

Gendered work-family life courses and late-life physical functioning: A comparative analysis from 28 European countries

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ABSTRACT

Combining work and family roles can have beneficial consequences on health but could also result in chronic stress and adverse health outcomes at older ages. This study aimed to examine combined employment, parenthood, and partnership histories of men and women during the childbearing period (ages 15–49), and to investigate the links of these work and family roles with physical functioning later in life. We used data from the Survey of Health, Ageing and Retirement in Europe (SHARE) with retrospective information on employment, parenthood, and partnership histories for 18,057 men and 20,072 women ($n = 38,129$) living in 28 different countries belonging to six European welfare clusters. We applied multichannel sequence analysis (MCSQA) and hierarchical clustering to group work-family trajectories into 12 clusters for men and 15 clusters for women. We assessed the association between work-family life courses and grip strength by estimating multivariable linear regression models. Delayed work and family transitions, unstable employment, and the absence of combinations of work and family roles between age 15 and 49 were associated with weaker grip strength in later life for both men and women. Results differed by gender and were framed by the welfare context in which gendered work and family responsibilities unfold across individual life courses. The findings make an important contribution to the domain of gender and health in later life and stress the need to engage more with issues related to the mechanisms linking work and family trajectories to poor health in later life.

1. Introduction

Paid work and family circumstances are interrelated and gendered life domains that structure the accumulation of health-related resources over the life course (Aisenbrey & Fasang, 2017; Mayer, 2009). Research has established strong evidence on the combined impact of these two life domains on different health outcomes, showing how adverse circumstances early in life accumulate and pose health risks at older ages (for a review, see Machū et al., 2022). Yet, life course research in social epidemiology has predominantly focused on how work-family trajectories affect self-reported measures of general health (e.g., Bennett & Waterhouse, 2018; McDonough et al., 2015; Zella & Harper, 2018, 2020) or mental well-being (e.g., Engels et al., 2021; Hernandez

Saucedo et al., 2022; Ice et al., 2020; McDonough et al., 2015; Xue et al., 2021; Zella & Harper, 2020). This results in an incomplete picture, where it remains an open question as to whether combining work and family roles throughout the life course enhances or harms *physical functioning* in old age (Machū et al., 2022). In addition, we know little about whether and how this may vary between men and women and across institutional contexts (Boye, 2011; Machū et al., 2022; Worts et al., 2016; Zella & Harper, 2018, 2020). This knowledge gap becomes especially relevant against the background of ongoing changes in gender roles and increasing labour market insecurity for both genders.

Maintaining physical functioning in old age is one of the main objectives of active and healthy ageing research and policy (Walker & Zaidi, 2019), and it is a crucial precondition for independence and

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quality of life at older ages (Vermeulen et al., 2011). Surprisingly, most empirical studies assess either time patterns of work-family trajectories as predictors for health outcomes other than physical functioning (cf. Machù et al., 2022), or they look at physical health outcomes but without taking into account the complex ways in which the domains of work and family intertwine throughout the life course (e.g., Thomeer et al., 2022; Wahrendorf et al., 2020). Yet, work-family life courses matter not only for (mental) well-being but also for physical functioning in later life. The extant evidence shows that individuals with exposure to early-life adversities in work and family domains have chronic stress and elevated allostatic load (Danese & McEwen, 2012; Lin et al., 2022; McCrory et al., 2019; Nusslock & Miller 2016; Wahrendorf et al., 2022), which could lead to increased levels of inflammation and dysfunction in the immune system (Danese & McEwen, 2012; Fagundes et al., 2013). This in turn can cause damage to skeletal muscle and lower physical functioning later in life (Dalle et al., 2022; Kamper et al., 2021; Schaap et al., 2006). Omitting the physical dimension of health, the characteristics of different work and family states (e.g., employment, parenthood, and partnership formation and dissolution), as well as the timing of events, the duration, and the ordering in which events happen means missing an important part of the picture.

