or a given population's (average) pension in a given time period and the (average) income in a given time period.

¹<https://stats.oecd.org/glossary/detail.asp?ID=2485>

²<https://stats.oecd.org/glossary/detail.asp?ID=2480>

³<https://stats.oecd.org/glossary/detail.asp?ID=2481>

⁴<https://stats.oecd.org/glossary/detail.asp?ID=2493>

⁵<https://stats.oecd.org/glossary/detail.asp?ID=1903>

⁶<https://stats.oecd.org/glossary/detail.asp?ID=5293>

4.1.3.1 *Social protection measures*

Three country-level measures of social protection spending will be defined:

- *Welfare effort* (Wilensky, 1975), expressed as a percentage of GDP, describes the extent to which a country's economic output is devoted to social protection
- *Emphasis* (Kautto, 2002) describes the proportion of government social protection spending devoted to specific policy areas or benefit type as defined by intended recipients or mode of delivery
- *Expenditure* refers to government spending per resident or recipient by benefit type denominated in purchasing power parity adjusted units of currency (PPPs).

Considerations of different methods of quantifying country-level spending on different social protection policy areas represent an outgrowth from research on the qualitative features of welfare states and critiques thereof. Castles and Mitchell (1992) and Esping-Andersen (1990), question the utility of measures of aggregate expenditure as they ignore how resources are utilised. For example, it is argued that earnings-related benefits tend to be less redistributive than universal flat-rate benefits. By extension, Abrahamson (1999) argues that, in addition to neglecting the qualitative features of social and civic institutions, previous welfare typologies betray a one-sided focus on provision of social insurance and a neglect of social services. The latter, it is argued, is particularly relevant when constructing welfare typologies sensitive to the influence of social and institutional attitudes towards gender roles and the degree of familisation in the provision of care (Bambra et al., 2009).

The overemphasis of previous studies on transfer regimes and the failure to differentiate cash transfers from services (benefits in kind) has been criticised extensively (Kautto, 2002; Bambra, 2005). These two roles of welfare states can be considered two distinct dimensions of welfare state policy in that effort devoted to each of these is not correlated and their determinants and outcomes differ markedly (Castles, 2008; Jensen, 2008). In addition to these two expenditure types, the OECD also categorises social protection into eight policy areas, namely: old age, survivors, incapacity, health, family, unemployment, housing and other OECD (2007). Examples of specific types of social protection programme by category (according to OECD standard definitions) are summarised in Table 4.2.

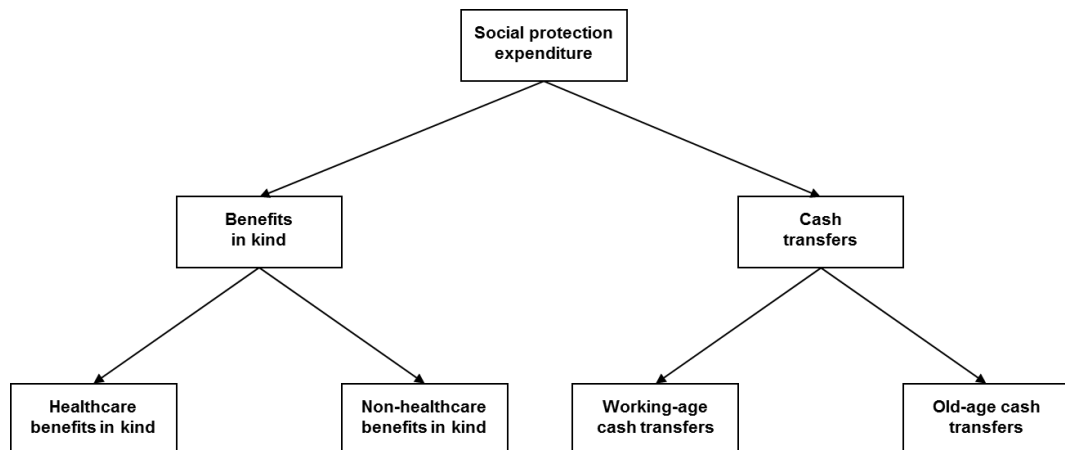
Table 4.2. Types of social protection programme by OECD policy area and expenditure type

	Expenditure type		
	Benefits in kind	Cash transfers	
Policy area	Old age	Residential care Home help services Other benefits in kind	Pension Early retirement pension Other old age cash benefits
	Survivors	Funeral expenses Other benefits in kind	Pension Other cash benefits
	Incapacity	Residential care Home help services Other benefits in kind	Disability pensions Paid sick leave Other cash benefits
	Health	Healthcare services	N/A
	Family	Day care Other benefits in kind Home help services	Family allowances Maternity and parental leave Other cash benefits
	Unemployment	Other benefits in kind	Unemployment compensation Severance pay Early retirement pension (for labour market reasons)
	Housing	Housing assistance Other benefits in kind	N/A
	Other	Social assistance Other benefits in kind	Income maintenance Other cash benefits

Adapted from OECD (2007)
(http://stats.oecd.org/oecdstatdownloadfiles/oecdsox2007interpretativeguide_en.pdf)

Using the earliest iteration of SOCX (OECD, 1996), Castles (2008) builds on the distinction between cash transfers and benefits in kind and disaggregates welfare expenditure into four primary categories (by volume of expenditure), namely: old age cash transfers, non-old age (or working age) cash transfers, health-related benefits in-kind and other service (non-health) expenditure. Of these, only other service and non-old age cash transfer spending were found to be positively correlated. Figure 4.1 summarises how social protection benefits are disaggregated by SOCX categories into its four main components as defined by Castles.

Figure 4.1. Disaggregated social protection spending by SOCX categories (based on Castles, 2008)



Although the concept of decommodification may appear more relevant to the cash transfer component of welfare expenditure and defamilisation to in-kind benefits (Jensen, 2008), Bamba (2005) argues that maintenance of a “socially-acceptable standard of living regardless of [individuals’] market performance” (Esping-Andersen, 1987, p.86) may also come about through individual consumption of services independent of market forces. Expenditure on in-kind benefits also, therefore, exerts a decommodifying effect.

In addition to addressing the previous lack of specific spending data, use of these measures has been used to quantitatively justify previously-defined qualitative welfare typologies. The first attempt by Bonoli (1997) considered welfare funding mechanisms. After plotting percentage of social protection spending funded via contributions from workers against

total welfare effort using 1995 data from Eurostat, Bonoli identified four clusters of countries corresponding to Ferrera's typology. These included a group of Social Democratic countries with high welfare effort and commitment to universalism, a Liberal group comprising the UK and Ireland with low welfare effort and social protection funded through general taxation, and clusters of Bismarckian and Mediterranean countries with extensive financing through worker contributions and high and low levels of welfare effort respectively.

Kautto (2002), meanwhile, focused on welfare effort on cash transfers against effort on in-kind benefits using Eurostat data from 1990. In doing so, country clusters could be identified. These included a 'service approach' group corresponding to Scandinavian countries, a 'transfer approach' group comprising Italy and Bismarckian welfare states, and a third, less distinct group including Ireland, Greece, Portugal and Spain whose welfare states are less extensive.

4.1.3.2 An expenditure perspective on welfare state types

In addition to providing measures of effort or emphasis as used by Bonoli (1997) and Kautto (2002), SOCX also permits country-level welfare spending to be expressed in terms of per capita expenditure in PPP-adjusted units of currency. These measures of expenditure can then be disaggregated by type (i.e. into cash and in-kind social protection expenditures). Countries can be categorised into groups according to their level of per capita social protection expenditure (in 2011) in increments of EUR 2,000 and the proportion thereof dedicated to in-kind benefits as a percentage of the total (Figure 4.2). This differs from previous attempts to justify welfare typologies using quantitative measures in that it employs absolute expenditure rather than measures such as effort and emphasis which are relative to a given country's GDP or total welfare spending.

Figure 4.2. Groupings of European countries using an absolute expenditure measures

	High Proportion of In-kind Benefits (>50%)	Low Proportion of In-kind Benefits (<50%)
High Spending (PPPs) (>EUR 6,000)	(1) Sweden, Denmark	(2) Austria, Germany, Netherlands, Italy, France, Switzerland, Belgium
Medium Spending (EUR 4,000–EUR 6,000)	England (UK)	(3) Spain, Greece, Slovenia
Low Spending (EUR 2,000–EUR 4,000)		(4) Czech Republic, Poland, Estonia

These groups correspond with Kautto's categorisation of redistributive policies employed in different welfare states. Groups (1) to (3) shown in the matrix above represent Kautto's 'service approach', 'transfer approach' and 'third' groups. The UK stands apart with medium overall expenditure and high service emphasis. This is consistent with its designation by Bonoli (1997) and Ferrera (1993) as a 'mixed universalist' welfare state due to its relatively high commitment to universalism and provision of public services but low welfare effort when compared with Scandinavian welfare states.

Thanks to the availability of country-level indicators from former socialist countries a fourth group can be added. Slovenia's inclusion in the third group can be justified by Beblavy's (2008) description of the Slovenian welfare state as 'nearly conservative' and closer to that of EU-15 countries than other new EU-12 member states due to its high welfare effort and emphasis on cash benefits. The Czech Republic and Estonia, meanwhile, are designated 'conservative light' and 'liberal light' respectively. This reflects the former's (albeit low) degree of redistributive effort and the latter's residual system characterised by a low expenditure on either transfers or services.

4.1.4 Institutional approaches: Social and economic determinants of wellbeing

Social and economic wellbeing determinants have been studied across a wide range of both developed and developing countries. Although some of these may influence the development of welfare states, they are primarily a reflection of the social and economic environment which is strongly influenced by the welfare state as they represent results of social policy. Social and economic wellbeing determinants investigated in previous studies include affluence, education, social tolerance and functioning of political systems (Veenhoven, 2009), coverage of pension benefits and access to healthcare (Bergqvist et al., 2013). The variety of these measures entails that they cannot be combined into a single variable and therefore must be considered separately.

4.1.4.1 Economic conditions and level of development

Economic and social development indicators may be influenced by the scope and scale of welfare states. Economic variables such as inflation (Rodríguez-Pose and Berlepsch, 2012), economic growth (Stevenson and Wolfers, 2008, Diener et al., 2013), unemployment at the individual-level, country-level unemployment rates (Novak, 2014), and GDP per capita have been suggested as determinants of average wellbeing at the country level (Easterlin, 1974; Oswald, 1997; Helliwell et al., 2010) and individuals' wellbeing both between countries and over time (Clark and Oswald, 1994; Frey and Stutzer, 2000; Di Tella et al., 2001; Deaton, 2008; Diener et al., 2009). Composite measures of socioeconomic development such as the Human Development Index (HDI) have also been shown to exert a strong influence (Johnson, 2009; Flèche et al., 2012). Conclusions on the effects of inequality on wellbeing, meanwhile, are mixed (Alesina et al., 2004; Johnson, 2009; Rozer and Kraaykamp, 2013). One possible reason for the diversity of findings is that the effect of country-level inequality may be moderated by individual-level variables such as aversion to inequality (Alesina et al., 2004).

The most contentious issue regarding economic conditions and wellbeing is the Easterlin Paradox. This arose from early observations that while life satisfaction is correlated with income at the individual level, no such pattern exists at the country level (Easterlin, 1974). Easterlin (2001) hypothesises that this is due to the relationship between increasing material aspirations over time in proportion to overall economic development and rising household income. As material aspirations rise the level of consumption needed to maintain the same

level of subjective wellbeing increases. While some researchers have reached similar conclusions for developed countries (Oswald, 1997), others claim that this association weakens as a country reaches the highest levels of economic development (Veenhoven and Hagerty, 2006). In addition, the effects of rising economic output may be overshadowed once other factors such as income inequality, social welfare, social capital, and democratisation are taken into account (Abdallah et al., 2008; Jorm and Ryan, 2014). Conversely, other authors have found that country-level wellbeing rises consistently with GDP per capita with no point of saturation (Deaton, 2008; Stevenson and Wolfers, 2008; Verme, 2009; Diener et al., 2013) even after adjustment for individual-level variables (Di Tella et al., 2001).

4.1.4.2 Social Capital

Social capital is another distinct feature of the social and economic environment which may be influenced by welfare state institutions. Although economic and welfare indicators may influence welfare outcomes and explain differences between countries, it is argued that these variables insufficiently characterise the effects of welfare states and that measures of social capital and democratisation must also be considered (Abdallah et al., 2008; Jorm and Ryan, 2014). General definitions of social capital encompass sense of trust and social obligation, channels of communication, systems of norms and sanctions which together provide a framework for cooperation between individuals and groups (Coleman, 1988).

Paxton (1999) has found that although social capital may be declining over time when it is measured using social engagement and trust, there has been no such decline in other measures of social capital such as trust in institutions. This suggests that social capital may comprise multiple uncorrelated dimensions. Based on these findings, Bjørnskov (2003) further developed the approach of measuring social capital using multiple dimensions. These were identified as macro, meso and micro levels of social capital measured by political freedom and perceptions of corruption, civic participation and social trust respectively. Rodríguez-Pose and Berlepsch (2012), meanwhile, identify informal social interaction and general social (including institutional) trust as the main drivers of the effects of social capital. Types of social capital may therefore be classified as ‘informal’ (i.e. on the level of individuals or communities), or ‘formal’ (i.e. at the country level) (Putnam, 2000).

Life satisfaction has been found to be positively influenced by country-level measures of social trust (Calvo et al., 2012) and perceived trustworthiness of other people, civic participation, quality of state institutions (Helliwell and Putnam 2004; 2005; Seaford, 2011), political culture as measured by direct democracy and local autonomy (Frey and Stutzer, 2000), political stability (Veenhoven, 2009), corruption (Bjørnskov, 2003; Verme, 2009; Helliwell et al., 2010; Flèche et al, 2012; Hamilton et al., 2016) and quality of institutions as measured using the World Governance Indicators (Abdallah et al., 2008; Kaufmann et al., 2010). These findings are applicable to countries at all levels of economic development (Calvo et al., 2012). It should be noted, meanwhile, that social capital itself may be influenced by the form and scope of political and welfare state institutions (Hagfors and Kajanoja, 2007; Svendsen and Bjørnskov, 2007).

4.1.5 Summary

Quantitative measures of social protection represent only one feature of welfare regimes. Their decommodifying effects are also dependent on mechanisms of financing, organisational principles, extent of benefit coverage and eligibility. Table 4.3 shows a framework proposed by Kuitto et al. (2016) for studying and comparing welfare states with qualitative summaries of their features (organisational principles, structure of welfare spending and institutional features of social protection programmes) by typology. This framework, as shown, is extended in Dimension II, to encompass measures of effort, emphasis and expenditure.

Table 4.3. Summary of welfare state regimes by organisational principles, structure of welfare spending and institutional features of social protection programmes (adapted from Kuitto et al., 2016)

Dimension	Policy	Welfare State Typology				
		Bismarckian	Mediterranean	Social Democratic	Post-Communist	Anglo-Saxon
I. Organisational Principles	Financing	Contributions	Contributions	Taxes	Contributions	Taxes
II. Structure of Welfare Spending	Effort	High/Medium	Medium	High	Low	Low
	Emphasis	Mixed	Transfers	Services	Transfers	Services
	Expenditure	High	Low	High	Low	Low
III. Decommodifying Potential <i>(i.e. Institutional Features)</i>	Objective	Income Maintenance	Income Maintenance	Redistribution	Income Maintenance	Poverty Prevention
	Benefits	Earnings-related	Earnings-related	Flat-rate	Earnings-related	Flat-rate
	Coverage	Employees	Employees	Universal	Employees	Universal
	Eligibility	Contributions	Contributions	Need	Contributions	Need

The institutional features of welfare spending represent a further dimension of social protection distinct from the spending approach itself. To fully account for the effects of welfare states on wellbeing change following work exit it is also necessary to describe the institutional features of welfare spending, for example by accounting for variables such as generosity of benefits as a proportion of in-work income (replacement rates), outcomes of welfare spending on access to services and the degree to which welfare spending is redistributive, using an institutional approach.

This framework gives a summary of how the full range of dimensions of welfare state policy can be integrated into a single framework and used to describe the overall characteristics of different welfare state regimes. In the present study, however, individual characteristics will be analysed separately to determine the associations between welfare state characteristics and individual-level outcomes and the degree to which welfare state country-level variables can explain between-country differences.

4.2 OBJECTIVES AND HYPOTHESES

4.2.1 Objectives

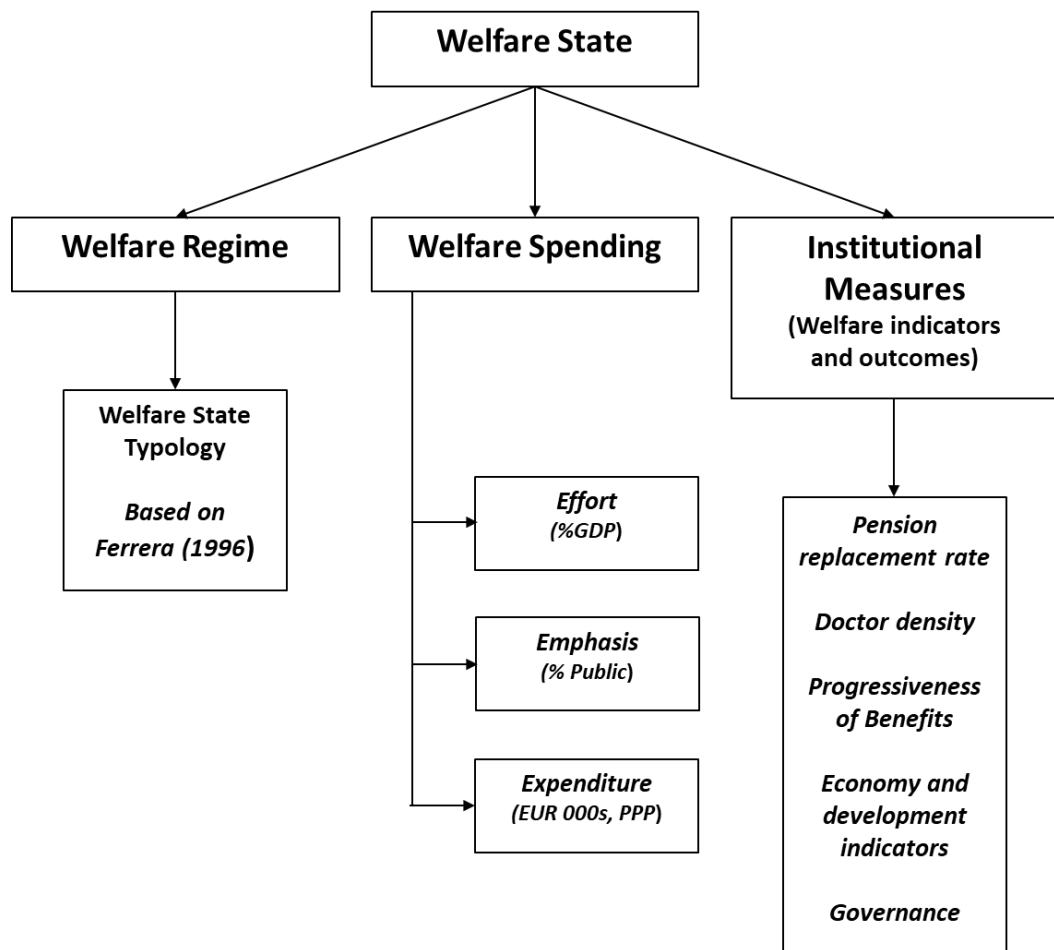
- a) To determine the extent to which country-level welfare state characteristics representing different approaches (welfare regime, social protection spending and institutional measures) influence individuals' change in wellbeing following work exit after adjustment for individual-level variables

- b) To ascertain the degree to which each of these variable types explains country-level differences by estimating the proportion of country-level variance explained by each.

4.2.2 Selection of country-level variables

To fulfil these objectives a range of country-level variables were selected for inclusion in the analysis and grouped according to Bergqvist et al.'s (2013) schema. Figure 4.3 shows Bergqvist et al.'s schema as applied to the present study with the inclusion of specific country-level variables to be investigated.

Figure 4.3. A full representation of Bergqvist et al.'s schema as applied to the present study



4.2.2.1 Regime approach

Although there is no generally-accepted standard welfare typology, the typology proposed by Bambra and Eikemo (2009) (based on Ferrera, 1996) was selected for use in the analysis of country-level welfare state effects. In his exposition of the ‘Southern’ welfare state regime, Ferrera, (1996) refers to specific welfare state features such as benefit coverage and income maintenance following work exit, protection for uninsured or irregular workers, fragmentation and stratification of welfare schemes, and state provision of healthcare and non-healthcare services. This typology, shown in Table 4.4, was therefore selected as it explicitly relates to the welfare effort at the country level, but also how social benefits are granted and organised, and, in particular, how these mitigate risk arising from labour market transitions such as unemployment and their effects for different groups of workers.

Table 4.4. Summary of welfare state categories according to Bambra and Eikemo's (2009) typology

Welfare regime	Bismarckian	Mediterranean	Social democratic	Post-Communist	Anglo-Saxon
Country	Austria	Spain	Sweden	Czech Republic	England
	Germany	Italy	Denmark	Poland	
	Netherlands	Greece		Slovenia	
	France			Estonia	
	Switzerland				
	Belgium				

4.2.2.2 *Spending approach*

Continuous measures of welfare effort, emphasis and expenditure were obtained from the OECD SOCX database as previously described (Section 1.3.1). Effort, emphasis and expenditure were then disaggregated into cash and in-kind benefits. Expenditure measures were further disaggregated into the four major categories of policy spending identified by Castles (2008), namely: old age cash benefits, non-old age cash benefits, in-kind health benefits and non-health in-kind benefits. Figures from the year of exit from work were used for each individual. Year of work exit was defined as the calendar year in which the month of reported work exit fell, or, where this was unavailable, the midpoint between t_0 and t_1 .

4.2.2.3 *Institutional approach*

Institutional measures selected included median net pension replacement rate (% median individual earnings in 2011), doctor density (per 100,000 residents in 2011), GDP per capita (EUR 000s in 2011) gross gini index of income (in 2013), unemployment rate (% workforce aged 55–64 in year of work exit), economic growth (% GDP in year of work exit) in year of work exit and inequality-adjusted HDI (in 2012).

A measure of welfare progressivity was defined using data on proportion of social protection transfers allocated to each income quartile by country in 2011 from the OECD Social Expenditure Update (November 2014). This was expressed as the Q5/Q1 ratio, which was operationalised as the proportion of total social protection spending allocated to the top quintile by total social protection spending allocated to the bottom quintile. Data

used to derive Q5/Q1 ratios for each country and welfare regime are shown in Appendix Table A4.2. Q5/Q1 ratios are presented alongside the ratio of gross income for the top and bottom quintiles of the working-age population (S80/S20 ratio) for comparison.

Measures of social capital at the institutional level were obtained from the World Governance Indicators database (Kaufmann et al., 2010). Each of the seven governance indicators (governance, voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law and control of corruption), defined in Appendix Table A4.3, is measured on a scale of -2.5 to 2.5. Mean values from the period 2003–2013 were used. For the purposes of this analysis Government Effectiveness, the most relevant of these measures to the provision of social protection, and the overall index (the mean of all seven indicators) were used to operationalise continuous measures of institutional social capital.

4.2.3 Hypotheses

The following hypotheses can be posed in relation to each of the three approaches highlighted above.

1) Welfare state regime

Residence in welfare state regimes achieving a greater degree of decommodification (i.e. Scandinavian) or providing higher levels of social protection spending is associated with more positive wellbeing outcomes following work exit.

2) Social protection expenditure

Higher levels of welfare effort (% of GDP devoted to social protection spending) are associated with more positive wellbeing outcomes following work exit due to the resulting decommodifying effects. With regards to measures of welfare emphasis (% of social expenditure devoted to a given policy area) and disaggregated expenditure (absolute spending per capita) on different policy areas, it is uncertain whether cash transfers or in-kind benefits exert the more significant decommodifying effect.

3) Institutional welfare indicators and outcomes

Higher median net pension replacement rate, doctor density (per 100,000 residents), GDP per capita (EUR 000s), economic growth (% GDP) in year of work exit and inequality-adjusted HDI are associated with more positive wellbeing outcomes following work exit. Higher values of the gross gini index, unemployment rate and low welfare progressivity (indicated by a high Q5/Q1 ratio) are hypothesised to be associated with more negative wellbeing outcomes.

4.3 METHODS

4.3.1 Individual-level data

The same analytic sample was used as in Chapter 3 (Section 4.1). It was drawn from respondents across 16 countries from Waves 1–5 (2004–2013) of the Study of Health, Ageing and Retirement in Europe (SHARE) and Waves 1–6 (2002–2013) of the English Longitudinal Study of Ageing (ELSA). It included core SHARE and ELSA participants and their partners aged 50 years and over with two or more consecutive waves of observations and who had exited from work since the previous wave. Respondents were considered to have experienced a work exit event where they self-reported their job situation as employed or self-employed at baseline (t_0) and as any other state in the following wave (t_1). Where an individual had experienced multiple exit events only data from the last event were used. This yielded a total sample of 8,037 respondents without missing data.

4.3.2 Country-level data

Country-level welfare state indicators and measures of socioeconomic development and quality of institutions (social capital) were selected as described previously. These variables, which were primarily drawn from the OECD SOCX database, are summarised in Table 4.5 with their years of coverage, units of measurement and source.

4.3.3 Descriptive analysis

4.3.3.1 *Summaries of social protection measures*

Mean CASP-12 scores at t_0 and t_1 , and mean change in CASP-12 scores from t_0 to t_1 , were calculated for the combined analytic sample ($n=8,037$) with 95% CIs. These were then calculated for each dataset (SHARE and ELSA) and for each country separately.

Measures of effort, emphasis and expenditure in 2011 were obtained for each country included in the present study from the SOCX database. Means were calculated for each welfare state type to provide summaries of these measures for countries and welfare regimes. These effort, emphasis and expenditure measures were further disaggregated into cash and in-kind benefits.

4.3.4 Statistical analysis

Models were fitted for change in CASP-12 scores between t_0 and t_1 using MLwiN version 2.36 fitted via the *runmlwin* command in Stata version 13.1 (Leckie and Charlton, 2013). A standard IGLS model with adjustment for individual-level covariates (here defined as the ‘fully-adjusted model’) was fitted as described in Chapter 3 with further adjustment for year of work exit to allow for possible confounding in associations between country-level variables and wellbeing change arising from the fact that years covered by the SHARE and ELSA surveys varied between countries. Year of work exit was defined, where available, using the month in which individuals self-reported exiting work. Otherwise the year of the midpoint between t_0 and t_1 was used.

The output of this fully-adjusted model provided starting values for the fully-adjusted MCMC model (Leckie and Charlton, 2013). MCMC models were run with a monitoring period of 100,000 iterations following a burn-in period of 10,000 iterations to allow model convergence and a sufficient effective sample of parameter estimates (as ascertained from regression diagnostics). A summary of non-standard and user-written commands for statistical and diagnostic tests used in the present study is given in Appendix Table A4.4.

Structured Markov Chain Monte Carlo methods were not used as this would have provided negligible benefit in terms of acceleration in model convergence due to the low degree of autocorrelation between chain samples (as determined using autocorrelation and partial autocorrelation plots generated using the *fiweyay* command). Two important limitations of the MCMC algorithms are that the use of survey weights or missing data methods such as multiple imputation are not currently supported in *runmlwin* and these were therefore not applied. The former issue may have implications for the generalisability of the study’s results (see Chapter 2, Section 2.3). Missing data were handled using complete case analysis, which may have had implications for statistical bias due to loss of observations and may have introduced bias into the results depending on the missing data mechanism. For example, if data were not missing completely at random, the analytic sample may potentially have represented a biased sub-sample of possible respondents (Bennett, 2001).

4.3.4.1 Analysis of individual- and country-level variables

Next, country-level variables and groups of country-level variables were added to the model after full adjustment for individual-level variables. A total of 17 models were fitted to cover all three approaches for investigating country-level welfare state effects. Where more than one country-level variable was included in a model these were mutually adjusted.

Models were fully-adjusted for the same individual-level variables, including route and timing of work exit, physical frailty, participation in socially-productive activities, birth outside country of residence, partnership status and financial variables including country-specific quartile of equivalised non-pension household net wealth and natural logarithm of equivalised gross household income, in addition to year of work exit and CASP-12 at t_0 . In each case, as with the model for individual-level effects only, equivalent IGLS models were run before fitting each MCMC model for country effects to generate prior distributions for each parameter (Leckie and Charlton, 2013). The same burn-in and monitoring periods of 10,000 and 100,000 iterations were used.

Country-level variables included in each of the 17 models are listed separately for each model. These were as follows:

Regime approach

Model 1: Welfare state typology

Spending approach

Effort measures

Model 2: Total public social protection spending

Model 3: In-kind benefits and cash benefits

Emphasis measures

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Model 4: In-kind benefits and cash benefits

Expenditure measures

Model 5: Total public expenditure 7

Model 6: In-kind benefits expenditure and cash benefits expenditure

Model 7: In-kind old age benefits expenditure, other in-kind benefits expenditure, old age cash benefits expenditure and other cash benefits expenditure

Institutional approach

Model 8: Median net pension replacement rate

Model 9: Doctor density

Model 10: Welfare progressivity (Q5/Q1 ratio)

Model 11: GDP per capita

Model 12: Gross gini index of income

Model 13: Unemployment

Model 14: Economic growth

Model 15: Inequality-adjusted HDI

Model 16: Governance score

Model 17: Government effectiveness score.

Each of these country-level variables is summarised in Table 4.5. Their units of measurement, source and years in which they were measured are shown.

Table 4.5. Summary of country-level measures employed in the present study

Statistic	Units	Year(s)	Source	Notes
Social protection (Spending approach)				
Social Protection Spending (Welfare Effort)¹				
Net Total (all public and private)				
Total Public				
Total Public Cash Benefits		In year of work exit (2002–2013)	OECD, Social Expenditure Aggregated Data, SOCX Database	All health benefits in the 16 countries analysed classified as benefits in-kind
Total Public Benefits In-kind	% GDP			
Health-related Benefits In-kind				
Non-health-related Benefits In-kind				
Old Age Cash Benefits				
Non- Old Age Cash Benefits				
Social Protection Spending (Welfare Emphasis)				
In-kind benefits (% public)		In year of work exit (2002–2013)	Derived	
Cash benefits (% public)			Derived	
Social Protection Spending (Per capita Expenditure)²				
Net Total (all public and private)				
Total Public				
Total Public Cash Benefits		In year of work exit (2002–2013)	OECD, Social Expenditure Aggregated Data, SOCX Database	All health benefits in the 16 countries analysed classified as benefits in-kind
Total Public Benefits In-kind	EUR 000s, 2011 PPPs			
Health-related Benefits In-kind				
Non-health-related Benefits In-kind				
Old Age Cash Benefits				
Non- Old Age Cash Benefits				
Welfare outcomes and outputs (Institutional approach)				
Progressivity of Cash Benefits³				
Percentage of Cash Public Social Benefits Paid to Highest Quintile			OECD, OECD Income Distribution and Poverty Database	Not analysed, used to derive welfare progressivity
Percentage of Cash Public Social Benefits Paid to Lowest Quintile		2011		
Q5 to Q1 Ratio (welfare progressivity)			Derived	
Pension Replacement Rate⁴				
Total Net Replacement Rate	% of Median Individual Earnings	2011	Pensions at a glance, OECD, 2013	
Gross Replacement Rate from Public Schemes				
Doctors per Head of Population⁵				
Doctors per 000 population		2011	OECD, Health Care Resources Database	
Statistic	Units	Year(s)	Source	Notes

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Human Development Index⁶

Inequality-adjusted Human Development Index	0–1.0	2012	United Nations Development Programme
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Gini Index (Income)⁷

Income Gini Coefficient	0–100	2013	World Bank, World Development Indicators
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GDP per capita⁸

GDP per capita (current prices, 2011 PPPs)	EUR 000s	2011	OECD, Level of GDP per capita and Productivity
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Unemployment⁹

Unemployment Rate (55–64 years)	% Workforce (55–64 years)	In year of work exit (2002– 2013)	OECD Employment Outlook	In year of exit event
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Economic Growth¹⁰

% GDP	In year of work exit (2002– 2013)	In year of exit event
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Governance (Institutional social capital)

Worldwide Governance Indicators¹¹

Governance				Governance is derived from country-level average scores across all governance indicators: Government effectiveness, political stability and absence of violence, regulatory quality, rule of law, voice and accountability and control of corruption
Government Effectiveness	Scale -2.5–2.5	Average 2003– 2013	The World Bank, World DataBank	

¹<https://stats.oecd.org/Index.aspx?DataSetCode=IDD>

²<https://stats.oecd.org/Index.aspx?DataSetCode=IDD>

³<https://stats.oecd.org/Index.aspx?DataSetCode=IDD>

⁴<http://dx.doi.org/10.1787/888932907224>

⁵<https://data.oecd.org/healthres/doctors.htm>

⁶http://hdr.undp.org/sites/default/files/reports/14/hdr2013_en_complete.pdf

⁷<http://hdr.undp.org/en/composite/IHDI>

⁸https://stats.oecd.org/Index.aspx?DataSetCode=PDB_LV

⁹<https://data.oecd.org/emp/employment-rate-by-age-group.htm>

¹⁰<https://stats.oecd.org/index.aspx?queryid=60702>

¹¹http://databank.worldbank.org/data/reports.aspx?Report_Name=WGI

4.3.4.2 *Variance components: Proportion of country effects explained*

The modelling procedure for determining proportion of country effects explained by country-level variables followed a number of distinct steps. First, a null (unconditional) model was fitted for CASP-12 change scores in the combined sample without adjustment for individual-level variables (see Chapter 2, Section 8.3.2). Random effects parameters were estimated using the MCMC algorithm within a multilevel ANCOVA framework as performed by Bock (2014). Estimates of random effects parameters from the null model were used to calculate the ICC for country effects. The ICCs derived from each of the conditional models with adjustment for individual-level variables and different country-level variables were divided by the ICC estimated from the null model to calculate the proportion of country-level variance explained by the addition each country-level variable (or group of country-level variables). The effects of the addition of country-level variables on between-country variance were illustrated by generating two residual plots for level-2 units based on the unconditional model and for the conditional model after adjustment for welfare regime and individual-level variables using the `serbar` command in Stata (StataCorp, 2013).

4.3.5 **Regression diagnostics**

An assumption of regression models is normality of error terms. This assumption also extends to level-2 residuals in the case of multilevel models. Given the small sample size a q-q (quantile-quantile) plot is graphed to visually ascertain the normality of level-2 country residuals using the outputs of the unconditional MCMC model. Diagnostics of MCMC model fit are undertaken using the `fiweaway` command. Using unconditional model outputs, this command generates plots of parameter trajectory, kernel density, auto-correlation function, partial auto-correlation function and Monte Carlo standard error. The latter three were used to determine whether there was excessive autocorrelation in outputs between iterations and whether the MCMC model had achieved convergence.

4.3.6 Sensitivity analyses

4.3.6.1 Influential level-2 units

Over-influential level-2 units may represent a source of instability and poor reliability of model coefficients. This is particularly the case in analyses of country-level variables where the number of individual-level observations is high relative to the level-2 units (Van der Meer, Grotenhuis and Pelzer, 2010). Over-influential countries were identified by calculating $DF\beta$, a measure of how much a given coefficient changes after excluding a given level-2 unit from the analytic sample.

$DF\beta$ was calculated using the in-built `mltcooksd` command within Stata. This sequentially refits the model specified but removing one level-2 unit at a time. $DF\beta$, calculated by the following formula using Van der Meer et al.'s approach (2004), shows the difference in each standardised variable coefficient between the full model and one in which a given country is removed:

$$DF\beta(j) = \frac{(b(j) - b(j)_i)}{se(j)_i} \quad (7)$$

Where $b(j)$ represents the original coefficient estimated from the original model without removal of any countries and $b(j)_i$ and $se(j)_i$ represent the coefficient estimate and standard error of the coefficient j after excluding country i .

Although no formal statistical test exists for identifying influential 'high-leverage' level-2 units, Belsley et al. (1980) advocate using $2/\sqrt{n}$ to define a cut-off for $DF\beta$ (where n is the number of level-2 units) while values over 1 are considered strongly influential (Mikucka, 2014).

Survey weights were generated for each country to account for the disparity in numbers of respondents between countries using the reciprocal of the proportion of the combined sample represented by each country. This analysis was carried out both with and without weighting to ensure any over-influential level-2 units identified were not identified only as a result of the size of one or more country samples. $DF\beta$ values were calculated using the

IGLS algorithm since the relevant in-built Stata commands do not support the use of MCMC model outputs.

4.3.6.2 Mediation of country-level variable effects by individual-level financial variables

Measures of household income at the individual-level included income derived from social protection benefits. It was considered that the effect of cash transfers (or economic variables) measured at the country level on wellbeing change may be mediated by household income. This is because higher economic and development indicator measures or higher effort or expenditure on cash transfers at the country level is likely to be translated into higher income at the household level, which, in turn, could have a positive influence on wellbeing outcomes following work exit. In a fully-adjusted model including financial variables any positive association between these country-level spending and economic variables and CASP-12 change scores may be attenuated as a result. Models 1–17 were therefore refitted for the same analytic sample without adjustment for country-specific quartile of equivalised inflation-adjusted household wealth and logged equivalised household income.

4.3.6.3 CASP-12 domains

Unlike one-dimensional measures of wellbeing such as subjective life satisfaction, which have been criticised for their inability to adequately encompass all aspects of wellbeing, leading to a loss of information when compared with multidimensional measures (Huppert and So, 2011), CASP-12 comprises aggregated measures of hedonic and eudaemonic wellbeing by measuring four constructs of wellbeing in later life, namely control, autonomy, self-realisation and pleasure (as elaborated in Chapter 2 section 3.1.1). Confirmatory factor analysis from CASP-19 has been found to yield a two-factor solution which isolates pleasure, a measure of positive affect and therefore hedonic wellbeing (Diener, 1984) from control, autonomy, and self-actualisation (Vanhoutte, 2014).

Change scores for each individual CASP-12 domain were therefore regressed on individual-level variables (including year of work exit) to confirm whether individual level-variables had the same effect on hedonic and eudaemonic domains of wellbeing. Three country-level

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variables, welfare regime, expenditure on in-kind and cash social protection benefits and Q5/Q1 ratio, were then selected to represent the regime, spending and institutional approaches. The effects of these on each CASP-12 domain were then estimated with full adjustment for individual-level variables to similarly test whether these selected variables influenced wellbeing change across both hedonic and eudaemonic measures. All models were fitted using the MCMC algorithm.

4.4 RESULTS

4.4.1 Descriptive analysis

Table 4.6 shows mean CASP-12 scores at t_0 and t_1 , and mean change in CASP-12 scores from t_0 to t_1 for the combined analytic sample ($n=8,037$) with 95% CIs and for each dataset and country separately. The mean change in CASP-12 scores following exit from paid work was for the entire analytic sample was positive (+0.11, 95% CI: 0.00, 0.22). The mean CASP-12 score at t_0 was 38.61 (95% CI: 38.48, 38.73). This is broadly consistent with estimates from other studies employing SHARE data which were more broadly representative of the population surveyed (e.g. Niedzwiedz et al., 2014).

Although mean CASP-12 scores at both t_0 and t_1 were both higher in the ELSA sample Mean change scores by dataset were positive for SHARE overall (+0.18, 95% CI: 0.05, 0.32) but negative for ELSA (-0.12, 95% CI: -0.30, 0.06). CASP-12 scores at t_0 were lowest in Greece and the Czech Republic and highest in Denmark and the Netherlands. The same was true for CASP-12 scores at t_1 . Mean changes in CASP-12 scores were most positive in France (+0.82, 95% CI: 0.39, 1.26) and most negative in Italy (-0.89, 95% CI: -1.47, -0.31) and Spain (-0.63, 95% CI: -1.23, -0.03). Overall, change in CASP-12 following work exit was positive in Conservative (+ 0.42, 95% CI: 0.24, 0.61) and Social Democratic (+0.30, 95% CI: 0.04, 0.56) welfare states, was near-zero in Former Communist welfare states (+ 0.09, 95% CI: -0.25, 0.42), and negative in Mediterranean ones (-0.73, 95% CI: -1.13, -0.33)

Table 4.6. Mean and values of CASP-12 by dataset and by country (n=8,037)

Dataset	Mean CASP-12 t ₀ (95% CI)	Mean CASP-12 t ₁ (95% CI)	Change CASP-12 t ₀ to t ₁ (95% CI)
Combined	38.61 (38.48, 38.73)	38.71 (38.59, 38.84)	0.11 (0.00, 0.22)
SHARE	38.50 (38.36, 38.65)	38.69 (38.54, 38.84)	0.18 (0.05, 0.32)
ELSA	38.92 (38.68, 39.15)	38.80 (38.55, 39.04)	-0.12 (-0.30, 0.06)
Country			
Austria	40.20 (39.66, 40.74)	40.55 (40.00, 41.10)	0.35 (-0.18, 0.89)
Germany	39.42 (38.87, 39.97)	39.56 (38.98, 40.13)	0.14 (-0.40, 0.68)
Sweden	39.85 (39.47, 40.23)	39.95 (39.51, 40.39)	0.10 (-0.25, 0.46)
Netherlands	40.91 (40.54, 41.29)	41.18 (40.78, 41.59)	0.27 (-0.10, 0.64)
Spain	37.33 (36.76, 37.91)	36.70 (36.09, 37.31)	-0.63 (-1.23, -0.03)
Italy	35.26 (34.64, 35.87)	34.37 (33.72, 35.02)	-0.89 (-1.47, -0.31)
France	37.76 (37.29, 38.23)	38.58 (38.09, 39.08)	0.82 (0.39, 1.26)
Denmark	40.99 (40.63, 41.36)	41.50 (41.12, 41.87)	0.50 (0.13, 0.88)
Greece	34.16 (32.67, 35.65)	33.74 (32.45, 35.03)	-0.42 (-1.92, 1.09)
Switzerland	40.68 (40.23, 41.14)	41.00 (40.53, 41.47)	0.32 (-0.12, 0.76)
Belgium	37.81 (37.38, 38.24)	38.31 (37.84, 38.78)	0.50 (0.09, 0.91)
Czech Republic	34.95 (34.46, 35.43)	35.53 (35.03, 36.04)	0.59 (0.02, 1.15)
Poland	36.56 (35.83, 37.30)	36.51 (35.76, 37.26)	-0.05 (-0.85, 0.75)
Slovenia	40.52 (39.57, 41.47)	40.79 (39.92, 41.67)	0.27 (-0.65, 1.19)
Estonia	36.90 (36.32, 37.48)	36.44 (35.87, 37.00)	-0.47 (-1.04, 0.11)
England	38.92 (38.68, 39.15)	38.80 (38.55, 39.04)	-0.12 (-0.30, 0.06)

Table 4.7 shows average welfare effort (expressed as a percentage of GDP), emphasis (percentage of overall social protection spending) and expenditure (in PPPs relative to Germany in 2011) devoted to in-kind and cash benefits in the 16 countries studied broken down by welfare state regime. Appendix Table A4.5 shows the same measures by country. As found by Kautto (2002), Social Democratic countries and the UK placed the highest emphasis on services during the period covered by the present analysis followed by Bismarckian, Mediterranean and Post-Communist countries. As noted by Bonoli (1997), however, the UK had lower levels of welfare effort and overall social protection expenditure despite its strong emphasis on service provision. Social Democratic countries, meanwhile, have high levels of real expenditure on cash benefits alongside Bimarckian and Mediterranean countries. Meanwhile, the Post-Communist countries, which were not included in Kautto (2002) and Bonoli's (1997) descriptions, in addition to having a similarly low emphasis on benefits in kind as in Mediterranean countries, had the lowest levels of effort and expenditure of all welfare state regimes. This is coherent with Eikemo and Bambra's (2008) description of Post-Communist welfare states as having low overall provision of social protection benefits and extensively privatised public services.