The gender differences in the life course events and circumstances are also of particular interest. However, even though men are increasingly involved in family life and childcare (Patterson & Margolis, 2019), they are often excluded from the empirical analyses (Machù et al., 2022) under the (possibly incorrect) assumption that combining work and family responsibilities matters less for men since traditionally they are not the primary family caregivers (McMunn et al., 2016). Among the few studies considering men as well as women (e.g., Engels et al., 2021; Lacey et al., 2017; Tosi & Grundy, 2019), results are consistent in showing that the different combinations of work and family circumstances have gendered consequences on health conditions in later life. Biomedical evidence suggests that there are multiple sex-specific pathways whereby stress accumulation along the life course leads to long-term health consequences and increased mortality risks (Juster et al., 2016; Juster et al., 2010; McCrory et al., 2020). For example, Juster et al. (2016) suggest that a high degree of simultaneous assumption of both masculine and feminine gender roles is not as protective for allostatic load for women as it is for men. Differential findings with respect to biological ageing in men and women suggest that using a gendered lens can contribute to a better understanding of whether there are different drivers of stress-related health outcomes at older ages for men and women (McCrory et al., 2020).

The configurations and pathways of employment, parenthood, and partnership histories also vary cross-nationally, due to differences in key aspects of countries' welfare state provisions, such as the characteristics of the labour market or the institutionalisation of family roles (Worts et al., 2016). Trajectories of work and family circumstances can be expected to vary according to the welfare state institutions (Anxo et al., 2011; Esping-Andersen, 1999; Fuwa & Cohen, 2007; Gershuny & Sullivan, 2003; Korpi, 2000; Orloff, 1993; Sainsbury, 1999), as well as their impact on women and men's health conditions (Adjei et al., 2017; Boye, 2011; Zella & Harper, 2018, 2020). Welfare state characteristics might exert an important role in moderating the negative influence of child-rearing trajectories on later-life health (Grundy, 2009; Grundy & Foverskov, 2016; Keenan & Grundy, 2019; Sironi, 2019) or other socioeconomic risks (Kleven et al., 2019; de Linde Leonard and Stanley, 2020; Lundberg et al., 2008). However, less is known about whether and how such institutional contexts can shape the links between specific combinations of work and family trajectories and their associations with physical functioning in later life for men and women (Machù et al., 2022; Zella & Harper, 2018, 2020). This study stresses the need to consider the links between work-family trajectories and physical health in later life as framed by the context in which men and women are embedded.

The present research aims at extending previous research by analysing longitudinal cross-national and fine-grained data which includes

entire early-life work and family trajectories and their properties over an extended period of time (i.e., from childhood to midlife). Unlike previous studies, we aim to account for the interdependencies between paid work, parenthood, and partnership histories by proposing an application of multichannel sequence analysis (MCSQA) (Gauthier et al., 2010; Pollock, 2007). The strength of this method is that it allows the precise identification of men's and women's diverse life courses composed of both continuity and transition to several work and family circumstances. For example, employing in a regression setting separate measures for employment experience, parenthood, and partnership as independent variables does not allow to reveal whether mothers employed at a specific point in time include those who were stably employed or those who dropped out and re-entered the labour force subsequently. Similarly, focusing separately on single life course transitions (e.g., labour market withdrawal, childbirth, etc.) overlooks other substantively important combinations of work-family patterns otherwise unidentifiable (e.g., stable employment in combination with early parenthood and partnership, re-entry into the labour market after childbirth, etc.). MCSQA is one way to simultaneously account for these interdependencies between employment, parenthood, and partnership histories (Gauthier et al., 2010; Pollock, 2007).

Given the scarcity of literature investigating physical functioning outcomes in older adults, we look at an objective indicator of physical health (i.e., grip strength) to come to a wider agreement on the impact of work-family combinations on health in later life (Machù et al., 2022; Oksuzyan et al., 2019; Spitzer & Weber, 2019). As we indicated above, adverse work-family trajectories could be related to physical health outcomes, either indirectly (e.g., through behavioural risk factors such as smoking, drinking, or sleep quality) (Grundy & Read, 2015; Juster et al., 2010; McCrory et al., 2020) or directly through long-term variations in physiological stress responses (Danese & McEwen, 2012; Fagundes et al., 2013) that in turn cause damage to muscle cells and lower physical functioning later in life (Dalle et al., 2022; Kamper et al., 2021; Schaap et al., 2006). Therefore, it is plausible that more direct measures of physical health – such as grip strength – better capture the negative consequences of stress than subjective, self-assessed health outcomes (Grundy & Read, 2015; Lacey et al. 2017; McMunn et al., 2016; Spitzer & Weber, 2019). Relying on more objective indicators of health, which have been overlooked in the past (for an exception see, for example, McMunn et al., 2016), may help to understand whether or not earlier research findings can be extended to other measures of physical health such as grip strength (Machù et al., 2022; Oksuzyan et al., 2019; Spitzer & Weber, 2019).

In recognition of the interdependence of paid work and child-rearing across adulthood – especially for women, but also increasingly for men – this study investigates whether and how the associations between specific early work-family life courses and physical functioning in later life vary by gender and between different macro-institutional settings, using data from 28 European countries participating in the retrospective Survey of Health, Ageing and Retirement in Europe (SHARE) waves 3 (2009) and 7 (2017). The present study aims to address the following research questions:

- (1) To what extent are the gender-specific work-family life courses associated with different levels of physical functioning in later life?
- (2) To what extent do the associations between work-family life courses and physical functioning in later life vary across institutional contexts?

2. Analytical framework and empirical evidence

2.1. Work-family life courses and associations with physical functioning

Stress accumulation is proposed as an important mechanism underlying the associations between work-family life courses and health

outcomes (Kostianen et al., 2009; Sironi et al., 2020; Umberson et al., 2010; Wahrendorf et al., 2013, 2020). Chronic stress and related long-term variations in psychobiological stress responses (or states of “allostatic load”) may be the factors that promote the onset and progression of long-term health effects and increase morbidity and mortality (Juster et al., 2010; McCrory et al., 2020). Recent empirical evidence sheds light on the mechanisms linking work-family life courses with physical health in later life. Collectively, these studies suggest that individuals with exposure to early-life adversities in work and family domains have chronic stress and elevated allostatic load (e.g., Danese & McEwen, 2012; Lin et al., 2022; McCrory et al., 2019; Nusslock & Miller, 2016; Wahrendorf et al., 2022). In turn, this is associated with increased levels of inflammation and dysfunction in the immune system (Danese & McEwen, 2012; Fagundes et al., 2013) which subsequently cause damage to skeletal muscle and lower physical functioning (e.g., Dalle et al., 2022; Kamper et al., 2021; Schaap et al., 2006).

Our study distinguished three theoretical approaches to better understand the associations between work-family life courses and physical health at older ages, respectively based on (a) theories of social stress, (b) role conflict, and (c) role enhancement.