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Table 4.7. Measures of social protection effort, emphasis and expenditure by welfare state type

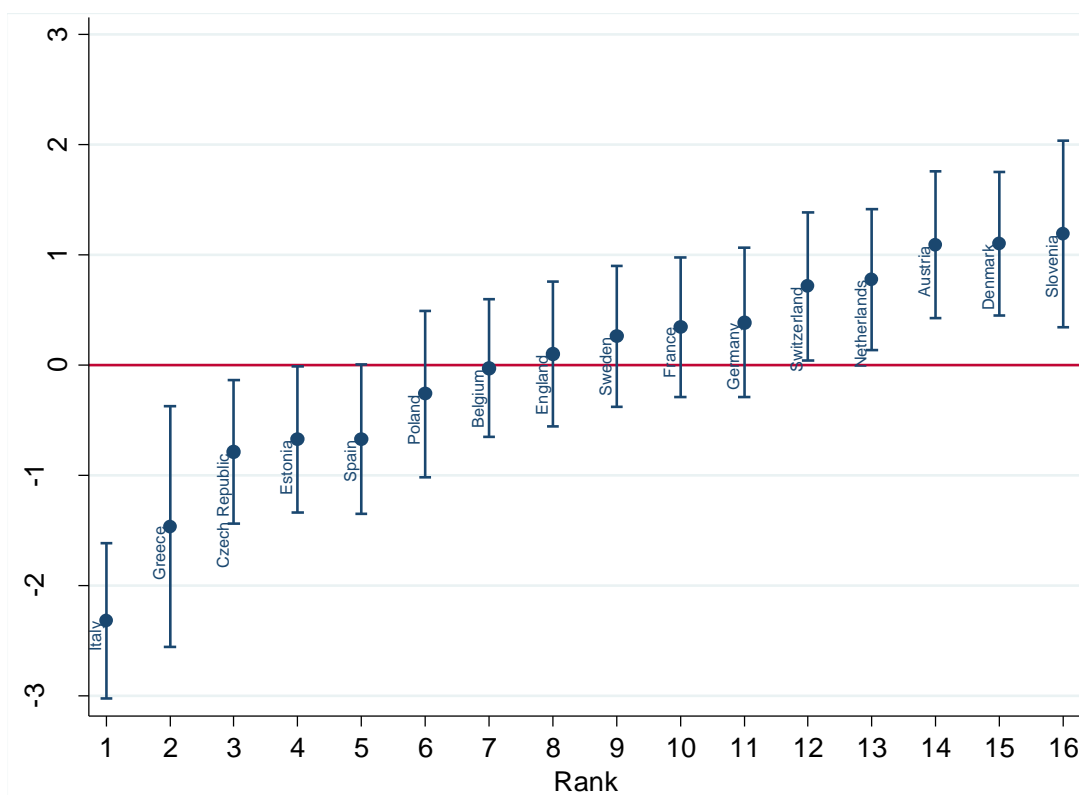
Welfare typology	Total public (% GDP)	Total public (EUR 000s)	Effort			Emphasis			Expenditure		
			In-kind benefits (% GDP)	Cash benefits (GDP)	(%)	In-kind benefits public)	(%	Cash benefits (% public)	In-kind benefits (EUR 000s)	Cash benefits (EUR 000s)	(EUR 000s)
Bismarckian	25.2	8,064.3	9.5	14.9		37.9		58.8	3,059.6	4,745.5	
Mediterranean	26.4	6,261.0	8.2	17.8		30.9		67.1	1,935.4	4,202.0	
Social Democratic	27.4	8,801.5	13.4	12.4		49.1		45.2	4,322.5	3,982.5	
Post-Communist	19.8	3,826.9	6.2	13.2		31.7		66.8	1,212.7	2,555.0	
Anglo-Saxon	22.4	6,279.4	11.2	11.0		49.8		49.2	3,127.1	3,088.4	

4.4.2 Statistical analyses

4.4.2.1 Variance components

The results of the null MCMC model show that country effects accounted for 6.8% of variance in CASP-12 change scores in the combined sample. Figure 4.4 shows country effects obtained from the null model. These are shown as residuals for random intercepts with 95% confidence intervals for each country included in the combined sample.

Figure 4.4. Level-2 country residuals obtained from the unconditional (null) model



The country residuals obtained from the null model show that Italy, Greece, the Czech Republic and Estonia, which are all categorised as Mediterranean or Post-Communist welfare states, all had significantly more negative mean changes in wellbeing following work exit relative to the overall mean before adjustment for country-level variables.

Conversely, respondents in Switzerland, the Netherlands, Austria, Denmark and Slovenia had significantly more positive wellbeing change outcomes on average.

4.4.2.2 Model results for individual-level effects

Results for MCMC models show regression coefficients for change in CASP-12 scores (from t_0 to t_1) based on posterior parameter estimates, Bayesian 95% credible intervals and Bayesian p-values. Table 4.8 shows the outputs for the fully adjusted multilevel random intercepts MCMC model for individual-level effects on CASP-12 change scores. As found in Chapter 3 using a standard IGLS model, the results of the MCMC model indicate that exit from paid work via disability pension, sickness benefits, unemployment benefits and social assistance was significantly associated with more negative changes in CASP-12 scores. Respondents who had exited over one year before or one year after their expected retirement age, in addition to those not participating in reciprocal social activities and not in a marriage or partnership, also had significantly more negative scores. Exit via early retirement pension and higher household wealth and income were associated with more positive change scores.

Table 4.8. Results of a multivariable MCMC model for the determinants of change in wellbeing scores between baseline and follow-up post labour market exit in the SHARE and ELSA combined sample (n=8,037)

Variable	Categories	Coefficient (95% Credible Interval)	p
Route of exit from work	Old age pension	ref	
	Disability pension	-1.45 (-1.94, -0.96)	<0.001
	Unemployment benefit	-1.13 (-1.66, -0.61)	<0.001
	Sickness benefit	-2.13 (-2.97, -1.28)	<0.001
	Social Assistance	-1.33 (-2.72, 0.05)	0.029
	Early retirement pension	0.55 (0.13, 0.98)	0.005
	None	-0.22 (-0.46, 0.02)	0.036
Age at exit from work	>1 year before	-0.37 (-0.63, -0.12)	0.002
	Official pension age \pm 1 year	ref	
	>1 year after	-0.46 (-0.73, -0.19)	<0.001
Country-specific quartile of household net worth	1 (poorest)	ref	
	2	0.85 (0.53, 1.17)	<0.001
	3	1.05 (0.74, 1.37)	<0.001
	4 (wealthiest)	1.37 (1.05, 1.69)	<0.001
Household income	Logged equivalised income	0.27 (0.15, 0.38)	<0.001
Frailty index	Frailty Index	-6.02 (-7.28, -4.75)	<0.001
Participation in social activities	Never	ref	
	Yes	0.87 (0.65, 1.07)	<0.001
Partnership status	Partnered	ref	
	Non-partnered	-0.25 (-0.48, -0.01)	0.021
Born abroad	No	ref	
	Yes	-0.26 (-0.63, 0.11)	0.082
Random-effects parameters			
Country		1.18 (0.51, 2.56)	
Individual		19.20 (18.62, 19.81)	

4.4.2.3 Model results for country-level effects: Welfare state type (regime approach)

Table 4.9 shows the effects of welfare state regime and country-level welfare spending measures on CASP-12 change scores with full adjustment for individual-level variables and year of exit from work (Models 1–7). The results of Model 1 show that welfare typology accounted for 62.1% of country differences in wellbeing change following work exit. Individuals residing in Mediterranean welfare states had significantly worse wellbeing outcomes following work exit with a change of -2.15 (95% credible interval: -3.23, -1.06, $p < 0.001$) CASP-12 points when compared to those in Bismarckian welfare states. Residence in a Post-Communist welfare state had a borderline significant negative effect of -0.85 (95% CI: -1.81, 0.15, $p = 0.044$) points.

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Table 4.9. Country-level effects of welfare regime and spending measures on change in wellbeing following work exit and proportion of between-country variance explained (fully-adjusted) (n=8,037)

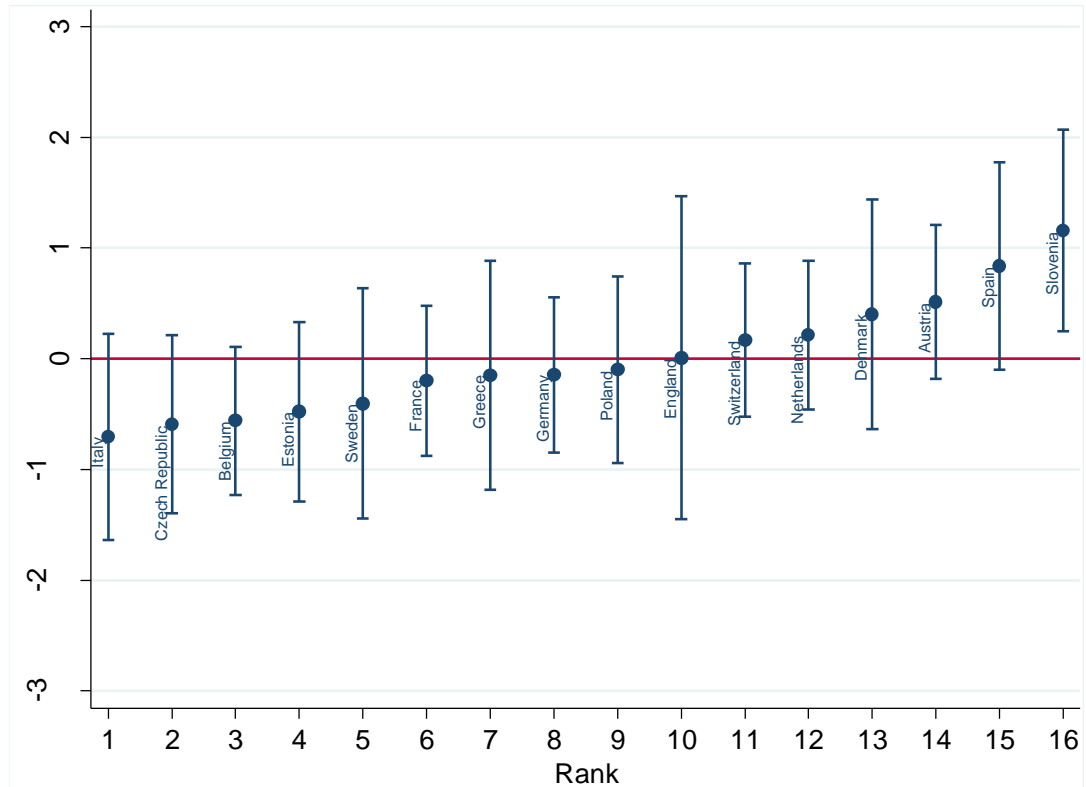
Variable ¹	REGIME APPROACH		SPENDING APPROACH				
	Model 1	Model 2	Effort Model 3	Emphasis Model 4	Model 5	Expenditure Model 6	Model 7
Welfare typology							
Conservative	Ref						
Mediterranean	-2.15 (-3.23, -1.06)***						
Social democratic	0.21 (-0.98, 1.43)						
Post-Communist	-0.85 (-1.81, 0.15)*						
Liberal	-0.76 (-2.37, 0.78)						
Social protection							
Total public (% GDP)	0.01 (-0.10, 0.10)						
In-kind benefits (% GDP)	0.12 (-0.08, 0.31)						
Cash benefits (% GDP)	-0.07 (-0.19, 0.05)						
<hr/>							
In-kind benefits (% public)	0.05 (-0.01, 0.10)						
<hr/>							
Total public (EUR 000s)	0.27 (0.02, 0.53)*						
In-kind benefits (EUR 000s)	0.47 (-0.05, 0.97)*						
Cash benefits (EUR 000s)	0.06 (-0.36, 0.52)						
In-kind health benefits (EUR 000s)	-0.15 (-1.43, 1.03)						
Other in-kind benefits (EUR 000s)	0.93 (0.00, 2.07)*						
Old-age cash benefits (EUR 000s)	0.34 (-0.53, 1.41)						
Working-age cash benefits (EUR 000s)	0.13 (-0.76, 1.00)						
<hr/>							
Country-level variance	0.51	1.18	1.01	0.96	1.00	0.93	1.31
Individual-level variance	19.17	19.18	19.17	19.18	19.15	19.17	19.17
Percent country-level variance	2.57	5.78	4.99	4.77	4.96	4.62	6.38
Percent Explained (vs null)	62.11	14.76	26.53	29.66	26.86	31.96	5.99

¹Independent effects of country-level welfare state variables after full adjustment for individual-level variables: route of exit from work, age at exit from work, country-specific quartile of household net worth, household income, frailty index, participation in social activities, partnership status, born abroad, year of exit event and CASP-12 at t₀.

***p<0.001; **p<0.01; *p<0.05

The level-2 country residuals and 95% confidence intervals derived from Model 1 after adjustment for welfare state regime are shown in Figure 4.5.

Figure 4.5. Level-2 country residuals derived from Model 1 with adjustment for welfare state type and individual-level variables



The country residuals displayed show that, after adjusting for welfare regime, which accounts for 62.1% of between-country differences when compared with the null model in Figure 4.4, only residence in Slovenia continued to have a statistically significant positive effect on change in wellbeing following work exit.

4.4.2.4 Model results for country-level effects: Social protection (spending approach)

Model 2 shows the effect of overall welfare effort as a percentage of GDP on CASP-12 change following work exit while Model 3 shows the effects of welfare effort disaggregated

into in-kind and cash transfer components (Table 4.8). Neither total welfare effort nor welfare effort devoted to in-kind and cash benefits had statistically significant effects on wellbeing change following work exit. These variables only explained 14.8% and 26.5% of between-country differences respectively. Model 4 shows the effect of emphasis on benefits in kind as a percentage of total public social protection spending. For each additional percent of spending devoted to benefits in kind there was a borderline significant increase of 0.05 CASP-12 points (95% CI: -0.01, 0.10, $p=0.058$) following work exit. Emphasis on in-kind benefits explained 29.9% of between-country differences.

The results of Model 5 show that each additional EUR 1,000 in per capita total social protection expenditure had a statistically significant effect of 0.27 CASP-12 points (95% CI: 0.02, 0.53, $p=0.018$) and accounted for 26.9% of country-level variance. The results of Model 6 show that when expenditure was disaggregated into in-kind and cash benefits these had effects of 0.47 (95% CI: -0.05, 0.97, $p=0.036$) and 0.06 (95% CI: -0.36, 0.52, $p=0.398$) CASP-12 points respectively. Only in-kind benefits had a significant association with CASP-12 change. The results of Model 7 show that whereas each additional EUR 1,000 in per capita expenditure on healthcare benefits in kind had a non-significant effect of -0.15 (95% CI: -1.43, 1.03, $p=0.413$) CASP-12 points, the same increase in expenditure on other (non-health) benefits in kind had an effect of 0.93 (0.00, 2.07, $p=0.025$) points. Neither expenditure on old age nor on working age cash benefits had a statistically significant effect on wellbeing change following work exit.

4.4.2.5 Model results for country-level effects: Welfare outcomes, economy, development and institutional-level social capital (institutional approach)

Table 4.10 shows the effects of country-level institutional measures on change in CASP-12 following work exit with full adjustment for individual-level variables and year of exit from work (Models 8–17). Of the welfare outcomes considered (Models 8–10), only welfare progressivity had a significant effect on CASP-12 change scores ($p=0.001$) (Model 10). Lower welfare progressivity as indicated by higher Q5/Q1 ratios had a strong negative effect on wellbeing outcomes and explained 53.7% of country differences in wellbeing change following work exit. Median net pension replacement rate and doctor density, meanwhile, had no statistically significant effects on the outcome measure ($p=0.374$ and

$p=0.156$) and only accounted for 10.6% and 15.9% of between-country variance respectively (Models 8 and 9).

Models 11–15 show the effects of economic and development indicators on CASP-12 change scores following work exit. The effect of GDP per capita was small but statistically significant, with an effect size of 0.09 (95% CI: 0.01, 0.16, $p=0.013$) CASP-12 points per additional EUR 1,000 in GDP per capita. This variable explained 32.9% of country-level variance (Model 11). Inequality measured using the gini index (gross income) was also found to significantly influence wellbeing change following work exit ($p=0.007$), resulting in more adverse changes in wellbeing following work exit, and accounting for 39.9% of between-country variance (Model 12). Country-level unemployment rates among people aged 55–64 years and economic growth in the year of work exit had non-significant effects of -0.05 (-0.12, 0.02, $p=0.079$) and 0.06 (-0.04, 0.16, $p=0.124$) per percentage point on CASP-12 change scores respectively (Models 13 and 14). These variables accounted for 14.7% and 30.7% of between-country variance respectively. Inequality-adjusted HDI, meanwhile, had a statistically significant effect on wellbeing change following work exit ($p<0.001$) and explained 61.3% of country-level differences (Model 15).

Finally, the results of Models 16 and 17 show that institutional social capital measures governance and government effectiveness had effects of 1.88 (95% CI: 1.07, 2.70) and 1.49 (95% CI: 0.83, 2.14) CASP-12 points per scale unit. Both these effects were highly statistically significant ($p<0.001$) and explained a large proportion of country differences.

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Table 4.10. Country-level effects of institutional measures, including welfare outcomes, economic variables and institutional-level social capital, on change in wellbeing following work exit and proportion of between-country variance explained (fully-adjusted) (n=8,037)

Variable ¹	INSTITUTIONAL APPROACH									
	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17
Welfare outcomes										
Pension replacement rate	0.01 (-0.03, 0.05)									
Doctor density		-0.29 (-0.88, 0.28)								
Welfare progressivity			-0.64 (-1.03, -0.25)**							
Economy and development										
GDP per capita (EUR 000s)				0.09 (0.01, 0.16)*						
Gross gini index of income					-17.65 (-32.68, -3.71)**					
Unemployment						-0.05 (-0.12, 0.02)				
Economic growth (% GDP)							0.06 (-0.04, 0.16)			
Inequality-adjusted HDI								21.70 (10.55, 33.08)***		
Institutional social capital										
Governance									1.88 (1.07, 2.70)***	
Government effectiveness										1.49 (0.83, 2.14)***
Country-level variance	1.24	1.16	0.62	0.83	0.82	1.10	1.17	0.52	0.39	0.40
Individual-level variance	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.18	19.18
Percent country-level variance	6.06	5.71	3.14	4.15	4.08	5.44	5.77	2.63	2.00	2.06
Percent Explained (vs null)	10.63	15.87	53.70	38.77	39.90	19.77	14.96	61.26	70.56	69.71

¹Independent effects of country-level welfare state variables after full adjustment for individual-level variables: route of exit from work, age at exit from work, country-specific quartile of household net worth, household income, frailty index, participation in social activities, partnership status, born abroad, year of exit event and CASP-12 at t₀.

***p<0.001; **p<0.01; *p<0.05

4.4.3 Regression diagnostics

Country-level residuals had a near normal distribution based on the output of the unconditional model suggesting that the assumption of their normality at all levels of the model was met (Appendix Figure A4.1). The MCMC diagnostic outputs indicated that auto-correlation was not excessive and that the model had achieved convergence by 100,000 iterations as evidenced by the rapid dropoff in autocorrelation and partial autocorrelation as lag increased (Appendix Figure A4.2).

4.4.4 Sensitivity analyses

4.4.4.1 Influential level-2 units

Figure 4.6 shows the $DF\beta$ for each individual-level variable with and without weights to account for differences in sample size between countries. The red lines show the critical level above which a given level-2 unit could be over-influential. Estimates of $DF\beta$ for each model coefficient without weights showed that England may represent an over-influential country in the analysis on estimates of several of the individual-level variables. This was not the case, however, once weights were applied. These results can be interpreted as showing that although the inclusion of ELSA participants in the combined sample did have an influential effect on several variables, this was likely due to the fact that England represented the largest level-2 unit ($n=2,006$, or 25.0% of the combined sample).

4.4.4.2 *Mediation of country-level variable effects by individual-level financial variables*

Appendix Tables A4.6 and A4.7 show the country-level effects for Models 1–7 (regime and spending approaches) and Models 8–17 (institutional approach) respectively without adjustment for individual-level financial variables. In each case the associations between country-level variables and CASP-12 change scores in response to work exit were the same as with the fully-adjusted models. In particular, the associations between effort and emphasis on cash transfers and wellbeing change (Models 4 and 6) remained non-significant without the inclusion of financial variables. It can be surmised, therefore, that household-level financial variables did not mediate the effects of country-level measures of effort and emphasis on cash transfers, or institutional variables such as welfare progressivity, on individual-level wellbeing outcomes.

4.4.4.3 *CASP-12 domains*

When the analysis was repeated for change in control, autonomy, self-actualisation and pleasure as outcome variables the same associations between individual-level variables and these outcome measures the same statistically significant associations were found as with full CASP-12 change scores (Appendix Table A4.8). The only exception, however, was that participants not in a marriage or partnership experienced a significant increase in autonomy following work exit when autonomy was regressed on partnership status.

Finally, Appendix Table A4.9 shows the associations between three country-level variables, welfare regime, expenditure on in-kind and cash benefits and Q5/Q1 ratio, and change in individual CASP-12 domains following work exit. The associations between country-level variables and the autonomy, pleasure and self-actualisation domains were the same as when the full CASP-12 scale was the outcome variable. No significant associations were found between any of the country-level variables and the control domain.

These results can be interpreted as indicating that both individual- and country-level variables have significant effects on measures of change in both eudaemonic and hedonic dimensions of wellbeing following work exit.

4.5 DISCUSSION

This chapter developed the analysis of individual-level determinants of wellbeing change following work exit (Chapter 3) in two ways. Firstly, a range of country-level influences on individuals' wellbeing change following work exit were also considered. Secondly, the analytic methods were refined by fitting multilevel models using an MCMC algorithm to minimise bias when estimating random effects and provide reliable estimates of proportion of country-level differences explained by given country-level variables. The present study considered country-level welfare state determinants of wellbeing outcomes following work exit using three approaches: the regime approach, the spending approach and the institutional approach. Welfare regime had a significant effect on wellbeing change scores following work exit with individuals residing in Mediterranean and Post-Communist welfare states experiencing more negative outcomes than in Bismarckian welfare states. In addition to this, one novelty of the present study is the inclusion of disaggregated measures of social protection spending and their expression as effort, emphasis and expenditure. Finally a range of variables representing welfare state features and institutional social capital were considered. In sum, the present study addresses the relative lack of attention devoted to the effects of welfare expenditure allocated to different policy areas across countries (Bergqvist et al., 2013) while also considering the role of other institutional welfare state factors not summarised by spending measures such as progressiveness of welfare spending, healthcare access and pension generosity.

This study also addresses the major criticism of previous cross-national studies on wellbeing that they have generally focused on hedonic concepts of wellbeing while ignoring eudaemonic measures (Jorm and Ryan, 2014) by using change in CASP-12 and its individual domains as outcome measures. The results show that individual-level determinants identified in Chapter 3, in addition to country-level variables representing the regime, spending and institutional approaches not only have effects on CASP-12 summary scores but across eudaemonic and hedonic domains of wellbeing.

4.5.1 Country-level effects

4.5.1.1 *Welfare state regimes and wellbeing change following work exit*

Change in wellbeing in response to work exit events constitutes a major risk that welfare states and social protection spending are intended to mitigate. As hypothesised (see Section 2.3), residence in Social Democratic welfare states, which achieve a greater degree of decommodification than other welfare state regimes, has a non-significant but positive effect on CASP-12 change scores relative to Bismarckian welfare states. Residence in Post-Communist and Mediterranean welfare states, meanwhile, had a negative effect on CASP-12 change scores. Niedzwiedz et al. (2015) found similar effects of welfare state type on cross-sectional CASP-12 wellbeing among SHARE respondents. It can be hypothesised that this is a function of the degree of decommodification achieved by each welfare state regime (Pacek and Freeman, 2015). Just as the Scandinavian welfare state regime is considered most effective in achieving decommodification (e.g. Esping-Andersen, 1990), followed by the Bismarckian, Anglo-Saxon, Post-Communist and Mediterranean welfare regimes, respondents in Social Democratic welfare states had more positive CASP-12 wellbeing scores following work exit than those in Bismarckian welfare states who in turn had more positive wellbeing change outcomes than respondents in Anglo-Saxon, Post-Communist and Mediterranean welfare states. This association was significant only in the case of the latter after full adjustment for individual-level variables, however.

4.5.1.2 *The influence of disaggregated social protection expenditure components*

To my knowledge, the present study is the first to address country-level determinants of wellbeing change following work exit and to use disaggregated spending measures. Furthermore, few studies to date have considered the role of welfare spending on wellbeing. Studies that did only considered effects of welfare effort. Specifically, Okulicz-Kozaryn et al. (2014) found that overall welfare effort had a positive effect on subjective life satisfaction in cross-section while Veenhoven (2000b) found no effect on country-level average life satisfaction. As hypothesised, the results show that higher levels of welfare effort and expenditure were associated with more positive changes in wellbeing following work exit in early old age. They also show that overall expenditure (Model 5), expenditure on in-kind benefits (Model 6) and expenditure on in-kind benefits other than healthcare (Model 7) were significantly associated with more positive changes in wellbeing change

following work exit. Expenditure on expenditure on in-kind benefits other than healthcare was found to have the strongest influence on CASP-12 change outcomes in terms of effect size.

These findings imply that in-kind benefits, particularly non-health in-kind benefits, are decommodifying to a greater degree than cash transfers (Bambra, 2005) which are focused more on smoothing of consumption over the lifecourse (Esping Andersen, 1990; Eikemo and Bambra, 2008) or horizontal life-cycle distribution of income from in-work periods to retirement rather than vertical redistribution from higher to lower income households (Castles, 2008). One interpretation of this finding is that consumption of services is made less dependent on market forces as greater absolute social expenditure (in terms of PPP-adjusted units of currency) is directed towards in-kind benefits (Bambra, 2005). In turn, this may lower the risk that the cost of these services, when needed, will exceed household financial resources once individuals have exited the workforce. Welfare spending may therefore act as a buffer against declines in consumption following work exit and the accompanying decline in wellbeing (Bonsang and Klein, 2011; 2012). For these reasons, it is argued that in-kind benefits, which are unrelated to earnings or in-work contributions, and consequently do not favour individuals of higher socioeconomic position, are likely to exert a stronger decommodifying effect (Jensen, 2008).

One feature of in-kind welfare provision is that effort on in-kind health-related benefits is relatively similar across developed countries. This is therefore less salient and unlikely to represent a differentiating feature of welfare state types. Rather, mechanisms of financing and delivery of health services, rather than measures of effort or expenditure, are likely to represent the primary drivers of national differences in health indicators (Moran, 2000). Conversely, expenditure on other services varies significantly between countries, and, particularly in the case of social care services, is considered to reflect the degree of commitment to defamilisation as seen in Scandinavian welfare states (Jensen, 2008). This is particularly the case when considering services other than healthcare which can be provided both within and outside the family (Ferrera, 1996).

In addition to substantiating criticisms that previous work betrays a one-sided focus on social insurance provisions and neglect of personal social services (Abrahamson, 1999), these results may also indicate that per capita expenditure measures are more representative of utility derived from transfers and services received by individuals and therefore the decommodifying effects of welfare policies. Measures of welfare effort and emphasis

(Models 2–4), meanwhile, had no statistically significant effect on wellbeing change. Expenditure measures denominated in PPP-adjusted units of currency are more indicative of the purchasing power of cash transfers and value of public services consumed by individuals, and therefore more representative of their decommodifying effects, than measures of welfare effort as a percentage of GDP or emphasis on a given area of social protection given as a percentage of social protection spending.

In sum, use of disaggregated spending measures, partitioning of variance components within a multilevel MCMC framework and the use of comparable country-level indicators available through databases such as SOCX present new avenues for investigating the influence of welfare state policies and could be applied to a range of outcome measures.

4.5.1.3 Effects of social and economic factors on wellbeing change following work exit

As hypothesised, low welfare progressivity (indicated by a high Q5/Q1 ratio) and higher gross Gini index values (Models 10 and 12) were associated with negative changes in wellbeing following work exit and their effects were statistically significant. Wellbeing change outcomes were therefore more negative in more unequal countries. Meanwhile, higher country-level measures of GDP per capita, inequality-adjusted HDI and institutional social capital were significantly associated with more positive wellbeing outcomes following work exit (Models 11 and 15–17). Higher HDI scores may exert their effects through a combination of lower income inequality, higher GDP per capita, and greater access to public services as indicated by higher life expectancy and average years of schooling. The effects of institutional social capital, which also positively influences country-level wellbeing in cross-section (e.g. Helliwell and Putnam, 2004; Abdallah et al., 2008), may be a result of greater effectiveness of government in pursuing welfare objectives (i.e. decommodification), its capacity to effectively formulate and implement sound policies, the quality of the civil service and the degree of its independence from political pressures, and the quality of policy formulation and implementation (Appendix Table A4.3). Median net pension replacement rate, doctor density (per 100,000 residents) and annual economic growth (Models 8, 9 and 14) did not have a significant effect on wellbeing change following work exit.

4.5.1.4 *Variance components*

Attempts have also been made to quantify the degree to which welfare state factors explain country-level differences in health-related variables by partitioning of variance within a multilevel framework. Multilevel models can be used to estimate both the proportion of variance in an outcome measure explained by country effects and the proportion of these country effects explained by a given country-level variable.

To my knowledge, this is the first study to apply these methods to wellbeing outcomes following work exit. Variables explaining more than 50% of country-level differences in wellbeing change following work exit in the present study included welfare regime (62.1%), progressivity of welfare spending as measured using the Q5/Q1 ratio (53.7) inequality-adjusted HDI (61.3%), governance (70.6%) and government effectiveness (69.7%). By comparison, although measures of welfare expenditure had strong effects on individual-level CASP-12 change scores per additional EUR 1,000, in particular expenditure on non-healthcare benefits in kind (0.93, 95% CI: 0.00, 2.07), no group of expenditure variables explained more than 32% of differences between countries. Welfare state regime, therefore explained a higher proportion of country-level effects than any measure of social protection effort, emphasis or expenditure. In addition to stratification of cash transfers and service provision, welfare regimes may also influence wellbeing change via specific welfare rules which guide the institutional patterns of work exit and individuals' behaviour (Morsa, 2002; van Raak et al., 2005). These rules and conditions of work exit may exert a decommodifying effect independent of cash transfers or provision of services. Referring back to Kuitto et al.'s framework (2016), welfare regimes can also be considered to exert effects on wellbeing outcomes not only through expenditure but also their institutional features which govern mechanisms of financing, extent of benefit coverage and eligibility. Furthermore, institutional measures of welfare progressivity, governance and HDI give a broader summary of the social and economic conditions within a given country as they are either a function of, or are themselves composite measures of, multiple variables representing a range of institutional welfare state features. Therefore, although measures of expenditure on a specific policy area may be more informative from a policy perspective or more powerful predictors of wellbeing following work exit at the individual level, such measures only represent one aspect of a welfare state and are likely to only partially explain between-country differences.

4.5.2 Strengths and Limitations

The study's strengths include its large sample size and adjustment for important individual-level determinants of wellbeing change following work exit. Another is its use of disaggregated spending measures and partitioning of variance components within a multilevel MCMC framework using comparable country-level indicators available through databases such as SOCX. This study presents new avenues for investigating the influence of welfare state policies across a range of outcome measures.

Although the use of MCMC methods minimised bias in estimates of random effects parameters due to the small number level-2 units, the assumption that the 16 countries included in the analysis comprised a random sample may have been undermined as these were limited for pragmatic reasons by their inclusion in SHARE and ELSA and only included OECD member countries with a high level of socioeconomic development (Gogh and Wood, 2006). This limits the generalisability of the study's results to non-European contexts. Furthermore, one assumption of multilevel models is that level-2 units are randomly drawn from a representative sample (Kish, 1965). When undertaking country comparisons, however, countries are selected non-randomly and it is unclear what sample they are drawn from and what this sample is representative of. This assumption was therefore likely to have been broken as this issue cannot be addressed in the present analysis. One disadvantage of the use of MCMC methods was that they do not currently support the use of sample weights or missing data methods such as multiple imputation.

Components of welfare spending could not be disaggregated into more specific policy areas as this would have compromised the comparability of the measures between countries. The present study was unable to give a full coverage of all institutional welfare state features as outlined by Kuitto et al. (2016). Additional comparable cross-country data would likely be required to characterise welfare states in fuller detail. Although comparable expenditure measures may provide an effective means for making cross-country comparisons, they represent an incomplete picture of decommodification at the country level as they cannot account for all welfare state features.

4.6 CONCLUSIONS

Although country of residence only explained around 7% of overall variance in change in wellbeing as individuals leave work in early old age, the majority of the differences between countries could be explained by country-level variables. In particular, welfare regime explained 62% of between-country differences. These country-level variables are also associated with large effects on wellbeing change at the individual level. Individuals residing in countries with a Mediterranean welfare regime experience the most negative change in wellbeing. Total per capita social protection expenditure, and particularly expenditure on non-healthcare services, was associated with more favourable changes in wellbeing after leaving paid work. By extension, expenditure on non-healthcare services can be interpreted as exerting the strongest decommodifying effect. The results may highlight the benefits of widespread provision of welfare services, such as home help and residential care (Table 4.2), as a means to mitigate the potential negative impacts of transitions out of paid work on individuals' wellbeing in early old age.

To my knowledge this is the first study to address country-level determinants of wellbeing change following work exit. With regards to the spending approach this is also the first to use disaggregated spending measures. To date few studies have considered the associations between welfare spending and wellbeing and these used aggregated wellbeing measures at the country level as their outcome and only considered effects of welfare effort (Veenhoven, 2002; Okulicz-Kozaryn et al., 2014). The study's results underscore the policy importance of provision of welfare services as greater numbers of workers in developed countries reach retirement age (Monnier, 1997).

These results may also have important implications from a resilience standpoint. Country-level factors such as welfare provision can be interpreted as having an influence on the process of adaptation as individuals make important age-graded lifecourse transitions but clearly cannot be interpreted as representing proxies for resilience. The relationships between country of residence country-level factors and the process of resilience during transitions out of paid work will be discussed in Chapter 6 in greater depth.

In contrast with the present chapter, which investigated country-level influences on resilience following exit from work in early old age, the next chapter will consider resilience determinants operating at different points over the lifecourse. Specifically, two measures of lifecourse adversity, adverse lifecourse events and cumulative socioeconomic disadvantage,

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will be defined using data from the ELSA Wave 3 Life History Survey. Their associations with measures of wellbeing and mental health in cross section and resilience following work exit will be investigated.

5 CHAPTER 5: Lifecourse Determinants of Adaptation and Resilience in Later Life

5.1 INTRODUCTION

The previous chapter built on the analysis of Chapter 3 by adding groups of country-level variables. These variables were grouped according to one of three approaches to the study of welfare state measures: the regime approach, the spending approach and the institutional approach. The results not only showed the associations of different country-level variables with wellbeing change following work exit at the individual-level, but also reported the proportion of between-country differences explained by each group of country level variables.

The objective of this chapter is to characterise the associations between exposure to adversity over the lifecourse and resilience outcomes following exit from work. It will pursue multiple lines of enquiry. First, it will consider two different types of adversity over the lifecourse. Second, it will consider multiple outcome measures, including wellbeing, subjective life satisfaction and mental health, in relation to the concepts of adaptation and resilience. Third it will investigate how the associations between adversity and different outcomes in later life are influenced by the type and timing of the exposures to adversities over the lifecourse.

5.1.1 Resilience and adaptation

In Chapter 1 (Section 1.3), definitions of resilience were provided, including: a) positive outcomes despite an individual's high-risk status, b) sustained competence despite threat or stress, and c) recovery from trauma (Masten et al., 1990). Masten and Coatsworth (1998, p. 206) explain: "to identify resilience, two judgments are required: first, that there has been a significant threat to the individual, typically indexed by high-risk status... or exposure to severe adversity or trauma... and second, that the quality of adaptation or development is good". Risk and resilience can therefore be considered two sides of the same coin (Ungar, 2004), implying that resilience must incorporate into its definition the interplay of risk

factors. As Rutter (1987) has argued, manifestations of vulnerability or resilience are only apparent in the presence of a risk variable.

In Chapter 3, exit from work, particularly involuntary exit, which can be considered a socially-constructed, age-graded transition and a risk factor in its own right (Coursolle et al, 2010), had significant implications for individuals' wellbeing. In this chapter, work exit will again be the risk event against which resilience is measured.

Although the term 'adaptation' has been used extensively in the context of studies on resilience (e.g. Rutter, 1987; Luthar, 2000), less attention has been paid to providing an explicit definition. Furthermore, some definitions of resilience refer to adaptation as an integral part of the resilience process. For example, one definition of resilience offered by Luthar et al. (2001) is that of a "dynamic process encompassing positive adaptation within the context of significant adversity" (p. 1). Just as both risk and resilience outcomes must also be relevant to the domain 'at stake' (Staudinger, 1993), adaptation as an outcome is determined by the study context. In the context of the present study, resilience and adaptation can be differentiated in the sense that resilience is the process and adaptation is the positive outcome that arises due to resilience processes.

In their review of studies on lifecourse determinants of adult health from birth cohort studies, Power et al. (2013) have gone so far to suggest that any analysis of later-life health outcomes is incomplete without accounting for individuals' trajectories of risk exposure across the lifecourse.

The lifecourse approach to resilience arises from observations that there is often a significant degree of diversity between individuals' lifecourses, which can display continuities, discontinuities and deviations from anticipated norms in their trajectories. These lifecourse effects have a crucial role in creating a multiplicity of pathways across the life-span and the diversity of end points (Rutter, 1989) and are considered integral to understanding the origins of age-graded and historical risk and their impact on individuals and their functional trajectories over time (Staudinger 1995).

5.1.2 The lifecourse and outcomes in later life

Resilience will be considered maintenance of wellbeing in response to risks associated with route and timing of work exit while adaptation is a positive wellbeing outcome in cross-section. In studying the determinants of resilience and adaptation outcomes in later life, two broad themes in lifecourse research will also be addressed:

- i. Lifecourse risk models
- ii. Lifecourse adversity

In doing so, this chapter will examine different measures of adversity over the lifecourse, and the nature of the association between risk arising from lifecourse adversity and later-life outcomes. More concretely, the following will be investigated:

- i. Exposure to different types of adversity, specifically adverse events categorised according to the age they occurred and self- or other-orientation; and socioeconomic disadvantage measures relating to different points in the life course
- ii. Accumulation of risk, chains of risk, and critical and sensitive periods.

Furthermore this chapter will not only consider one outcome measure in later life but several. CASP-12 overcomes weaknesses of more commonly-used unidimensional outcome measures in that it provides an assessment of multiple domains of wellbeing by evaluating both hedonic and eudaemonic aspects of wellbeing and recognising the role of positive and negative affect (Huppert and So, 2011; Vanhoutte 2014). One limitation of CASP-12, however, is that it only measures adaptation from a ‘salutogenic’ perspective by only including measures of positive functioning (Keyes, 2007). The following analysis will consider both positive and negative aspects of functioning and address the latter through use of psychopathology measures.

Two types of lifecourse adversity, specifically cumulative adverse events and cumulative lifecourse socioeconomic disadvantage, will be investigated as part of the present study. These are outlined below.

5.1.3 Lifecourse risk models

Various models describing the types of associations between exposures occurring at different points in the lifecourse and their effects have been proposed (see Chapter 1, Section 1.10). Different models may apply according to the exposure and outcome of interest and their timing during the lifecourse. These are summarised in brief below:

- The accumulation of risk model
Based on Riley's (1989) concept of 'insult accumulation', this model conceives the association between lifecourse adversity and outcomes in later life as a lifelong dose-response relationship (Hertzman et al., 2001; Cohen et al., 2010).
- The chains of risk model
This model describes how early-life exposures set individuals onto trajectories which eventually lead to an adverse outcome later in time via a causal chain of events or exposures (Hertzman et al., 2001). The strictest interpretation of this model is that of a fully-mediated association in which earlier events or exposures have no independent effect on the outcome measure without a final link or 'trigger event' in the causal chain.
- The critical period model
A critical period represents a limited time window in which a given exposure (or lack of an exposure) can produce adverse or protective effects on subsequent development and later-life outcomes (Ben-Shlomo and Kuh, 2002).
- The sensitive period model
This describes a situation in which a given exposure has a stronger effect on subsequent development than the same exposure in a different period. The timing of these periods depends on both the exposure and outcome of interest (Cohen et al., 2010).

5.1.4 Lifecourse adversity: Cumulative adverse events

Although no standard definition of an adverse life event exists, various descriptions have been offered. Adverse events are also referred to as ‘potentially traumatic events’ due to their known associations with post-traumatic stress disorder (PTSD) and the fact that the occurrence of one or more of these event is one of its essential features according to the diagnostic criteria specified in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) (American Psychiatric Association, 1994). Other features emphasised in previous studies are their undesirability, uncontrollability and unpredictability (Jackson and Finney, 2002; Jackson et al., 2004), their potential to negatively influence wellbeing and the fact they are exogenous to the individual (Suh et al., 1996).

On the one hand, ‘adverse’, ‘traumatic’ or ‘negative’ life events can be characterised as sudden, dramatic experiences that have the potential to significantly alter one's social world (Wheaton, 1994). On the other, from the perspective of the individual, such events are indicative of or require a significant change in an individual's life pattern and are associated with the need for adaptive or coping behaviour (Holmes and Rahe, 1967). This is reflected in the Australian Psychological Society's (2017) definition of potentially traumatic events as “powerful and upsetting incidents that intrude into daily life... usually defined as experiences which are life threatening, or where there is a significant threat to one's physical or psychological wellbeing”.

As defined in DSM-IV-TR (American Psychiatric Association, 1994), adverse events are those which include any threat, actual or perceived, to the life or physical safety of the individual, their loved ones or those around them. These may include, but are not limited to, war, torture, sexual assault, physical assault, natural disasters, accidents and terrorism. Exposure to such events may be experienced or witnessed directly or indirectly (i.e., confronted with or learnt about). More recent studies take a wider definition of adverse events as representing a threat to either the physical or psychological integrity of an individual or others (Green et al., 2000; Schmotkin and Litwin, 2009).

5.1.4.1 Specific adverse events

The majority of studies on associations between adverse events and later mental health or wellbeing outcomes have focused on specific types of events individually. These often take

place in the context of a case-control study. One notable example is that of abuse and interpersonal loss in childhood. These events are associated with a range of mental disorders over the lifecourse (Green et al., 2010), impaired physical health (Draper et al., 2008) and depression even among individuals aged over 60 years (Comijs et al., 2013). Childhood sexual abuse in particular has been shown to predict more psychological distress symptoms on the 28-item General Health Questionnaire (GHQ-28), low self-esteem (Mullen et al., 1993), higher Centre of Epidemiological Studies Depression Scale (CES-D) scores, higher levels of anxiety and lower CASP-19 wellbeing scores in adulthood (Kamiya et al., 2016). Sexual assault and harassment in adulthood, meanwhile, has been positively associated with depression, anxiety, substance abuse (Burnam et al., 1988) lower self-esteem (Roberts et al., 2004), depression and PTSD in military contexts (Bell et al., 2014).

At the same time, there are differences in the strength of the associations between different forms of childhood abuse and later mental health outcomes (Kessler et al., 2010; Comijs et al., 2013). The example of child abuse shows that, given the diversity of types of adverse events and their outcomes, it is necessary not only to quantitatively measure the number of events when attempting to measure cumulative adversity, but also to give consideration to the qualitative features of these events.