Theories of *social stress*, such as Pearlin’s stress process model (Pearlin, 2010; Pearlin et al., 1981; Pearlin and McKean Skaff 1996), conceptualise stress as the result of excessive life demands combined with insufficient resources capable of addressing such demands (i.e., coping repertoires, social support, and mastery). Within this framework, work and family circumstances can be understood to be domains that bring individual rewards (e.g., more social and economic resources) but also stress and strain. These stressors may in turn result in negative well-being outcomes such as depression or low mood (Pearlin et al., 1981) but also lower physical functioning and muscular strength (Dalle et al., 2022; Kamper et al., 2021; Schaap et al., 2006). Unpaid family caregiving is a typical example of a family stressor that can interact with employment demands to impact physical health conditions later in life (Pearlin et al., 1990; Pinguart & Sørensen, 2006). In general, processes originating from work-family stress are linked with detrimental consequences for health outcomes, including physical health (Shockley & Allen, 2013), particularly for women and single mothers (Lundberg & Frankenhaeuser, 1999; Matud, 2004; McDonough et al., 2015). Repeated stressful episodes arising from the timing, intensity, and sequencing of specific work and family events might result in chronic stress, which in turn affects physical health conditions later on (Dalle et al., 2022; Kamper et al., 2021; Pearlin, 2010; Pearlin and McKean Skaff, 1996; Schaap et al., 2006). For example, the accumulated stress of repeated child-rearing, its substantial economic costs, or the role overload arising from combining employment and family demands can lead to physical “wear and tear” for both men and women (Grundy & Read, 2015; Townsend et al., 1989). Similarly, early fatherhood may indirectly influence health conditions through dropouts from high school, underemployment, low wealth accumulation at older ages, or other markers of life-course socioeconomic disadvantage (Dariotis et al., 2011). In particular, research shows that parents of young children (i.e., aged 6 or younger) experience the greatest disadvantages in terms of health when combining child-rearing with employment (Schnittker, 2007).

A second possible mechanism linking the joint influences of paid work and family responsibilities on later age physical health is *role conflict*. The role conflict theory postulates that the competing demands of paid work and caregiving responsibilities increase the stress levels among employed parents, with detrimental consequences on their health (Chandola et al., 2004; Fokkema, 2002; Gove, 1984; Khlal et al., 2000; Lahelma et al., 2002). In other words, combining extensive work and family responsibilities may lead to role overload, work-family conflict, and stress, which in turn can negatively impact parents’ physical health. Recent studies appear to support this mechanism and highlight how the timing of specific combinations of paid work, parenthood, and partnership throughout the life course might influence health later in life. Two recent studies suggest that working mothers of

young children report worse health than those out of the labour market (Leupp, 2017) and than childless women that work full-time (Chandola et al., 2019). Similarly, a study using data from the United States (US) found that mortality was lowest for non-working, married, later-mothers (McKetta et al., 2018) and a Swedish study has found the lowest levels of health and well-being among women who start early to participate in paid work and had rather late first childbirth (Johansson et al., 2007).

The third mechanism is derived from the *role enhancement* theory which argues that multiple roles are beneficial for individuals’ health because they promote psychophysiological functioning, providing attachment and social ties outside the family (or work) domain, as well as higher self-esteem and financial independence (Barnett and Shibley Hyde, 2001; Lahelma et al., 2002; Martikainen, 1995; Nordenmark, 2004; Sieber, 1974). In this case, the positive effects in one domain of life are thought to outweigh the potentially negative ones. Consequently, the combination of different roles might subsequently benefit an individual’s physical health. For example, adding the worker role might promote mothers’ health by generating social and economic security (Kostianen et al., 2009). For fathers, a stronger involvement in family roles might provide meaning, direction, and guidance in life that in turn positively impact psychological well-being (Nordenmark, 2004). Recent comparative studies of European countries support this mechanism by showing that early life combinations of paid employment and domestic duties along the life course have a positive impact on women’s later life self-reported health and mental well-being (Zella & Harper, 2018, 2020). Studies mostly based on female samples and data from the United Kingdom (UK) and the US show that life courses characterised by early motherhood with long periods out of the labour market are associated with poor health in mid-life (Lacey et al., 2016; McKetta et al., 2018; McMunn et al., 2016; Sabbath et al., 2015) and at older ages (Tosi & Grundy, 2019).

If the expectations of the stress process model and the role conflict theory are well-founded, we should expect that combining multiple social roles throughout the life course decreases the levels of individual health at older ages. Based on the above-mentioned theoretical considerations and empirical findings, we hypothesise that individuals’ work-family life courses characterised by parenthood in combination with paid work – that is, trajectories of working fathers and mothers who have children early, late, or many children (i.e., three or more) – are associated with lowest levels of physical functioning compared to childless individuals or parents with fewer children and/or a weaker labour market attachment (**Hypothesis 1a**).

Alternatively, if the expectations of the role enhancement theory are proven to be valid, we should expect that combining multiple social roles throughout the life course increases the levels of individual health at older ages. This result in the hypothesis that individuals’ work-family life courses characterised by strong labour market attachment in combination with having children – that is, trajectories of fathers and mothers who have stable sequences of employment throughout the life course – are associated with the highest levels of individual health in later life compared to parents with few children or a weaker labour market attachment, or compared to childless individuals with strong labour market attachment (**Hypothesis 1b**). Since having a partner is an important source of social and economic support, we hypothesise that the presence of a stable partnership throughout the life course is further associated with better physical functioning later in life (**Hypothesis 1c**).

2.2. Gender, work-family life courses, and health

The health consequences of combining work and family roles may differ by gender. Gender affects the stress process in two main ways (Barnett et al., 1987). First, by determining whether a circumstance or life event will be perceived as stressful. Second, by influencing coping responses and the health consequences of stress reactions. Women and men are also different in how they respond to stress biologically, psychologically, and physiologically (Juster et al., 2010; Lundberg, 2005;

Macintyre et al., 1996; Matud, 2004; McCrory et al., 2020). For example, since women have traditionally been socialised to assume maternal and homemaker roles, any family-related strain may have a stronger detrimental impact on health for women than for men (Frone, 2000). Conversely, since men have been socialised to assume breadwinner roles, work-related strains may have a stronger detrimental impact on health for men than for women (Frone, 2000).

The Social Production Function (SPF) theory (Lindenberg, 1996, 2013; Steverink, 2014; Steverink & Lindenberg, 2006) can also help understand how gender influences the relationship between social stress and health in later life. SPF theory considers the health consequences of stress as the result of a lack of fulfilment of basic human social needs. If these basic needs are not met (which generates stress), there will be a lack of conditions necessary for effective individual functioning and well-being, which in turn may impact subsequent health (Deci & Ryan, 2000). Especially important in this regard are two basic human social needs: the needs for affection (met thanks to close personal relationships, such as family ties) and the needs for status (met in social situations such as at work) (Lindenberg, 1996, 2013; Steverink, 2014; Steverink & Lindenberg, 2006).

SPF theory assumes gendered specificities in the possibility for substitution or compensation between different need fulfilments (Steverink et al., 2011; Steverink et al., 1998). According to the SPF theory, when stress emerges in the domains of status or affection, both men and women experience negative health and well-being consequences from this. However, women will be more protected from status-related stress than men because they can compensate for it more easily than men with increased affection need fulfilment (Steverink et al., 1998). This is because women are generally more socialised than men to give and receive affection (Maccoby, 1990) and also better physiologically advantaged for giving and receiving attachment and connectedness (Taylor et al., 2002). On the contrary, men have these advantages for status need fulfilment, in that they seek social connectedness particularly by competing for a good position in a status hierarchy (Baumeister & Sommer, 1997). Steverink et al. (2011) found that experiencing early-life status-related stress (i.e., deriving from unemployment or other strains related to the labour market) is associated with later-life health for men but not for women. Their findings also indicate no gender differences in the association between affection-related stressors (i.e., strains on personal relationships involving family and spouses) and physical and mental health (Steverink et al., 2011).

Overall, these theoretical reflections and empirical findings suggest that life courses characterised by unstable work patterns (e.g., trajectories with a long accumulation of time out of the labour market) should be less detrimental to the health of women than to men's health (**Hypothesis 2a**). However, life courses characterised by strains in the family domain (e.g., early or late transition to parenthood, single parenthood, a high number of children, etc.) should be detrimental to both men's and women's health in later life (**Hypothesis 2b**).