5.1.4.2 Cumulative measures

Early measures of cumulative lifecourse adversity include the Inventory of Stressful Life-Events (Siegrist and Dittman, 1984) and the Holmes and Rahe (1967) Stress Scale. In addition to these scales of cumulative exposure to adverse events, either expressed as counts of events or severity-weighted scores, other studies have taken account of the qualitative nature of these events either by addressing specific types of event individually or by categorising them according to whether they relate to the self or others and whether they are controllable (Bouman et al., 2009).

Not only can the effects of cumulative exposure to adverse events on mental health outcomes persist over long periods of time and vary according to the type of event (Green et al., 2010), these effects can accumulate over time in an additive fashion (Turner and Lloyd, 1995; Kessler et al., 2010; Krause, 2004; Krause, Shaw and Cairney, 2004). Failure to

account for these additive effects may lead to an underestimation of the role of adverse events in explaining variations in mental health outcomes between individuals.

5.1.4.3 Self- and other-orientation of adverse events

Adverse events may be directly experienced by the individual or indirectly through knowledge of experiences of other people. In contrast with previous editions, the DSM-IV offers a wider definition of a traumatic event in the context of acute stress disorder which makes a distinction between events which involve an injury or threat to the integrity of the self or of others (American Psychiatric Association, 1994, p.427). Although this aspect of adverse events has previously been overlooked, some more recent studies have made this distinction (e.g. Breslau et al., 1999; Green et al., 2000; Shmotkin and Litwin, 2009).

Parallels have been drawn between mental health outcomes following experiences of other-oriented adverse events and phenomena such as ‘compassion fatigue’ (Figley, 1995) and ‘vicarious’ or ‘secondary’ traumatisation (Baird and Kracen, 2006). These terms describe the symptoms of exhaustion, hypervigilance and avoidance often experienced by professionals working with, and family members of, people with PTSD.

Various studies have attempted to investigate the relative strength of the associations between self- and other-oriented events on the one hand and mental health and wellbeing outcomes on the other. Breslau et al. (2008) concluded that while loss of a loved one accounts for the plurality of cases of PTSD, this was a function of its frequency rather than the strength of its association with PTSD. Loss of a loved one and learning about adversities experienced by others was associated with a lower conditional risk of PTSD than self-oriented events. This was found to be especially the case regarding violent self-oriented events such as physical or sexual assault.

5.1.4.4 Timing of adverse events and duration of effect

Differences in associations between adverse events and outcomes including psychopathology, wellbeing and physical health may arise according to the age at which these events occurred. These differences may be due to the existence of sensitive periods during which the effect of adversities on later life functioning is more pronounced. When

adversities only exert a given effect on later-life functioning if they occur within a specific period this is an example of a critical period effect.

Critical or sensitive periods may not only be present in childhood but also at other lifecourse stages. For example, Dulin and Passmore (2010) observed that adverse events in young adulthood and middle age are stronger predictors of depression and anxiety in individuals aged 65–94 than those in childhood. Krause, Shaw and Cairney (2004) found stronger associations between worse self-rated physical health and events occurring between ages 18–64 than those occurring between ages 0–5.

Zlotnick et al. (2008), meanwhile, find that specific mental disorders are associated with experiences of adverse events experienced at different points in the lifecourse. First, when respondents without any experiences of adverse events were compared with those with an experience of at least one adverse event in adulthood or childhood, it was found that events in adulthood were associated with panic disorder, anxiety, dysthymic disorder and antisocial personality disorder while those in childhood were associated with the same cluster of disorders in addition to alcohol and drug use disorders.

Timing of events is not only defined according to age of occurrence but also time elapsed since a given event occurred. The duration of effect of adverse events on mental health outcomes has long been controversial (Brown et al., 1973). While Draper et al. (2008) and others (Green et al., 2010; Kessler and Magee, 1993) have found that physical and mental health effects stemming from adverse events early in the lifecourse such as physical and sexual abuse in childhood can be observed into adulthood and old age, others find that such events only predict adverse outcomes in the short term (Suh et al., 1996).

5.1.4.5 Orientation and timing of events

Findings on the differential effects of adverse events by lifecourse stage may be influenced by the nature of the events themselves so that the presence of sensitive periods within the lifecourse may vary according to the type of event in question. A limited number of studies, all of which were performed on the same sample of respondents, have disaggregated events both by their self- or other-orientation and their timing. Schmotkin and Litwin (2009) and Shrira et al. (2012) conclude, based on their analysis of respondents surveyed as part of the Israeli component of the Survey of Health, Ageing and Retirement in Europe (SHARE-

Israel), that there is an association between cumulative exposure to other-oriented adversity in early-life and positive mental outcomes in old age and between self-oriented events in adulthood and adverse mental health outcomes.

5.1.5 Lifecourse adversity: Early-life and cumulative socioeconomic disadvantage

In addition to other measures such as social status or prestige (Bartley, 2004), socioeconomic position is considered to be a result of, and is measured by, socially-derived economic factors that influence the position an individual holds within a stratified society (Galobardes et al., 2007). The accumulation model posits that both early- and later-life exposure to disadvantaged socioeconomic position are independently associated with adverse physical and mental health outcomes in later life (Singh-Manoux et al., 2004). In order to represent lifecourse adversity using measures of socioeconomic disadvantage it is advised to use measures of socioeconomic disadvantage from different points of an individual's lifecourse, for example childhood, early adulthood, and active professional life, to construct indices sensitive to both the time individual measures of socioeconomic position and outcome measures are taken (Galobardes et al., 2006; 2007).

Previous studies have operationalised measures of cumulative disadvantage using composite indices (Niedzwiedz et al., 2012). For the purposes of the present study, the term 'cumulative socioeconomic disadvantage' shall refer to socioeconomic disadvantage over the lifecourse as measured using cumulative measures at different lifecourse stages.

While previous studies on lifecourse disadvantage have employed a variety of outcome measures, exposure measures have included:

- Parental education (Mäkinen et al., 2006; Laaksonen et al., 2007; Marmot et al., 1998; Loucks et al., 2010; Lyu and Burr, 2016; Horvat et al., 2014; Luo and Waite., 2005) including mother's level of education (Deere et al., 2016; Camelo et al., 2014)
- Paternal occupation (Huurre et al., 2003; Batty et al., 2005; Turrell et al., 2007; Singh-Manoux et al., 2004; Otero-Rodríguez et al., 2011; Singh-Manoux et al., 2004; Batty et al. 2012; Lyu and Burr, 2016; Luo and Waite., 2005)

- Own level of education (Laaksonen et al., 2007; Marmot et al., 1998; Mäkinen et al., 2006; Turrell et al., 2007; Singh-Manoux et al., 2004; Loucks et al., 2010; Otero-Rodríguez et al., 2011; Singh-Manoux et al., 2004; Batty et al., 2012).
- Own occupational position (Laaksonen et al., 2007; Huurre et al., 2003; Batty et al., 2005; Singh-Manoux et al., 2004; Loucks et al., 2010) including first occupation (Camelo et al., 2014) or that of the household 'breadwinner' (Niedzwiedz, 2014; Otero-Rodríguez et al., 2011), household financial measures (Turrell et al., 2007; Niedzwiedz, 2014; Lyu and Burr, 2016; Camelo et al., 2014; Luo and Waite., 2005)
- Amenities in childhood (Niedzwiedz, 2014; Singh-Manoux et al., 2004; Deere et al., 2016)
- Housing tenure and presence of hazards such as damp or air pollution in childhood (Blane et al., 2004).

In addition to investigating individual associations between socioeconomic position at different lifecourse stages and later-life outcomes (e.g. Blane et al., 2004), some studies have combined these measures using indices of lifecourse deprivation based on points-scoring methods to represent cumulative disadvantage over time (e.g. Singh-Manoux et al., 2004; Niedzwiedz, 2014). In a review of 12 studies, Niedzwiedz et al. (2012) found that two supported the accumulation model in which measures of socioeconomic disadvantage across the lifecourse predict worse mental health in adulthood or later life (Singh-Manoux et al., 2004; Otero-Rodríguez et al., 2011). Much less attention has been paid to the effects of cumulative or early-life socioeconomic disadvantage on measures of wellbeing (as opposed to mental and physical health) in later life (Blane et al., 2004) and none have considered its role in influencing wellbeing outcomes in response to exit from paid work.

5.1.6 Proposed causal mechanisms: Lifecourse adversity and later-life wellbeing and mental health outcomes

A number of mechanisms or mediating factors have been proposed to explain the association between adversity earlier in the lifecourse and adverse effects on wellbeing or

mental health later in the lifecourse. Previous work has identified psychological mediators such as attachment insecurity leading to deficits in emotional regulation (Mikulincer and Shaver, 2012), emotional closeness with family (Salva et al., 2013), avoidance behaviours (Dulin and Passmore, 2010), neuroticism (Jeronimus et al., 2015), health behaviours, sense of community (Nurius et al., 2015), maladaptive coping strategies such as self-blame (Stikkelbroek et al., 2016) and failure to achieve generativity (Erikson, 1950; Landes et al., 2014).

Potential physiological mechanisms include dysregulation of the hypothalamic pituitary axis (HPA) (Kamiya et al., 2016) and stress-induced alterations to the ventral striatum (Goff and Tottenham, 2013). For example, it is suggested that early socioeconomic adversity could exert a direct effect on depression via the HPA and that these effects are independent of exposure to adulthood adversity (Stansfeld et al., 2011). This hypothesis is substantiated by findings that cumulative lifecourse socioeconomic disadvantage is positively associated with a wide variety of markers of inflammation including fibrinogen and white blood cell counts (Dowd and Goldman, 2006; Politt et al., 2007; Politt et al., 2008). Early-life socioeconomic experience, measured using paternal occupational position, has also been associated with expression of inflammation-related genes (Castagné et al., 2016).

5.1.7 Applications of resilience models

As elaborated in Chapter 1, resilience is a positive adaptive process in the context of exposure to a risk factor or a risk event (Rutter, 1987; Masten and Coatsworth, 1998; Ungar, 2004; Schoon, 2006) known to predict adverse outcomes (Masten, 1990). In this chapter, resilience shall refer to a positive change (or no change) in wellbeing measures in response to exit from paid work. Inversely, vulnerability shall refer to a negative change in wellbeing. As such, measurements of resilience are relative to an individual's baseline (t_0) wellbeing before the occurrence of an adverse event. Adaptation (and mal-adaptation) shall refer to an individual's wellbeing (or mental health status) at a given time point.

5.2 RESEARCH QUESTIONS AND HYPOTHESES

The present study hypothesised 1) that exposure to adverse events over the lifecourse would be associated with lower CASP-12 wellbeing, lower subjective life satisfaction, higher odds of CES-D depressive caseness and GHQ-12 psychological distress; and 2) that lifecourse adversity, measured using both exposure to adverse events and cumulative socioeconomic disadvantage, would predict a negative change in CASP-12 following work exit. This chapter will comprise two analyses (Part I and Part II) based around the themes of adaptation in later life and resilience to work exit respectively. The specific research questions addressed by each are shown below.

5.2.1 Research questions

5.2.1.1 *Part I: Adverse events over the lifecourse, early-life socioeconomic disadvantage and adaptation in old age*

1. Does adversity over the lifecourse, defined as exposure to adverse events, affect adaptation in old age (measures of wellbeing status at time of interview) after adjustment for concurrent wellbeing determinants?
 - i. Do the effects of adverse events depend on the age at which they occurred or whether they are self- versus other-oriented?
2. Can an association be found between early life disadvantage and adaptation in old age?
 - i. If so, is this association mediated by more proximal measures of socioeconomic position as found by Blane et al. (2004)?
3. In addition to CASP-12 wellbeing status, are these findings applicable across different positive (i.e. hedonic and eudaemonic wellbeing) and negative (i.e. psychological distress symptoms and depression) measures of functioning?

5.2.1.2 Part II: Adversity over the lifecourse and resilience following work exit

4. Does exposure to adversity over the lifecourse, expressed as both cumulative socioeconomic disadvantage and cumulative exposure to adverse events, affect resilience (change in CASP-12 wellbeing) in response to work exit?
 - i. Are the effects of cumulative socioeconomic disadvantage over the lifecourse and exposure to adverse events independent of concurrent measures of socioeconomic position and other individual-level variables at the time of work exit?
 - ii. Do the effects of exposure to adverse events differ according to the age at which they occurred or whether they are self- or other-oriented?

5.2.1.3 Overall

5. Which of the three lifecourse risk models (accumulation of risk, sensitive and critical periods, or chains of risk) best describe the nature of the associations between each lifecourse adversity measure and later-life wellbeing outcome measures?

5.2.2 Hypotheses

5.2.2.1 Part I: Adverse events over the lifecourse, early-life socioeconomic disadvantage and adaptation in old age

- It can be hypothesised that higher cumulative exposure to adverse events of all types during the lifecourse is associated with lower wellbeing and a greater odds of depression or psychological distress (Green et al, 2010; Turner and Lloyd, 1995; Kessler et al., 2010; Krause, 2004; Krause, Shaw and Cairney, 2004).
- In light of the results of Shrira et al.'s study (2012), the only one to disaggregate adverse events over the lifecourse by both age of occurrence and self or other orientation, it can be hypothesised that cumulative exposure to other-oriented adversity in early life is associated with more positive wellbeing and mental health outcomes in later life while self-oriented events in adulthood are associated with worse mental health outcomes.

- Given previous findings that individuals who had experienced a greater degree of socioeconomic disadvantage across the lifecourse were found to experience worse mental health in adulthood or later life (Singh-Manoux et al., 2004; Otero-Rodríguez et al., 2011; Niedzwiedz et al., 2012), it can be assumed that early-life socioeconomic disadvantage is also associated with both lower wellbeing and worse mental health.

5.2.2.2 Part II: Adversity over the lifecourse and resilience following work exit

- Although no previous work has been conducted on the lifecourse determinants of wellbeing change following work exit, it could be hypothesised that exposure to adverse events over the lifecourse is, in general, associated with less favourable changes in wellbeing following work exit in later life and therefore associated with vulnerability. If it is assumed that the associations between specific types of adverse events and cross-sectional wellbeing (and mental health outcomes) on the one hand, and the same types of adverse events and wellbeing change following work exit on the other, are similar, then two predictions can be made based on the hypotheses for Part I and the results of Shrira et al. (2012). First, it can be predicted that experiences of self-oriented adverse events in adulthood are associated with more negative changes in wellbeing (or vulnerability) following work exit. Second, exposure to other-oriented adversity in childhood is likely to be associated with more positive changes in wellbeing.
- Likewise, if the same findings for the association between cumulative socioeconomic disadvantage and cross-sectional wellbeing hold for wellbeing change outcomes, it can be predicted that individuals who have experienced a greater degree of cumulative socioeconomic disadvantage over their lifecourse will be more vulnerable to risks related to exit from paid work in old age, and, as a result, experience a more negative change in wellbeing.

5.3 METHODS

This section is divided into three parts. Firstly, the data sources and retrospective life history variables common to Part I and Part II and the descriptive analysis will be outlined. Second, methods will be described separately for each of these studies. In addition to specifying the statistical techniques used, this section will describe how analytic samples were defined and how outcome measures, adversity exposure measures and covariates were derived using the same data sources in both studies.

5.3.1 Data sources

Parts I and II both used data from core ELSA respondents aged 50–90 who participated in Waves 1–7 (2002/2003–2014/2015) and who also provided retrospective life history data. Retrospective data on exposures to adverse events and parental occupational position, for measures of cumulative lifecourse adversity, were extracted from the Wave 3 Life History Module. These retrospective measures were merged to all other waves. Unless stated otherwise, all other variables were defined using the methods described in Chapter 2.

Data from SHARE were excluded from the analysis. This was because only data on financial hardship, severe illness and generalised stress, in addition to other events related to war, persecution and dispossession, were available with age of occurrence as part of SHARELIFE (SHARE Wave 3). In addition to the small number of events available for analysis, the latter three were not considered appropriate for investigation due to the rarity of these events in the sample, the high proportion of missing observations, the fact that these data could not be harmonised with ELSA and the low degree of generalisability in relation to other populations.

5.3.1.1 *Cumulative adverse events*

Sixteen types of adverse event were identified in the ELSA Wave 3 Life History module (Table 5.1). Of these, six of them were specific to childhood and questions explicitly asked whether the events occurred from ages 0–15. Events were categorised according to whether they were self- or other-oriented using the definition earlier in this chapter

(Section 1.4.3). Both exposure variables for self- and other-oriented events had ranges of 0–8.

Table 5.1. A summary of adverse life events in ELSA Wave 3 Life History Module by self- or other-orientation

Adverse life events (any age)	Orientation
1. Ever experienced a major fire, flood, earthquake or other natural disaster	
2. Ever had a life-threatening illness or accident	
3. Ever been a victim of serious physical attack or assault	Self-oriented
4. Ever been a victim of sexual assault (including rape or harassment)	
5. Ever fired a weapon in combat or been fired upon	
6. Ever experienced severe financial hardship	
7. Ever provided long-term care to disabled/impaired relative or friend	
8. Ever had a husband/wife/partner/child who has been addicted to drugs or alcohol	Other-oriented
9. Ever witnessed accident/violent act when someone was killed/seriously wounded (not war)	
10. Ever had a friend/relative at risk of death/died due to illness/serious accident	
Adverse events in childhood (before 16 years)	
11. Whether physically abused by parents	Self-oriented
12. Whether separated from mother for 6 months or more	
13. Whether parents ever permanently separated or divorced	
14. Whether parents argued or fought very often	Other-oriented
15. Whether either parent was involuntarily unemployed for over 6 months	
16. Whether parents drunk/took drugs/had mental health problems	

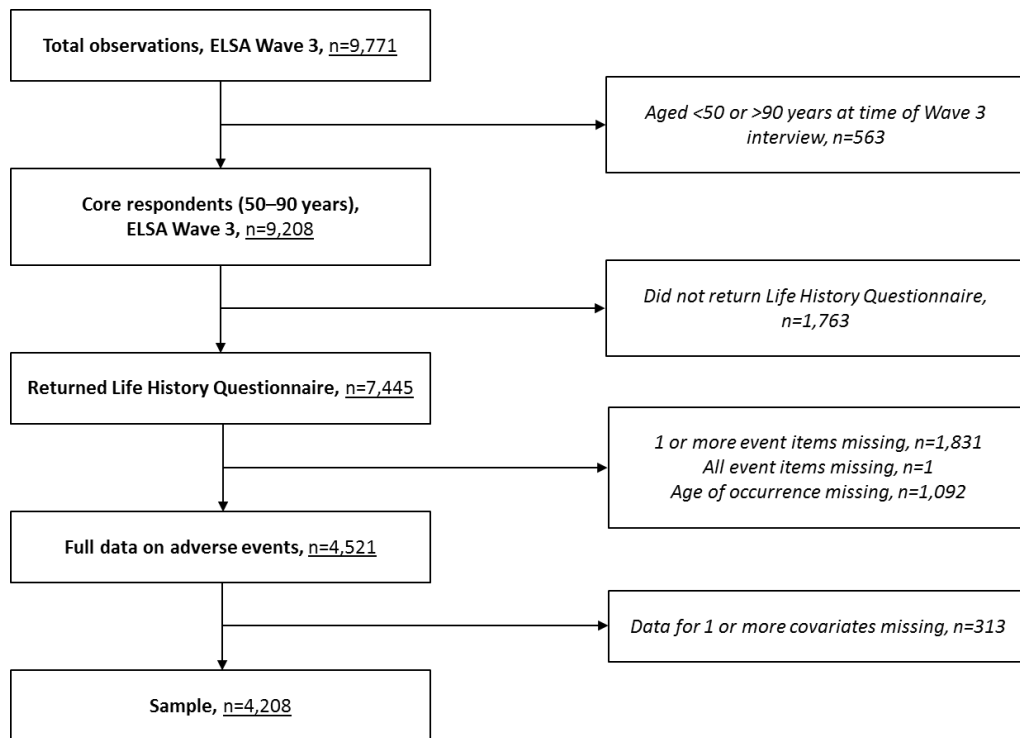
Items on maternal separation and parental divorce were included in the Life History interview. The other 14 items were included in the Life History Self-Completion Questionnaire.

Finally, items on homelessness and periods spent in prison, which have been included in other analyses of effects of adverse events on wellbeing and psychopathology (e.g. Shrira and Litwin, 2014), were also available. These were not included in the exposure measure, however, as age of first occurrence could not be determined from the available data.

5.3.2 Data sample

Of the 9,771 respondents who participated in ELSA Wave 3, 9,208 of these were core respondents aged 50–90 years at the time of interview (Figure 5.1). Of these 4,521 unique individual respondents had full information on all 16 adverse events and the age of occurrence. Of the 4,687 missing observations, 1,763 (38%) were due to individuals not returning the dropoff questionnaire, one (<0.1%) was due to an individual not responding to any item on adverse events, 1,831 (39%) were due to missing responses for one or more items and 1,092 (around 23%) were due to missing data on age of occurrence.

Figure 5.1. Flow diagram describing the definition of the ELSA Wave 3 sample for investigation of adverse events



5.3.2.1 *Timing of adverse events*

Adverse events were categorised according to age of first occurrence to investigate whether critical or sensitive periods could be identified. Events were categorised as occurring within a given lifecourse stage. These stages included childhood, early adulthood, and active professional life (or late adulthood) (Galobardes et al., 2006; 2007). Count measures for events first occurring in childhood (0–15 years) or adulthood (16–49 years), and then for events occurring in the age ranges 0–5, 6–15, 16–30 and 31–49 years, were operationalised. Exposure measures were then derived for self- and other oriented events separately at ages 0–15 years and 16–49 years, and at ages 0–5, 6–15, 16–30 and 31–49 years.

5.3.3 Descriptive analysis: Adverse events in the English population

The proportions of respondents in the analytic sample who had experienced each adverse event by age 16 and age 50 were calculated and presented in a table. Proportions were then re-estimated using Wave 3 cross-sectional survey weights to give representative proportions for the wider English population aged 50–90.

A histogram was then generated to show the frequencies of respondents by total number of adverse events experienced from age 0–49. Plots were generated to show the cumulative proportions of respondents who had experienced each of the 16 adverse events with increasing age. These were presented separately for the six events for which only ages of first occurrence of 16 years or under could be given. Figures were generated using survey weights.

5.3.3.1 *Missing data*

As indicated in Figure 5.1, 4,521 (49.1%) of the 9,208 core ELSA respondents (aged 50–90 years) who participated in Wave 3 provided full information on experiences of adverse events and their age of occurrence. After excluding individuals with missing data on covariates this yielded an analytic sample of 4,208. Only 313 (6.7% of total excluded core respondents) were therefore excluded from the analysis due to missing covariates while the remainder either did not return the Life History Questionnaire or did not provide full information on adverse events and age of occurrence. This implies that missing data on

adverse events was by far the most common reason respondents were excluded from the analytic sample.

The characteristics of core Wave 3 respondents with full data on adverse events (n=4,521) and those who did not provide full data on adverse events (n=4,687) are presented in a table and compared using chi square tests to determine whether the former group was representative of ELSA Wave 3 respondents as a whole.

5.4 Part I (Adversity over the lifecourse, early-life socioeconomic disadvantage and adaptation in old age)

To investigate lifecourse determinants of adaptation in old age, Part I analysed associations between measures of exposure to adverse events, both overall and categorised according to age of occurrence and self- or other-orientation, and wellbeing and mental health status in later life. The associations between early childhood socioeconomic disadvantage and wellbeing and mental health outcomes were also considered.

5.4.1 Outcome measures

In addition to CASP-12, three additional outcome variables were employed in Part I to verify whether the results obtained for associations between exposure to adverse events over the lifecourse and CASP-12 outcomes were consistent across a wider range of measures of wellbeing and mental health. These were measures of subjective life satisfaction, and depression caseness and psychological distress (see Chapter 2, Section 4.2).

5.4.2 Covariates

Covariates were selected for inclusion in the fully-adjusted model for cross-sectional CASP-12 scores using backwards stepwise selection as performed in Chapter 3. The same covariates were then applied to models for life satisfaction, CES-D depression caseness and GHQ-12 psychological distress outcomes. As data from SHARE respondents were not used, thereby obviating the need for use of harmonised measures, some variables

(occupational position and housing tenure) were operationalised using the original non-harmonised versions available in ELSA.

Occupational position of last known job

Respondents were categorised by occupational position using the five-category National Statistics Socio-economic Classification (NS-SEC) groupings, operationalised using Office for National Statistics (ONS) Standard Occupational Classification 2000 (SOC2000) codes. This simplified classification was used as respondents were not questioned on size of their last employer and only information on job category was available (ONS, 2000). The SOC2000 classifications were obtained from respondents as part of the Health Survey for England before recruitment into ELSA and in Waves 2–7. NS-SEC was coded at the individual level and respondents were categorised according to their current job, or, where they were not in employment at the time of interview, their last job. Categories included managerial and professional occupations (I), intermediate occupations (II) small employers and own account workers (III), technical occupations (IV) and semi routine and routine occupations (V). A final sixth category was included for respondents who had never worked.

Housing tenure

Respondents were placed into three categories according to their housing tenure at the time of interview. These included owner occupation with outright ownership (reference group), owner occupation with outstanding mortgage payments and any other status (including shared ownership with rent payments, renting in private or state housing, living rent-free without ownership and squatting).

5.4.2.1 Other covariates

Other model covariates included age in years, gender, current self-reported labour market status (retired, in employment, unemployed, permanently sick or disabled or other), participation in social activities (yes/no), birth abroad (yes/no), partnership

status(partnered/non-partnered), equivalised household net worth and natural logarithm of square root equivalised household income (2011 GBP) as described in Chapter 2. In contrast with the analyses presented in previous chapters, equivalised household net worth was expressed in terms of quintiles as provided in the ELSA dataset.

5.4.3 Exposure measures

5.4.3.1 Adverse events

First, a continuous variable for overall cumulative exposure to adverse events (0–49 years) was generated. Disaggregated exposure variables were then generated separately for counts of adverse events occurring in early childhood (0–5 years), late childhood (6–15 years), early adulthood (16–30 years) and late adulthood (31–49 years). To investigate associations between self- and other-oriented events and later-life wellbeing and mental health outcomes, measures of exposure to self-oriented events and other-oriented events were generated (0–49 years). These were then disaggregated by age of occurrence. Further exposure variables were specified for self- and other-oriented events in childhood (0–15 years) and adulthood (16–49 years), and then for self- and other-oriented events in early childhood (0–5 years), late childhood (6–15 years), early adulthood (16–30 years) and late adulthood (31–49 years).

5.4.3.2 Early-life socioeconomic disadvantage

Early life socioeconomic disadvantage was defined using the occupational position of the respondent's father (or primary household economic provider where this was not applicable) at age 14. This was expressed as a continuous variable and based on a point scale graded according to paternal occupational position defined using SOC2000. A higher score denoted a more disadvantaged paternal occupational position. Categories of paternal occupational position were SOC2000 1–4 (0 points), 0 and 5–9 (1 point), 'other', 'something else', 'casual jobs', 'retired', 'unemployed' and 'sick or disabled' (2 points). This variable was derived from Wave 3 responses and merged to Waves 1–7.

5.4.4 Analytic sample

Analytic samples were identified for each outcome measure after dropping observations which did not meet the criteria for inclusion and had missing responses for covariates. 4,521 unique individuals who responded in Wave 3 had full data on cumulative adverse events. Only complete cases without missing responses for the exposure measure or covariates were included in the analytic samples for each outcome. This yielded a Wave 3 sample of 4,208 individuals as shown in Figure 5.1 (Section 3.2).

Each of these unique individual respondents had between one and seven observations given that seven waves of data were available and that Wave 3 data on adverse events were merged to all other waves. Appendix Figures A5.1–A5.4 outline how the analytic samples for each of the four outcome measures were defined in terms of total person-wave observations. Of the 73,893 total observations over Waves 1–7 of ELSA, 69,672 of these were for core respondents (aged 50–90 years). Full data on experiences of adverse events and the age at which they occurred were available for 26,780 person-wave observations. Of these, 22,146 had no missing data for any of the covariates.

Four separate analytic samples were then defined for each of the outcome measures in turn and observations were dropped if data was missing for the outcome measure in question. First, an analytic sample of 4,176 unique individuals (32 missing CASP-12 scores) with 22,146 observations over Waves 1–7 was defined for CASP-12 outcomes. For other outcome measures sample sizes were 4,152 unique individuals (56 missing) with 17,948 observations over Waves 2–7 for life satisfaction; 4,208 unique individuals (0 missing) with 22,039 observations over Waves 1–7 for CES-D depression; and 3,623 unique individuals (585 missing) with 6,522 observations in Waves 1 and 3 only for GHQ-12 psychological distress symptoms.

Finally, the analytic sample for the tests of the associations between early-life socioeconomic disadvantage and CASP-12 and CES-D outcomes was defined using the same methods. The analytic sample for CASP-12 outcomes included 37,687 observations from 9,618 unique individual respondents and the analytic sample for CES-D outcomes comprised 41,552 observations from 9,917 unique individuals.

5.4.5 Descriptive and statistical analysis

First, the mean CASP-12 and life satisfaction scores, and the proportion of respondents meeting the criteria for (CES-D) depression caseness and GHQ-12 psychological distress, we calculated for each analytic sample. The full characteristics of the analytic sample for CASP-12 outcomes were then presented in a table. Analyses were carried separately out for CASP-12, life satisfaction, (CES-D) depression caseness and GHQ-12 score. Multilevel analyses were performed in Stata 14 using the IGLS algorithm for repeated measures. MCMC methods were not used since the number of level-2 units (i.e. $n=4,176$ for CASP-12 as the outcome measure) was sufficiently large that neither the fixed nor random effects parameters were likely to be biased due to sample size issues.

Linear multilevel models were fitted where CASP-12 scores and subjective life satisfaction were the outcome measures as these had a near-normal distribution. Logistic multilevel models were fitted for odds of (CES-D) depression caseness and GHQ-12 psychological distress.

Models adjusted for different groups of covariates to determine whether their inclusion in the model influenced the association between exposure to adverse events and wellbeing outcomes. After fitting unadjusted multilevel models for the associations between total adverse events (0–49 years) and CASP-12 and CES-D depression caseness, five further models were fitted for each of these outcomes. Model 1 adjusted for frailty index and age. Model 2 further adjusted for gender, current labour market status, participation in activities, partnership status and birth abroad. While both Models 3 and 4 included all covariates fitted in Model 2, Model 3 further adjusted for NS-SEC (of respondents' last-known job) and Model 4 adjusted for household net worth, household income and housing tenure. A fully-adjusted model was then fitted with adjustment for age as a continuous variable, gender, physical frailty index, current self-reported labour market status, participation in social activities, partnership status, birth abroad, quintile of equivalised household net worth, natural log of household income, housing tenure and NS-SEC. This was only performed for CASP-12 and depression caseness outcomes.

To test whether the effects of exposure to adverse events differ according to the age at which they occurred or whether they are self- or other-oriented, four fully-adjusted models were then fitted for each of the four outcome measures (CASP-12, life satisfaction, CES-D depression caseness and GHQ-12 psychological distress) with exposure to adverse events

disaggregated by age of occurrence and self- versus other-orientation. The following four fully-adjusted models were fitted for each outcome with the following mutually adjusted exposure variables:

- Model A (events by age of occurrence): Adverse events in early childhood (0–5 years), adverse events in childhood late childhood (6–15 years), adverse events in early adulthood (16–30 years) and adverse events in childhood late adulthood (31–49 years)
- Model B (events by orientation): Self-oriented events at all ages (0–49 years) and other-oriented events at all ages (0–49 years)
- Model C (events by orientation and age of occurrence): Self-oriented events in childhood (0–15 years), self-oriented events in adulthood (16–49 years), other-oriented events in childhood (0–15 years), and other-oriented events in adulthood (16–49 years)
- Model D (events by orientation and age of occurrence): Self-oriented events in early childhood (0–5 years), self-oriented events in late childhood (6–15 years), self-oriented events in early adulthood (16–30 years), self-oriented events in late adulthood (31–49 years), other-oriented events in early childhood (0–5 years), other-oriented events in late childhood (6–15 years), other-oriented events in early adulthood (16–30 years) and other-oriented events in late adulthood (31–49 years).

The associations of early-life socioeconomic disadvantage with CASP-12 and CES-D depression caseness outcomes were then tested using the same statistical methods. An unadjusted model, a full model and four partially-adjusted models (Models 1–4) were fitted as described above. Missing data were handled using complete case analysis.

5.5 Part II (Adversity over the lifecourse and resilience following work exit)

Part II investigated the associations between measures of exposure to adverse events and cumulative socioeconomic disadvantage over the lifecourse, and change in wellbeing following work exit measured by CASP-12 change scores.

5.5.1 Work exit events in an English context

A low proportion of respondents in ELSA who had left work since the previous wave reported receipt of any social protection benefits following work exit. Of 2,440 ELSA participants who had left work between any two consecutive waves from Waves 1–6, only 755 (37.9%) reported receiving any public benefit. The harmonised variable for exit route previously used in Chapters III and IV, which relied on an institutional definition of route of exit based on type of benefits received, may not be as appropriate for classifying route of work exit in an English context. The subsequent analyses therefore used self-reported measures of labour market status at t_1 . Responses included ‘retired’, ‘unemployed’, ‘permanently sick or disabled’ and ‘looking after home / other’. Retired respondents were used as the reference category for the purposes of analysis.

5.5.2 Outcome measures

The outcome measure in Part I was CASP-12 change scores from before work exit (t_0) to after work exit (t_1), expressed as a continuous variable as described in Chapter 2 (Section 4.1).

5.5.3 Covariates

Based on determinants of wellbeing change following work exit identified in Chapter 2, covariates investigated in Part II included the physical frailty index, participation in social activities, partnership status, birth abroad and household income. Route of work exit was defined using current self-reported labour market status at t_1 . Data on quintile of equivalised household net worth provided in the ELSA dataset were used as opposed to harmonised quartiles of equivalised household net worth which were used in Chapters III

and IV. Furthermore, a continuous measure of age at work exit in years was used instead of age of retirement relative to the country-specific retirement age as the likelihood ratio test showed that this provided better model fit. As in Chapters III and IV (and described in Chapter 2, Section 8.1), models were adjusted for CASP-12 at t_0 to correct for possible regression towards the mean.

5.5.4 Exposure measures

Two measures of exposure to adversity over the lifecourse were considered as part of Part II: cumulative adverse events and cumulative socioeconomic disadvantage. As in Part I the former were disaggregated by orientation and age of occurrence.

5.5.4.1 Adverse events

Overall counts of adverse events were generated using responses from the 16 items covered in the ELSA Wave 3 Life History Module (range 0–10). Lifecourse exposure variables were operationalised as count variables. First, a variable for total cumulative exposure to adverse events (0–49 years) was specified. Next, to test whether associations between exposure to adverse events and wellbeing change outcomes differ according to the age at which they occurred, count variables were generated separately for events occurring in childhood (0–15 years) and adulthood (16–49 years). Finally, to investigate exposure to self- or other-oriented events, total counts of self- and other-oriented events (0–49 years) were generated, followed by counts of self- and other-oriented events in childhood (0–15 years) and adulthood (16–49 years).

5.5.4.2 Cumulative socioeconomic disadvantage

An index of cumulative socioeconomic disadvantage was generated for Wave 3 ELSA respondents using methods similar to those of Singh-Manoux et al. (2004) and merged with observations from Waves 1–7. This seven-point scale (0–6), operationalised as a continuous variable, was based on three measures including paternal socioeconomic position, own level of education and occupational grade of the individual's last known job as these three measures were most commonly used in previous work and covered different

stages of the lifecourse (see Section 1.4). Higher scores represented a higher degree of cumulative disadvantage. The first measure was based on the occupation of the respondent's father or primary caregiver at age 14, which is considered to represent household living standards, access to resources and social prestige during childhood (Lawlor et al., 2005b). Where the same individual was asked multiple times over different waves their first response was used. Categories of paternal occupational position were SOC2000 1–4 (0 points), 0 and 5–9 (1 point), 'other', 'something else', 'casual jobs', 'retired', 'unemployed' and 'sick or disabled' (2 points). Secondly, points were allocated based on the age at which a respondent had completed full time education. Categories included 17 or over (0 points), 15–16 (1 point), and 14 or under (2 points). Finally, points were allocated according to the respondents' National Statistics Socio-economic Classification (NS-SEC) classification based on their occupational grade in their last job. Respondents were classified as falling under NS-SEC categories I (managerial/professional) (0 points), II–IV (1 point), and V (routine/semi-routine) (2 points). No respondents included in the analytic sample were in the sixth category for respondents who had never worked as this was incompatible with the selection criteria. The full scale was then calculated by summing scores across all three measures.

5.5.5 Analytic sample

Analytic samples of 1,126 and 1,985 respondents were identified with full data on adverse events and lifecourse socioeconomic disadvantage respectively who had exited from work since the previous wave, had CASP-12 scores at t_0 and t_1 , and no missing observations for covariates. Figures 5.2 and 5.3 show flow diagrams describing the definition of the two analytic samples for investigations of associations of cumulative adverse events and socioeconomic disadvantage respectively on CASP-12 change scores.

Figure 5.2. Flow diagram describing the definition of the analytic sample for investigation of associations between exposure to adverse events and wellbeing change following work exit (Part II)

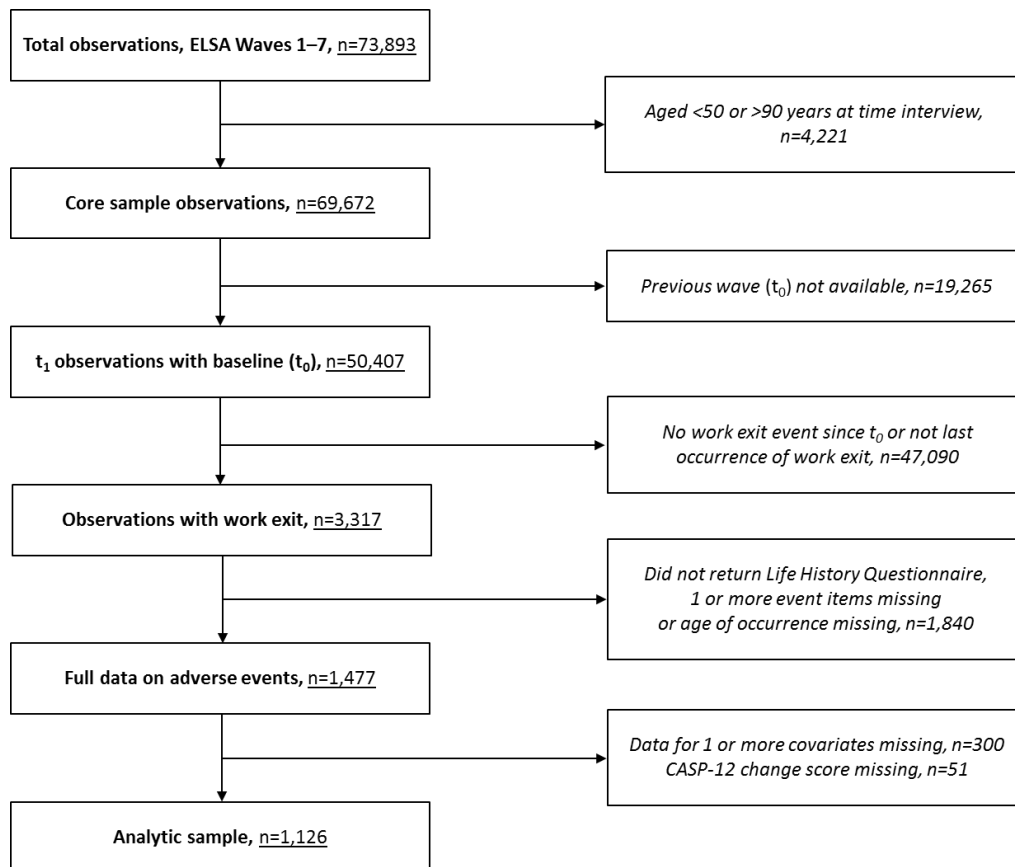
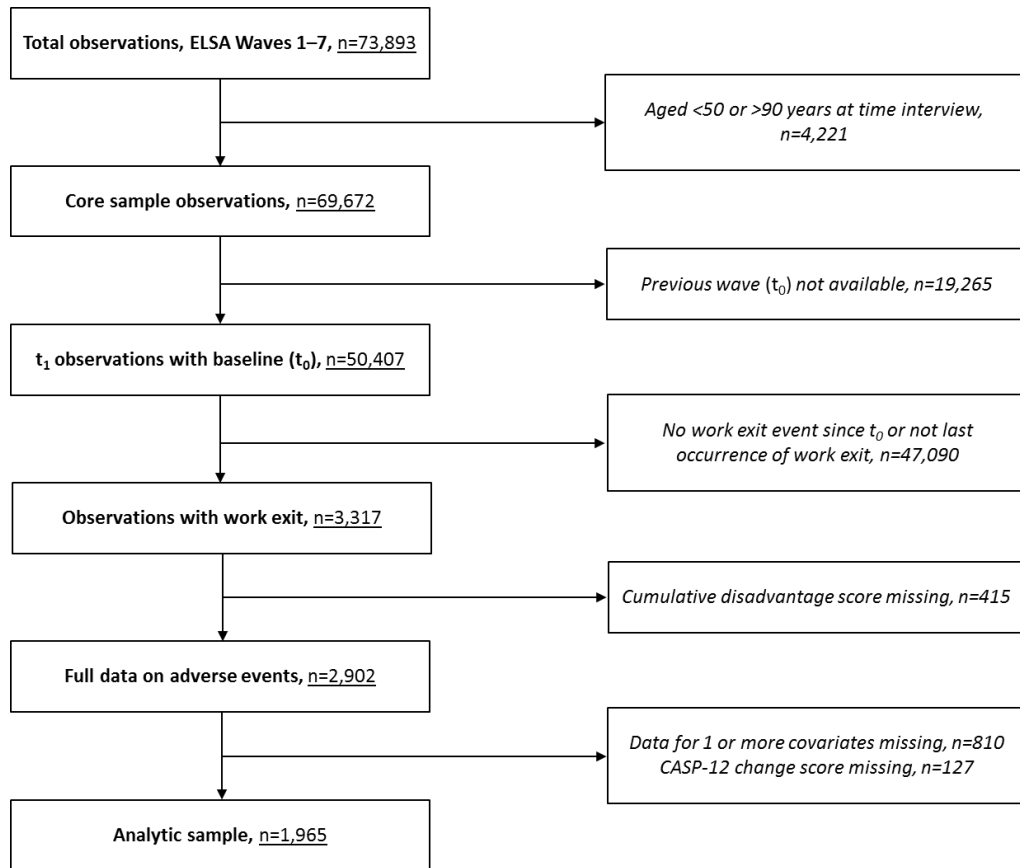


Figure 5.3. Flow diagram describing the definition of the analytic sample for investigation of associations between cumulative socioeconomic disadvantage and wellbeing change following work exit (Part II)



5.5.6 Descriptive and statistical analysis

First, the characteristics of each of the two analytic samples were displayed in a table and the mean change in CASP-12 scores was calculated for each. Cumulative socioeconomic disadvantage index scores for the analytic sample of individuals who had left work since the previous wave (n=1,985) were presented using a histogram.

Standard linear regression models for change in CASP-12 scores from t_0 (before work exit) to t_1 (after work exit) were fitted in Stata 14 to test the effects of different measures of lifecourse adversity on resilience following transitions from paid work. Missing data were handled using complete case analysis.

Models were fitted for the following adversity exposure variables or groups of (mutually-adjusted) variables:

- Total number of adverse events (0–49 years)
- Number of adverse events in childhood (0–15 years) and adverse events in adulthood (16–49 years)
- Number of self-oriented events at all ages (0–49 years) and other-oriented events at all ages (0–49 years)
- Number of self-oriented events in childhood (0–15 years), self-oriented events in adulthood (16–49 years), other-oriented events in childhood (0–15 years), and other-oriented events in adulthood (16–49 years)
- Index of cumulative socioeconomic disadvantage.