2.3. Institutional context and work-family life courses

The above-mentioned mechanisms and patterns of associations may differ in their importance and health consequences according to the institutional context in which individuals are embedded. For example, societies differ in the degree to which opportunities and resources are granted to women and men (Bird and Perri Rieker, 2008) and consequently, this variation may lead to country differences in gender gaps in health (Hunt & Annandale, 1999; Moss, 2002; Read & Gorman, 2010). In this regard, research points to inequalities arising from family care responsibilities (e.g., housework, care for children and older adults, etc.) – disproportionately shouldered by women – and highlights variations in work and family combinations (Orloff, 1996). Welfare state theory (Esping-Andersen, 1990, 1999) provides a useful framework for understanding how the macro-level institutional context may influence the associations between work and family life courses and health in later

life. For example, the welfare state can moderate the negative impact of non-employment (Bambra & Eikemo, 2009) or child-rearing trajectories on later-life health (Grundy, 2009; Grundy & Foverskov, 2016; Keenan & Grundy, 2019; Sironi, 2019).

According to the stress-process framework, the availability of formal care options might help to reduce intrapsychic strain which leads to stress and ultimately to negative health outcomes (Pearlin et al., 1990). Moreover, specific policies might affect the extent to which it is economically feasible to withdraw from the labour market to provide informal care for family members in need, such as young children (Guo & Gilbert, 2007; Pavolini & Ranci, 2008; Pfau-Effinger, 2005). In countries with high levels of dual-career employment, high levels of family benefits, child care and leave, where the care work is mainly allocated to the state (such as in Social Democratic countries) (Gauthier, 2002; Korpi, 2000), the negative health consequences of combining work and family life – implied by the role conflict theory – may be reduced because the stronger support for working parents can influence the burden of care and also the stressors that are directly related to the family care activities (Kaschowitz & Brandt, 2017). The high level of state support for working parents and the high commitment to gender equality in such countries can buffer the stressors that can arise from the burdens due to fulfilling multiple social roles (e.g., that of a spouse, a parent, or an employee) as conceived by the role conflict theory (Zella & Harper, 2018, 2020). In contrast, in the more familistic countries (such as in the Southern and Eastern European countries) with stronger kinship ties, where economic uncertainty is higher, the availability of formal support to a dual-earner family model is strongly limited, and in which women are the primary family caregivers, the combination of work and family responsibilities might exert a bigger toll on women's health at older ages as assumed by the role conflict theory.

Only a very few studies have explicitly investigated how specific work-family life course types may become a real benefit or threat to health at older ages in different macro-institutional settings (cf. Machū et al., 2022). Zella and Harper (2018), in an analysis based on female samples and data from 12 European countries, show that the associations between work-family life courses and health are framed by the welfare context in which women live. Particularly, where family policies support combining paid work with family responsibilities, employed mothers and fathers are more protected from poor health and depression in later life (Engels et al., 2021; Zella & Harper, 2018, 2020). Similarly, a study that compares health outcomes for American and British mothers shows that the accumulation of socioeconomic disadvantages is more prominent in the US (a context characterised by weak social safety nets) than in the UK (McDonough et al., 2015). However, a study that compares the US with the European context found only small international differences in the links between cardiovascular risks and work-family life courses of American and European women (van Hedel et al., 2016).

According to these theoretical arguments and empirical findings, we can expect that individuals' work-family life courses characterised by strong labour market attachment in combination with having children – that is, trajectories of fathers and mothers who have stable sequences of employment throughout the life course – are associated with lower levels of individual health in Southern (Cyprus, Greece, Malta, Spain, Italy and Portugal), Baltic (Estonia, Lithuania, and Latvia) and Central and Eastern European (CEE) countries (Czech Republic, Poland, Hungary, Slovenia, Slovakia, Croatia, Bulgaria, and Romania) than in other countries (**Hypothesis 3**).