Six models were fitted for each exposure measure or group of exposure measures. First, unadjusted models were fitted for the association between each of the exposure measures and CASP-12 change following work exit. Model 1 adjusted for the physical frailty index, Model 2 adjusted for age at work exit and route of work exit and Model 3 adjusted for participation in activities, partnership status and birth abroad. Model 4 adjusted for all of these covariates except financial variables (quintile of equivalised household income and

natural logarithm of equivalised household income). Finally, the fully-adjusted model adjusted for all covariates mentioned above including financial variables.

5.5.6.1 Resilience and vulnerability

Respondents who had exited from paid work were categorised as either ‘resilient’ or ‘vulnerable’ and models used a binary outcome variable as in previous studies (e.g. Rutter, 1999; Schoon, 2006; Schoon, 2007; McAslan, 2010). Respondents were considered resilient when CASP-12 change scores from t_0 to t_1 were equal to or greater than zero. Conversely, they were categorised as having experienced vulnerable outcomes in response to exit from paid work when CASP-12 scores were negative. The outcome variable was specified such that resilient outcomes were coded as 0 and vulnerable outcomes were coded as 1. As such, logistic regression analysis was used and the outputs, expressed as odds ratios, represented the association between each variable and vulnerable outcomes.

The same exposure variables were used as described above. After testing the association between overall counts of adverse events (0–49 years) and odds of vulnerability following work exit, events were then disaggregated into events in adulthood and childhood, into self- and other-oriented events, and then by both age and orientation. The association between the index of cumulative socioeconomic disadvantage and vulnerable outcomes was also tested. The same six models were fitted for each of the adversity exposure variables (or groups of mutually-adjusted variables) including an unadjusted model, Models 1–4 with adjustment for different covariates, and the fully-adjusted model.

5.6 RESULTS

5.6.1 Descriptive analysis: Cumulative adverse events

A total of 4,521 core ELSA respondents aged 50–90 responded to all 16 items on adverse life events and provided the age at which these first occurred as part of the Wave 3 Life History Module. Table 5.2 shows the proportions of respondents who had experienced each individual event. Proportions of respondents who had first experienced each event from ages 0–16 and 0–49 are shown. For life events only applicable to childhood, only the proportions experiencing each event from ages 0–16 are shown. Second, survey weights provided in ELSA were applied so that the proportions (displayed right) were representative of the wider English population.

While “ever provided long-term care to disabled/impaired relative or friend” was the most common adverse event overall, “parents fought or argued often” was the most commonly experienced event before the age of 16. The rarest events overall among the sample were “physically abused by parents”, “ever had a husband/wife/partner/child who has been addicted to drugs or alcohol” and “ever been a victim of serious physical attack or assault”. The smallest proportional change and absolute change in terms of percentage points from age 16 to age 50 was found for “ever been a victim of sexual assault (including rape or harassment)”, suggesting that incidence of this event decreases substantially after age 16 and that the majority of those who had experienced this event had done so before age 16. Meanwhile, the event “ever had a husband/wife/partner/child who has been addicted to drugs or alcohol” almost never occurred before age 16. Weighted and unweighted proportions of respondents who had experienced each event were broadly similar

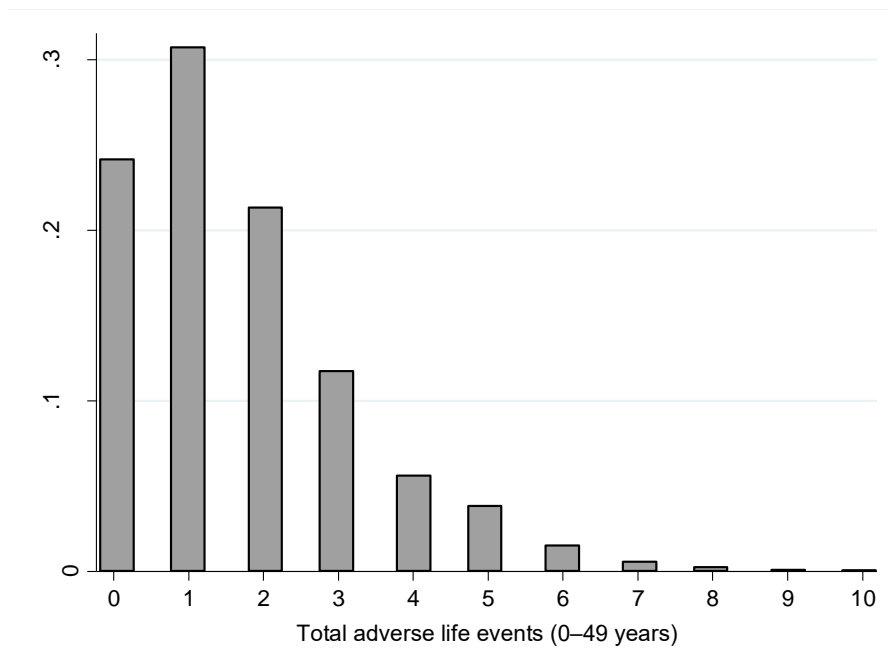
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Table 5.2. Proportions of respondents experiencing adverse events in ELSA Wave 3 Life History module by age (unweighted and weighted) (n=4,521)

Adverse life events (any age)		Unweighted (n=4,521)		Weighted	
		Experienced by age 16 (%)	Experienced by age 50 (%)	Experienced by age 16 (%)	Experienced by age 50 (%)
Self-oriented	1. Ever experienced a major fire, flood, earthquake or other natural disaster	2.9	7.7	3.0	7.9
	2. Ever had a life-threatening illness or accident	7.3	14.9	7.7	15.7
	3. Ever been a victim of serious physical attack or assault	1.0	4.0	1.2	4.3
	4. Ever been a victim of sexual assault (including rape or harassment)	2.7	4.2	2.7	4.0
	5. Ever fired a weapon in combat or been fired upon	0.4	4.7	0.4	5.1
	6. Ever experienced severe financial hardship	2.2	13.7	2.3	14.3
Other-oriented	7. Ever provided long-term care to disabled/impaired relative or friend	76.4	87.0	79.8	90.6
	8. Ever had a husband/wife/partner/child who has been addicted to drugs or alcohol	0.1	3.4	0.1	3.5
	9. Ever witnessed accident/violent act when someone was killed/seriously wounded (not war)	2.6	10.9	2.8	11.6
	10. Ever had a friend/relative at risk of death/died due to illness/serious accident	10.8	46.7	10.7	47.7
Adverse events in childhood (before 16 years)		Unweighted (n=4,521)		Weighted	
		Experienced by age 16 (%)		Experienced by age 16 (%)	
Self-oriented	11. Whether physically abused by parents	2.0		2.2	
	12. Whether separated from mother for 6 months or more	12.2		13.1	
Other-oriented	13. Whether parents ever permanently separated or divorced	3.8		4.0	
	14. Whether parents argued or fought very often	13.5		13.9	
	15. Whether either parent was involuntarily unemployed for over 6 months	5.2		5.4	
	16. Whether parents drunk/took drugs/had mental health problems	4.2		4.3	

Figure 5.4 shows the distribution of Wave 3 respondents by the number of adverse life events experienced. Although 16 events were included in the exposure measure the number of events experienced by respondents from age 0–49 years ranged from 0 to 10 with a mode of one event. While the weighted proportion of individuals who had experienced zero events was 24.2%, 30% of the sample experienced one event and 21.3% experienced two events. Of the 4,521 respondents in Wave 3 with full data on adverse events and their timing, three individuals were found to have experienced 10 events.

Figure 5.4. Distribution of total adverse events experienced by age 50 (weighted, n=4,521)



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Figures 5.5 and 5.6 show the weighted cumulative prevalence of each type of adverse event by age as a proportion of Wave 3 respondents with complete data on adverse events. The cumulative distribution curves indicate that the incidence of firing a weapon or being fired upon in a combat situation, experiencing sexual assault, and witnessing a serious accident or act of violence was highest around age 20 and diminished substantially after the age of 30 as evidenced by the plateau in cumulative prevalence after this age. Meanwhile, the probability of having to provide long-term care to a physically impaired close friend or relative increased as respondents' ages approached 50 as shown by the accelerating increase in cumulative prevalence with age. Finally, the probability of having a friend or relative die or be at risk of death remained constant over time as evidenced by the constant rate of growth in cumulative prevalence with age.

Figure 5.5 Cumulative proportions of respondents in the ELSA Wave 3 Life History module experiencing individual adverse events by age (weighted, n=4,521)

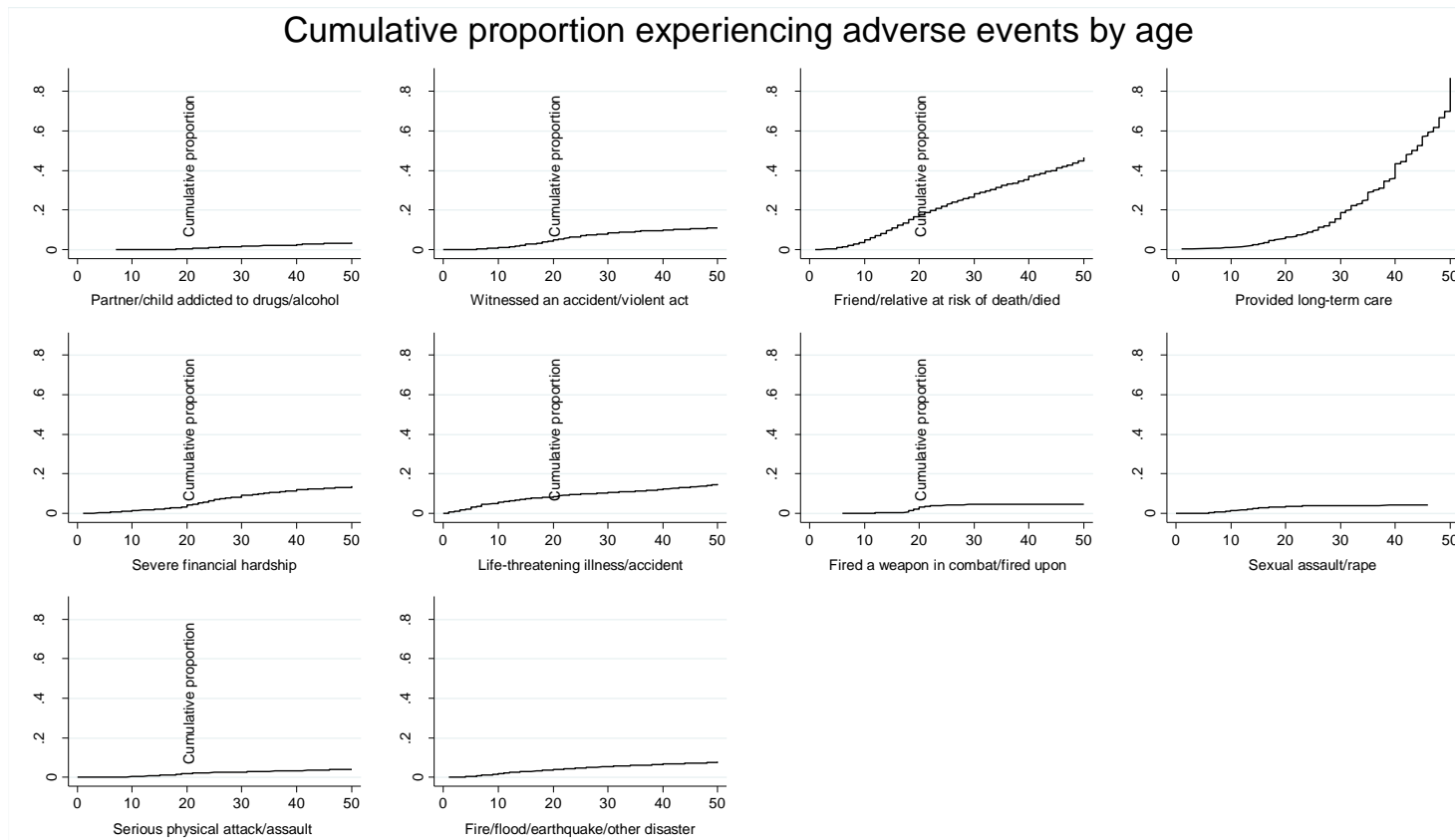
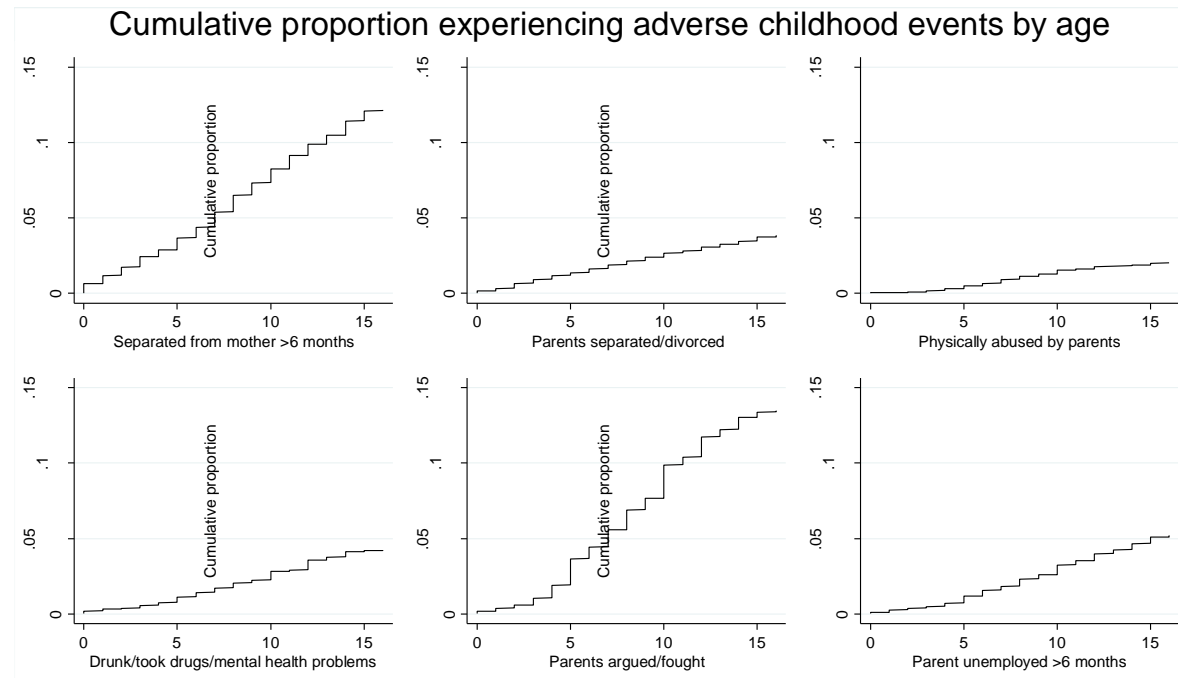


Figure 5.6. Cumulative proportions of respondents in the ELSA Wave 3 Life History module experiencing adverse childhood events by age (weighted, n=4,521)



5.6.1.1 *Missing data*

Appendix Table A5.1 shows the characteristics of Wave 3 core respondents who returned the Life History Questionnaire with full information on adverse events and those who did not. Respondents without data on adverse events were more likely to have had a more disadvantaged occupational position in their last known job (as indicated by NS-SEC category), be in a lower quintile of equivalised net household wealth and less likely to own their current home. Those with missing data on adverse events were also more likely to be permanently sick or disabled than those with complete data (7.2% vs. 3.7%). The results of the chi square tests showed that the differences in these variables between the two groups were highly statistically significant in all cases ($p < 0.001$). Respondents without full data on adverse events were significantly more likely to be born abroad, not be in a marriage or partnership and to not engage in social activities ($p < 0.001$). A higher proportion of Wave 3 respondents without full data on adverse events were female although the difference between the two groups was non-significant ($p = 0.068$).

These results imply that respondents who provided full data on adverse events may not have been fully representative of ELSA participants as a whole. It can be hypothesised that some of variables may have influenced the probability of a respondent completing and returning the Wave 3 Life History Questionnaire. These data were therefore not missing completely missing at random and may have been missing not at random (i.e. the probability that a given value was missing may have depended on the missing value itself). There is the possibility that the structure of the missing data may have introduced bias into model parameter estimates (Pedersen et al, 2017).

5.6.2 **Part I (Adverse events over the lifecourse, early-life socioeconomic disadvantage and adaptation in old age)**

The characteristics of the analytic sample for CASP-12 outcomes are shown in Appendix Table A5.2. These are shown for the entire sample of observations over Waves 1–7. Mean counts of adverse events experienced, both expressed as total counts (0–49 years) and as counts disaggregated by age of occurrence, self- and other-orientation, and self- and other-orientation and age of occurrence, are shown.

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The mean CASP-12 score among respondents analysed (n= 20,701) was 38.49 (95% CI: 38.41, 38.56) while the mean life satisfaction score (range: 1–7) for the analytic sample (n=17,948) was 5.48 (95% CI: 5.46, 5.50). At the sample time, out of those respondents with information on (CES-D) depression outcomes (n=22,039) and GHQ psychological distress outcomes (n=6,522), 3,698 (16.8%) met the criteria for depression while 915 (14.0%) met the criteria for psychological distress.

Table 5.3 shows the results of six models for the relationships between total adverse events (0–49 years) and later-life CASP-12 scores with adjustment for different groups of covariates. In all cases counts of adverse events were significantly and independently associated with lower CASP-12 wellbeing and effect sizes were similar and unattenuated regardless of covariates included. The results of the fully-adjusted model show that total counts of cumulative adverse events over the lifecourse from ages 0 to 49 were associated with a decrease of CASP-12 scores by -0.49 (95% CI: -0.58, -0.41, p<0.001) for each additional adverse event experienced.

Table 5.3. Results of models for the associations between total adverse events (0–49 years) and CASP-12 scores (n=20,176 observations / 4,176 unique individuals)

Model	Categories	Coefficient	P
Unadjusted	Total (0–49 years)	-0.53 (-0.63, -0.44)	<0.001
Model 1	Total (0–49 years)	-0.52 (-0.61, -0.44)	<0.001
Model 2	Total (0–49 years)	-0.52 (-0.60, -0.43)	<0.001
Model 3	Total (0–49 years)	-0.53 (-0.62, -0.44)	<0.001
Model 4	Total (0–49 years)	-0.49 (-0.58, -0.41)	<0.001
Full Model	Total (0–49 years)	-0.49 (-0.58, -0.41)	<0.001

Model 1: frailty index and age

Model 2: Model 1 + gender, current labour market status, participation in activities, partnership status and born abroad

Model 3: Model 2 + NS-SEC

Model 4: Model 2 + household net worth, household income and housing tenure

Full Model: Model 2 + NS-SEC, household net worth, household income and housing tenure (all covariates)

Similar results were found when the same models were fitted for the relationship between overall counts of adverse events and odds of CES-D depression caseness (Appendix Table A5.3). The unadjusted association between adverse events and depression caseness suggests that the odds of a given individual meeting the CES-D criteria for depression in a given wave was increased by 29% for each additional adverse event experienced (OR: 1.29, 95% CI: 1.22, 1.36, $p < 0.001$).

Table 5.4 shows the complete results of the fully-adjusted model for the association between total adverse events and CASP-12 scores. Female gender, participation in social activities, higher quintile of household wealth, higher household income and more advantaged occupational position were significantly associated with higher CASP-12 scores. Respondents who were unemployed, sick or disabled or in paid work at the time of interview, meanwhile, had significantly lower CASP-12 scores than retired individuals. Those not in a marriage or partnership, with higher physical frailty scores and without outright ownership of residential property were also found to have significantly worse wellbeing outcomes.

Table 5.4. Complete results of the fully-adjusted model for the association between total adverse events (0–49 years) and CASP-12 scores (n=20,176 observations / 4,176 unique individuals)

Variable	Categories	Coefficient (95% CI)	p
Adverse events	Total (0–49 years)	-0.49 (-0.58, -0.41)	<0.001
Age	Years	-0.14 (-0.15, -0.13)	<0.001
Gender	Male	Ref	
	Female	0.39 (0.12, 0.67)	0.005
Physical frailty index	Frailty Index	-8.83 (-9.47, -8.18)	<0.001
Current labour market status (self-reported)	Retired	Ref	
	In paid employment	-0.58 (-0.75, -0.41)	<0.001
	Unemployed	-1.06 (-1.64, -0.48)	<0.001
	Permanently sick or disabled	-1.77 (-2.13, -1.41)	<0.001
	Looking after home / other	-0.38 (-0.60, -0.16)	0.001
Participation in social activities	Never	Ref	
	Yes	0.55 (0.42, 0.67)	<0.001
Partnership status	Partnered	Ref	
	Non-partnered	-0.43 (-0.66, -0.21)	<0.001
Born abroad	No	Ref	
	Yes	-0.06 (-0.62, 0.50)	0.841
Quintile of household net worth	1 (poorest)	Ref	
	2	0.40 (0.19, 0.62)	<0.001
	3	0.74 (0.52, 0.96)	<0.001
	4	1.20 (0.97, 1.43)	<0.001
	5	1.50 (1.25, 1.75)	<0.001
Household income	Log equivalised income (2011 GBP)	0.14 (0.04, 0.23)	0.005
Housing tenure	Outright ownership	Ref	
	Ownership with mortgage	-0.52 (-0.70, -0.33)	<0.001
	Renting / other	-0.60 (-0.91, -0.28)	<0.001
NS-SEC (5 category)	I. Managerial / professional occupations	0.90 (0.62, 1.17)	<0.001
	II. Intermediate occupations	0.73 (0.40, 1.05)	<0.001
	III. Small employers/ own account workers	0.54 (0.20, 0.89)	0.002
	IV. Technical occupations	0.38 (0.01, 0.76)	0.046
	V. Semi routine / routine occupations	Ref	
	Never worked	-1.23 (-2.75, 0.29)	0.113

Table 5.5 shows the full model results for the association between total exposure to adverse events and covariates on life satisfaction scores and odds of CES-D depression caseness. As with CASP-12, overall exposure to adverse events significantly predicted a decrease in self-reported life satisfaction scores of -0.11 points (95% CI: -0.13, -0.09, $p < 0.001$) and 19% increase in odds of depression (95% CI: 1.14, 1.25, $p < 0.001$) for each additional event. There were significant differences between respondents in terms of both life satisfaction and odds of depression according to labour market status, household wealth, physical frailty, partnership status and engagement in social activities. Although increasing age and female gender significantly predicted higher odds of depression this was not the case with regards to subjective life satisfaction.

Table 5.5. Complete results of fully-adjusted models for the associations between total adverse events (0–49 years) and life satisfaction (n=17,948 observations / 4,152 unique individuals) and CES-D depression caseness outcomes (n=22,039 observations / 4,208 unique individuals)

Variable	Categories	Life Satisfaction		CES-D Depression Caseness	
		Coefficient (95% CI)	p	OR (95% CI)	p
Adverse events	Total (0–49 years)	-0.11 (-0.13, -0.09)	<0.001	1.19 (1.14, 1.25)	<0.001
Age	Years	0.00 (0.00, 0.00)	0.918	0.99 (0.98, 1.00)	0.023
Gender	Male	Ref		ref	
	Female	-0.03 (-0.10, 0.03)	0.302	1.51 (1.28, 1.78)	<0.001
Physical frailty index		-1.76 (-1.94, -1.57)	<0.001	1497.46 (887.14, 2527.66)	<0.001
Current labour market status (self-reported)	Retired	Ref		ref	
	In paid employment	-0.08 (-0.14, -0.03)	0.002	1.05 (0.88, 1.25)	0.599
	Unemployed	-0.48 (-0.66, -0.29)	<0.001	1.87 (1.07, 3.26)	0.029
	Permanently sick or disabled	-0.50 (-0.61, -0.39)	<0.001	1.31 (0.99, 1.74)	0.055
	Looking after home / other	-0.07 (-0.14, 0.00)	0.038	1.33 (1.08, 1.62)	0.007
Participation in social activities	Never	Ref		ref	
	Yes	0.12 (0.08, 0.16)	<0.001	0.71 (0.63, 0.80)	<0.001
Partnership status	Partnered	Ref		ref	
	Non-partnered	-0.41 (-0.47, -0.34)	<0.001	2.28 (1.95, 2.67)	<0.001
Born abroad	No	Ref		ref	
	Yes	0.11 (-0.03, 0.24)	0.113	1.09 (0.79, 1.52)	0.591
Quintile of household net worth	1 (poorest)	Ref		ref	
	2	0.07 (0.00, 0.13)	0.047	0.93 (0.77, 1.13)	0.475
	3	0.10 (0.03, 0.17)	0.004	0.71 (0.58, 0.87)	0.001
	4	0.14 (0.07, 0.22)	<0.001	0.64 (0.52, 0.79)	<0.001
	5	0.18 (0.10, 0.25)	<0.001	0.62 (0.50, 0.78)	<0.001
Household income	Log equivalised income (2011 GBP)	0.02 (-0.01, 0.05)	0.170	0.88 (0.80, 0.96)	0.006
Housing tenure	Outright ownership	Ref		ref	
	Ownership with mortgage	-0.06 (-0.12, 0.00)	0.036	0.94 (0.79, 1.12)	0.481
	Renting / other	-0.09 (-0.17, 0.00)	0.041	1.17 (0.95, 1.44)	0.144
NS-SEC (5 category)	I. Managerial / professional occupations	0.06 (-0.02, 0.13)	0.121	0.82 (0.68, 0.99)	0.043
	II. Intermediate occupations	0.01 (-0.08, 0.10)	0.820	0.85 (0.68, 1.07)	0.167
	III. Small employers/ own account workers	0.03 (-0.06, 0.13)	0.456	0.78 (0.61, 1.00)	0.046
	IV. Technical occupations	0.03 (-0.07, 0.13)	0.572	0.84 (0.64, 1.09)	0.182
	V. Semi routine / routine occupations	Ref		ref	
	Never worked	0.02 (-0.33, 0.38)	0.891	0.72 (0.30, 1.71)	0.458

Finally, there was a positive and statistically significant association between total exposure to adverse events (0–49 years) and higher odds of psychological distress measured using GHQ-12 symptoms (OR: 1.19, 95% CI: 1.11, 1.27, $p < 0.001$) (Appendix Table A5.4). This can be interpreted as a 19% increase in the odds of psychological distress per additional adverse event experienced.

5.6.2.1 Adverse events by age and self- or other- orientation

Table 5.6 and Appendix Tables A5.5, A5.6 and A5.7 show the associations between adverse events disaggregated by age and self- or other- orientation and CASP-12, subjective life satisfaction, CES-D depression caseness and GHQ-12 psychological distress symptoms respectively. In addition to the results of the fully-adjusted model for the association between total adverse events (0–49 years) as a single, continuous variable and each outcome variable, the tables show the results of four further models in which exposure to adverse events was specified as different mutually adjusted groups of variables. Specifically, they expressed counts of adverse events in terms of events occurring in early childhood (0–5 years), late childhood (6–15 years), early adulthood (16–30 years) and late adulthood (31–49 years) (Model A); total self- and other-oriented events (0–49 years) (Model B); self- and other-oriented events in childhood (0–15 years) and adulthood (16–49 years) (Model C); and self- and other-oriented events in early childhood (0–5 years), late childhood (6–15 years), early adulthood (16–30 years) and late adulthood (31–49 years) (Model D) respectively.

CASP-12 outcomes

The results of Model A (Table 5.6) show that events of all types in early childhood (0–5 years), late childhood (6–15 years), early adulthood (16–30 years) and late adulthood (31–49 years) were significantly associated with lower CASP-12 scores with effect sizes of -0.38 (95% CI: -0.65, -0.11, $p = 0.005$), -0.41 (95% CI: -0.56, -0.26, $p = 0.001$), -0.58 (95% CI: -0.75, -0.40, $p = 0.001$), and -0.59 (95% CI: -0.78, -0.41, $p < 0.001$) respectively per additional event. When events were disaggregated into self- and other-oriented events (0–49 years), it was found that individuals' CASP-12 scores were -0.41 (95% CI: -0.56, -0.26, $p < 0.001$) and -0.57 (95% CI: -0.70, -0.43, $p < 0.001$) points lower for each event experienced (Model B).

When self- and other-oriented events were further disaggregated by age of occurrence, both self- and other oriented events in adulthood (16–49 years) were significantly associated with lower CASP-12 scores with effect sizes of -0.71 (95% CI: -0.92, -0.49, $p < 0.001$) and -0.50 (95% CI: -0.68, -0.31, $p < 0.001$) respectively. The pattern was different in childhood (0–15 years), however, as other-oriented events were found to significantly predict lower CASP-12 scores in later life (0.63, 95% CI: 0.82, -0.44, $p < 0.001$) while self-oriented events did not (-0.10, 95% CI: -0.32, 0.11, $p = 0.354$) (Model C). This pattern was still apparent when events were further disaggregated into narrower age ranges as neither self-oriented events in early childhood (0–5 years) (0.07, 95% CI: -0.34, 0.49, $p = 0.738$) nor in late childhood (6–15 years) (-0.16, 95% CI: -0.42, 0.09, $p = 0.208$) significantly predicted lower CASP-12 scores in later life. Exposures to either self- or other-oriented events at any other age were significantly associated with lower wellbeing. While the largest effect size was found for self-oriented events in late adulthood (31–49 years) (-1.07, 95% CI: -1.43, -0.71, $p < 0.001$), the effects of other-oriented events were strongest in early childhood (0–5 years) (-0.83, 95% CI: -1.23, -0.43, $p < 0.001$) and weakest in late adulthood (31–49 years) (-0.38, 95% CI: -0.61, -0.14, $p = 0.002$) (Model D). This pattern showed two gradients in effect sizes with self-oriented events having larger negative impacts on later-life wellbeing when they occurred later in the lifecourse and the effect of other-oriented events diminishing with age.

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Table 5.6. Results of fully-adjusted models for associations between total adverse events disaggregated by age of occurrence and self- or other-orientation (Models A–D), and CASP-12 scores (n=20,701 observations / 4,176 unique individuals)

Variable	Categories	Total Events		Model A		Model B		Model C		Model D	
		Coefficient	p	Coefficient	p	Coefficient	p	Coefficient	p	Coefficient	p
Adverse events by lifecourse stage	Total (0–49 years)	-0.49 (-0.58, -0.41)	<0.001								
	Early childhood (0–5 years)			-0.38 (-0.65, -0.11)	0.005						
	Late childhood (6–15 years)			-0.41 (-0.56, -0.26)	<0.001						
	Early adulthood (16–30 years)			-0.58 (-0.75, -0.40)	<0.001						
	Late adulthood (31–49 years)			-0.59 (-0.78, -0.41)	<0.001						
Adverse events by self- or other-orientation and lifecourse stage	Self-oriented, total (0–49 years)					-0.41 (-0.56, -0.26)	<0.001				
	Other-oriented, total (0–49 years)					-0.57 (-0.70, -0.43)	<0.001				
	Self-oriented, childhood (0–15 years)							-0.10 (-0.32, 0.11)	0.354		
	Self-oriented, adulthood (16–49 years)							-0.71 (-0.92, -0.49)	<0.001		
	Other-oriented, childhood (0–15 years)							-0.63 (-0.82, -0.44)	<0.001		
	Other-oriented, adulthood (16–49 years)							-0.50 (-0.68, -0.31)	<0.001		
	Self-oriented, early childhood (0–5 years)									0.07 (-0.34, 0.49)	0.738
	Self-oriented, late childhood (6–15 years)									-0.16 (-0.42, 0.09)	0.208
	Self-oriented, early adulthood (16–30)									-0.47 (-0.75, -0.20)	0.001
	Self-oriented, late adulthood (31–49 years)									-1.07 (-1.43, -0.71)	<0.001
	Other-oriented, early childhood (0–5 years)									-0.83 (-1.23, -0.43)	<0.001
	Other-oriented, late childhood (6–15 years)									-0.58 (-0.80, -0.37)	<0.001
	Other-oriented, early adulthood (16–30)									-0.63 (-0.89, -0.38)	<0.001
Other-oriented, late adulthood (31–49)									-0.38 (-0.61, -0.14)	0.002	

Subjective life satisfaction

The results of Model A show that events occurring across all ages were significantly associated with lower life satisfaction scores (Appendix Table A5.5). Meanwhile, as with CASP-12 outcomes, the results of Model C indicated that overall counts of self- and other-oriented events (0–49 years) both had significant associations with lower life satisfaction in later life ($p < 0.001$). (Model B). Experiences of other-oriented events in childhood (0–15 years) were significantly associated with lower life satisfaction scores in later life (-0.14, 95% CI: -0.19, -0.10, $p < 0.001$) while experiences of self-oriented events in childhood were not (-0.04, 95% CI: -0.09, 0.01, $p = 0.118$). Statistically significant associations were found for both other-oriented events in adulthood (16–49 years) ($p = 0.001$) and self-oriented events in adulthood (16–49 years) ($p = 0.033$) (Model C). Similar results were found when events were further disaggregated into narrower age bands and statistically significant associations were found for all event types across all ages except for self-oriented events in early childhood ($p = 0.716$) and late childhood ($p = 0.097$) (Model D).

CES-D depression

Adverse events of both types occurring across all ages (Model A), in addition to overall counts of self- and other-oriented events (0–49 years) (Model B), significantly predicted higher odds of depression ($p < 0.001$) (Appendix Table A5.6). The results of Model C show that, as was the case for CASP-12 and life satisfaction outcomes, counts of other-oriented events in childhood (0–15 years) had a significant association with odds of depression in later life (OR: 1.27, 95% CI: 1.14, 1.40, $p < 0.001$) while self-oriented events in childhood did not (OR: 1.07, 95% CI: 0.95, 1.21, $p = 0.261$). Although exposure to self-oriented events in adulthood (16–49 years) predicted higher odds of depression (OR: 1.33, 95% CI: 1.18, 1.50, $p < 0.001$) the association between counts of other-oriented events in adulthood and CES-D depression was only borderline significant and its effect size was smaller (OR: 1.10, 95% CI: 0.99, 1.22, $p = 0.063$). The results of Model D showed statistically significant associations for all event types across all ages except for other-oriented events in early adulthood (16–30 years) (OR: 1.04, 95% CI: 0.90, 1.21, $p = 0.574$) and self-oriented events in early childhood ($p = 0.738$) and late childhood ($p = 0.208$).

GHQ-12

Exposure to adverse events in early childhood (0–5 years) had no significant association with odds of psychological distress (OR: 1.14, 95% CI: 0.93, 1.41, $p=0.210$) although events occurring at all other ages did (Model A) (Appendix Table A5.7). Overall counts of both self- and other-oriented events (0–49 years) had significant positive associations with higher odds of psychological distress (Model B). Counts of self-oriented events in adulthood and other-oriented events in childhood were both significantly associated with psychological distress (Models C). Similar results were found for Model D as self-oriented events in adulthood significantly predicted higher odds of psychological distress while those occurring in childhood did not. Only other-oriented events in late childhood (6–15 years) were significantly associated with higher odds of psychological distress ($p=0.009$). Consistent with the results of Model A, exposure to other-oriented events in early childhood was not significantly associated with GHQ-12 psychological distress (OR: 1.27, 95% CI: 0.93, 1.75, $p=0.137$).

5.6.2.2 Early-life socioeconomic disadvantage

Table 5.7 shows the results of multilevel regression models testing the associations between the index of early-life socioeconomic disadvantage and CASP-12 scores in later life. The unadjusted univariable models predicted a -0.66 (95% CI: 0.53, 0.79, $p<0.001$) difference in CASP-12 scores per index point of early-life disadvantage. This association remained significant in Models 1–4 with adjustment for covariates; although the effect size was reduced. In the fully-adjusted model, however, increased paternal socioeconomic disadvantage no longer significantly predicted lower CASP-12 scores after all covariates were fitted (-0.07, 95% CI: -0.05, 0.18, $p=0.271$)

Similar results were found for CES-D depression outcomes (see Appendix Table A5.8). While the odds of CES-D depression caseness was 34% higher per additional index point of early-life socioeconomic disadvantage (OR: 1.34, (95% CI: 1.25, 1.45, $p<0.001$) in the unadjusted model, the associations remained significant in Models 1–3. The association was no longer significant, however, after adjustment for financial variables in Model 4 (OR: 1.05, 95% CI: 0.99, 1.12, $p=0.119$) and in the full model (OR: 1.02, 95% CI: 0.96, 1.09, $p=0.466$).

Table 5.7. Results of models for the associations between early-life socioeconomic disadvantage and CASP-12 scores (n=37,687 observations / 9,618 unique individuals)

Model	Paternal occupational position (0–2 point index) Age 14	
	Coefficient (95% CI)	p
Unadjusted	-0.66 (0.53, 0.79)	<0.001
Model 1	-0.42 (0.30, 0.54)	<0.001
Model 2	-0.34 (0.22, 0.46)	<0.001
Model 3	-0.21 (0.10, 0.34)	<0.001
Model 4	-0.17 (0.05, 0.28)	0.004
Full model	-0.07 (-0.05, 0.18)	0.271

Model 1: frailty index and age

Model 2: Model 1 + gender, current labour market status, participation in activities, partnership status and born abroad

Model 3: Model 2 + NS-SEC

Model 4: Model 2 + household net worth, household income and housing tenure

Full Model: Model 2 + NS-SEC, household net worth, household income and housing tenure (all covariates)

5.6.3 Part II (Adversity over the lifecourse and resilience following work exit)

The characteristics of the analytic samples are summarised in Appendix Table A5.9. These are shown separately for analyses of adverse events and cumulative socioeconomic disadvantage. The characteristics of these samples were similar. The mean CASP-12 change score for the analytic sample to test the associations between total adverse events and wellbeing change following work exit ($n=1,126$) was -0.04 (95% CI: $-0.27, 0.18$). The mean change score for the sample of respondents to test the association between cumulative socioeconomic disadvantage and wellbeing change ($n=1,965$) was $+0.04$ (95% CI: $-0.13, 0.22$). Although the former was positive and the latter negative, neither of these mean change scores was significantly different from zero.

Figure 5.7 shows unweighted the proportions of the analytic sample of 1,965 respondents with retrospective ELSA Wave 3 Life History data who had left work between two waves by scores on the 7-point index of socioeconomic disadvantage (comprising measures of paternal socioeconomic position, level of education and occupational position in last employment). Scores of zero and six index points denote the lowest and highest degrees of cumulative socioeconomic disadvantage respectively. The modal number of index points was two with 436 respondents (22.2%) having this score. The distribution of respondents by index points was asymmetrical, with around 37 times as many Wave 3 respondents in the most advantaged category than in the most disadvantaged category. While 299 (15.2%) respondents had a score of zero index points, 8 (0.4%) were in the most disadvantaged category with a score of six index points.

Figure 5.7. Proportions of sample respondents in Waves 2–7 with retrospective ELSA Wave 3 Life History data who had exited work from t_0 to t_1 by scores on the 7-point index of socioeconomic disadvantage (unweighted, $n=1,965$)

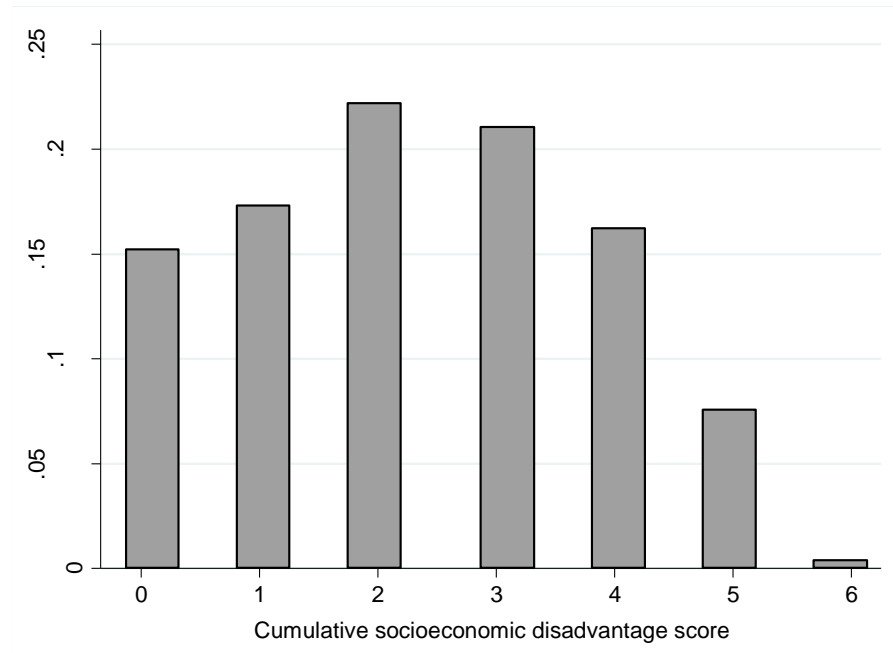


Table 5.8 shows the associations between total adverse events and CASP-12 change scores (left), and adverse events by age of first occurrence and CASP-12 change scores (right). The results of the unadjusted and fully-adjusted models show that overall counts of adverse events (0–49 years) had a significant association with CASP-12 change scores following work exit. The fully-adjusted model found an effect size of -0.14 (95% CI: -0.27, 0.00, $p=0.046$) per additional adverse event experienced. Adverse events occurring in childhood (0–15 years) were not significantly associated with change in CASP-12 following work exit ($p=0.897$) according to the fully-adjusted model. Events in adulthood (16–49 years), meanwhile, were significantly and independently associated with a negative effect of -0.32 (95% CI: -0.53, -0.11, $p=0.003$) on CASP-12 change scores. The results of Models 1–4 show that this was true regardless of which covariates were included and effect sizes remained similar across all six models.

Table 5.8. Results of models for the relationships between total adverse events and adverse events disaggregated by age of occurrence, and CASP-12 change scores following work exit (n=1,126)

Model	Total adverse events			Adverse events by lifecourse stage		
	Categories	Coefficient (95% CI)	p	Categories	Coefficient (95% CI)	p
Unadjusted	Total (0–49 years)	-0.15 (-0.28, -0.01)	0.040	Childhood (0–15 years)	-0.01 (-0.21, 0.18)	0.892
				Adulthood (16–49 years)	-0.31 (-0.53, -0.09)	0.005
Model 1	Total (0–49 years)	-0.12 (-0.26, 0.01)	0.076	Childhood (0–15 years)	0.00 (-0.19, 0.19)	0.998
				Adulthood (16–49 years)	-0.28 (-0.49, -0.06)	0.011
Model 2	Total (0–49 years)	-0.14 (-0.28, -0.01)	0.038	Childhood (0–15 years)	0.01 (-0.18, 0.20)	0.939
				Adulthood (16–49 years)	-0.33 (-0.55, -0.12)	0.002
Model 3	Total (0–49 years)	-0.17 (-0.31, -0.03)	0.017	Childhood (0–15 years)	-0.03 (-0.22, 0.16)	0.780
				Adulthood (16–49 years)	-0.34 (-0.56, -0.13)	0.002
Model 4	Total (0–49 years)	-0.13 (-0.27, 0.00)	0.054	Childhood (0–15 years)	0.00 (-0.19, 0.19)	0.999
				Adulthood (16–49 years)	-0.30 (-0.51, -0.09)	0.006
Model 5	Total (0–49 years)	-0.15 (-0.28, -0.01)	0.031	Childhood (0–15 years)	0.00 (-0.19, 0.19)	0.989
				Adulthood (16–49 years)	-0.34 (-0.55, -0.12)	0.002
Full model	Total (0–49 years)	-0.14 (-0.27, 0.00)	0.046	Childhood (0–15 years)	0.01 (-0.17, 0.20)	0.897
				Adulthood (16–49 years)	-0.32 (-0.53, -0.11)	0.003

Model 1: Physical health (frailty index)

Model 2: Work exit circumstances (age and route of exit)

Model 3: Psychosocial variables (participation in activities, partnership status and born abroad)

Model 4: Financial variables (quintile of equalised net household wealth and gross equalised household income)

Model 5: Model 1 + Model 2 + Model 3

Full model: Model 1 + Model 2 + Model 3 + Model 4

Table 5.9 shows the associations between counts of adverse events and wellbeing change following work exit disaggregated by self- and other-orientation, and by age of occurrence and self- and other-orientation. The results of the fully-adjusted model show that the associations between total counts of self and other-oriented events (0–49 years) and CASP-12 change following work exit were not statistically significant with effect sizes of -0.14 (95% CI: -0.38, 0.09, $p=0.226$) and -0.13 (95% CI: -0.34, 0.09, $p=0.236$) respectively (left). Similar results were found for Models 1–4. This was only somewhat different in the case of the unadjusted model, where total counts of self-oriented events had a borderline significant association with CASP-12 change scores (-0.23, 95% CI: -0.48, 0.01, $p=0.058$) while other-oriented events did not (-0.07, 95% CI: -0.29, 0.15, $p=0.538$).

When counts of self- and other-oriented events were further disaggregated according to age at first occurrence (right), self-oriented events in adulthood (16–49 years) were found to be significantly associated with a decline in wellbeing with an effect of -0.45 (95% CI: -0.81, -0.09, $p=0.014$) CASP-12 points for each of these events experienced. No significant associations between counts of events and CASP-12 change scores following work exit were found for exposure to self-oriented events in childhood (0.06, 95% CI: -0.24, 0.37, $p=0.684$) or for other-oriented events in either childhood (-0.02, 95% CI: -0.34, 0.29, $p=0.900$) or adulthood (-0.24, 95% CI: -0.54, 0.05, $p=0.110$). The same associations were found in the unadjusted model and Models 1–4. These results suggest that the apparent significant associations between overall counts of adverse events and CASP-12 change scores, and between counts of self-oriented adverse events and CASP-12 change scores, are largely driven by self-oriented events in adulthood.

Table 5.9. Results of models for the relationships between adverse events disaggregated by self- or other-orientation and by self- or other-orientation and age of occurrence, and CASP-12 change scores following work exit (n=1,126)

Model	Adverse events by self and other-orientation			Adverse events by orientation and lifecourse stage		
	Categories	Coefficient (95% CI)	p	Categories	Coefficient (95% CI)	p
Unadjusted	Self-oriented, total (0–49 years)	-0.23 (-0.48, 0.01)	0.058	Self-oriented, childhood (0–15)	-0.10 (-0.41, 0.22)	0.538
	Other-oriented, total (0–49 years)	-0.07 (-0.29, 0.15)	0.538	Self-oriented, adulthood (16–49)	-0.49 (-0.86, -0.12)	0.011
Model 1	Self-oriented, total (0–49 years)	-0.21 (-0.45, 0.03)	0.083	Other-oriented, childhood (0–15)	0.11 (-0.22, 0.43)	0.521
	Other-oriented, total (0–49 years)	-0.05 (-0.27, 0.17)	0.658	Other-oriented, adulthood (16–49)	-0.17 (-0.48, 0.13)	0.264
Model 2	Self-oriented, total (0–49 years)	-0.20 (-0.44, 0.04)	0.101	Self-oriented, childhood (0–15)	-0.04 (-0.35, 0.28)	0.820
	Other-oriented, total (0–49 years)	-0.10 (-0.32, 0.12)	0.384	Self-oriented, adulthood (16–49)	-0.49 (-0.86, -0.12)	0.010
Model 3	Self-oriented, total (0–49 years)	-0.25 (-0.49, -0.01)	0.044	Other-oriented, childhood (0–15)	0.07 (-0.25, 0.40)	0.659
	Other-oriented, total (0–49 years)	-0.10 (-0.32, 0.12)	0.373	Other-oriented, adulthood (16–49)	-0.13 (-0.43, 0.17)	0.405
Model 4	Self-oriented, total (0–49 years)	-0.12 (-0.34, 0.09)	0.263	Self-oriented, childhood (0–15)	0.00 (-0.31, 0.31)	0.989
	Other-oriented, total (0–49 years)	-0.15 (-0.38, 0.09)	0.229	Self-oriented, adulthood (16–49)	-0.52 (-0.88, -0.16)	0.006
Model 5	Self-oriented, total (0–49 years)	-0.20 (-0.43, 0.04)	0.096	Other-oriented, childhood (0–15)	0.05 (-0.27, 0.37)	0.767
	Other-oriented, total (0–49 years)	-0.10 (-0.32, 0.11)	0.347	Other-oriented, adulthood (16–49)	-0.20 (-0.50, 0.10)	0.185
Full model	Self-oriented, total (0–49 years)	-0.14 (-0.38, 0.09)	0.226	Self-oriented, childhood (0–15)	-0.11 (-0.42, 0.21)	0.503
	Other-oriented, total (0–49 years)	-0.13 (-0.34, 0.09)	0.236	Self-oriented, adulthood (16–49)	-0.51 (-0.88, -0.14)	0.007
				Other-oriented, childhood (0–15)	0.08 (-0.24, 0.41)	0.607
				Other-oriented, adulthood (16–49)	-0.21 (-0.51, 0.09)	0.166
				Self-oriented, childhood (0–15)	-0.01 (-0.32, 0.30)	0.956
				Self-oriented, adulthood (16–49)	-0.38 (-0.74, -0.02)	0.045
				Other-oriented, childhood (0–15)	0.02 (-0.30, 0.34)	0.894
				Other-oriented, adulthood (16–49)	-0.25 (-0.55, 0.05)	0.105
				Self-oriented, childhood (0–15)	0.02 (-0.29, 0.33)	0.889
				Self-oriented, adulthood (16–49)	-0.53 (-0.89, -0.17)	0.004
				Other-oriented, childhood (0–15)	0.01 (-0.30, 0.33)	0.936
				Other-oriented, adulthood (16–49)	-0.20 (-0.50, 0.10)	0.186
				Self-oriented, childhood (0–15)	0.06 (-0.24, 0.37)	0.684
				Self-oriented, adulthood (16–49)	-0.45 (-0.81, -0.09)	0.014
				Other-oriented, childhood (0–15)	-0.02 (-0.34, 0.29)	0.900
				Other-oriented, adulthood (16–49)	-0.24 (-0.54, 0.05)	0.110

Model 1: Physical health (frailty index)**Model 2:** Work exit circumstances (age and route of exit)**Model 3:** Psychosocial variables (participation in activities, partnership status and born abroad)**Model 4:** Financial variables (quintile of equivalised net household wealth and gross equivalised household income)**Model 5:** Model 1 + Model 2 + Model 3**Full model:** Model 1 + Model 2 + Model 3 + Model 4

Table 5.10 shows the results of models testing the association between the index of cumulative socioeconomic disadvantage and CASP-12 change scores following work exit with adjustment for different groups of covariates. The unadjusted model found that cumulative socioeconomic disadvantage predicted significantly worse wellbeing change outcomes following work exit with an effect size of -0.22 CASP-12 points (95% CI: -0.34, -0.11, $p < 0.001$) per additional index point. This association remained statistically significant after adjustment for single blocks of covariates, as shown in Models 1–3. In Models 4 and 5, however, after adjustment for financial variables and for all three blocks of covariates included in Models 1–3, this association was now only borderline significant ($p = 0.180$ and $p = 0.071$). Finally, this association was no longer significant in the fully-adjusted model after inclusion of all these covariates (including financial variables) with an effect size of only -0.02 (95% CI: -0.14, 0.10, $p = 0.728$) per index point. From this it can be surmised that, since cumulative socioeconomic disadvantage did not predict resilience to exit from paid work independently of individuals' quintile of equivalised household net worth and household income (Model 4 and full model), the effect of earlier-life socioeconomic disadvantage on wellbeing change following work exit may be mediated by current socioeconomic position.

Table 5.10. Results of models for the relationships between an index of cumulative socioeconomic disadvantage and CASP-12 change scores following work exit (n=1,985)

Model	Cumulative disadvantage (0–6 point index)	
	Coefficient (95% CI)	p
Unadjusted	-0.22 (-0.34, -0.11)	<0.001
Model 1	-0.20 (-0.31, -0.09)	<0.001
Model 2	-0.16 (-0.27, -0.05)	0.005
Model 3	-0.18 (-0.29, -0.06)	0.002
Model 4	-0.08 (-0.20, 0.04)	0.180
Model 5	-0.10 (-0.22, 0.01)	0.071
Full model	-0.02 (-0.14, 0.10)	0.728

Model 1: Physical health (frailty index)

Model 2: Work exit circumstances (age and route of exit)

Model 3: Psychosocial variables (participation in activities, partnership status and born abroad)

Model 4: Financial variables (quintile of equivalised net household wealth and gross equivalised household income)

Model 5: Model 1 + Model 2 + Model 3

Full model: Model 1 + Model 2 + Model 3 + Model 4

Table 5.11 shows the complete results for the fully-adjusted models for the associations between CASP-12 change scores following work exit and total exposure to adverse events (ages 0–49) and cumulative lifecourse socioeconomic disadvantage respectively. Self-reported labour market status following work exit, age at exit, physical frailty score and

quintile of equivalised household income were found to have significant associations with the dependent variable in both models.

Table 5.11. Fully-adjusted models for the relationships between measures of lifecourse adversity (cumulative adverse events and index of cumulative socioeconomic disadvantage) and CASP-12 change scores following work exit

Variable	Categories	Adverse events (n=1,126)		Cumulative disadvantage (n=1,965)	
		Coefficient (95% CI)	p	Coefficient (95% CI)	p
Adverse events	Total (0–49 years)	-0.14 (-0.27, 0.00)	0.046		
Cumulative disadvantage	0–6 point index			-0.02 (-0.14, 0.10)	0.728
Labour market status at t ₁ (self-reported)	Retired	Ref		ref	
	Unemployed	-0.50 (-1.41, 0.42)	0.289	-0.81 (-1.54, -0.08)	0.030
	Permanently sick or disabled	-3.23 (-4.52, -1.93)	<0.001	-2.87 (-3.76, -1.97)	<0.001
	Looking after home / other	-0.26 (-0.97, 0.46)	0.484	-0.67 (-1.21, -0.13)	0.015
Frailty index	Frailty Index	-3.85 (-6.23, -1.47)	0.002	-3.05 (-4.99, -1.11)	0.002
Age	Years	-0.06 (-0.10, -0.01)	0.014	-0.04 (-0.07, 0.00)	0.037
Participation in social activities	Never	Ref		ref	
	Yes	0.84 (0.39, 1.28)	<0.001	0.55 (0.20, 0.91)	0.002
Partnership status	Partnered	Ref		ref	
	Non-partnered	-0.07 (-0.63, 0.50)	0.820	-0.22 (-0.64, 0.21)	0.312
Born abroad	No	Ref		ref	
	Yes	0.04 (-0.95, 1.04)	0.932	0.34 (-0.36, 1.03)	0.342
Quintile of household net worth	1 (poorest)	Ref		ref	
	2	0.98 (-0.05, 2.01)	0.062	1.12 (0.39, 1.84)	0.003
	3	1.55 (0.63, 2.46)	0.001	1.35 (0.70, 2.01)	<0.001
	4	1.67 (0.78, 2.57)	<0.001	1.56 (0.92, 2.21)	<0.001
	5	1.92 (1.02, 2.83)	<0.001	1.73 (1.08, 2.38)	<0.001
Household income	Log equivalised income (2011 GBP)	0.24 (-0.06, 0.55)	0.121	0.13 (-0.10, 0.36)	0.274

5.6.3.1 Resilience and vulnerability

Resilient and vulnerable outcomes were defined as a maintenance or increase in wellbeing and as a decline in wellbeing following work exit respectively. Of the analytic samples of 1,126 and 1,985 respondents for adverse events and cumulative socioeconomic disadvantage, 657 (58.4%) and 1,139 (58.0%) experienced a neutral or positive change in wellbeing and were categorised as resilient to work exit. Conversely, 469 (41.7%) and 826 (42.0%) were considered to have experienced vulnerable outcomes following exit from paid work.

As it was hypothesised that experiences of adverse events and cumulative socioeconomic disadvantage would be associated with vulnerability to work exit, the outcome variable was operationalised such that odds ratios above 1.00 indicate an increase in the odds of a decline in CASP-12 wellbeing per additional adverse event or cumulative socioeconomic disadvantage index point.

Adverse events

The results of the fully-adjusted model for the association between total counts of adverse events (0–49 years) and vulnerable outcomes show that the odds of vulnerability to a decline in CASP-12 wellbeing following exit from paid work significantly increased by 9% for each additional event experienced (OR: 1.09, 95% CI: 1.01, 1.19, $p=0.033$). When adverse events were categorised by age of occurrence, adverse events in adulthood were associated with vulnerable outcomes, it was found that events in adulthood (16–49 years) were associated with vulnerability (OR: 1.15, 95% CI: 1.01, 1.30, $p=0.030$) while those in childhood (0–15 years) were not (OR: 1.05, 95% CI: 0.94, 1.17, $p=0.415$). When events were disaggregated by their orientation, it was found that neither total counts of self-oriented events (0–49 years) (OR: 1.14, 95% CI: 0.99, 1.31, $p=0.070$) nor other-oriented events (0–49 years) (OR: 1.05, 95% CI: 0.92, 1.20, $p=0.438$) were significantly associated with vulnerability to work exit. When self- and other-oriented events were further categorised by age of occurrence, self-oriented events in adulthood (16–49 years) were significantly and positively associated with a higher odds of vulnerable outcomes (OR: 1.25, 95% CI: 1.01, 1.56, $p=0.043$) while self-oriented events in childhood (0–15 years) (OR: 1.05, 95% CI: 0.85, 1.29, $p=0.647$), other-oriented events in childhood (OR: 1.03, 95% CI:

0.87, 1.23, $p=0.707$) and other-oriented events in adulthood (OR: 1.08, 95% CI: 0.91, 1.29, $p=0.380$) were not.

Cumulative socioeconomic disadvantage

Table 5.12 shows results for the associations between the index of cumulative socioeconomic disadvantage and the odds of vulnerable outcomes following work exit with adjustment for different groups of covariates. Similar to the results shown in Table 5.10 for continuous CASP-12 wellbeing outcomes, there was an association between higher cumulative socioeconomic disadvantage and more negative changes in wellbeing with a 14% increase in the odds of decline in wellbeing following work exit per index point (OR: 1.14, 95% CI: 1.07, 1.21, $p<0.001$). The results of Models 1–3 show that this association remained significant after adjustment for physical health, circumstances of work exit and respondents' psychosocial characteristics as individual blocks of variables. This association remained significant after adjustment for all these variables (Model 5). This association was no longer statistically significant, however, after adjustment for financial variables (Model 4) and in the fully-adjusted model. As shown for the associations between cumulative socioeconomic disadvantage and continuous CASP-12 change outcomes, the results suggest that the association between cumulative socioeconomic disadvantage and decline in wellbeing following work exit was mediated by equivalised household income and quintile of equivalised household net worth at the time of work exit.

Table 5.12. Results of logistic regression models for the relationships between an index of cumulative socioeconomic disadvantage and binary resilience outcomes following work exit (n=1,985)

Model	Cumulative disadvantage (0–6 point index)	
	Odds ratio (95% CI)	P
No adjustment	1.14 (1.07, 1.21)	<0.001
Model 1	1.13 (1.06, 1.20)	<0.001
Model 2	1.11 (1.04, 1.18)	0.001
Model 3	1.12 (1.05, 1.19)	<0.001
Model 4	1.08 (1.01, 1.16)	0.020
Model 5	1.09 (1.03, 1.16)	0.006
Full model	1.06 (0.99, 1.14)	0.081

Model 1: Physical health (frailty index)

Model 2: Work exit circumstances (age and route of exit)

Model 3: Psychosocial variables (participation in activities, marital status and born abroad)

Model 4: Financial variables (quintile of equivalised net household wealth and gross equivalised household income)

Model 5: Model 1 + Model 2 + Model 3

Full model: Model 1 + Model 2 + Model 3 + Model 4

5.7 DISCUSSION

5.7.1 Overall findings

Exposure to adverse events over the lifecourse was independently and significantly associated with lower resilience to work exit in early old age (CASP-12 change scores t_0 to t_1) and adaptation in old age (measured by CASP-12, life satisfaction, odds of depression and psychological distress symptoms). This was not the case with regards to cumulative socioeconomic disadvantage, however, as this did not predict resilience to work exit (CASP-12 change scores t_0 to t_1) independently of respondents' household income and household wealth.

5.7.2 **Part I (Adverse events over the lifecourse, early-life socioeconomic disadvantage and adaptation in old age)**

5.7.2.1 *Adverse events*

Overall, an increase in the number of adverse events experienced over the lifecourse (0–49 years) was associated with significantly lower CASP-12, lower life satisfaction, higher odds of CES-D depression caseness and higher odds GHQ-12 psychological distress in later life. This is consistent with the hypothesis that higher cumulative exposure to adverse events over the lifecourse is associated with lower wellbeing and adverse mental health outcomes in later life (see Section 2.1.1). The fact that the significance of these associations and their effect sizes remained the same regardless of which covariates measured at the time of interview were included in the model suggests that they are direct (unmediated). Although there was a shallow gradient in the effect of adverse events on CASP-12 wellbeing according to age of first occurrence, there was no statistically significant difference in the magnitude of these effects. When events were categorised according to whether they were self- or other-oriented, it was found that other-oriented events in childhood influenced later-life adaptation in the fully-adjusted model while self-oriented events did not. Both event types had a significant negative association with CASP-12 scores when they occurred in adulthood. The effect size was greater for self-oriented events but it was not significantly larger than that of other-oriented events. These findings were similar when life satisfaction and depression were the outcome measures. These results disagree with the findings of Shrira et al. (2012) and Schmotkin and Litwin (2009), and the original hypothesis, that

other oriented events, particularly those occurring in childhood, were associated with higher CASP-12 wellbeing in old age.

Shrira et al.'s (2012) study employed a sample of 1,130 individuals drawn from SHARE-Israel respondents in Wave 1 (2005–2006) who replied to a drop-off questionnaire featuring life history items. Exposure to adverse events by age of occurrence was self-reported and categorised as self- or other-oriented using the same criteria as in the present study. Outcome measures included CASP-12, subjective life satisfaction, the European Depression scale (Euro-D) (Prince et al., 1999) and an adapted version of the Center for Epidemiological Studies-Depression Scale (ACES-D). When disaggregated by age, only events occurring after age 50 had a significant association with EURO-D and ACES-D depression outcomes. Events occurring from 0–19 years significantly predicted fewer EURO-D depression symptoms and higher CASP-12 wellbeing and subjective life satisfaction scores. Other-oriented events from ages 0–19 were significantly associated with fewer EURO-D and ACES-D symptoms and higher CASP-12 and life satisfaction scores. Self-oriented events occurring after the age of 50 were significantly associated with higher counts of EURO-D and ACES-D symptoms in addition to lower life satisfaction. All analyses adjusted for socioeconomic and demographic variables including age, gender, place of origin and level of education. Shrira et al. (2012) and Schmotkin and Litwin (2009) concluded that while self-oriented events in adulthood result in irreversible damage in terms of maintenance of mental health and wellbeing, exposure to other-oriented events before age 20 had protective effects. The latter is hypothesised to be a result of experiences of other-oriented events earlier in the lifecourse providing opportunities for posttraumatic growth (Weiss, 2004; Calhoun and Tedeschi, 1998) and the development of empathy and a sense of commitment or responsibility to others who are victims of severe adverse events. It is suggested that this, in turn, positively influences the individual's identity development process in adolescence so as to promote greater capacity for adaptation.

The results of these Israeli studies may diverge from those of the present study for two reasons. First, prevalence of depression has been shown to be substantially higher in both the SHARE-Israel sample used (Schmotkin and Litwin, 2009) and in a nationally-representative survey drawn from an Israeli national database (Schmotkin et al., 2003) than in comparable European populations. A proportion of this difference in the prevalence of depression among older Israelis may be attributable to long-term effects of traumatic experiences related to the Holocaust and World War II (Schmotkin, 2003; Schmotkin et al.,

2003). As conceded by Shrira et al. (2012), one explanation for the difference in results could therefore be the unique characteristics of the Israeli sample which reduce the extent to which findings may be generalised to other populations such as in England. Second, differences in the composition of the exposure measure used (i.e. the specific adverse events items) may have influenced the findings. The cumulative measure of adverse events in SHARE-Israel was based on 17 different survey items of which eight related to self-oriented events and nine related to other-oriented events. At the same time, four of the nine other-oriented events related to war or terrorism while only two of the eight self-oriented events did (Appendix Table A5.10). This can be contrasted with the ELSA Wave 3 Life History survey which included none of the events related to war or terror. Not only are there substantial divergences in the composition of the measure of adverse events used, particularly in the case of other-oriented events, but also that events related to war or terror are experienced at a much greater frequency in the Israeli sample than in the ELSA sample employed in the present study of the English general population. Shrira et al.'s (2012) finding that experiences of other-oriented events in childhood were associated with more positive mental health and wellbeing outcomes in later life could therefore be attributable to differences in the items comprising this measure.

The differences in the mental health outcome measures used, for example EURO-D or ACES-D as opposed to CES-D, could offer one more possible explanation. Courtin et al. (2015) found that although CES-D and Euro-D are strongly correlated, there are significant discrepancies in scores by demographic characteristics. As these associations between demographic characteristics and both outcomes were always found to be in the same direction, however, this explanation cannot account for the differences in the findings between the present study and that of Shrira et al. (2012). This explanation is also not applicable to differences in findings related to CASP-12 outcomes.

The significant negative association between adverse events in childhood and life satisfaction in later life found in the present study also disagrees with the finding of Suh et al. (1996) that only adverse events which occurred three months ago or less had a significant effect on subjective life satisfaction. This difference may be attributed to the small analytic sample used in Suh et al.'s study (n=222) which may have limited the study's statistical power to detect significant associations between more distal events (with smaller effect sizes) and subsequent life satisfaction.

5.7.2.2 *Self- versus other-orientation*

Stronger associations were observed between exposures to other-oriented events in childhood (0–15 years) or early childhood (0–5 years) and lower CASP-12 scores, lower subjective life satisfaction, and higher odds of depression and psychological distress symptoms, than for events occurring at any other lifecourse stage. This finding may be interpreted as indicating that childhood represents a sensitive period in which other-oriented events exert a greater influence on outcomes later in the lifecourse.

5.7.2.3 *Early-life socioeconomic disadvantage*

In a study on earlier-life socioeconomic disadvantage, measured using childhood household hazards and cumulative labour market disadvantage, and CASP-19 scores, Blane et al. (2004) found no significant associations once models were adjusted for current affluence and current health. Similarly, Laaksonen et al. (2007) found that effects of childhood circumstances on adulthood physical and mental functioning (SF-36 scores), measured using parental education and childhood economic difficulties, were mediated by socioeconomic position in adulthood.

The present study's results confirm those of Blane et al. (2004) and Laaksonen et al. (2007), and the study's original hypothesis (see Section 2.1.1), that the associations between early-life disadvantage and CASP-12 and CES-D depression outcomes are mediated by circumstances at the time wellbeing and mental health are assessed; particularly financial variables in the case of depression. As in previous studies, these results highlight that earlier lifecourse socioeconomic circumstances need not preclude a high degree of wellbeing or positive adaptation in old age and favourable later circumstances can compensate for the effects of earlier disadvantage (Graham, 2002; Blane et al., 2004). The effect of exposure to adverse socioeconomic circumstances earlier in the lifecourse is likely to be limited to influencing more proximal wellbeing determinants in old age rather than exerting a direct effect.

One feature of the present analysis was the large sample size, its coverage of multiple survey waves and its representativeness of the English population. The analytic sample comprised 37,687 observations drawn from 9,618 unique individuals over Waves 1–7 of

ELSA. By contrast, the sample employed by Blane et al (2004) comprised around 250 individuals depending on the outcome variable.

5.7.2.4 Summary

With reference to the study's hypotheses (see Section 2.2), the results agreed with findings of previous work that higher cumulative exposure to adverse events of all types during the lifecourse is associated with lower wellbeing and a greater odds of depression and psychological distress. However, when adverse events were disaggregated according to their self or other orientation and age of occurrence, the results disagreed with the findings of Shrira et al. (2012) that other-oriented adversity in early life is associated with more positive wellbeing and mental health outcomes in later life. The present study found the opposite: not only were other-oriented events in childhood associated with more adverse wellbeing and mental health outcomes, this association became stronger the earlier other-oriented events occurred in the lifecourse (see Section 6.2.1). The present study's results did agree with Shrira et al.'s finding that self-oriented events had the most negative associations with wellbeing and mental health the later in the lifecourse they occurred.

The study's results disagreed with the hypothesis that early-life socioeconomic disadvantage is associated with both lower wellbeing and worse mental health. Rather it was found that this association was not significant after adjustment for financial variables at the time wellbeing and mental health were measured. The results are coherent with the conclusions made by Blane et al. (2004) and Laaksonen et al. (2007) that the associations between early-life disadvantage and CASP-12 and CES-D depression outcomes are mediated by later-life circumstances.

5.7.3 **Part II (Adversity over the lifecourse and resilience following work exit)**

5.7.3.1 *Adverse events*

Exposure to higher overall counts of adverse events (0–49 years) was significantly associated with lower CASP-12 change scores following work exit. This finding supports the study’s hypothesis that exposure to adversity over the lifecourse is associated with less favourable changes in wellbeing following work exit in later life (see Section 2.2.2). When events were categorised by age of first occurrence it was found that events in adulthood (16–49 years) had a significant influence on resilience to work exit. It was also found that disaggregated measures of exposure to self- and other-oriented events (0–49 years) were not significantly associated with wellbeing change outcomes. When events in adulthood were further disaggregated into self- and other-oriented events it was found that self-oriented events in adulthood had a strong and highly significant negative association with CASP-12 change following work exit. One interpretation of these findings as a whole is that the apparent associations of overall exposure to adverse events over the lifecourse (0–49 years) and events in adulthood (16–49 years) with CASP-12 change are largely driven by effects of self-oriented events in adulthood. These findings held regardless of which covariates were included in the model. This implies that self-oriented events in adulthood are independently and directly associated with a greater decline in wellbeing following work exit regardless of route and timing of exit or health status, psychosocial factors and financial variables measured at the time of work exit.

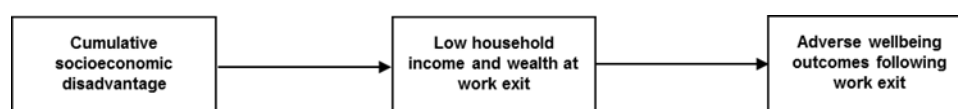
Two general explanations for this finding regarding self-oriented events in late adulthood may be given for these findings. Firstly, in contrast with the analysis in Part I, the smaller sample size ($n=1,985$) may have resulted in less statistical power to detect significant associations between adverse events at different parts of the lifecourse and CASP-12 change following work exit. Secondly, prior experience of adverse events may increase vulnerability to more recent risk events which have similar characteristics (Brown et al., 1973b). In this case, it may be speculated that, as involuntary exit from paid work itself could be considered a self-oriented adverse event in adulthood, experiences to other such events may have more salience for resilience outcomes.

5.7.3.2 *Cumulative socioeconomic disadvantage*

Cumulative socioeconomic disadvantage had no conditional effect on CASP-12 change in the fully-adjusted model. This finding is consistent with the study's original hypothesis (see Section 2.2.2). Significant effects were found, however, when financial variables were not present in the model. The results of Part II mirror those of Part I and previous work by Blane et al. (2004) and Laaksonen et al. (2007). Similar conclusions can be drawn with regards to resilience to work exit as with adaptation. The results can be interpreted as suggesting that cumulative lifecourse disadvantage need not preclude positive transitions from paid employment and that its negative effects are limited to influencing factors at the time of work exit. Specifically, the results imply, as illustrated in Figure 5.8, that any adverse effect of cumulative lifecourse disadvantage on resilience to work exit (or adaptation in later life) may be mediated by an individual's financial situation at the time of work exit.

Early- or mid-life disadvantage may influence wellbeing change following work exit indirectly through a variety of mechanisms. For example, level of education at age 25 may influence access to the labour market and mid-life occupational position. In turn, this may influence access to pension entitlements and savings accrued.

Figure 5.8. Illustration of the mediated association between cumulative lifetime socioeconomic disadvantage and wellbeing following work exit



The association between cumulative lifecourse disadvantage and wellbeing change following work exit is not mediated by either current physical health status immediately before work exit (measured using the frailty index) or age and route of work exit. Furthermore, the association is only partially mediated by psychosocial factors present at work exit (including participation in activities, partnership status and birth abroad). Referring back to the three risk models, it appears that the chains of risk model provides the best framework for describing the association between cumulative socioeconomic disadvantage and wellbeing following work exit.

5.7.3.3 Resilience and vulnerability

The association between total counts of adverse events (0–49 years) and vulnerable outcomes show that the odds of vulnerability to a decline in CASP-12 wellbeing following exit from paid work significantly increased in proportion to the number of adverse events experienced. The odds of vulnerability to a decline in CASP-12 wellbeing following exit from paid work significantly increased by 9% for each additional event experienced (OR: 1.09, 95% CI: 1.01, 1.19, $p=0.033$). When self- and other-oriented events were further categorised by age of occurrence, self-oriented events in adulthood (16–49 years) were significantly and positively associated with a higher odds of vulnerable outcomes.

While the results show a significant and positive unadjusted relationship between higher cumulative socioeconomic disadvantage index scores and the odds of vulnerability to a decline in wellbeing following work exit, this association was found to be mediated by equivalised household income and quintile of equivalised household net worth at the time of work exit.

5.7.3.4 Summary

Referring back to the study's hypotheses (see Section 2.2), the results agreed with the first hypothesis that overall exposure to adverse events was associated with more negative changes in wellbeing following work exit. This held true regardless of which covariates were included in the model. Next, when adverse events were disaggregated by self or other orientation and age of occurrence, only self-oriented events in adulthood were significantly associated with negative wellbeing change. This agrees with the hypothesis regarding the association between self-oriented events and adverse changes in wellbeing following work exit. The study's results disagreed with the hypothesis that cumulative lifecourse socioeconomic disadvantage is independently associated with vulnerability (negative changes in wellbeing) following exit from work. As in Part I, this association was no longer significant once financial variables were included in the model.

5.7.4 Lifecourse risk models

The results of Part I suggest that the accumulation of risk hypothesis provides the best description of the association between exposure to adverse events over the lifecourse and later-life wellbeing and mental health outcomes. Events occurring at different lifecourse stages had independent effects on all four outcome measures when these were mutually adjusted. This can be interpreted as indicating, for example, that effects of adverse events in early childhood had a direct association with CASP-12 scores in respondents aged over 50. This association was not mediated by any of the variables considered in the analysis. Although outside the scope of the present discussion, mediation may have occurred via other factors which were not included.

The results of Part II, meanwhile, indicate that experiences of adverse events over the lifecourse, particularly self-oriented events in adulthood, were associated with more negative wellbeing change following exit from paid employment in later life even after adjustment for potential confounders or mediators. The linear nature of the relationship suggests that the negative effects of these adverse events are cumulative. Events in adulthood could be interpreted as having a greater influence on accumulation of risk with respect to wellbeing change

With regards to cumulative socioeconomic disadvantage, however, an association with CASP-12 and CASP-12 change following exit from paid work could only be found when models were not adjusted for household net income and relative household net wealth. These results suggest that a chains of risk type association may be operating in this case, and that the association between cumulative socioeconomic disadvantage and wellbeing change is mediated by household financial resources at the time of work exit. Although cumulative socioeconomic disadvantage over the lifecourse was not independently associated with wellbeing change following exit from work, it may exert an influence on outcomes through its effects on other individual-level variables. For example, low parental socioeconomic position may have a negative impact on later-life household net wealth due to lower transfers of wealth from parents via inheritance. Parental socioeconomic position may also influence access to educational opportunities and final level of educational attainment. Low educational attainment may, in turn, negatively influence both income and wealth by lower acquisition of marketable skills and labour market disadvantage resulting in reduced household income and accumulation of wealth during years in paid employment. Low occupational position may also affect household income in later life by influencing

eligibility for public and private pension benefits. As has found to be the case for CASP-19 in later life (Blane et al., 2004), disadvantage earlier in the lifecourse need not preclude high wellbeing in later life or more positive wellbeing change in response to work exit.

5.7.5 Strengths and limitations

Due to the sensitive nature of some of the questionnaire items, underreporting of certain adverse events may have occurred even where responses were given for the relevant questionnaire item. The extent to which this may have biased the study's results could not be determined and this may have occurred for a variety of reasons.

Some studies have suggested that underreporting of adverse events that are further chronologically from the date of interview may lead to recall bias (Hardt and Rutter, 2004; Green et al., 2010). Related to this is the possibility that counts of events in early childhood may have also been underestimated due to infantile amnesia arising from the fact that discrete events occurring in the first two years of life are rarely recalled in adulthood. The extent to which reports of adverse events were influenced by repression of potentially distressing memories is also unknown. Finally, although the issue of false memories of adverse events has been raised (Loftus, 1993), this is unlikely to occur at a high frequency or represent a serious issue in retrospective studies (Hardt and Rutter, 2004).

According to the implicit theories approach, individuals' recollection of past states, attributes or events are influenced by aspects of an individual's current circumstances such as mental health status (Ross, 1989; Wilson and Ross, 2003). Individuals use autobiographical memory to explain or justify their current state. Although contrasts between past and present states may be exaggerated when change is expected to have occurred, attitudes towards past events, and therefore their reporting, may be correlated with an individual's current circumstances due to assumptions of the stability of these circumstances over time. This, phenomenon, referred to as an 'endowment effect' (Shrira et al., 2012), is likely to be stronger when events are less removed in terms of subjective experience of time as more recent events are perceived as more closely related to the individual's present state. In the present study this may have resulted in biased reporting of adverse events and may have strengthened apparent associations between past adverse events and depression, psychological distress and wellbeing outcomes. In particular, this is more likely to have influenced reporting of more recent events and further strengthened

apparent associations between events in late adulthood and negative wellbeing or mental health outcomes. This effect, if present, may have been mitigated by the fact that respondents reported wellbeing, depressive symptoms and psychological symptoms during the main Wave 3 interview and that information on life events was collected separately via a self-completion questionnaire. This format may have reduced the degree to which outcome measures were salient while recalling adverse events. Social desirability bias, which may also have influenced the reporting of adverse events such as childhood abuse (Kuo et al., 2011), was also likely to have been reduced by the absence of an interviewer. The retrospective nature of the study entailed that no data were available from the time events occurred with which to validate retrospective self-reports. Although outside the scope of the present study, these limitations could potentially be overcome through the use of a prospective cohort study design in which events and outcomes are measured frequently and in which multiple informants are employed to verify self-reports of adverse events. Other minor issues relating to retrospective self-reporting of adverse events have also been raised, such as Hepp et al.'s (2006) observation of inconsistencies in individuals' reporting of potential traumatic events between different time points. Turner and Lloyd (1995) also question whether all types of event are reported with equal reliability.

The above criticisms may also be applicable to self-reports of paternal occupational position during childhood and reporting bias may have posed an issue regarding the reliability of the exposure measure when analysing the associations between lifecourse cumulative socioeconomic disadvantage and wellbeing change following work exit. The largest study to date to examine this issue found moderate agreement between self-reports of social class in early life and birth records. In the majority of cases where there was not agreement this was a result of individuals reporting a higher paternal occupational position than recorded (Batty et al., 2005). In the present study this may have resulted in an attenuation of the apparent relationship between lifecourse socioeconomic disadvantage and wellbeing change.

Confounding may also pose an issue for the present analysis. Care must be taken when interpreting the associations between adverse events and wellbeing or mental health outcomes due to the possibility that the determinants of exposure to adverse events may not be fully exogenous to the individual. For example, Green et al. (2010) propose an alternative hypothesis that the association between childhood adversity and mental illness in adulthood may be confounded by third variables such as individuals' behavioural

dispositions which both elicit adverse events such as abuse and predict development of mental disorders. Furthermore, while Heady and Wearing (1989) suggest that age and personality traits such as extraversion and openness to experience influence occurrence of adverse events, Phillips et al. (2015) have found that anxiety predicts events in later life, which in turn predict later depressive symptomatology. These results suggest that the association between life events and depression or low wellbeing may be confounded if personality traits and anxiety both predict later life events and mental health and wellbeing outcomes. Alternatively, parental mental illness may also predict both childhood adversity and mental illness through genetic pathways unrelated to adverse events (Green et al., 2010).

The present study's results may not be applicable to other birth cohorts. Lacey et al. (2012) have found that the association between parental separation and psychological distress measured using the Malaise Inventory has diminished in a younger cohort (born in 1970) when compared with an older one (born in 1958). The fact that associations between specific events or cumulative events and later mental health outcomes may differ by age cohort may limit the present study's generalisability.

A major reason for missing observations was due to failure to complete and return the ELSA Wave 3 Life History Questionnaire, resulting in missing data on adverse events. Respondents without data on adverse events were significantly more likely to have had a more disadvantaged occupational position in their last known job, be in a lower quintile of equivalised net household wealth, be born abroad, be permanently sick or disabled and less likely to own their current home (Appendix Table A4.1). This suggests the possibility that bias may have arisen because missing data on adverse events may not have been missing at random.

Another weakness of the present study may have arisen due to the limitations inherent in some of the covariate measures used in the statistical analysis and the structure of the missing data. For example, use of the simplified method of deriving NS-SEC classifications has been shown to result in a 24% reduction in data quality from the full method (Morris, 2012; ONS, 2010). Furthermore, use of the individual's last known job to define socioeconomic status may not have been appropriate for some individuals for whom the occupation of the head of household may have been more relevant. This includes individuals who had voluntarily downgraded their occupation in anticipation of retirement or who had voluntarily remained outside the labour force. In addition, the structure of the

missing data and the high missingness for one of the primary exposure variables (experiences of adverse events) may have resulted in bias in model parameter estimates (see Chapter 6, Section 5) and the loss of observations reduced the study's statistical power. This is because complete case analysis, employed in this study, assumes that complete cases are assumed to be a random sample of the whole population (Pedersen et al., 2017). In this study, it was found that there were significant differences in the characteristics of respondents who returned the Wave 3 Life History Questionnaire, and this suggests that this assumption was not met.

Another limitation of this analysis was that it only employed data from English respondents collected as part of ELSA. Further work could consider the associations between lifecourse socioeconomic disadvantage and experiences of adverse events at different ages on the one hand, and cross-sectional wellbeing (and mental health) and change in wellbeing following work exit on the other, may differ between countries. Although, inequalities between different European countries and welfare regimes by household wealth have been tested by Niedzwiedz et al. (2014a), there has (to my knowledge) been no comparison of the associations between lifecourse socioeconomic disadvantage and wellbeing or mental health in a cross-country context. This could theoretically be carried out within a multilevel framework by interacting measures of exposures to adverse events or disadvantage over the lifecourse by country, to determine the extent to which early experiences of adversity or disadvantage may influence later-life outcomes differs by country. With regards to adverse events, however, this was not possible within the scope of the present study as data on specific adverse events was not available in SHARELIFE to permit cross-country comparisons (see Chapter 5, Section 3.1)

To my knowledge this is the first study to address the association between measures of adversity over the lifecourse and change in wellbeing following exit from paid work. Its strengths include the use of data covering a wide range of events occurring at all stages of the lifecourse, its use of a large sample of respondents with retrospective data (n=4,521) and its representativeness of the wider English population. This contrasts with studies based on case reports in which apparent associations between self-reported adverse events and mental health outcomes are attenuated because samples are restricted to individuals with a prior history of depression (Kessler and Magee, 1993). The findings of Part I are also strengthened by the fact that they apply to four different outcomes, including mental health, hedonic wellbeing and eudaemonic wellbeing, so as to encompass a wider range of

aspects of wellbeing (Huppert and So, 2011). Furthermore, the use of multiple outcomes allows the study's results to be relevant to both the 'salutogenic' and negative interpretations of adaptation in later life (Keyes, 2007).

5.8 CONCLUSIONS

Chapter 5 characterised the associations between exposure to two different types of adversity over the lifecourse and both adaptation and resilience outcomes. Four potential risk models to describe the associations between the adversity measures and adaptation or resilience outcomes were also outlined. The association between adverse events and adaptation appear to follow an accumulation of risk type pattern in which exposure to successive adverse events over time proportionately increases the risk of depression and psychological distress. At the same time, events in childhood appear to represent a sensitive period in which other-oriented events have a stronger effect on later life outcomes. Adverse events were also associated with CASP-12 change following work exit. While this association also appears to be coherent with the accumulation of risk model, this was primarily driven by self-oriented events in adulthood. Associations between cumulative socioeconomic disadvantage and later-life adaptation and resilience outcomes appear to mirror the findings of Blane et al. (2004) in that they are mediated by later-life circumstances. This is consistent with the chains of risk model.

In addition to a general summary and discussion of the results of the thesis, Chapter 6 will present a discussion of the potential mechanisms underlying these associations and the conceptual relationship between exposure to adversity over the lifecourse and resilience.

6 CHAPTER 6: Discussion

6.1 INTRODUCTION

Chapter 6 provides an overview of the doctoral thesis and summarises the findings of each of the preceding chapters in relation to their objectives. These findings will then be discussed from a resilience perspective. There will be a discussion of the results of the statistical analyses in the context of other studies, comparing directions and sizes of effect. Finally, the strengths and limitations of the thesis, possible policy implications and future research directions will be outlined.

6.2 Summary of the thesis

The overarching aim of the doctoral project was to investigate the determinants of resilience to exit from work in early old age. The thesis had three objectives. The first was to characterise the risk to wellbeing experienced by individuals undergoing labour market transitions in early old age (i.e. the risk event against which resilience was measured). The second was to investigate the country-level determinants of resilience outcomes to labour market transitions in early old age. The third objective was to characterise the associations between exposure to adversity over the lifecourse and resilience outcomes. These three objectives correspond to Chapters III, IV and V respectively.

6.2.1 Chapter 3

The aim of Chapter 3 was to characterise the individual-level determinants of wellbeing change following work exit. The analysis tested whether exit at times other than the normal state retirement age and non-normative (or involuntary) work exits such as through unemployment or disability would result in reduced wellbeing in individuals. Manifestations of vulnerability or resilience are only apparent in the presence of a risk variable relevant to the outcome in question (Rutter, 1987). From a resilience perspective (Masten, 1990), these exit events were considered as risk events as they are correlates of poor or negative

wellbeing and mental health outcomes (Hepworth, 1980; Winkelmann and Winkelmann, 1988; Feather, 1990; Lahelma, 1989; Warr, 1987; McKee-Ryan, Wanberg and Kinicki, 2005).

The results showed that respondents who left work more than one year before or one year after the typical retirement age in their country of residence experienced significant declines in CASP-12 scores compared with those exiting on-time. Whereas respondents who exited work via a public early retirement pension experienced a significantly more favourable change in CASP-12 scores, those in receipt of disability pension, unemployment benefit, sickness benefit and social assistance had significantly more negative changes in wellbeing than those exiting from paid work via a state pension. Respondents with higher equivalised household net worth and those who reported participation in social activities experienced significantly more positive changes in wellbeing following work exit. Meanwhile those with higher frailty scores and who reported financial strain had significantly more negative wellbeing change scores.

Two limitations should be noted. First, physical health is a powerful predictor of wellbeing and was found to have a significant influence on wellbeing change following work exit. It is possible, however, that the frailty index employed in this study may not have fully adjusted for possible confounding of the association between route or timing of work exit and wellbeing change by physical health. One reason may be that the frailty index may have excluded important health conditions not covered by the SHARE and ELSA surveys. Furthermore the relationship between certain routes of work exit, particularly exit via disability pension and sickness benefits, and wellbeing change from t_0 to t_1 , may be confounded by change in health over the same period. Negative change in CASP-12 scores attributable to these exit routes may be partially due to specific health conditions, which may have been progressive in nature and not captured by the frailty index..

Secondly, the analytic sample did not include comparison groups for each route of work exit who had not left work; thereby limiting the interpretation of the study's results. Instead, different routes of exit from work were compared against retirement in terms of their association with wellbeing change. The lack of such a comparison group did not allow the changes in wellbeing as a result of different routes of work exit to be compared against those occurring among individuals who remained in work..

There were two issues in the creation of such comparison groups comprising individuals who remained in work. First, multiple waves of data (and pairs of waves) could have been available for each respondent. Secondly, only the most recent work exit event was used for the purposes of analysis. These two issues complicate the question as to which respondents would be included in the comparison group and from which waves data should be drawn. The study could have employed propensity score matching to overcome these issues by creating matched sets based on propensity score estimated according to the likelihood that a given individual would have exited from paid work since the previous wave (and by a specific route) (Austin, 2011). This could have allowed, for example, for a matched sample of respondents in the same wave who did not leave work for each route of work exit but had a similar likelihood of experiencing the same exit event.

6.2.2 Chapter 4

Chapter 4 extended the analysis of individual-level determinants of wellbeing change following work exit by adding country-level variables within a multilevel framework. The study's objectives were to determine the extent to which country-level welfare state characteristics influence individuals' change in wellbeing following work exit after adjustment for individual-level variables and to ascertain the degree to which each of these country-level variables explain country-level differences.

Most variation in wellbeing change was attributable to differences between individuals rather than between countries. Only 6.8% of total variance in wellbeing change following work exit was due to country effects. After adding groups of country-level variables, welfare state regime was found to account for 62.1% of these country differences. Individuals residing in Mediterranean welfare states had significantly more negative wellbeing change outcomes following work exit when compared to those in Bismarckian welfare states. Residence in a Post-Communist welfare state had a borderline significant association with negative CASP-12 change scores. Neither total welfare effort (% of GDP) nor welfare effort devoted to in-kind and cash benefits had statistically significant effects on wellbeing change following work exit. These variables only explained 14.8% and 26.5% of between-country differences respectively. Significant associations were found when there were expressed as expenditure measures (PPP-adjusted EUR 000s), however. When expenditure was disaggregated into its four primary components it was found that

expenditure on non-health benefits in kind (such as residential care and housing assistance) also significantly predicted more positive wellbeing change. Expenditure on healthcare-related benefits in kind, old age cash benefits and working age cash benefits had no statistically significant relationship with wellbeing change following work exit.

Among the other hypothesised country-level determinants of wellbeing change following work exit, lower welfare progressivity and higher gross Gini index value) were significantly associated with negative changes in wellbeing following work exit. Higher country-level GDP per capita, inequality-adjusted HDI and institutional social capital were significantly associated with more positive wellbeing outcomes following work exit. Median net pension replacement rate, doctor density and annual economic growth, meanwhile, were not found to have any significant associations with wellbeing change following work exit.

6.2.3 Chapter 5

Chapter 5 comprised two studies. The first study (Part I) sought to determine whether exposure to adverse events at different times over the lifecourse affects adaptation in old age after adjustment for concurrent wellbeing determinants. The second (Part II) sought to determine whether adversity over the lifecourse is associated with resilience in response to work exit.

6.2.4 Part I (Adverse events over the lifecourse, early-life socioeconomic disadvantage and adaptation in old age)

6.2.4.1 Adverse events

Individuals who experience a greater number of adverse events over the lifecourse (0–49 years) reported significantly lower CASP-12 and lower life satisfaction. They also had a higher odds of CES-D depression caseness and psychological distress in later life. These associations were not attenuated after adjustment for a range of variables including measures of socioeconomic position, health, age and labour market status.

6.2.4.2 Self- versus other-orientation

Counts of self- and other-oriented events (0–49 years) both had significant associations with lower CASP-12 wellbeing scores in later life. Experiences of other-oriented events in childhood (0–15 years) were significantly associated with lower wellbeing scores in later life while experiences of self-oriented events in childhood were not. Statistically significant associations were found for both other-oriented events in adulthood (16–49 years) and self-oriented events in adulthood (16–49 years). Similar results were found for life satisfaction, CES-D caseness and GHQ-12 psychological distress outcomes.

The associations between exposures to other-oriented events in childhood (0–15 years) or early childhood (0–5 years) and lower CASP-12 scores, lower subjective life satisfaction, higher odds of depression and higher prevalence of psychological distress had larger effect sizes than those for events occurring at any other lifecourse stage.

6.2.4.3 Early-life socioeconomic disadvantage

The relationship between early-life socioeconomic disadvantage and CASP-12 and CES-D depression caseness outcomes was mediated by later-life circumstances; particularly household income and wealth. Exposure to socioeconomic disadvantage earlier in the lifecourse need not preclude positive adaptation and a high degree of wellbeing in later life. The results of the present study mirror those of Blane et al. (2004).

6.2.5 Part II (Adversity over the lifecourse and resilience following work exit)

Exposure to higher overall counts of adverse events (0–49 years) was significantly associated with more negative CASP-12 change scores following work exit. When these events were disaggregated by age of occurrence and self- or other-orientation, it was found that self-oriented events in adulthood had a strong and highly significant negative association with CASP-12 change following work exit. One interpretation of these findings is that the apparent associations of overall exposure to adverse events over the lifecourse (0–49 years) with CASP-12 change are largely driven by effects of self-oriented events in adulthood. These findings held regardless of which covariates were included in the model.

6.3 DISCUSSION

This section will discuss the major themes addressed in Chapters III–V.

6.3.1 Route and timing work exit: Risk versus resilience

Chapter 3 did not consider resilience determinants per se. Rather, this analysis characterised the degree of risk experienced by individuals according to their route and timing of exit. It also considered factors which may exacerbate or buffer against the negative effects of exit from work on individuals' wellbeing. Certain routes of institutionally-defined work exit and work exit at times other than an individual's expected retirement age were associated with more negative wellbeing change outcomes. It is uncertain whether these are direct associations, or whether (as other studies have suggested) features of work exit events such as whether they occurred voluntarily or occurred at appropriate times according to social and institutional norms are drivers of these associations rather than self-reported route of exit itself (Gallo et al., 2000; Dave et al., 2008; Isakksson and Johansson, 2008; Calvo et al., 2013). Furthermore, it is also possible that the effects of different routes of work exit may be mediated by other factors that were outside the scope of the present study.

6.3.2 Country-level determinants of resilience to work exit versus country-level risk

Chapter 4 extended the analysis of individual-level determinants of wellbeing change following work exit by adding country-level variables within a multilevel framework. In doing so, the analysis considered not only the associations between country-level factors and change in wellbeing at the individual level, but also the extent to which these variables explained the proportion of total variance in outcomes between countries.

Galobardes et al. (2006) assert that it is implausible that money in itself directly affects health. Rather, it is the conversion of money and assets into health-enhancing commodities via expenditure which is likely to be the mechanism by which income affects health. The same could perhaps be said for wellbeing. As outlined in Chapter 1 (Section 2.5), one aspect of resilience is the use of internal and external resources to aid adaptive processes to resolve stage-salient developmental issues (Lazarus, 1993; Egland et al., 1993). One

interpretation of the association between social protection expenditure and wellbeing change outcomes following work exit is that social protection expenditure could be viewed as a type of resilience resource in so far as the ability of individuals to afford or access resilience-promoting resources is enhanced. As such, social transfers can be viewed as a form of tangible social support (Daatland and Lowenstein, 2004). From this perspective, welfare states and the cash transfers and services they provide can be considered as a factor moderating the potential association between work exit and negative changes in wellbeing. In view of the results of the present study, this is especially likely to apply to countries with greater provision of in-kind non-healthcare services.

Although variables such as welfare state regime could explain the majority of variance in outcomes attributable to country effects, country effects only accounted for around 7% of total variance. The remainder of the total variance can be attributed to individual-level factors which were not adjusted for in the study. Individual-level differences, rather than country-level differences, largely drive wellbeing change outcomes as individuals transition out of paid employment. One interpretation of this is that there is wide latitude for individuals to display resilience as they transition out of paid work regardless of their country of residence, the welfare regime of that country, welfare spending and other institutional factors which influence the circumstances through which these transitions occur.

6.3.2.1 The relationship between welfare state type and expenditure

Caution should be exercised when relating social protection spending to welfare typologies. Three main reasons can be identified. First, Esping-Andersen (1990) argues in favour of constructing typologies using structural, historical and institutional features. As such, although measures of effort and emphasis may represent the structure of a welfare state and its objectives, they are results of welfare policy rather than its drivers. Furthermore, measures of expenditure are also implicitly dependent on and limited by a country's GDP per capita.

Esping-Andersen and others (e.g. Bambra et al., 2010) conceptualise welfare states as ideal types to which sampled countries are compared. In addition to their historical development, they are based on welfare culture, institutions (Rice, 2013), political origins (Castles and Mitchell, 2005) and systems of power stratification that uphold them

(Kemeny, 1995). It is argued that relating expenditures on given social benefit types to welfare state types is unconstructive in that they are “epiphenomenal to the theoretical substance of welfare states” (Pacek and Freeman, 2015, p.19). Furthermore, as shown in Chapter 4 (Section 1.5) these spending measures cluster with organisational and institutional characteristics of welfare state regimes. Flat-rate, universal benefits tend to be funded through taxation and delivered as services, as in Social Democratic and Anglo-Saxon welfare states (Table 4.3). Given this clustering, it is difficult to determine whether apparent effects of a given spending measure may be partially attributable to other associated organisational or institutional characteristics of a given welfare state type.

Second, just as the assumption that level-2 units were randomly drawn from a representative sample may be undermined in the present analysis, samples of countries included in welfare state typologies are constrained for pragmatic reasons by cultural familiarity, level of socioeconomic development (Wood and Gogh, 2006) and availability of relevant data (which in turn are related to OECD membership). This therefore limits the generalisability of the present study and other quantitative cross-national analyses on welfare state characteristics such as social protection expenditure.

Thirdly, there remains controversy as to whether welfare state classifications constructed on the basis of quantitative measures remain stable over time. Although their historical development may imply that regimes will persist and follow path-dependent trajectories even when faced with similar challenges (Korpi and Palme 2003), some authors have noted a convergence in a number of welfare state indicators, particularly welfare effort, over time (Arcanjo, 2009; Paetzold, 2013). It remains uncertain whether this may be a result of increases in certain benefit types attributable to population ageing over time rather than any large-scale changes in welfare emphasis (Arcanjo, 2009). Kasza (2002) goes further still, arguing that even welfare typologies are often incoherent and undermined by the cumulative nature of welfare policies, the diverse histories of policies in different welfare fields, the involvement of different sets of policy actors, variations in policymaking processes and influence of foreign models across and within countries. With respect to the latter, Sengoku (2009) points to the strong influence of exogenous factors such as requirements for structural reform imposed by international bodies and the exigencies of globalisation. Finally, different classifications may be given to specific countries depending on their purpose or the focus of a given welfare state typology (see Appendix Table A4.1). Care must be taken when relating these typologies to the policy area and outcome measures

under analysis. The interpretation of welfare state effects must therefore be consistent with the welfare typology used.

6.3.3 Risk over the lifecourse, later-life adaptation and resilience: Causal models

With regards to the risk models outlined in Chapter 5 (Section 1.3), the findings of Part I may be interpreted as indicating that childhood represents a sensitive period in which other-oriented events exert a greater influence on outcomes later in the lifecourse.

According to the definitions provided, this cannot be considered an example of a critical period as other-oriented adverse events can have associations with lower wellbeing or psychopathology when they occur outside of childhood (albeit with smaller effect sizes).

These findings are coherent with Maslow's observations (p. 388), outlined in Chapter 1 (Section 2.10):

In respect to this phenomenon of increased frustration tolerance, it seems probable that the most important gratifications come in the first two years of life. That is to say, people who have been made secure and strong in the earliest years, tend to remain secure and strong thereafter in the face of whatever threatens.

The present study found that higher wellbeing and lower odds of depression in later life are associated with a lack of other-oriented events in childhood. Here, Maslow refers to resilient individuals in the passive voice, emphasising the role of caregivers in promoting resilience and their absence of dysfunction (other-oriented adversity) as a predictor of vulnerability and poor adaptation in later life. Although the exact mechanisms have not been characterised in detail, this sensitive period effect may occur as a result of early programming effects or 'biological embedding', through which early experiences engender greater changes in the nature of person-environment interactions throughout the remainder of the lifecourse (Hertzman et al., 2001; Kuh et al., 2003).

At the same time, total counts of adverse events experienced over the lifecourse (0–49 years) were found to have positive and linear associations with wellbeing outcome measures. This therefore also suggests that an accumulation of risk type association is also

present as events increase risk of low wellbeing, depression caseness and higher counts of psychological distress symptoms in an additive manner independent of other adverse events.

The results also highlight that the associations between adversity and resilience outcomes may differ depending on the adversity measure used and on the outcome measure.

Exposure to adverse events, particularly self-oriented adverse events in adulthood, was associated with vulnerability to negative wellbeing change outcomes and individuals' exit from paid work. Referring back to the three risk models (Chapter 5, Section 1.3), it appears that the accumulation of risk model best characterises the association of adverse events and wellbeing following work exit as exposure to successive adverse events over time proportionately increased the risk of depression and psychological distress in an additive fashion. Meanwhile, the chains of risk model provides the best framework for describing the association between cumulative socioeconomic disadvantage and wellbeing following work exit as this was mediated by financial variables at the time of work exit.

6.3.3.1 Resilience and vulnerability

One interpretation of the results is that experiences of adverse events over the lifecourse increase the odds of vulnerability to a decline in CASP-12 wellbeing among individuals aged over 50 years following work exit independently of other variables such as route and timing of work exit, household income and wealth, age, physical health status and other psychosocial factors. Meanwhile, individuals can experience resilient outcomes following work exit even when they had been exposed to a high degree of socioeconomic adversity over the lifecourse as this association was mediated by equalised household wealth and income at the time of work exit.

6.3.3.2 Lifecourse causal mechanisms

An investigation of the mechanisms underlying the association between exposures to adversity over the lifecourse and adaptation or resilience outcomes in later life with explicit analysis of biological mediators was beyond the scope of Chapter 5. It is possible, however, to discuss which hypotheses previously presented in the literature provide the most appropriate causal model.

In Chapter 1 (Section 1.9), three hypotheses to explain the causal mechanisms (or ‘models’) for the relationship between adversity over the lifecourse and outcomes in later life were identified. These were the allostasis hypothesis, the phenotypic match/mismatch hypothesis, and the biological sensitivity to context hypothesis as described below.

6.3.3.3 Lifecourse causal models in the context of the present study

In addition to the linear associations between adverse events and all outcome measures in Part II, including CASP-12 scores, life satisfaction, odds of CES-D depression caseness and GHQ-12 psychological distress symptoms, the long range associations between adverse events earlier in the lifecourse and negative later life outcomes imply that the allostasis hypothesis is more likely to represent the most appropriate causal model for the relationships found in this study. These long-range effects may be a consequence of adverse events exerting important indirect effects through chronic stress (Turner and Lloyd, 1995; Colman et al., 2014) which are mediated by a host of allostatic load components (Kessler et al., 2010; Loucks et al., 2010; McCaffrey et al., 2012) and lead to increased vulnerability to future stressors (McEwen and Gianaros, 2011).

6.3.3.4 Lifecourse causal models: Conclusions

Although the allostasis model is most likely to represent the most appropriate causal explanation among the lifecourse causal models described, it was not possible to verify the biological mechanisms underlying the associations between exposure to adverse events over the lifecourse and adaptation in later life within the scope of the present study. Further work is warranted to verify the potential biological mechanisms underlying these associations.

6.4 RESULTS IN CONTEXT

This section will briefly compare the results of the studies presented in Chapters III–V with those of previous studies of wellbeing in terms of effect sizes.

Two studies using ELSA data attempted to evaluate the wellbeing impacts of various life events using changes in CASP-19 scores between Waves 1–3 and 1–2 respectively using multivariate regression models (Webb et al., 2011; Howell, 2012). Webb et al. found that significant changes in CASP-19 scores were associated with occurrence of depression (-3.46), divorce or separation (-0.28), perceived worsening of neighbourhood characteristics based on a nine-item scale measuring levels of trust and occurrence of incivilities (-1.14), and increase in difficulties with activities of daily living score (-0.54, per unit increase). In the Howell's study, significant falls in CASP-19 scores occurred as a result of incidence of depression (-1.4), occurrence of difficulty walking $\frac{1}{4}$ of a mile (-1.9) and loss of access to a vehicle (-0.8). It has also been found among ELSA Wave 1 respondents that CASP-19 wellbeing was significantly lower among those reporting having experienced a stroke (-6.59), diabetes (-3.91) and cancer (-2.47) when compared with those without any conditions (Wikman et al., 2011). Although a number of studies have investigated associations between work exit and change in wellbeing or mental health (as elaborated in Chapter 3, Section 2), none of the effect estimates obtained from these could be directly comparable to the present study. This is due to the fact that the majority did not use change scores but instead compared cross-sectional measures of these outcomes after work exit with measures before work exit. In addition, none of these studies used the CASP-19 or CASP-12 scale to allow direct comparison of effect size.

The effect sizes for change in CASP-19 scores listed above can be compared with those found in Chapters 3 and 4. The effect sizes for change in CASP-12 scores following work exit via disability pension, unemployment benefit, and sickness benefit were -1.45, -1.13 and -2.13 respectively as estimated in the final random effects model for individual-level effects only (see Table 4.7). These coefficients for CASP-12 change scores could be rescaled to CASP-19 change scores of -2.29, -1.98, and -3.35 respectively by dividing them by 12 and multiplying by 19. A comparison of these effect sizes with those from previous studies suggests that exit from work in early old age via these routes can be considered a significant risk factor with serious potential repercussions for wellbeing in later life which can be comparable in magnitude to a diagnosis of a serious physical health condition.

6.5 STRENGTHS AND LIMITATIONS

A number of strengths and limitations of this thesis could be identified. Strengths include the relatively large analytic samples drawn from high-quality, nationally-representative datasets. Thanks to the complementarity of these datasets in terms of their design, it was possible to harmonise a range of variables and include respondents from both SHARE and ELSA. A range of wellbeing and mental health outcome variables were available. In particular, these included the CASP scale which encompasses both hedonic and eudaemonic aspects of wellbeing and is specifically designed to assess wellbeing of individuals in early old age. One unique aspect of the study was that it was able to employ institutional definitions of work exit (based on type of welfare benefits received) as its primary individual-level exposure measure. This is in contrast with previous studies which have typically used self-reported route of work exit. The study was also able to adjust for a wide range of important individual-level determinants of wellbeing change following work exit.

Another strength of this thesis is the inclusion of multiple countries with differing welfare models. These include countries in Central and Eastern Europe which have received less attention in welfare state literature compared with those in Western Europe or North America. The study also took a disaggregated spending approach and used partitioning of variance components within a multilevel framework using comparable country-level indicators available through databases such as SOCX. These variables were comparable both between countries and over time thanks to adjustment for price inflation and relative living costs. This study presents a framework for investigating the influence of welfare state policies across a range of outcome measures which can be expanded upon in future work.

The study of country-level determinants of wellbeing change following work exit had some limitations. One assumption of multilevel models is that level-2 units are randomly drawn from a representative sample (Kish, 1965). This assumption may have been undermined in our analysis as the sample of countries available was constrained for pragmatic reasons by their inclusion in SHARE and ELSA and only included OECD member countries with a high level of socioeconomic development. This limits the generalisability of the study's results to non-European contexts. One disadvantage of the data available was the low number of countries included in the sample. The limitations of this were partly overcome with the use of MCMC methods, however, and this reduced potential bias in the random effects parameters.

Missing data may have posed an issue in the present study. The analyses presented in Chapters 3 and 4 were unlikely to have been substantively influenced by missing data as missingness in the outcome measure and covariates was low (15.6% and 6.0% respectively). The size of the analytic sample was primarily limited by the inclusion criteria of having experienced exit from work between two consecutive waves. In Chapter 5, however, the sample size was reduced substantially as nearly half (49.1%) of respondents in ELSA Wave 3 did not complete and return the ELSA Wave 3 Life History Questionnaire. As a result of this, missingness for the study's primary exposure (experiences of adverse events over the lifecourse) was high. As discussed in Chapter 5, Section 7.5, there is the possibility that the study's results may have been biased because missing data on adverse events may not have been missing at random.

Missing data was handled using complete case analysis. The primary advantage of this method was its simplicity, and the fact that its alternatives are not currently supported when using MCMC analysis (as in Chapter 4). However, it assumes that data are missing completely at random, such that the analytic sample represents a random subsample of possible respondents. In Chapter 5 Section 6.1), however, it was shown that, in the analysis of the association between adverse lifecourse events and later-life wellbeing and mental health, it could not be said that data in the analytic sample were missing completely at random as it was found that the characteristics of respondents who did not return the ELSA Wave 3 Life History Questionnaire (such as socioeconomic position and health) differed from those who did. This may have resulted in biased parameter estimates, and suggests that data were either missing at random or missing not at random. Missing responses due to failure to return the questionnaire and missing responses due to incomplete information on returned questionnaires may have had a different missing data structure.. Although missing data methods such as multiple imputation using chained equations could have been considered, this may have raised other issues (White et al., 2011; Pedersen, 2017). For example, given that 49.1% of responses relating to exposures to adverse events were missing (due to both non-response within the Life History Questionnaire and failure to complete it). The high proportion of missing data on adverse events would have required numerous imputations (perhaps 40 or more) as this would have otherwise resulted in a high root mean square error for imputed values. White et al. (2011) suggest that the number of imputations should be similar to the percentage of incomplete cases. This is even more so the case under the assumed that data were missing not at random where the potential for biased estimates of missing values is greater (especially

when missingness is high) (Lee and Huber, 2011). Given the overall size of the potential dataset (9,771), the possibility that data were missing not at random, and the high proportion of missing responses, this would have been computationally expensive, challenging to implement and prone to bias. Handling of missing data may have represented a limitation to this study and further exploration of the missing data structure may have been warranted and MCMC imputations methods could possibly have been explored.

Related to missing data are several limitations inherent in the SHARE and ELSA surveys themselves; in particular with regards to non-response, loss to follow-up, and differences in the sampling frames employed in different countries (see Chapter 2, Section 2.3). These issues may have resulted in the potential for selection bias to have occurred, and further undermined the representativeness of the data employed and the generalisability of the results of the statistical analyses. Although this potential selection bias could possibly have been reduced using the ex-post calibrated weights provided with the dataset, this was not possible in the context of this thesis as their use is not supported in `runmlwin` (see Chapter 4, Section 3.4).

The exclusion criteria of the SHARE and ELSA surveys may have also undermined the study's generalisability. For example, SHARE excludes individuals living in institutions such as care homes or prisons, or who were out of the country during the entire survey period, were unable to speak an official language of their country of residence or had moved to an unknown address (Börsch-Supan et al., 2013). The fact, however, that the sample comprised individuals who were in employment at baseline and had a mean age of 62.9 years at follow-up implies that the effect on the results was likely to have been limited.

The study of lifecourse determinants of adaptation and resilience to work exit in later life also had a number of strengths; particularly when compared with other comparable studies (e.g. Shrira et al., 2012). These include the large sample of respondents with information on occurrences of adverse events (around four times that of Shrira et al.), the wide range of both self- and other-oriented events reported on and the availability of multiple measures of wellbeing and mental health status.

Just as the findings of Chapter 4 may not be applicable to the populations of non-western or non-European countries, these results may not be generalisable to contexts other than the England. This may be evidenced by the differences in the findings drawn from the

present study and those from the Israeli population (see Chapter 5, Section 7.2). Furthermore, it was not possible to determine the severity of individual adverse events. Unlike in the SHARE Israel sample, ELSA Wave 3 Life History Survey respondents were not invited to rate their severity. Like in SHARE Israel, however, all reporting on events was retrospective and may have been influenced by various reporting biases (outlined in Chapter 5, Section 7.5). The lack of comparable data on adverse events over the lifecourse in the other countries sampled as part of SHARE (apart from one variable for generalised stress) prevented this study from considering their associations with later-life mental health and wellbeing in cross-country context. It was therefore not possible to investigate cross-country differences in the relationship between adverse events and later-life outcomes or the country-level factors which may explain between-country differences.

Finally, the present study was not able to investigate potential psychological and biological (including genetic, inflammatory and endocrine) factors which may mediate the associations between adverse events and lifecourse socioeconomic disadvantage on the one hand and wellbeing and mental health status on the other. Further work using a wider range of variables is needed to verify the mechanisms underlying the associations between exposures to adversity over the lifecourse and adaptation or resilience outcomes in later life. Including these variables would allow for a fuller understanding of the causal mechanisms behind the resilience process and test which of the three hypotheses describing these mechanisms (see Chapter 1, Section 1.9) best characterise the associations between exposures to risk over the lifecourse and later-life resilience. Suggestions for further work to address some of the limitations outlined above will be elaborated in Section 8 of this chapter.

6.6 POLICY AND POPULATION HEALTH IMPLICATIONS

The results of the thesis have several policy implications. Firstly, routes of exit which were more likely to be voluntary were associated with more positive changes in wellbeing. This implies that policies at the country level to give workers more control over the timing and circumstances of their transition out of the workforce in early old age may result in more positive wellbeing outcomes at the population level (and possibly health outcomes by extension).

To my knowledge, the present study is the first to address country-level determinants of wellbeing change following work exit and to use a disaggregated spending approach. The results of the analysis of country-level factors suggests that greater expenditure on in-kind benefits, particularly those unrelated to healthcare, may be most effective at buffering against the potential adverse consequences of exit from work on wellbeing in early old age. Expenditure on these types of benefits can be interpreted as exerting the strongest decommodifying effect and may do so by ensuring access to in-kind services such as housing or residential care regardless of individuals' economic performance. Work exit or retirement in early old, an age-graded transition with significant implications for health and wellbeing, is growing in importance as the large 'baby boom' cohort in developed economies reaches retirement age and places additional strain on existing welfare state structures (Monnier, 1997). Furthermore, the issue of individuals' health and wellbeing during the post-retirement years of the lifespan will become ever more pertinent as life expectancy continues to rise and retired individuals comprise an ever-increasing proportion of countries' populations (Government Office for Science, 2016). Conversely, as pensionable ages rise in many European countries, greater attention must also be paid to the implications of extended working lives in terms facilitating the participation of older workers (who, for example, may develop functional limitations before retirement age) in the workforce. These implications may differ in different welfare state regimes (Akinwale et al., 2011).

The results of Chapter 5 imply that experiences of adverse events over the lifecourse can be an important determinant of wellbeing and mental health status in later life. They also highlight the greater importance of other-oriented events in early life as important determinants of psychopathology in later life. The question remains whether policy at the country level can influence the incidence of such events, or whether targeting interventions at individuals at different points in the lifecourse or modifying other contextual factors

through policy may be able to mitigate their potential negative effects on wellbeing and mental health later in the lifecourse. Greater awareness of the associations between different types of adverse events at different times in the lifecourse and mental health status may aid in identifying those in need of treatment or interventions at the individual level.

The results of this thesis may also have implications for population health (and further indirect implications for health policy) as wellbeing and change in wellbeing have been identified as precursors to changes in other health and psychosocial outcomes. In addition to findings on the association between subjective life satisfaction and mortality risk on the individual (Step toe et al., 2015; Lawrence et al., 2015) and country levels (Bjornskov, 2008), a review of 33 studies undertaken by Diener and Chan (2011) found that various measures of subjective wellbeing exert a significant influence on longevity and disease outcomes. While researchers such as Gerstorf et al. (2007) have found a unidirectional longitudinal association between life satisfaction and change in perceptual speed in old age, the overall direction of the association between wellbeing and health remains contentious and various studies support a bidirectional relationship (Step toe et al., 2015). These effects may also be mediated by a range of biological processes which have yet to be fully elucidated. One line of inquiry relates to the role of neuroendocrine responses as mediators for these associations, with studies showing relationships between psychological distress (GHQ scores), depression (CES-D) and subjective wellbeing (CASP-19) scores on the one hand, and c-reactive protein, cortisol output and blood fibrinogen stress responses on the other (Step toe et al., 2005; Step toe et al., 2008; Step toe, 2011). These effects may have long-term consequences for the development of chronic disease at the individual level and increase the overall disease burden at the societal level.

At a wider level, individuals' exposure to risk over their lifecourses is also history-graded, with those in the same age cohort experiencing similarities in the patterning of risks (Baltes, 1987). It may be speculated that the social and institutional meaning of work may change over time in line with changes in the structure of economies and technology, changes in longitudinal patterns of employment status over the lifecourse, more frequent changes in employment roles and greater geographic mobility. These changes may lead to changes in social norms and institutional policies which in turn influence the health and wellbeing impacts of work exit events (Dannefer, 2011). One example is the increase in pension age in many European countries in response to fiscal pressures and increasing dependency

ratios. Furthermore, increasing social diversity and changes in the underlying composition in the populations of many European countries may also contribute to changes in work patterns over the lifecourse, policy and the social meaning of work. Together, these changes may entail that the results presented in this thesis may differ for future European population cohorts.

6.7 SYNTHESISING PERSPECTIVES: THE WELFARE STATE, 'RESOURCES OF RESISTENCE', RESILIENCE AND THE LIFECOURSE

6.7.1 Novel findings of the thesis

In relation to the wider literature, the thesis confirmed that work exits via non-normative and involuntary routes such as unemployment are associated with declines in wellbeing (see Chapter 3, Sections 2.1 and 2.4). The study was the first to do so in a cross-country perspective and to use institutionally-defined exit routes, however. While previous work has identified cross-country differences in wellbeing according to welfare state regime (Niedzwiedz et al., 2014a), the thesis found that this is also applicable to wellbeing change in response to work exit events. The study found that wellbeing change scores were most positive in Scandinavian Social Democratic welfare regimes and most negative in Former Communist and Mediterranean welfare regimes. Two innovative aspects of this study are its consideration of variance components and its investigation of a wide range of country-level welfare state measures, particularly welfare spending measures obtained from the OECD SOCX database; which had not previously been investigated in relation to wellbeing or wellbeing change following work exit. Adverse outcomes following exits from work are one of the primary risks the welfare state is constructed to defend against, and this study is, to my knowledge, the first to investigate which aspects of the welfare state are effective to this end. The study found that although country effects only explained around 7% of wellbeing change outcomes, around 68% of this effect could be explained by welfare regime. Another innovative aspect was its consideration of both cash transfers and in-kind benefits, and the disaggregation of spending measures. This represents a continuation of previous discussions in the field of welfare state research over the relative importance of services versus cash transfers, and the relative neglect of the former in earlier work (Jensen, 2008). These measures were operationalised in terms not only of percentage of GDP

(effort), but also emphasis and expenditure (Castles, 2008). To my knowledge this is the first time such measures have been investigated in relation to the effects of exit from work. With its finding that expenditure on in-kind benefits (in particular non-healthcare in-kind benefits), the study confirms their importance as both a salient feature of welfare states and their greater potential to influence important outcomes for individuals.

The thesis then considered the association between adverse events over the lifecourse and wellbeing and mental health among individuals aged over 50 years. The study's unique characteristics were its large sample size, with each individual respondent able to provide multiple outcome measures over up to seven waves of ELSA. To my knowledge, this represents the largest such study in terms of sample size using individual-level data. In terms of comparison with similar studies, the results corroborated those in the literature that experiences of adverse events (on aggregate) are associated with worse wellbeing and mental health (see Chapter 5, Section 1.4). In relation to events when disaggregated into self- and other-oriented types, the results of the thesis disagree with those of Shrira et al. (2013) in that the latter had the most negative association with wellbeing and mental health (as opposed to a positive association). The reasons for this discrepancy could not be determined within the scope of this thesis

Finally, the study is the first to consider the associations between lifecourse experiences of adverse events and lifecourse socioeconomic disadvantage on the one hand, and change in wellbeing following work exit on the other. Although wellbeing in later life has been investigated in relation to socioeconomic position over the lifecourse (see Chapter 5, Section 1.5), previous studies have not considered their role in moderating the effects of lifecourse transitions in later life such as work exit. Notably, the association between early-life socioeconomic disadvantage and both wellbeing and wellbeing change in later life was only statistically significant without adjustment for household income and wealth at the time of work exit. This suggests that the association between early-life disadvantage and negative wellbeing outcomes on exit from work are mediated by financial variables.

6.7.2 A new synthesis

One major limitation of this thesis, however is its inability to fully synthesise perspectives on resilience and the lifecourse within a cross-country perspective. Instead, it considered

various elements of a fully comprehensive study in isolation and was unable to fully integrate them within a resilience framework. While the analysis in Chapter 4 was able to investigate country-level influences on individuals' outcomes following work exit, country effects could not be said to constitute resilience. Although the investigation of adverse events over the lifecourse points to the validity of the accumulation of risk model in this case, the causal mechanism could not be determined to explain why some individuals experience negative outcomes (in terms of wellbeing and mental health, and wellbeing change following work exit) while others did not. Furthermore, it was not possible to consider these lifecourse effects in a cross-country context. Given the limitations of the available data, such as the unavailability of comparable variables on adverse events over the lifecourse for SHARE respondents (with the notable exception of Israel), this remained outside the scope of the thesis.

Future work, however, could investigate the outcomes considered in this thesis from a traditional resilience perspective (Werner, 1989; Rutter, 1999; Schoon, 2006). This could involve identifying individuals who had positive (or 'resilient') and negative (or 'vulnerable') outcomes to different routes of work exit and characterising the differences between them in terms of lifecourse factors including, but not restricted to, experiences of adverse events and socioeconomic position at different stages of the lifecourse. This hypothetical analysis could be extended to encompass biological factors, parental factors (such as parenting quality or parenting styles), or career and family trajectories (e.g. categorised using sequence analysis). Specifically, these analyses could address research questions such as, for example, whether negative effects of later-life work exit on wellbeing are particularly pronounced among individuals who have experienced adverse events and socioeconomic disadvantage early in the lifecourse.

Such a study could then be extended to take account of the 'resources of resistance' perspective, which emphasises the capacity of resilient individuals to draw upon external resources (where available) to facilitate successful coping in response to stressors (Antonovsky, 1972). Associations between lifecourse factors and later-life outcomes may be modified by both individual- and country-level welfare state variables (including both in-kind and as cash transfers, see Section 3.2), advantaged socioeconomic position, intangible support from other individuals and economic resources at different points over time. In such an analysis these could be operationalised as moderators for the associations between adverse life events or involuntary exits from work in early old age on the one hand, and

wellbeing, mental health and change in wellbeing following work exit on the other. In doing so, it would recognise the individual's environmental embeddedness and exposure to individual, familial, and societal factors over time which may constitute risk or protective factors (Rutter, 1993), to a greater extent than permitted within the scope of this thesis.

To give a full account of resilience within a lifecourse perspective, it is necessary to understand not only individual patterns of adaptation in specific domains of functioning with respect to current challenges, but also the role of prior adaptation, development and maturational change earlier in the lifecourse (Sroufe and Rutter, 1984). Future work could therefore also investigate how displays of resilience in response to earlier life events predict later resilience in responding to later-life events such as work exit. One challenge inherent in such a study would be that links between earlier experiences and adaptation on the one hand, and later-life pathology on the other, are rarely direct. It is therefore important to consider potential mediators such as subsequent lifecourse events or moderators such as resilience resources or socioeconomic status. An important consideration may include 'key turning points' in the lifecourse which may either precipitate or prevent subsequent 'negative chain reactions' of risk events (Rutter, 1987). Such a study, however, would require more comprehensive data from across individuals' lifecourses than is currently provided in ELSA. The Millenium Cohort Study may provide promise to allow such work once its respondents mature into adulthood (Connelly and Platt, 2014).

Finally, the concept of resilience has yet to be studied in cross-country context. Although this was not possible using the available data, this may be facilitated in the future with the proliferation of comparable panel studies of older individuals across a range of countries, their increasing sophistication and coverage of new variables.

6.8 FUTURE DIRECTIONS FOR RESEARCH ON RESILIENCE AND THE LIFECOURSE

6.8.1 Integrating levels of analysis

Resilience can be viewed as a ‘transactional process’ driven by the interaction of innate genetic and biological characteristics and psychological and sociological factors (Egeland et al., 1993). Consistent with the conclusions drawn from previous work that resilience can be considered an outcome of successful allostasis (Logan et al., 2008), the results of Parts I and II of Chapter 5 indicate support for the allostasis hypothesis as the most appropriate causal model to explain the association between experiences of adverse events over the lifecourse and wellbeing and psychopathology outcomes. It has been suggested that psychological, behavioural, genetic, endocrine and inflammatory factors may mediate the associations between exposures to adversity earlier in the lifecourse and resilience or adaptation outcomes (while interacting with one another).

Psychological and behavioural factors may play act as partial mediators for the associations between adversity earlier in the lifecourse and adverse effects on wellbeing or mental health later in the lifecourse. These factors could include emotional closeness with family (Salva et al., 2013), avoidance behaviours (Dulin and Passmore, 2010), neuroticism (Jeronimus et al., 2015), cognitive-personality styles (Mazure et al., 2000) and maladaptive coping strategies such as self-blame (Stikkelbroek et al., 2016). Physiological mechanisms for the relationships between adversity and later-life wellbeing or mental health outcomes may include HPA dysregulation (Kamiya et al., 2016) and inflammation (Dowd and Goldman, 2006; McEwan and Wingfield, 2003; Politt et al., 2007; 2008). Finally, Kessler et al. (2010) point to the potential utility of investigating these associations using a genetically informative design to both quantify the extent to which exposures to adverse events may be associated with genetic factors, and whether reactivity to adverse events may be moderated by genetic factors. In sum, resilience outcomes may be influenced by a host of bidirectional reciprocal interactions between four levels of analysis: the genetic, neural, behavioural and environmental (encompassing physical, social and cultural effects) (Gottlieb and Halpern, 2002; Gottlieb, 2007).

6.8.2 Avenues for future research

Future research on resilience in later life could encompass these four levels of analysis in recognition of the fact that resilience processes can occur at the social, psychological and biological levels and are embedded within specific social contexts (Masten and Obradović, 2006). Specifically, further studies could identify ‘resilient’ and ‘vulnerable’ individuals (as shown by an increase or decrease in wellbeing or mental health respectively) as they undergo transitions out of work or other life events in later life. The associations between resilient or vulnerable outcomes and exposure to risk over the lifecourse could then be investigated with adjustment for sociodemographic, psychosocial and financial variables, and the inclusion of psychological, behavioural, biological or genetic factors as potential mediators for these associations. Identifying potential mediators for these associations would allow for a fuller characterisation of the mechanisms or processes underlying resilience. If possible these analyses could be carried out using data from multiple countries to facilitate cross-country comparisons and the inclusion of country-level factors which could potentially moderate the associations between lifecourse risk exposure and later-life resilience.

CONCLUSION

Resilience is a dynamic process of adaptation in response to risk status or a risk event. Work exit in early old age was the risk event against which resilience was measured. Work exit or retirement in early old age is an important socially-constructed, age-graded transition with significant implications for health and wellbeing. Retirement, and work exit in general, is embedded in social and organisational policies which dictate normal routes and times for exiting work. Country-level factors such as social expenditure can influence how individuals' wellbeing changes when they leave work, and services provided by welfare state expenditures can act as resources which individuals may draw upon to buffer against the risks this transition entails. The thesis also found associations between exposure to adverse events and resilience in response to work exit in early old age and adaptation in later life. Further work is warranted to elucidate the mechanisms through which adversity over the lifecourse influences later-life health, mental health and wellbeing outcomes to fully characterise the process of resilience over multiple levels of analysis.

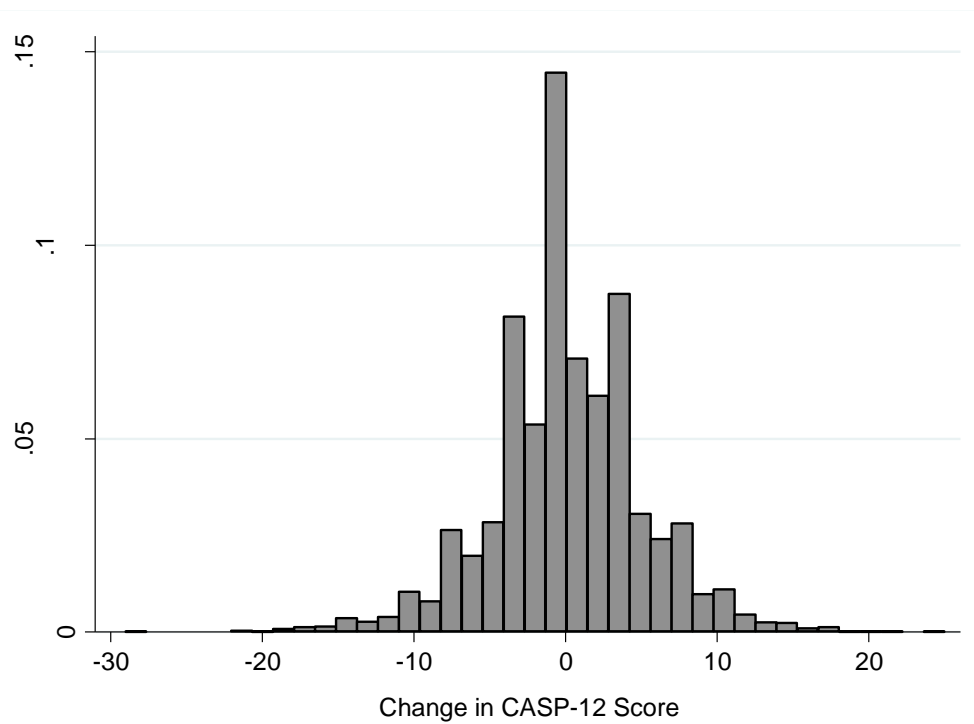
APPENDICES

7 APPENDICES

APPENDIX: Chapter 2

Figures

Figure A2.1. Distribution of CASP-12 change scores from t_0 to t_1 in the combined sample



APPENDICES

Figure A2.2. Absolute age at exit from work by country

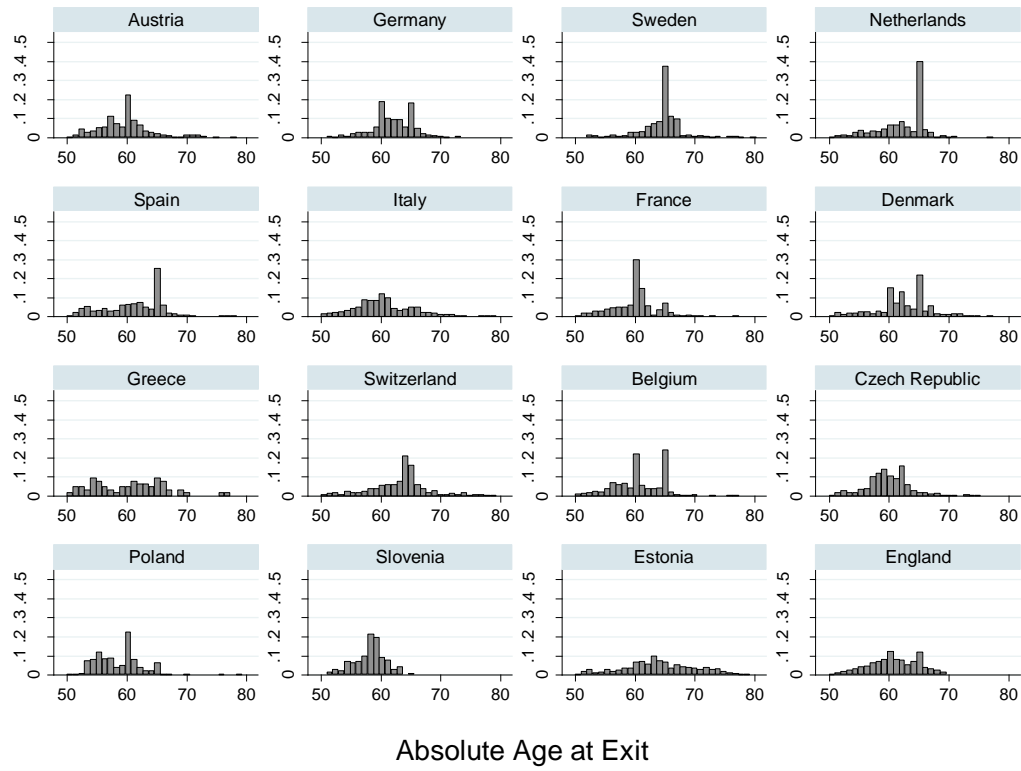


Figure A2.3. Age relative to the state retirement age at exit from work by country



APPENDICES

Tables

Table A2.1. Categorisation of route of work exit in the SHARE and ELSA samples

Category	Benefit in SHARE	Benefit in ELSA
1	Disability insurance benefits	Incapacity benefit (previously invalidity benefit) Severe disablement allowance Disability living allowance Industrial injuries disablement benefit Any other benefit for people with disabilities
2	Unemployment benefits	Job-seeker's allowance (formerly unemployment benefit)
3	Sickness benefits	Statutory sick pay
4	Social assistance	Income support or minimum income guarantee
5	Early retirement pension	N/A
6	Old age pension	State pension

APPENDICES

Table A2.2. Typical pensionable ages for male retirees by country and year according to OECD definitions

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	65	65	65	65	65	65	65	65	65	65	65	65
Belgium	60	60	60	60	60	60	60	60	60	60	60	60
Czech Republic	60.5	60.56	60.63	60.69	60.75	60.81	60.88	60.94	61	61.12	61.24	61.36
Denmark	67	66.75	66.5	66.25	66	65.75	65.5	65.25	65	65	65	65
France	60	60.06	60.13	60.19	60.25	60.31	60.38	60.44	60.5	60.55	60.6	60.65
Germany	63.5	63.69	63.88	64.06	64.25	64.44	64.625	64.81	65	65	65	65
Greece	57	57	57	57	57	57	57	57	57	57.3	57.6	57.9
Italy	57	57.25	57.5	57.75	58	58.25	58.5	58.75	59	59.2	59.4	59.6
Netherlands	65	65	65	65	65	65	65	65	65	65	65	65
Poland	65	65	65	65	65	65	65	65	65	65	65	65
Spain	65	65	65	65	65	65	65	65	65	65	65	65
Sweden	65	65	65	65	65	65	65	65	65	65	65	65
Switzerland	65	65	65	65	65	65	65	65	65	65	65	65
United Kingdom	65	65	65	65	65	65	65	65	65	65	65	65
Estonia*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63	63	63	63
Slovenia**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	58	58	58	58

Typical state retirement age data were obtained from official OECD (2011) figures.

*Estonia acceded to the OECD in 2010 and official OECD pensionable age data from before this date was unavailable. Data on pensionable age for male and female recipients in Estonia were obtained from the Estonian Social Insurance Fund (<http://www.sotsiaalkindlustusamet.ee/old-age-pension/>). **Slovenia acceded to the OECD in 2010 and official OECD pensionable age data from before this date was unavailable. Data on pensionable age for male and female recipients in Slovenia were obtained from the OECD (2013). Figures for the lowest relevant age for receiving a full pension (after 40 years of contributions) are shown.

APPENDICES

Table A2.3. Typical pensionable ages for female retirees by country and year according to OECD definitions

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Austria	60	60	60	60	60	60	60	60	60	60	60	60
Belgium	60	60	60	60	60	60	60	60	60	60	60	60
Czech Republic	58	58.09	58.18	58.26	58.35	58.44	58.53	58.61	58.7	58.9	59.1	59.3
Denmark	67	66.75	66.5	66.25	66	65.75	65.5	65.25	65	65	65	65
France	60	60.06	60.13	60.19	60.25	60.31	60.38	60.44	60.5	60.55	60.6	60.65
Germany	60.5	61.06	61.63	62.19	62.75	63.31	63.88	64.44	65	65	65	65
Greece	57	57	57	57	57	57	57	57	57	57.4	57.8	58.2
Italy	57	57.25	57.5	57.75	58	58.25	58.5	58.75	59	59.2	59.4	59.6
Netherlands	65	65	65	65	65	65	65	65	65	65	65	65
Poland	60	60	60	60	60	60	60	60	60	60	60	60
Spain	65	65	65	65	65	65	65	65	65	65	65	65
Sweden	65	65	65	65	65	65	65	65	65	65	65	65
Switzerland	62	62.13	62.25	62.38	62.5	62.63	62.75	62.88	63	63.1	63.2	63.3
United Kingdom	60	60	60	60	60	60	60	60	60	60.5	61	61.5
Estonia*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	62	62	62	62
Slovenia**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	56.66	57	57.33	57.66

Typical state retirement age data were obtained from official OECD (2011) figures.

*Estonia acceded to the OECD in 2010 and official OECD pensionable age data from before this date was unavailable. Data on pensionable age for male and female recipients in Estonia were obtained from the Estonian Social Insurance Fund (<http://www.sotsiaalkindlustusamet.ee/old-age-pension/>). **Slovenia acceded to the OECD in 2010 and official OECD pensionable age data from before this date was unavailable. Data on pensionable age for male and female recipients in Slovenia were obtained from the OECD (2013). Figures for the lowest relevant age for receiving a full pension (after 40 years of contributions) are shown. Annual increments in the official pension age for women were obtained by cross-referencing with another analysis on the Slovenian pension system (Majcen and Verbič, 2008).

Table A2.4. Items used to specify a physical frailty scale in SHARE and ELSA

Variable	Categories
<i>Medically diagnosed conditions</i>	
Myocardial infarction	1=yes, 0=no
Hypertension	1=yes, 0=no
Stroke	1=yes, 0=no
Diabetes or elevated blood sugar	1=yes, 0=no
Chronic Obstructive Pulmonary Disease	1=yes, 0=no
Asthma	1=yes, 0=no
Arthritis	1=yes, 0=no
Osteoporosis	1=yes, 0=no
Cancer	1=yes, 0=no
Parkinson's Disease	1=yes, 0=no
Cataracts	1=yes, 0=no
Alzheimer's disease, dementia or memory impairment	1=yes, 0=no
<i>Medical symptoms</i>	
Problem sleeping or restlessness	1=yes, 0=no
Difficulty seeing objects at distance	1=yes, 0=no
Difficulty seeing objects at arm's length	1=yes, 0=no
<i>Difficulties with functional activities</i>	
Walking short distances (100 metres/100 yards)	1=yes, 0=no
Sitting for long periods (≥2 hours)	1=yes, 0=no
Standing up from sitting down	1=yes, 0=no
Climbing several flights of stairs	1=yes, 0=no
Climbing one flight of stairs without resting	1=yes, 0=no
Stooping, kneeling or crouching	1=yes, 0=no
Extending arms above shoulders	1=yes, 0=no
Pulling or pushing large objects	1=yes, 0=no
Carrying or lifting heavy objects (≥5kg/≥10lbs)	1=yes, 0=no
Picking up a small coin from a table	1=yes, 0=no
<i>Difficulties with activities of daily living (ADLs)</i>	
Dressing (including shoes and socks)	1=yes, 0=no
Walking across a room	1=yes, 0=no
Bathing or showering	1=yes, 0=no
Eating	1=yes, 0=no
Getting in or out of bed	1=yes, 0=no
Using the toilet (including getting up or down)	1=yes, 0=no
Using a map to navigate in a strange place	1=yes, 0=no
Preparing a hot meal	1=yes, 0=no
Shopping for groceries	1=yes, 0=no
Making telephone calls	1=yes, 0=no
Taking medication	1=yes, 0=no
Work in the home or garden	1=yes, 0=no
Managing money	1=yes, 0=no

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Table A2.5. ISCED-97 major categories and equivalent measures of educational attainment in SHARE and ELSA

ISCED-97 level equivalent*	Highest level of education in SHARE	Highest qualification attained in ELSA	Variable coding
0	Pre-primary education	No formal qualification	1
1	Primary education		
2	Lower secondary education	NVQ1, CSE or equivalent	2
3	Upper secondary education	NVQ2, O-level or equivalent	
4	Post-secondary, non-tertiary education	NVQ3, A-level or equivalent	
5	First stage of tertiary education	Tertiary education below degree-level	3
6	Second stage of tertiary education	NVQ4, NVQ5, degree or equivalent (including postgraduate)	
N/A	Other	Foreign or other	
	Still in education		4

*Equivalencies between ISCED-97 groups and UK qualifications determined using the revised coding scheme proposed by Schneider (2009).

Table A2.6. ISCO-88 major groups and equivalent measures of occupational class in SHARE and ELSA

ISCO-88 major group	Occupational class description in SHARE/ISCO-88	SOC2000 major group	Occupational class description in ELSA/SOC2000	Variable coding
1	Legislators, senior officials and managers	1	Managers and senior officials	1
2	Professionals	2	Professional occupations	
3	Technicians and associate professionals	3	Associate professional and technical occupations	2
4	Clerks	4	Administrative and secretarial occupations	
5	Service workers and shop and market sales workers	6	Personal service occupations	
		7	Sales and customer service occupations	
6	Skilled agricultural and fishery workers	5	Skilled trades occupations	3
7	Craft and related trade workers			
8	Plant and machine operators and assemblers	8	Process, plant and machine operatives	4
9	Elementary occupations	9	Elementary occupations	
0	Armed forces		N/A*	

*Armed forces were not included as a separate major category in SOC200 but respondents in military roles are distributed to other categories according to their job duties as part of the classification method. In SHARE, respondents who reported working as commissioned or non-commissioned military officers were reclassified under ISCO-88 major group 1 for the purposes of analysis.

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Tables

Table A3.1. Distributions of timing of work exit by country

Country	>1 year before		Official age ± 1 year		>1 year after		Total n
	N	%	n	%	n	%	
Total sample	4,364	50.67	2,230	25.89	2,019	23.44	8,613
Austria	276	66.35	73	17.55	67	16.11	416
Germany	227	62.19	90	24.66	48	13.15	365
Sweden	165	30.56	250	46.30	125	23.15	540
Netherlands	287	50.26	244	42.73	40	7.01	571
Spain	236	61.14	119	30.83	31	8.03	386
Italy	102	27.87	66	18.03	198	54.10	366
France	178	32.78	238	43.83	127	23.39	543
Denmark	335	65.30	112	21.83	66	12.87	513
Greece	22	33.33	4	6.06	40	60.61	66
Switzerland	167	39.11	134	31.38	126	29.51	427
Belgium	214	31.94	166	24.78	290	43.28	670
Czech Republic	159	31.12	174	34.05	178	34.83	511
Poland	162	68.94	59	25.11	14	5.96	235
Slovenia	37	25.52	43	29.66	65	44.83	145
Estonia	142	32.57	69	15.83	225	51.61	436
England	1,655	68.30	389	16.05	379	15.64	2,423

χ -square=1.6 \times 103, df=30, p<0.001

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Table A3.2. Distributions of timing of work exit by respondent characteristics and chi-square tests

Variable	Categories	>1 year before		Official age ± 1 year		>1 year after		χ -square	df	p
		n	%	n	%	n	%			
Total sample		4,364		2,230		2,019				
Route of exit from work	Old age pension	950	21.87	1,376	62.18	1,355	67.45	1.8 $\times 10^3$	12	<0.001
	Disability pension	361	8.31	40	1.81	32	1.59			
	Unemployment benefit	325	7.48	19	0.86	6	0.30			
	Sickness benefit	108	2.49	7	0.32	4	0.20			
	Social Assistance	37	0.85	3	0.14	9	0.45			
	Early retirement pension	446	10.27	88	3.98	69	3.43			
	None	2116	48.72	680	30.73	534	26.58			
	Missing	21		17		10				
Gender	Male	2,209	50.62	1,007	45.16	894	44.28	30.15	2	<0.001
	Female	2,155	49.38	1,223	54.84	1,125	55.72			
	Missing	0		0		0				
Country-specific quartile of household net worth	1 (poorest)	798	18.43	364	16.40	357	17.81	12.88	6	0.045
	2	966	22.31	551	24.82	464	23.15			
	3	1,217	28.11	662	29.82	549	27.40			
	4 (wealthiest)	1,349	31.15	643	28.96	634	31.64			
	Missing	34		10		15				
Level of education (ISCED category)	Primary (0 and 1)	1,104	25.46	745	33.79	683	34.08	97.64	6	<0.001
	Secondary (2, 3 and 4)	1,971	45.45	951	43.13	772	38.52			
	Tertiary (5 and 6)	1,074	24.76	463	21.00	484	24.15			
	Other/Still in education	188	4.33	46	2.09	65	3.24			
	Missing	27		25		15				
Occupational level (ISCO Category) at t_0	Elementary manual (8 and 9)	1,519	56.01	1099	72.30	869	69.02	191.16	6	<0.001
	Skilled manual (6 and 7)	281	10.36	163	10.72	136	10.80			
	Skilled non-manual (3, 4 and 5)	510	18.81	173	11.38	173	13.74			
	Professional (1 and 2)	402	14.82	85	5.59	81	6.43			
	Missing	1,652		710		760				
Contract at t_0 (hours/week)	Full-time (≥ 30 hours/week)	3,263	76.17	1,918	86.59	1,586	79.74	98.15	2	<0.001
	Part-time (<30 hours/week)	1,021	23.83	297	13.41	403	20.26			
	Missing	80		15		30				
Participation in social activities	Yes	2,007	46.59	1,037	46.77	1,023	51.00	11.64	2	0.003
	No	2,301	53.41	1180	53.23	983	49.00			
	Missing	56		13		13				

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Table A3.3. Distributions of route of work exit by country

Country	Old age pension		Disability pension		Unemployment benefit		Sickness benefit		Social Assistance		Early retirement pension		None		Total n
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Total sample	3,681	42.98	433	5.06	350	4.09	119	1.39	49	0.57	603	7.04	3,330	38.88	8,565
Austria	209	50.24	26	6.25	19	4.57	3	0.72	5	1.20	41	9.86	107	25.72	416
Germany	174	47.67	10	2.74	18	4.93	4	1.10	9	2.47	0	0.00	150	41.10	365
Sweden	367	67.96	7	1.30	14	2.59	27	5.00	0	0.00	0	0.00	122	22.59	540
Netherlands	202	35.38	18	3.15	28	4.90	6	1.05	2	0.35	91	15.94	217	38.00	571
Spain	157	40.67	13	3.37	41	10.62	12	3.11	0	0.00	24	6.22	133	34.46	386
Italy	89	24.32	7	1.91	9	2.46	0	0.00	1	0.27	98	26.78	156	42.62	366
France	278	51.20	14	2.58	45	8.29	8	1.47	1	0.18	7	1.29	186	34.25	543
Denmark	190	37.04	31	6.04	27	5.26	19	3.70	3	0.58	164	31.97	75	14.62	513
Greece	18	27.27	2	3.03	0	0.00	0	0.00	0	0.00	0	0.00	44	66.67	66
Switzerland	205	48.01	12	2.81	15	3.51	0	0.00	5	1.17	24	5.62	163	38.17	427
Belgium	315	47.01	22	3.28	51	7.61	20	2.99	4	0.60	87	12.99	166	24.78	670
Czech Republic	310	60.67	46	9.00	20	3.91	8	1.57	5	0.98	38	7.44	83	16.24	511
Poland	106	45.11	19	8.09	5	2.13	0	0.00	0	0.00	14	5.96	90	38.30	235
Slovenia	85	58.62	3	2.07	12	8.28	0	0.00	1	0.69	0	0.00	44	30.34	145
Estonia	301	69.04	45	10.32	16	3.67	2	0.46	1	0.23	15	3.44	56	12.84	436
England	675	27.86	158	6.52	30	1.24	10	0.41	12	0.50	0	0.00	1,538	63.48	2,423

χ -square=2.6×10³, df=90, p<0.001

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Table A3.4. Distributions of route of work exit by respondent characteristics and chi-square tests

Variable	Categories	Old age pension		Disability pension		Unemployment benefit		Sickness benefit		Social Assistance		Early retirement pension		None		χ-square	df	p
		n	%	n	%	n	%	n	%	n	%	n	%	n	%			
Total sample		3,681		433		350		119		49		603		3,330				
Age at exit from work	>1 year before	950	25.81	361	83.37	325	92.86	108	90.76	37	75.51	446	73.96	2,116	63.54	1.8×10 ³	12	<0.001
	Official pension age ±1 year	1,376	37.38	40	9.24	19	5.43	7	5.88	3	6.12	88	14.59	680	20.42			
	>1 year after	1,355	36.81	32	7.39	6	1.71	4	3.36	9	18.37	69	11.44	534	16.04			
	Missing	0		0		0		0		0		0		0				
Gender	Male	1,813	49.25	231	53.35	180	51.43	54	45.38	22	44.90	316	52.40	1,470	44.14	33.69	6	<0.001
	Female	1,868	50.75	202	46.65	170	48.57	65	54.62	27	55.10	287	47.60	1,860	55.86			
	Missing	0		0		0		0		0		0		0				
Country-specific quartile of household net worth	1 (poorest)	587	15.95	129	30.07	115	32.95	34	28.57	31	63.27	77	12.77	541	16.51	289.14	18	<0.001
	2	875	23.77	116	27.04	98	28.08	29	24.37	14	28.57	146	24.21	689	21.03			
	3	1,078	29.29	110	25.64	87	24.93	27	22.69	2	4.08	204	33.83	907	27.69			
	4 (wealthiest)	1,141	31.00	74	17.25	49	14.04	29	24.37	2	4.08	176	29.19	1,139	34.77			
	Missing	0		4		1		0		0		0		54				
Level of education (ISCED category)	Primary (0 and 1)	1,118	30.66	139	32.18	110	31.43	43	36.75	22	44.90	191	32.10	895	27.06	152.81	18	<0.001
	Secondary (2, 3 and 4)	1,567	42.97	211	48.84	170	48.57	52	44.44	24	48.98	213	35.80	1,436	43.41			
	Tertiary (5 and 6)	873	23.94	65	15.05	63	18.00	22	18.80	2	4.08	190	31.93	793	23.97			
	Other/Still in education	89	2.44	17	3.94	7	2.00	0	0.00	1	2.04	1	0.17	184	5.56			
	Missing	34		1		0		2		0		8		22				
Occupational level (ISCO Category) at t ₀	Elementary manual (8 and 9)	1,619	68.49	119	56.13	136	81.93	67	90.54	22	73.33	343	90.26	1,161	52.09	393.86	18	<0.001
	Skilled manual (6 and 7)	255	10.79	37	17.45	6	3.61	1	1.35	4	13.33	21	5.53	248	11.13			
	Skilled non-manual (3, 4 and 5)	326	13.79	42	19.81	18	10.84	5	6.76	3	10.00	11	2.89	448	20.10			
	Professional (1 and 2)	164	6.94	14	6.60	6	3.61	1	1.35	1	3.33	5	1.32	372	16.69			
	Missing	1,317		221		184		45		19		223		1,101				

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Table A3.4 (continued). Distributions of route of work exit by respondent characteristics and chi-square tests

Variable	Categories	Old age pension		Disability pension		Unemployment benefit		Sickness benefit		Social Assistance		Early retirement pension		None		χ-square	df	p
		n	%	n	%	n	%	n	%	n	%	n	%	n	%			
Contract at t ₀ (hours/week)	Full-time (≥30 hours/week)	3,022	83.00	329	76.87	316	90.54	107	92.24	42	87.50	552	92.00	2,355	72.28	231.55	6	<0.001
	Part-time (<30 hours/week)	619	17.00	99	23.13	33	9.46	9	7.76	6	12.50	48	8.00	903	27.72			
	Missing	40		5		1		3		1		3		72				
Participation in social activities	Yes	1,722	47.14	242	56.81	218	62.46	73	61.34	30	65.22	250	41.46	1,501	45.66	74.50	6	<0.001
	No	1,931	52.86	184	43.19	131	37.54	46	38.66	16	34.78	353	58.54	1,786	54.34			
	Missing	28		7		1		0		3		0		43				
Partnership status	Partnered	2,906	78.95	306	70.67	241	68.86	90	75.63	23	46.94	467	77.45	2,583	77.57	56.71	6	<0.001
	Non-partnered	775	21.05	127	29.33	109	31.14	29	24.37	26	53.06	136	22.55	747	22.43			
	Missing	0		0		0		0		0		0		0				
Housing tenure	Outright ownership	1,664	60.80	182	51.85	103	40.39	38	45.24	9	20.93	194	47.43	1,713	62.07	348.37	30	<0.001
	Ownership with repayment	520	19.00	77	21.94	59	23.14	26	30.95	5	11.63	151	36.92	613	22.21			
	Private rent	341	12.46	47	13.39	64	25.10	15	17.86	19	44.19	44	10.76	268	9.71			
	Housing collective	8	0.29	2	0.57	5	1.96	0	0.00	3	6.98	3	0.73	5	0.18			
	Social rent	110	4.02	39	11.11	18	7.06	0	0.00	6	13.95	9	2.20	120	4.35			
	Rent-free, no ownership	94	3.43	4	1.14	6	2.35	5	5.95	1	2.33	8	1.96	41	1.49			
Missing	944		82		95		35		6		194		570					
Financial stress	Yes	1,990	72.87	180	53.73	102	41.13	45	54.88	13	30.95	319	78.19	1,818	70.36	201.09	6	<0.001
	No	741	27.13	155	46.27	146	58.87	37	45.12	29	69.05	89	21.81	766	29.64			
	Missing	950		98		102		37		7		195		746				

*Frailty index expressed as a continuous variable scaled from 0 to 1. The proportion of respondents with nonmissing frailty index scores is shown.

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Table A3.5. Comparison of two specifications of route of work exit (benefits received since t_0 wave and benefits currently received) among SHARE respondents (n=6,142)

Benefit received since t_0 wave	Disability benefit		Unemployment benefit		Sickness benefit		Social assistance		Early retirement pension		None		Old age pension		Total
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n
Disability benefit	275	66.43	0	0.00	2	0.48	2	0.48	1	0.24	75	18.12	59	14.25	414
Unemployment benefit	0	0.00	319	52.21	7	1.15	7	1.15	24	3.93	175	28.64	79	12.93	611
Sickness benefit	0	0.00	0	0.00	100	44.64	1	0.45	4	1.79	65	29.02	54	24.11	224
Social assistance	0	0.00	0	0.00	0	0.00	27	52.94	1	1.96	17	33.33	6	11.76	51
Early retirement pension	0	0.00	1	0.13	0	0.00	0	0.00	573	71.63	115	14.38	111	13.88	800
None	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1180	100.00	0	0.00	1180
Old age pension	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	165	5.77	2697	94.23	2862

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Figures

Figure A4.1. q-q plot of country residual estimates against inverse normal

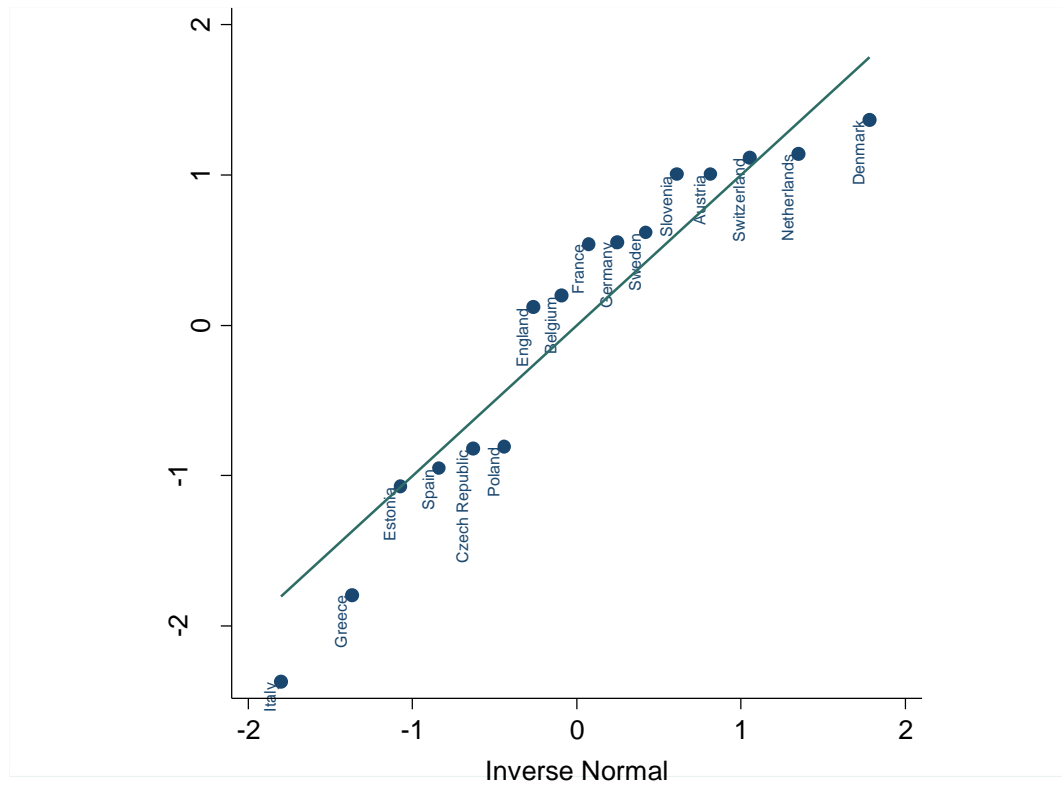
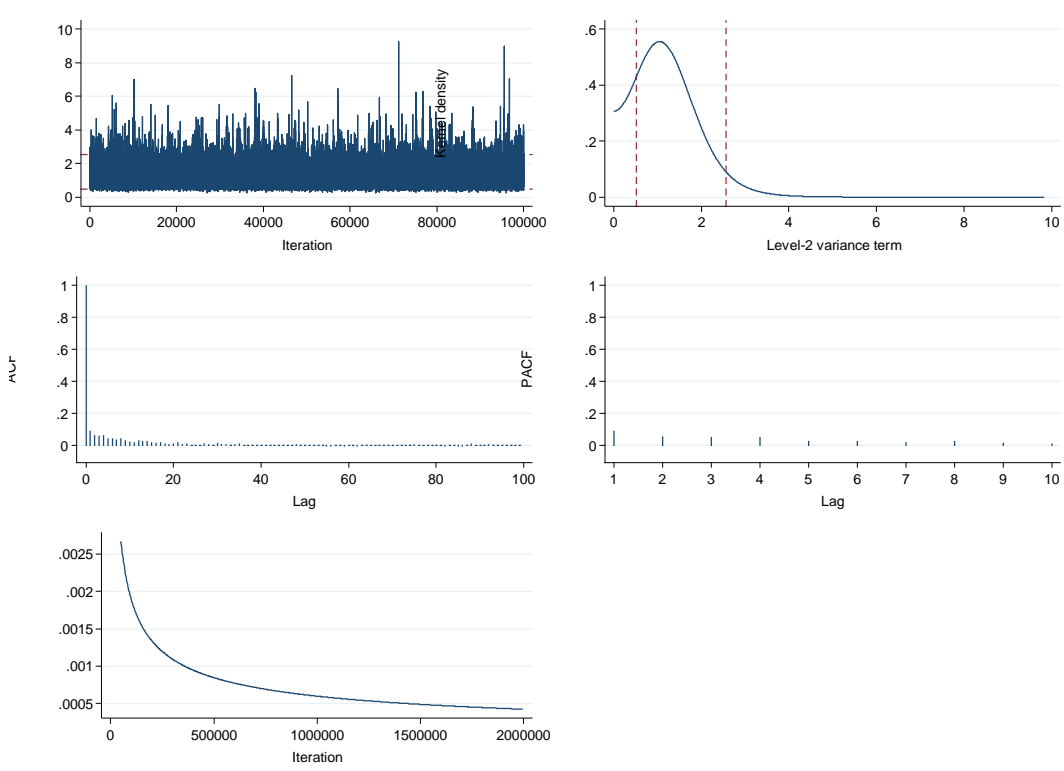


Figure A4.2. Fiveway plot for country-level random effects term estimating from a fully-adjusted MCMC model



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Tables

Table A4.1. A review of welfare state typologies

Reference	Austria	Germany	Sweden	Neth.	Spain	Italy	France	Denmark	Greece	Switz.	Belgium	Czechia	Poland	Slovenia	Estonia	England	Measures (according to Bambra, 2007)
Esping-Andersen, 1990, 1999	Social Democratic	Cons	Social Democratic	Social Democratic	Cons	Cons	Cons	Social Democratic	Cons	Cons	Social Democratic	N/A	N/A	N/A	N/A	Liberal	<ul style="list-style-type: none"> Decommodification Social stratification Public-private mix
Eikemo et al, 2008, 2008, Bambra and Eikemo, 2009 (based on Ferrera, 1996)	Bismarckian	Bismarckian	Scandinavian	Bismarckian	Southern	Southern	Bismarckian	Scandinavian	Southern	Bismarckian	Bismarckian	Eastern European	Eastern European	Eastern European	Eastern European	Anglo-Saxon	<ul style="list-style-type: none"> Coverage Replacement rate Poverty rate
Typology of welfare state organisation																	
Bambra, 2007	Cons (group 1)	Cons (group 2)	Social-democratic	Cons (group 2)	N/A	Cons (group 1)	Cons (group 1)	Cons (group 1)	N/A	Cons (group 2)	Cons (group 1)	N/A	N/A	N/A	N/A	Liberal	<ul style="list-style-type: none"> Social expenditure Financing via contributions
Beblavy, 2008, Aspalter et al., 2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cons-light	Cons-light	Near-Cons	Liberal-light	N/A	
Bonoli, 1997	N/A	Nordic	Continental	Continental	Southern	Southern	Continental	Nordic	Southern	Southern	Continental	N/A	N/A	N/A	N/A	British	<ul style="list-style-type: none"> Social expenditure Financing via contributions
Bowell and Barrientos, 2004	Liberal	Cons	Social-democratic	Social-democratic	Cons	N/A	Cons	Social-democratic	Cons	N/A	Liberal	N/A	N/A	N/A	N/A	Liberal	
Castles and Mitchell, 1993	N/A	Cons	Non-right Hegemony	Cons	N/A	Cons	N/A	Non-right Hegemony	N/A	Liberal	Non-right Hegemony	N/A	N/A	N/A	N/A	Radical	<ul style="list-style-type: none"> Welfare spending Benefit equality
Castles and Obinger, 2008	Cons	Cons	Social-democratic	N/A	Southern	Southern	Cons	Social-democratic	Southern	Liberal	Cons	N/A	N/A	Central/East Europe	Central/East Europe	Liberal	

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Chung and Muntaner, 2007	Christian Democratic	Christian Democratic	Social Democratic	Christian Democratic	Christian Democratic	Christian Democratic	Christian Democratic	Christian Democratic	Social Democratic	N/A	Christian Democratic	Christian Democratic	N/A	N/A	N/A	N/A	Liberal	
Danforth, 2014	European	European	European	European	European	European	European	European	European	N/A	European	European	N/A	N/A	N/A	N/A	Anglo-american	
Fenger, 2007	Cons-corporatist	Cons-corporatist	Social-democratic	Cons-corporatist	Cons-corporatist (Southern)	Cons-corporatist (Southern)	Cons-corporatist	Social-democratic	Cons-corporatist (Southern)	N/A	Cons-corporatist	European Post-Communist	European Post-Communist	European Post-Communist	Post-USSR	Liberal		
Ferrera, 1993	Occupational (pure)	Occupational (pure)	Universalist (pure)	Occupational (mixed)	N/A	Occupational (mixed)	Occupational (pure)	Universalist (pure)	N/A	Occupational (mixed)	Occupational (pure)	N/A	N/A	N/A	N/A	Universalist (mixed)	<ul style="list-style-type: none"> • Coverage 	
Ferrera, 1996	Bismarckian	Bismarckian	Scandinavian	Bismarckian	Southern	Southern	Bismarckian	Scandinavian	Southern	Bismarckian	Bismarckian	N/A	N/A	N/A	N/A	Anglo-Saxon	<ul style="list-style-type: none"> • Coverage • Replacement rate • Poverty rate 	
Huber and Stephens, 2001	Christian Democratic (leans Social Democratic)	Christian Democratic	Social Democratic	Christian Democratic	N/A	Christian Democratic	Christian Democratic	Social Democratic	N/A	Christian Democratic	Christian Democratic	N/A	N/A	N/A	N/A	Liberal	<ul style="list-style-type: none"> • Political culture 	
Jensen, 2008	2nd Cluster	2nd Cluster	3rd Cluster	1st Cluster	1st Cluster	2nd Cluster	2nd Cluster	3rd Cluster	N/A	N/A	2nd Cluster	N/A	N/A	N/A	N/A	1st Cluster	<ul style="list-style-type: none"> • Expenditure on services • Transfers 	
Kammer et al., 2012	Cons	Cons	Social Democratic	Hybrid	Southern	Southern	Cons	Social Democratic	Southern	Cons	Hybrid	N/A	N/A	N/A	N/A	Liberal		
Kangas, 1994	Cons	Cons	Social-democratic	Cons	N/A	Cons	N/A	Social-democratic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Radical	<ul style="list-style-type: none"> • Decommodification 	
Kautto, 2002	Transfer Approach	Service Approach	Service Approach	Transfer Approach	Low Expenditure	Transfer Approach	Service Approach	N/A	Low Expenditure	N/A	Transfer Approach	N/A	N/A	N/A	N/A	Service Approach	<ul style="list-style-type: none"> • Expenditure on services • Transfers 	
Korpi and Palme, 1998	Corporatist	Corporatist	Encomp.	Basic Security	N/A	Corporatist	Corporatist	Basic Security	N/A	Basic Security	Corporatist	N/A	N/A	N/A	N/A	Basic Security	<ul style="list-style-type: none"> • Social expenditure 	
Liebfried, 1992	Bismarckian	Bismarckian	Scandinavian	N/A	Latin	Latin	Latin	Scandinavian	Latin	N/A	N/A	N/A	N/A	N/A	N/A	Anglo-Saxon	<ul style="list-style-type: none"> • Characteristics • Rights • Basic income 	

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Navarro and Shi, 2001	Social-democratic	Christian Democratic	Social-democratic	Christian Democratic	Ex-fascist	Ex-fascist	Christian Democratic	Social-democratic	Ex-fascist	Christian Democratic	Christian Democratic	N/A	N/A	N/A	N/A	Liberal	<ul style="list-style-type: none"> • Political culture • Decommodification (pension-specific) • Decommodification
Obinger and Wagschal, 1998	Cons	European	Social-democratic	European	N/A	Cons	Cons	Social-democratic	N/A	Liberal	European	N/A	N/A	N/A	N/A	European	
Ragin, 1994	Corporatist	Undefined	Social-democratic	Undefined	N/A	Corporatist	Corporatist	Social-democratic	N/A	Liberal	Corporatist	N/A	N/A	N/A	N/A	Undefined	
Pitzurello, 1999	Cons-bismarckian	Cons	Social-democratic	Cons	N/A	Cons-bismarckian	Cons-bismarckian	Social-democratic	N/A	Cons	Social-democratic	N/A	N/A	N/A	N/A	Liberal	
Sain-Arnaud and Bernard, 2003	Cons	Cons	Social-democratic	Cons	Southern	Southern	Cons	Social-democratic	Southern	N/A	Cons	N/A	N/A	N/A	N/A	Liberal	
Samuel and Hadjar, 2015 (based on Blossfield, 2008)	Cons	Cons	Social Democratic	Cons	Family-oriented	Family-oriented	Cons	Social Democratic	Family-oriented	Liberal	Cons	Liberal	Post-socialist	Post-socialist	Post-socialist	Liberal	
Schröder, 2009	Cons	Cons	Social-democratic	Cons	Cons	Cons	Cons	Social-democratic	N/A	Undefined	Cons	N/A	N/A	N/A	N/A	Liberal	
Scruggs and Allan, 2006	Cons	Cons	Social-democratic	Social-democratic	N/A	Liberal	Cons	Social-democratic	N/A	Social-democratic	Social-democratic	N/A	N/A	N/A	N/A	Liberal	
Shalev, 1986	Cons	Undefined	Social-democratic	Undefined	N/A	Cons	Cons	Social-democratic	N/A	Liberal	Cons	N/A	N/A	N/A	N/A	Undefined	
Vrooman, 2009	N/A	Cons	Social-democratic	Undefined	N/A	N/A	Cons	Social-democratic	N/A	N/A	Cons	N/A	N/A	N/A	N/A	Liberal	
Wildeboer Schut et al., 2001	N/A	Cons	Social-democratic	Undefined	N/A	N/A	Cons	Social-democratic	N/A	N/A	Cons	N/A	N/A	N/A	N/A	Liberal	
Typology of pension systems																	
Hinrichs and Lynch, 2010	Bismarckian	Bismarckian	Beveridgean	Beveridgean	Bismarckian	Bismarckian	Bismarckian	Bismarckian	Beveridgean	Bismarckian	Beveridgean	Bismarckian	N/A	N/A	N/A	N/A	Beveridgean

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Norström and Palme, 2010	State Corporatist	State Corporatist	Encompassing	Basic/Targeted	N/A	State Corporatist	State Corporatist	Basic/Targeted	N/A	Basic/Targeted	State Corporatist	N/A	N/A	N/A	N/A	Basic/Targeted
Ragin, 1994	Corporatist	Undefined	Social-democratic	Undefined	N/A	Corporatist	Corporatist	Social-democratic	N/A	Liberal	Corporatist	N/A	N/A	N/A	N/A	Undefined
Typology of industrial organisation																
Soskice and Hall, 2001	Coordinated	Coordinated	Coordinated	Coordinated	Mediterranean	Mediterranean	Mediterranean (Dirigiste)	Coordinated	Mediterranean	Coordinated	Coordinated	N/A	N/A	N/A	N/A	Liberal
Typology of public service provision																
Kautto, 2002	Transfer Approach	Service Approach	Service Approach	Transfer Approach	Low Expenditure	Transfer Approach	N/A	N/A	N/A	N/A	Transfer Approach	N/A	N/A	N/A	N/A	Service Approach
Typology of healthcare decommodification																
Bambra, 2005	Medium	Medium	High	Medium	N/A	Medium	Medium	High	N/A	Medium	Medium	N/A	N/A	N/A	N/A	High
Typology of defamilisation																
Bambra, 2004	Medium	Medium	High	Medium	N/A	Medium	N/A	High	N/A	Medium	Medium	N/A	N/A	N/A	N/A	Medium
Siaroff, 1994	Advanced Christian-democratic	Advanced Christian-democratic	Protestant Social-democratic	Advanced Christian-democratic	Late Female Mobilisation	Late Female Mobilisation	Advanced Christian-democratic	Protestant Social-democratic	Late Female Mobilisation	Late Female Mobilisation	Advanced Christian-democratic	N/A	N/A	N/A	N/A	Protestant Liberal

•Decommodification (pension-specific)

•Decommodification (healthcare-specific)

Note: Cons=Conservative.

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Table A4.2. Summary of percentage welfare expenditure by quintile of income used to calculate Q5/Q1 ratios compared with working-age S80/S20 earnings ratios (2011)

Welfare typology	Country	Q1	Q2	Q3	Q4	Q5	Q5/Q1 ratio	S80/S20 ratio 2011 (age 18–65)
Bismarckian	Austria	14.1	19.2	20.7	20.8	25.2	1.8	4.3
	Germany	20.0	23.4	19.3	18.7	18.5	0.9	4.6
	Netherlands	28.8	26.2	18.1	14.8	12.5	0.4	4.5
	France	16.6	18.7	18.1	19.6	27.0	1.6	4.8
	Switzerland	30.1	22.5	18.9	15.9	12.6	0.4	4.2
	Belgium	23.4	25.0	19.7	15.4	16.3	0.7	4.0
	<i>Mean</i>		22.2	22.5	19.1	17.6	18.7	1.0
Southern	Spain	10.4	19.8	22.1	22.6	25.1	2.4	6.5
	Italy	9.0	16.5	19.5	21.1	33.9	3.8	6.0
	Greece	7.7	16.3	21.8	23.1	31.1	4.0	6.7
	<i>Mean</i>	9.0	17.5	21.1	22.3	30.0	3.4	6.4
Scandinavian	Sweden	27.8	26.4	17.9	14.7	13.2	0.5	4.2
	Denmark	34.2	32.1	16.6	10.5	6.7	0.2	3.7
	<i>Mean</i>	20.7	19.5	11.5	8.4	6.6	0.3	4.0
Eastern European	Czech Republic	20.0	28.3	22.0	16.0	13.7	0.7	3.7
	Poland	14.4	19.8	22.6	23.1	20.1	1.4	5.0
	Slovenia	18.8	21.7	19.5	19.2	20.8	1.1	3.6
	Estonia	18.2	26.4	19.2	16.9	19.4	1.1	5.9
	<i>Mean</i>	23.8	32.1	27.8	25.1	24.6	1.4	6.1
Anglo-Saxon	England	26.1	30.0	22.0	13.9	8.0	0.3	6.2
OECD Average		20.1	22.4	19.3	17.8	20.3	1.0	N/A

Adapted from OECD Social Expenditure Update (November 2014). Data based on 2011 estimates.

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Table A4.3. World Governance Indicators definitions

Term	Definition
Governance	Encompasses (a) the process by which governments are selected, monitored, and replaced; (b) the capacity of the government to effectively formulate and implement sound policies; (c) the respect of citizens and the state for the institutions that govern economic and social interactions among them.
Voice and Accountability	Captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
Political Stability and Absence of Violence/Terrorism	Captures perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
Government Effectiveness	Captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Regulatory Quality	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of Law	Captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
Control of Corruption	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.

Adapted from Kaufmann et al., 2010.
 (<http://info.worldbank.org/governance/wgi/pdf/wgi.pdf>)

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Table A4.4. Summary of non-standard and user-written commands in Stata 14

Command	Full title	Description	Author
simanova	Simulation for ANOVA	Allows you to use simulation to study type-I error rates and power in standard ANOVA	Statistical Consulting Group, Institute for Digital Research and Education, UCLA (idrestat@ucla.edu)
mcompare(scheffe)	Adjust for multiple comparisons	Controls the experiment-wise error rate using the F (or chi-squared) distribution with degrees of freedom equal to the rank of the term.	StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP
mcompare(sidak)		Adjusts the comparison-wise error rate based on the upper limit of the probability inequality	
runmlwin	Run the MLwiN multilevel modelling software from within Stata	This module fits multilevel models in MLwiN from within Stata. There are three steps to using runmlwin: (1) The researcher specifies the desired model using the runmlwin command syntax; (2) The model is sent to and fitted in MLwiN; and (3) The results are returned to and displayed in Stata where they can be accessed for further analyses.	Chris Charlton, Centre for Multilevel Modelling, University of Bristol; George Leckie, Centre for Multilevel Modelling, University of Bristol
fiveway	Five-way MCMC graphical diagnostics plot	N/A	
serrbar	Graph standard error bar chart	Graphs $mvar \pm scale() \times svar$ against $xvar$. Usually, but not necessarily, $mvar$ and $svar$ will contain means and standard errors or standard deviations of some variable so that a standard error bar chart is produced.	Nicholas J. Cox, Department of Geography, Durham University; StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP

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Table A4.5. Measures of welfare effort, emphasis and expenditure by country and welfare regime

Welfare typology	Country	Total public (% GDP)	Total public (EUR 000s)	Effort		Emphasis		Expenditure	
				In-kind benefits (% GDP)	Cash benefits (% GDP)	In-kind benefits (% public)	Cash benefits (% public)	In-kind benefits (EUR 000s)	Cash benefits (EUR 000s)
Bismarckian	Austria	26.8	8793.6	8.3	17.8	30.9	66.4	2717.1	5837.5
	Germany	24.7	7794.6	10.1	13.8	40.8	56.1	3178.0	4373.4
	Netherlands	22	7532.1	9.9	11	45.2	50.2	3402.3	3777.8
	France	30.5	8394.1	11.1	18.5	36.3	60.7	3047.1	5098.2
	Switzerland	18.3	7144.3	7.6	10.1	41.7	55.2	2980.5	3946.9
	Belgium	28.7	8727.0	10	17.9	34.7	62.3	3032.5	5439.3
	<i>Mean</i>		25.2	8064.3	9.5	14.9	37.9	58.8	3059.6
Southern	Spain	26.3	6398.8	8.8	16.6	33.5	63.2	2144.9	4041.7
	Italy	27.3	7161.8	7.8	19.1	28.6	69.9	2045.7	5008.4
	Greece	25.7	5222.5	8.0	17.7	30.9	68.1	1615.7	3556.0
	<i>Mean</i>		26.4	6261.0	8.2	17.8	30.9	67.1	1935.4
Scandinavian	Sweden	25.8	8355.4	13.3	11.3	51.8	43.8	4326.1	3655.6
	Denmark	28.9	9247.5	13.5	13.4	46.7	46.6	4318.8	4309.3
	<i>Mean</i>		27.4	8801.5	13.4	12.4	49.1	45.2	4322.5
Eastern European	Czech Republic	19.8	4168.9	6.9	12.6	35.0	63.6	1460.6	2653.3
	Poland	19.4	3244.7	5.4	13.7	27.7	70.2	897.8	2278.9
	Slovenia	23.5	5009.3	7.3	15.8	31.2	67.3	1562.3	3372.0
	Estonia	16.3	2884.7	5.3	10.8	312.2	66.4	929.9	1915.7
	<i>Mean</i>		19.8	3826.9	6.2	13.2	31.7	66.8	1212.7
Anglo-Saxon	England	22.4	6279.4	11.2	11.0	49.8	49.2	3127.1	3088.4

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Table A4.6. Country-level effects of welfare regime and spending measures on change in wellbeing following work exit and proportion of between-country variance explained without adjustment for individual-level financial variables (n=8,037)

Variable ¹	REGIME APPROACH		SPENDING APPROACH				
	Model 1	Model 2	Effort Model 3	Emphasis Model 4	Model 5	Expenditure Model 6	Model 7
Welfare typology							
Conservative	ref						
Mediterranean	-2.34 (-3.38, -1.31)***						
Social democratic	0.17 (-0.99, 1.28)						
Post-Communist	-1.00 (-1.89, -0.06)*						
Liberal	-0.75 (-2.20, 0.68)						
Social protection							
Total public (% GDP)		0.00 (-0.11, 0.10)					
In-kind benefits (% GDP)			0.13 (-0.08, 0.33)				
Cash benefits (% GDP)			-0.10 (-0.22, 0.03)				
In-kind benefits (% public)					0.06 (0.00, 0.11)*		
Total public (EUR 000s)					0.28 (0.04, 0.54)*		
In-kind benefits (EUR 000s)						0.56 (0.03, 1.06)*	
Cash benefits (EUR 000s)						0.01 (-0.42, 0.47)	
In-kind health benefits (EUR 000s)							0.03 (-1.28, 1.21)
Other in-kind benefits (EUR 000s)							0.97 (0.04, 2.14)*
Old-age cash benefits (EUR 000s)							0.27 (-0.57, 1.39)
Working-age cash benefits (EUR 000s)							0.04 (-0.86, 0.90)
Country-level variance	0.43	1.30	1.07	0.99	1.01	0.94	1.32
Individual-level variance	19.44	19.44	19.44	19.44	19.44	19.44	19.43
Percent country-level variance	2.17	6.25	5.22	4.84	4.95	4.62	6.36
Percent Explained (vs null)	67.98	7.90	23.13	28.74	27.00	31.92	6.26

¹Independent effects of country-level welfare state variables after full adjustment for individual-level non-financial variables: route of exit from work, age at exit from work, frailty index, participation in social activities, partnership status, born abroad, year of exit event and CASP-12 at t₀.

***p<0.001; **p<0.01; *p<0.05

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Table A4.7. Country-level effects of institutional measures, welfare outcomes, economic variables and institutional-level social capital, on change in wellbeing following work exit and proportion of between-country variance explained without adjustment for individual-level financial variables (n=8,037)

Variable ¹	INSTITUTIONAL APPROACH									
	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16	Model 17
Welfare outcomes										
Pension replacement rate	0.01 (-0.03, 0.05)									
Doctor density		-0.28 (-0.87, 0.31)								
Welfare progressivity			-0.69 (-1.08, -0.31)**							
Economy and development										
GDP per capita (EUR 000s)				0.09 (0.01, 0.16)**						
Gross gini index (income)					-17.65 (-32.68, -3.71)**					
Unemployment						-0.07 (-0.14, 0.01)*				
Economic growth (% GDP)							0.06 (-0.03, 0.17)			
Inequality-adjusted HDI								23.36 (12.41, 34.35)***		
Institutional social capital										
Governance									2.03 (1.24, 2.79)***	
Government effectiveness										1.60 (0.97, 2.22)***
Country-level variance	1.34	1.26	0.62	0.82	0.82	1.17	1.27	0.49	0.34	0.35
Individual-level variance	19.44	19.44	19.44	19.44	19.17	19.44	19.44	19.44	19.44	19.44
Percent country-level variance	6.44	6.08	3.07	4.03	4.08	5.72	6.14	2.47	1.74	1.79
Percent Explained (vs null)	5.15	10.34	54.78	40.57	39.90	15.76	9.57	63.57	74.42	73.69

¹Independent effects of country-level welfare state variables after full adjustment for individual-level non-financial variables: route of exit from work, age at exit from work, frailty index, participation in social activities, partnership status, born abroad, year of exit event and CASP-12 at t₀.
 ***p<0.001; **p<0.01; *p<0.05

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Table A4.8. Univariate and multivariable models for the determinants of change in wellbeing scores between baseline and follow-up post labour market exit in the SHARE and ELSA combined sample (n=8,037)

Variable*	Categories	Control		Autonomy		Self-actualisation		Pleasure	
		Coefficient (95% Credible Interval)	p	Coefficient (95% Credible Interval)	p	Coefficient (95% Credible Interval)	p	Coefficient (95% Credible Interval)	p
Route of exit from work	Old age pension	ref		ref		ref		ref	
	Disability pension	-0.49 (-0.69, -0.28)	<0.001	-0.26 (-0.43, -0.08)	0.002	-0.56 (-0.75, -0.37)	<0.001	-0.34 (-0.51, -0.18)	<0.001
	Unemployment benefit	-0.49 (-0.71, -0.27)	<0.001	-0.51 (-0.70, -0.32)	<0.001	-0.25 (-0.46, -0.05)	0.008	-0.06 (-0.24, 0.12)	0.254
	Sickness benefit	-0.78 (-1.13, -0.43)	<0.001	-0.07 (-0.38, 0.23)	0.316	-1.01 (-1.34, -0.67)	<0.001	-0.29 (-0.58, -0.01)	0.023
	Social Assistance	-0.33 (-0.91, 0.24)	0.130	-0.48 (-0.98, 0.01)	0.028	-0.54 (-1.09, 0.01)	0.026	-0.18 (-0.65, 0.29)	0.226
	Early retirement pension	0.15 (-0.03, 0.32)	0.052	0.16 (0.01, 0.31)	0.018	0.10 (-0.07, 0.27)	0.127	0.01 (-0.14, 0.15)	0.463
	None	-0.08 (-0.18, 0.02)	0.060	-0.06 (-0.15, 0.02)	0.076	0.03 (-0.07, 0.12)	0.274	-0.09 (-0.17, -0.01)	0.017
Age at exit from work	>1 year before	-0.10 (-0.21, 0.01)	0.034	-0.14 (-0.23, -0.05)	0.001	-0.10 (-0.20, 0.01)	0.031	-0.03 (-0.12, 0.06)	0.251
	Official pension age ±1 year	ref		ref		ref		ref	
	>1 year after	-0.20 (-0.31, -0.09)	<0.001	-0.02 (-0.12, 0.08)	0.338	-0.15 (-0.26, -0.04)	0.003	-0.03 (-0.13, 0.06)	0.230
Country-specific quartile of household net worth	1 (poorest)	ref		ref		ref		ref	
	2	0.28 (0.15, 0.41)	<0.001	0.40 (0.28, 0.51)	<0.001	0.35 (0.22, 0.47)	<0.001	0.16 (0.05, 0.27)	0.002
	3	0.24 (0.11, 0.37)	<0.001	0.51 (0.40, 0.62)	<0.001	0.47 (0.35, 0.59)	<0.001	0.29 (0.19, 0.40)	<0.001
	4 (wealthiest)	0.32 (0.19, 0.45)	<0.001	0.75 (0.63, 0.86)	<0.001	0.65 (0.52, 0.77)	<0.001	0.33 (0.22, 0.44)	<0.001
Household income	Logged equivalised income	0.05 (0.00, 0.10)	0.024	0.14 (0.10, 0.18)	<0.001	0.21 (0.02, 0.41)	0.014	0.05 (0.01, 0.09)	0.011
Frailty index	Frailty Index	-2.80 (-3.32, -2.28)	<0.001	-1.97 (-2.41, -1.54)	<0.001	-4.51 (-5.00, -4.02)	<0.001	-1.93 (-2.35, -1.52)	<0.001
Participation in social activities	Never	ref		ref		ref		ref	
	Yes	0.16 (0.07, 0.24)	<0.001	0.10 (0.03, 0.17)	0.004	0.44 (0.35, 0.52)	<0.001	0.30 (0.23, 0.37)	<0.001
Partnership status	Partnered	ref		ref		ref		ref	
	Non-partnered	-0.13 (-0.23, -0.03)	0.006	0.15 (0.06, 0.23)	<0.001	-0.19 (-0.29, -0.10)	<0.001	-0.29 (-0.37, -0.21)	<0.001
Born abroad	No	ref		ref		ref		ref	
	Yes	-0.12 (-0.27, 0.04)	0.069	-0.05 (-0.18, 0.08)	0.218	-0.07 (-0.22, 0.07)	0.171	-0.06 (-0.18, 0.07)	0.189
Random-effects parameters									
Country		0.11 (0.05, 0.26)		0.30 (0.13, 0.64)		0.23 (0.10, 0.49)		0.29 (0.13, 0.61)	
Individual		3.31 (3.22, 3.42)		2.42 (2.34, 2.49)		3.00 (2.91, 3.09)		2.20 (2.14, 2.27)	

*Fully-adjusted for individual-level variables: route of exit from work, age at exit from work, country-specific quartile of household net worth, household income, frailty index, participation in social activities, partnership status, born abroad, year of exit event and CASP-12 at t₀.

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Table A4.9. Univariate and multivariable models for the determinants of change in wellbeing scores between baseline and follow-up post labour market exit in the SHARE and ELSA combined sample (n=8,037)

Variable*	Control		Autonomy		Self-actualisation Country-level factors		Pleasure	
	Coefficient (95% Credible Interval)	p	Coefficient (95% Credible Interval)	p	Coefficient (95% Credible Interval)	p	Coefficient (95% Credible Interval)	p
Welfare typology								
Conservative	ref		ref		ref		ref	
Mediterranean	-0.24 (-0.83, 0.33)	0.189	-1.03 (-1.50, -0.57)	<0.001	-0.96 (-1.32, -0.60)	<0.001	-0.76 (-1.42, -0.09)	0.015
Social democratic	-0.05 (-0.68, 0.60)	0.436	0.25 (-0.26, 0.76)	0.159	0.15 (-0.23, 0.53)	0.198	0.30 (-0.43, 1.05)	0.203
Post-Communist	-0.05 (-0.57, 0.48)	0.413	-0.58 (-1.00, -0.16)	0.007	-0.47 (-0.78, -0.14)	0.006	-0.25 (-0.86, 0.36)	0.193
Liberal	-0.21 (-1.01, 0.64)	0.286	-0.48 (-1.12, 0.20)	0.068	-0.85 (-1.34, -0.35)	0.002	-0.24 (-1.17, 0.72)	0.282
Social expenditure								
In-kind benefits (EUR 000s)	0.01 (-0.18, 0.21)	0.148	0.27 (0.03, 0.46)	0.015	0.07 (-0.19, 0.29)	0.008	-0.02 (-0.06, 0.03)	0.051
Cash benefits (EUR 000s)	0.00 (-0.02, 0.02)	0.467	0.13 (-0.05, 0.35)	0.085	0.23 (0.03, 0.48)	0.326	0.64 (0.36, 0.95)	<0.001
Welfare outcomes								
Welfare progressivity	-0.05 (-0.22, 0.11)	0.261	-0.34 (-0.52, -0.16)	<0.001	-0.25 (-0.44, -0.07)	0.005	-0.25 (-0.46, -0.05)	0.011

*Fully-adjusted for individual-level variables: route of exit from work, age at exit from work, country-specific quartile of household net worth, household income, frailty index, participation in social activities, partnership status, born abroad, year of exit event and CASP-12 at t_0 .

APPENDIX: Chapter 5

Figures

Figure A5.1. Flow diagram describing the definition of the analytic sample for investigation of associations between exposure to adverse events and CASP-12 wellbeing in later life (Part I)

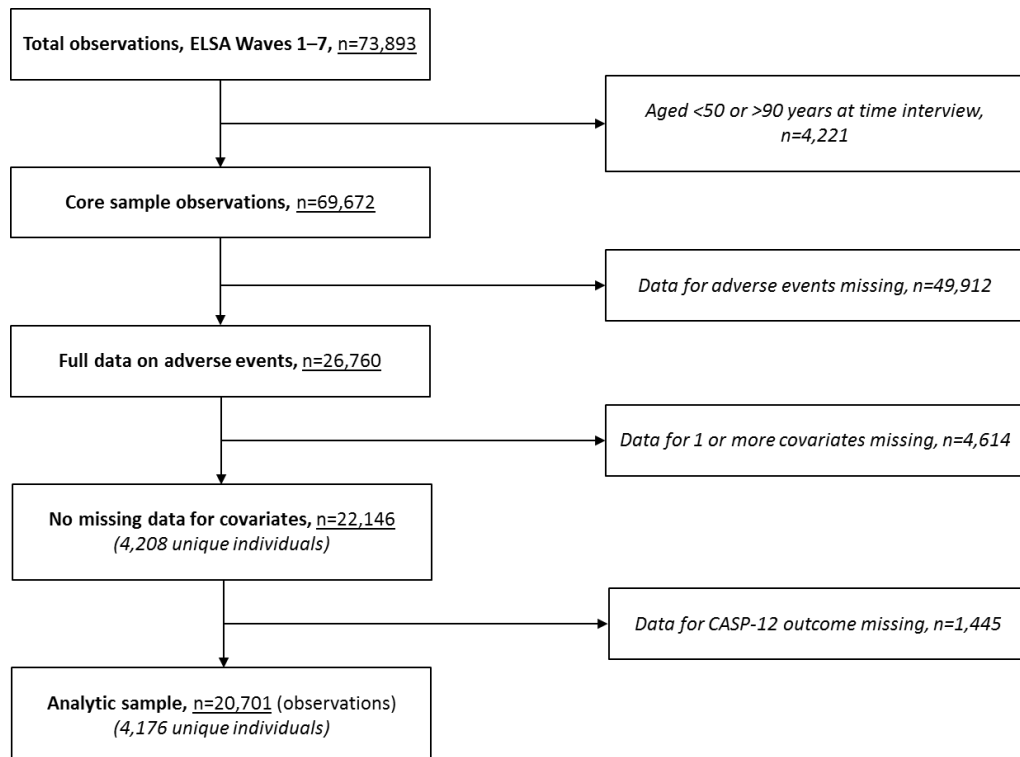


Figure A5.2. Flow diagram describing the definition of the analytic sample for investigation of associations between exposure to adverse events and subjective life satisfaction in later life (Part I)

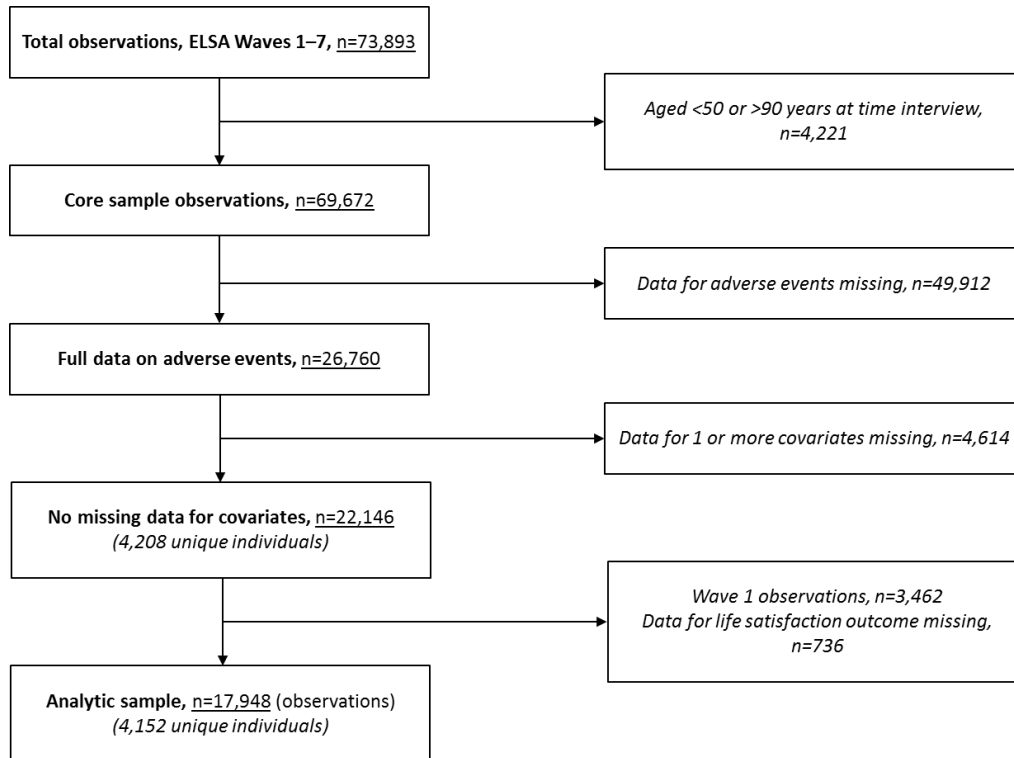


Figure A5.3. Flow diagram describing the definition of the analytic sample for investigation of associations between exposure to adverse events and (CES-D) depression caseness in later life (Part I)

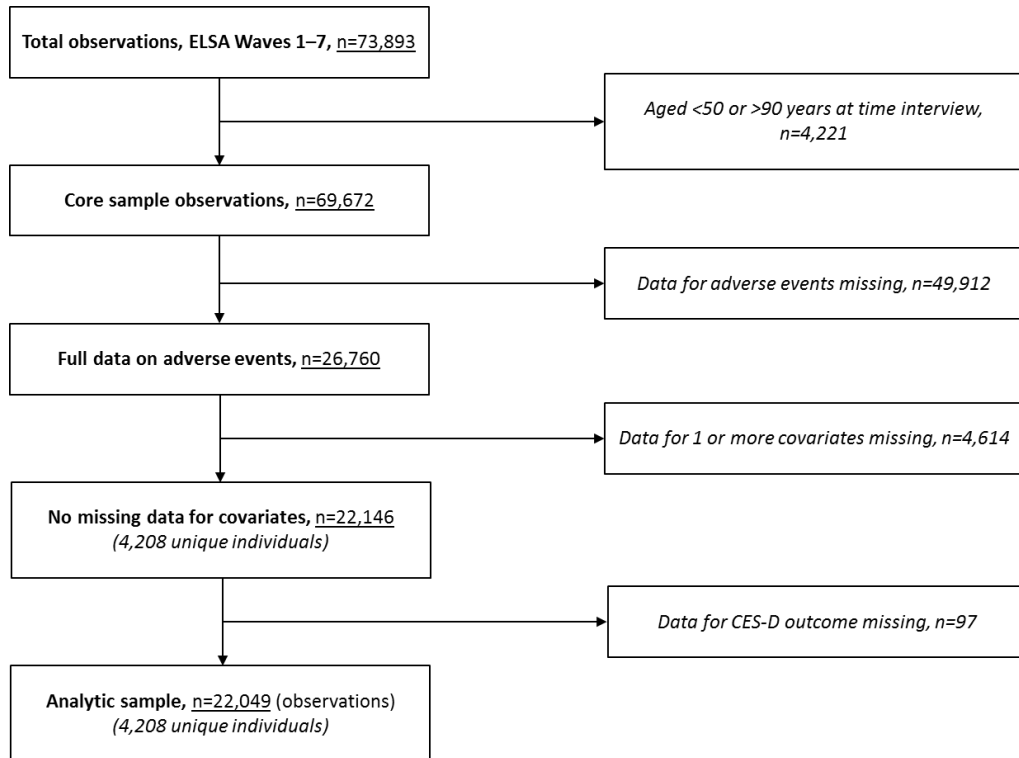
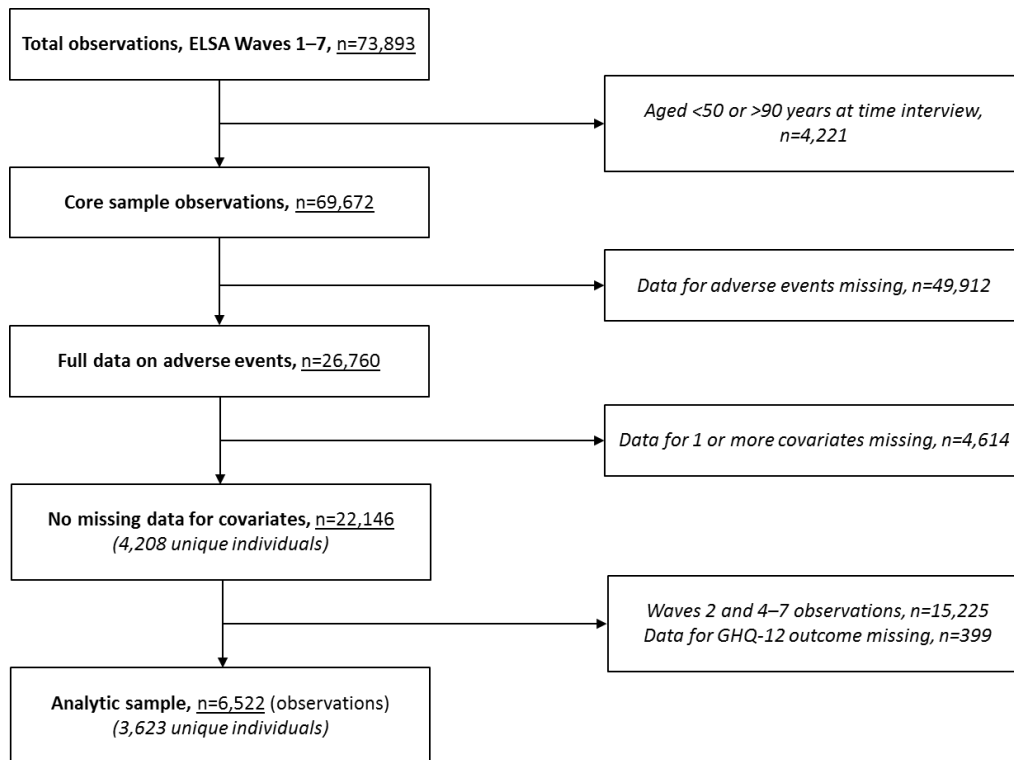


Figure A5.4. Flow diagram describing the definition of the analytic sample for investigation of associations between exposure to adverse events and (GHQ-12) psychological distress symptoms in later life (Part I)



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Tables

Table A5.1. Distributions of respondent characteristics by availability of ELSA Wave 3 Life History Module retrospective data on adverse events and chi-square tests

		n	With life event history %	Missing life event history n	Missing life event history %	χ-square	df	p
Total sample		4,521	100	4,687	100			
Gender	Male	2,088	46.18	2,076	44.29	3.32	1	0.068
	Female	2,433	53.82	2,611	55.71			
	Missing	0		0				
Current labour market status (self-reported)	Retired	2,260	49.99	2,205	47.09	59.66	4	<0.001
	In paid employment	1,697	37.54	1,679	35.85			
	Unemployed	33	0.73	45	0.96			
	Permanently sick or disabled	168	3.72	336	7.17			
	Looking after home / other	363	8.03	418	8.93			
	Missing	0		4				
Participation in social activities	Never	1,762	40.85	2,500	56.33	209.76	1	<0.001
	Yes	2,551	59.15	1,938	43.67			
	Missing	208		249				
Partnership status	Partnered	3,352	74.14	3,109	66.33	67.06	1	<0.001
	Non-partnered	1,169	25.86	1,578	33.67			
	Missing	0		0				
Born abroad	No	4,263	94.48	4,238	90.87	43.98	1	<0.001
	Yes	249	5.52	426	9.13			
	Missing	9		23				
Country-specific quintile of household net worth	1 (poorest)	595	14.86	976	23.21	202.95	4	<0.001
	2	703	17.56	904	21.50			
	3	703	17.56	828	19.69			
	4	928	23.18	786	18.69			
	5	1,074	26.83	711	16.91			
	Missing	518		482				
Housing tenure	Outright ownership	2,839	63.02	2,441	52.93	141.78	2	<0.001
	Ownership with mortgage	1,081	24.00	1,169	25.35			
	Renting / other	585	12.99	1,002	21.73			
	Missing	16		75				
NSSEC (5 category)	I. Managerial / professional occupations	1,650	36.66	1,290	27.99	133.25	5	<0.001
	II. Intermediate occupations	677	15.04	580	12.59			
	III. Small employers/ own account workers	497	11.04	513	11.13			
	IV. Technical occupations	438	9.73	534	11.59			
	V. Semi routine / routine occupations	1,199	26.64	1,613	35.00			
	Never worked	40	0.89	78	1.69			
Missing	20		79					

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Table A5.2. Characteristics of analytic samples of models for associations between adverse events by age of occurrence and age of occurrence and self or other-orientation (n=22,146 observations / 4,208 unique individuals)

Exposure measures		Observations (n=22,146)	
Variable	Categories	mean	
Adverse events by lifecourse stage	Total (0–49 years)	1.68	
	Early childhood (0–5 years)	0.18	
	Late childhood (6–15 years)	0.56	
	Early adulthood (16–30 years)	0.47	
	Late adulthood (31–49 years)	0.46	
Adverse events by self- or other-orientation and lifecourse stage	Self-oriented, total (0–49 years)	0.65	
	Other-oriented, total (0–49 years)	1.02	
	Self-oriented, childhood (0–15 years)	0.33	
	Self-oriented, adulthood (16–49 years)	0.32	
	Other-oriented, childhood (0–15 years)	0.41	
	Other-oriented, adulthood (16–49 years)	0.61	
Covariates			
Variable	Categories	mean	
Frailty index	Frailty Index	0.11	
Household income	Equivalentised income (2011 GBP)	19,589.45	
Age	Years	67.36	
		n	%
Gender	Male	10,237	46.23
	Female	11,909	53.77
Current labour market status (self-reported)	Retired	13,319	60.14
	In paid employment	6,461	29.17
	Unemployed	151	0.68
	Permanently sick or disabled	674	3.04
	Looking after home / other	1,541	6.96
Participation in social activities (previous month)	Never	8,555	38.63
	Yes	13,591	61.37
Partnership status	Partnered	16,059	72.51
	Non-partnered	6,087	27.49
Born abroad	No	21,023	94.93
	Yes	1,123	5.07
Country-specific quintile of household net worth	1 (poorest)	2,654	11.98
	2	3,492	15.77
	3	4,618	20.85
	4	5,193	23.45
	5	6,189	27.95
Housing tenure	Outright ownership	15,636	70.60
	Ownership with mortgage	3,834	17.31
	Renting / other	2,676	12.08
NSSEC (5 category)	I. Managerial / professional occupations	8,256	37.28
	II. Intermediate occupations	3,351	15.13
	III. Small employers/ own account	2,556	11.54
	IV. Technical occupations	2,112	9.540
	V. Semi routine / routine occupations	5,738	26.05
	Never worked	103	0.47

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Table A5.3. Results of models for the associations between total adverse events (0–49 years) and CES-D depression caseness (n=22,039 observations / 4,208 unique individuals)

Model	Categories	Odds ratio (95% CI)	p
Unadjusted	Total (0–49 years)	1.29 (1.22, 1.36)	<0.001
Model 1	Total (0–49 years)	1.19 (1.13, 1.25)	<0.001
Model 2	Total (0–49 years)	1.20 (1.14, 1.26)	<0.001
Model 3	Total (0–49 years)	1.20 (1.15, 1.26)	<0.001
Model 4	Total (0–49 years)	1.19 (1.13, 1.25)	<0.001
Full Model	Total (0–49 years)	1.19 (1.14, 1.25)	<0.001

Model 1: frailty index and age

Model 2: Model 1 + gender, current labour market status, participation in activities, partnership status and born abroad

Model 3: Model 2 + NS-SEC

Model 4: Model 2 + household net worth, household income and housing tenure

Full Model: Model 2 + NS-SEC, household net worth, household income and housing tenure (all covariates)

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Table A5.4. Complete results of a fully-adjusted model for the association between total adverse events (0–49 years) and odds of (GHQ-12) psychological distress (n=6,522 observations / 3,623 unique individuals)

Variable	Categories	Odds ratio (95% CI)	p
Adverse events	Total (0–49 years)	1.19 (1.11, 1.27)	<0.001
Age	Years	0.99 (0.98, 1.00)	0.065
Gender	Male	ref	
	Female	1.31 (1.02, 1.68)	0.033
Physical frailty index	Frailty Index	308.85 (126.75, 752.58)	<0.001
Current labour market status (self-reported)	Retired	ref	
	In paid employment	1.03 (0.76, 1.41)	0.843
	Unemployed	1.76 (0.67, 4.62)	0.253
	Permanently sick or disabled	1.67 (1.03, 2.71)	0.039
	Looking after home / other	1.05 (0.72, 1.54)	0.797
Participation in social activities	Never	ref	
	Yes	0.83 (0.67, 1.04)	0.101
Partnership status	Partnered	ref	
	Non-partnered	1.25 (0.96, 1.63)	0.095
Born abroad	No	ref	
	Yes	1.51 (0.91, 2.52)	0.113
Quintile of household net worth	1 (poorest)	ref	
	2	1.00 (0.70, 1.42)	0.989
	3	0.93 (0.65, 1.34)	0.710
	4	0.74 (0.51, 1.07)	0.106
	5	0.74 (0.50, 1.10)	0.135
Household income	Logged equivalised income	0.87 (0.73, 1.03)	0.100
Housing tenure	Outright ownership	ref	
	Ownership with mortgage	1.12 (0.84, 1.48)	0.447
	Renting / other	1.29 (0.92, 1.82)	0.141
NS-SEC (5 category)	I. Managerial / professional occupations	0.96 (0.71, 1.28)	0.761
	II. Intermediate occupations	0.79 (0.56, 1.12)	0.185
	III. Small employers/ own account workers	0.69 (0.46, 1.03)	0.067
	IV. Technical occupations	0.80 (0.53, 1.20)	0.276
	V. Semi routine / routine occupations	ref	
	Never worked	0.61 (0.15, 2.49)	0.488

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Table A5.5. Results of fully-adjusted models for associations between total adverse events disaggregated by age of occurrence and self- or other-orientation (Models A–D), and life satisfaction scores (n=17,948 observations / 4,152 unique individuals)

Variable	Categories	Total Events		Model A		Model B		Model C		Model D	
		Coefficient	p	Coefficient	p	Coefficient	P	Coefficient	p	Coefficient	p
Adverse events by lifecourse stage	Total (0–49 years)	-0.11 (-0.13, -0.09)	<0.001								
	Early childhood (0–5 years)			-0.07 (-0.13, -0.01)	0.026						
	Late childhood (6–15 years)			-0.11 (-0.14, -0.07)	<0.001						
	Early adulthood (16–30 years)			-0.11 (-0.15, -0.07)	<0.001						
	Late adulthood (31–49 years)			-0.12 (-0.17, -0.08)	<0.001						
Adverse events by self- or other-orientation and lifecourse stage	Self-oriented, total (0–49 years)					-0.08 (-0.12, -0.05)	<0.001				
	Other-oriented, total (0–49 years)					-0.13 (-0.16, -0.09)	<0.001				
	Self-oriented, childhood (0–15 years)							-0.04 (-0.09, 0.01)	0.118		
	Self-oriented, adulthood (16–49 years)							-0.13 (-0.18, -0.08)	<0.001		
	Other-oriented, childhood (0–15 years)							-0.14 (-0.19, -0.10)	<0.001		
	Other-oriented, adulthood (16–49 years)							-0.11 (-0.15, -0.07)	<0.001		
	Self-oriented, early childhood (0–5 years)									-0.02 (-0.12, 0.08)	0.716
	Self-oriented, late childhood (6–15 years)									-0.05 (-0.11, 0.01)	0.097
	Self-oriented, early adulthood (16–30 years)									-0.10 (-0.16, -0.03)	0.004
	Self-oriented, late adulthood (31–49 years)									-0.18 (-0.26, -0.09)	<0.001
	Other-oriented, early childhood (0–5 years)									-0.12 (-0.22, -0.03)	0.009
	Other-oriented, late childhood (6–15 years)									-0.15 (-0.20, -0.10)	<0.001
	Other-oriented, early adulthood (16–30 years)									-0.12 (-0.18, -0.06)	<0.001
Other-oriented, late adulthood (31–49 years)									-0.10 (-0.15, -0.04)	<0.001	

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Table A5.6. Results of fully-adjusted models for associations between total adverse events disaggregated by age of occurrence and self- or other-orientation (Models A–D), and CES-D depression caseness (n=22,039 observations / 4,208 unique individuals)

Variable	Categories	Total Events		Model A		Model B		Model C		Model D	
		Odds ratio	p	Odds ratio	p	Odds ratio	P	Odds ratio	p	Coefficient	p
Adverse events by lifecourse stage	Total (0–49 years)	1.19 (1.14, 1.25)	<0.001								
	Early childhood (0–5 years)			1.23 (1.06, 1.42)	0.005						
	Late childhood (6–15 years)			1.17 (1.08, 1.27)	<0.001						
	Early adulthood (16–30 years)			1.20 (1.08, 1.32)	<0.001						
	Late adulthood (31–49 years)			1.20 (1.08, 1.33)	0.001						
Adverse events by self- or other-orientation and lifecourse stage	Self-oriented, total (0–49 years)					1.20 (1.10, 1.30)	<0.001				
	Other-oriented, total (0–49 years)					1.18 (1.10, 1.28)	<0.001				
	Self-oriented, childhood (0–15 years)							1.07 (0.95, 1.21)	0.261		
	Self-oriented, adulthood (16–49 years)							1.33 (1.18, 1.50)	<0.001		
	Other-oriented, childhood (0–15 years)							1.27 (1.14, 1.40)	<0.001		
	Other-oriented, adulthood (16–49 years)							1.10 (0.99, 1.22)	0.063		
	Self-oriented, early childhood (0–5 years)									1.01 (0.80, 1.26)	0.951
	Self-oriented, late childhood (6–15 years)									1.09 (0.95, 1.26)	0.231
	Self-oriented, early adulthood (16–30 years)									1.37 (1.18, 1.60)	<0.001
	Self-oriented, late adulthood (31–49 years)									1.26 (1.04, 1.53)	0.019
	Other-oriented, early childhood (0–5 years)									1.46 (1.18, 1.80)	0.001
	Other-oriented, late childhood (6–15 years)									1.21 (1.07, 1.36)	0.002
Other-oriented, early adulthood (16–30 years)									1.04 (0.90, 1.21)	0.574	
Other-oriented, late adulthood (31–49 years)									1.14 (1.00, 1.31)	0.043	

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Table A5.7. Results of fully-adjusted models for associations between total adverse events disaggregated by age of occurrence and self- or other-orientation (Models A–D), and odds of (GHQ-12) psychological distress (n=6,522 observations / 3,623 unique individuals)

Variable	Categories	Total Events		Model A		Model B		Model C		Model D	
		Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
Adverse events by lifecourse stage	Total (0–49 years)	1.19 (1.11, 1.27)	<0.001								
	Early childhood (0–5 years)			1.14 (0.93, 1.41)	0.210						
	Late childhood (6–15 years)			1.22 (1.08, 1.38)	0.001						
	Early adulthood (16–30 years)			1.19 (1.03, 1.38)	0.019						
	Late adulthood (31–49 years)			1.15 (0.98, 1.34)	0.083						
Adverse events by self- or other- orientation and lifecourse stage	Self-oriented, total (0–49 years)					1.19 (1.06, 1.34)	0.003				
	Other-oriented, total (0–49 years)					1.18 (1.05, 1.32)	0.006				
	Self-oriented, childhood (0–15 years)							1.15 (0.99, 1.35)	0.072		
	Self-oriented, adulthood (16–49 years)							1.20 (1.00, 1.43)	0.046		
	Other-oriented, childhood (0–15 years)							1.25 (1.06, 1.48)	0.008		
	Other-oriented, adulthood (16–49 years)							1.15 (0.98, 1.34)	0.083		
	Self-oriented, early childhood (0–5 years)									1.03 (0.74, 1.43)	0.857
	Self-oriented, late childhood (6–15 years)									1.17 (0.95, 1.43)	0.134
	Self-oriented, early adulthood (16–30 years)									1.18 (0.94, 1.49)	0.152
	Self-oriented, late adulthood (31–49 years)									1.22 (0.91, 1.63)	0.178
	Other-oriented, early childhood (0–5 years)									1.27 (0.93, 1.75)	0.137
	Other-oriented, late childhood (6–15 years)									1.26 (1.06, 1.50)	0.009
	Other-oriented, early adulthood (16–30 years)									1.19 (0.96, 1.48)	0.109
	Other-oriented, late adulthood (31–49 years)									1.11 (0.91, 1.35)	0.294

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Table A5.8. Results of models for the associations between early-life socioeconomic disadvantage and CES-D depression caseness (n=41,552 observations / 9,917 unique individuals)

Model	Paternal occupational position (0–2 point index) Age 14	
	Odds ratio (95% CI)	P
Unadjusted	1.34 (1.25, 1.45)	<0.001
Model 1	1.16 (1.09, 1.24)	<0.001
Model 2	1.12 (1.05, 1.19)	<0.001
Model 3	1.07 (1.01, 1.14)	0.031
Model 4	1.05 (0.99, 1.12)	0.119
Full model	1.02 (0.96, 1.09)	0.466

Model 1: frailty index and age

Model 2: Model 1 + gender, current labour market status, participation in activities, partnership status and born abroad

Model 3: Model 2 + NS-SEC

Model 4: Model 2 + household net worth, household income and housing tenure

Full Model: Model 2 + NS-SEC, household net worth, household income and housing tenure (all covariates)

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Table A5.9. Characteristics of analytic samples of models for associations between total adverse events (0–49 years) and an index of cumulative socioeconomic disadvantage, and CASP-12 change scores following work exit

Exposure measures		Adverse events (n=1,126)		Cumulative disadvantage (n=1,965)	
Variable	Categories	mean		mean	
Adverse events by lifecourse stage	Total (0–49 years)	1.74		N/A	
	Childhood (0–15 years)	0.76			
	Adulthood (16–49 years)	0.98			
		N	%	n	%
Cumulative disadvantage (score 0–6)	0			299	15.22
	1			340	17.30
	2			436	22.19
	3	N/A		414	21.07
	4			319	16.23
	5			149	7.58
	6			8	0.41
Covariates		mean		mean	
Variable	Categories				
Frailty index	Frailty Index	0.08		0.08	
Household income	Equivalentised income (2011 GBP)	18,965.82		18,991.86	
Age	Years	63.15		63.19	
		N	%	n	%
Current labour market status (self- reported)	Retired	912	80.99	1,564	79.59
	Unemployed	70	6.22	115	5.85
	Permanently sick or disabled	33	2.93	76	3.87
	Looking after home / other	111	9.86	210	10.69
Age at exit from work	>1 year before	624	55.42	1,087	55.32
	Official pension age ±1 year	256	22.74	441	22.44
	>1 year after	246	21.85	437	22.24
Participation in social activities	Never	401	35.61	661	33.64
	Yes	725	64.39	1,304	66.36
Partnership status	Partnered	951	82.77	1,582	80.51
	Non-partnered	198	17.23	383	19.49
Born abroad	No	1,075	95.47	1,851	94.20
	Yes	51	4.53	114	5.80
Quintile of household net worth	1 (poorest)	83	7.37	185	9.41
	2	103	9.15	211	10.74
	3	214	19.01	355	18.07
	4	299	26.55	504	25.65
	5	427	37.92	710	36.13

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Table A5.10. Summary of adverse event items
(adapted from Schmotkin and Litwin, 2008; Shrira et al., 2012)

Adverse life events (any age)	
Experienced extremely severe economic deprivation*	
Was at risk of death owing to illness or serious accident*	
Needed long-term care owing to difficulty in caring for herself/himself	Self-oriented
Was the victim of crime (such as robbery or fraud)	
Was the victim of violence or abuse*	
Experienced sexual assault (rape or harassment)*	
<i>Was wounded in war or military action</i>	<i>Self-oriented</i>
<i>Was wounded in a terrorist act (an attack by terrorists against civilians)</i>	<i>(War and terror)</i>
Experienced the death of a spouse	
Experienced the death of a child or grandchild*	
Had a loved one at risk of death owing to illness or accident*	Other-oriented
Provided long-term care to a disabled or impaired relative*	
Witnessed an accident or violent act in which someone was seriously injured or killed*	
<i>Lost a loved one in a war or in military service</i>	
<i>Witnessed the serious injury or the death of someone in war or military action</i>	<i>Other-oriented</i>
<i>Experienced the injury or the death of a loved one in a terrorist act</i>	<i>(War and terror)</i>
<i>Witnessed a terrorist act in which she/he was not harmed personally</i>	

*Also included in the measures of adverse life events in the present analysis

PUBLICATION: Country-level welfare-state measures and change in wellbeing following work exit in early old age: evidence from 16 European countries.

Country-level welfare-state measures and change in wellbeing following work exit in early old age: evidence from 16 European countries.

Richardson S, Carr E, Netuveli G, Sacker A.

Int J Epidemiol. 2018 Oct 1. doi: 10.1093/ije/dyy205.

Permanent link: <https://academic.oup.com/ije/advance-article/doi/10.1093/ije/dyy205/5113265?guestAccessKey=9ae929fa-db81-4e36-b717-e9d56dc7b459>

Abstract

Background: Although the effects of individual-level factors on wellbeing change following work exit have been identified, the role of welfare-state variables at the country level has yet to be investigated.

Methods: Data on 8037 respondents aged 50 years and over in 16 European countries were drawn from the Survey of Health, Ageing and Retirement in Europe (SHARE) and the English Longitudinal Study of Ageing (ELSA). We employed multilevel models to assess determinants of change in wellbeing following work exit, using CASP-12 change scores. After adjusting for institutionally defined route and timing of work exit, in addition to other individual-level variables, we tested country-level variables including welfare-state regime and measures of disaggregated welfare spending to determine their associations with wellbeing change and the proportion of between-country variance explained.

Results: Individuals whose exit from paid work was involuntary or diverged from the typical retirement age experienced declines in wellbeing. Country effects accounted for 7% of overall variance in wellbeing change. Individuals residing in countries with a Mediterranean welfare regime experienced more negative changes in wellbeing, with a

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difference of -2.15 (-3.23, -1.06) CASP-12 points compared with those in Bismarckian welfare states. Welfare regime explained 62% of between-country variance. National per-capita expenditure on non-healthcare in-kind benefits (services) was associated with more positive wellbeing outcomes.

Conclusions: National expenditure on in-kind benefits, particularly non-healthcare services, is associated with more favourable wellbeing change outcomes following work exit in early old age. Welfare-state effects explain the majority of between-country differences in change in wellbeing.

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