3. Data and methods

3.1. Data and sample

Our analysis is based on data from the Survey of Health, Ageing and Retirement in Europe (SHARE), which is a multidisciplinary cross-national longitudinal survey focused on the collection of micro data on health, socioeconomic status, and family relations of older Europeans

(Börsch-Supan et al., 2013). To date, SHARE has collected five panel waves of current living circumstances (waves 1, 2, 4, 5, and 6) and two retrospective life history surveys as part of the “SHARELIFE” project (waves 3 and 7).

To derive complete work and family trajectories between ages 15 and 49, we employ data from the so-called “SHARELIFE’s Job Episodes Panel” (Brugiavini et al., 2019) that rearranges information taken from SHARE to create a longitudinal dataset containing the labour market, parenthood, and cohabitation status of each respondent throughout her or his life (for methodological details see: Bergmann et al., 2019; Börsch-Supan, 2022; Börsch-Supan et al., 2013; Brugiavini et al., 2019; Schröder, 2011).

The original SHARE sample consisted of 51,257 cases (43.79% men and 56.21% women) from 28 countries: 14 from the third SHARELIFE wave (Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Spain, Sweden, and Switzerland) and 14 from the seventh SHARELIFE wave (Bulgaria, Croatia, Cyprus, Estonia, Finland, Hungary, Latvia, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia, and Slovenia). Therefore, our study does not include the so-called “refreshment” samples of individuals from Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Spain, Sweden, and Switzerland having their first life history interview at wave 7 (Börsch-Supan, 2022). After standardising the sequences, this resulted in a total of 40,320 cases (1,411,200 observations) with complete employment, parenthood, and cohabitation histories between ages 15 and 49. We performed the multichannel sequence analysis on this sample. After discarding respondents with incomplete information on all the variables (2,191 cases; 5.43%), the analytic SHARE sample consisted of 38,129 individuals (47.36% men and 52.64% women). Table 1 reports the characteristics of the analytical sample.

3.2. Measures

3.2.1. Dependent variable: grip strength

This study employs an objective measure (grip strength) of general physical health as the dependent variable. This variable has become a popular indicator of both overall muscle strength and general functional performance (Cooper et al., 2011; Vermeulen et al., 2011) and is particularly suitable for gender and international comparisons (Andersen-Ranberg et al., 2009; Wu et al., 2017). Grip strength in kilograms was measured at each SHARELIFE wave (i.e., wave 3 for Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Spain, Sweden, and Switzerland, and wave 7 for Bulgaria, Croatia, Cyprus, Estonia, Finland, Hungary, Latvia, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia, and Slovenia) using a hand-held dynamometer twice, using both hands (four measurements in total for each respondent, two for each hand). Since multiple measurements of grip strength exist for the same individual, we have considered the maximum of the four observations as the relevant value for each respondent (Andersen-Ranberg et al., 2009). A higher score reflects higher grip strength and hence better health (variable range: 1–96).

3.2.2. Independent variable: work-family life courses (employment, parenthood, and partnership)

Work-family life courses served as our main independent variable. We identify them from annual retrospective information about employment, parenthood, and partnership status between ages 15 and

49.

Employment histories are derived from participants’ details on labour market participation including, among others, the starting and ending date of the job. For each year, there can be six states: “Working Full-Time (FT)”, “Working Part-Time (PT)”, “Unemployed”, “Home or Family Work”, “In Education or Training”, and “Other”.¹

Parenthood histories are derived from SHARE participants’ answers to questions on parenthood, including the birth year of each child. Having children is coded in a comprehensive way, including biological, step-, and adopted children. The variable identifies the number of children and whether the participant had at least one child aged 6 or younger (the age where children in Europe generally enter school, and where the child-care commitments are most demanding). For each year, there can be five parenthood states: childless; no children under seven years of age; one child under seven years of age; two children, where the youngest child is under seven years of age; three or more children, where the youngest child is under seven years of age.

Partnership histories are defined in terms of cohabitation with a partner or spouse. For each year, two partnership states are distinguished: “Not Cohabiting” and “Cohabiting”. We include unmarried cohabiting couples because cohabitation is increasingly viewed as an alternative to marriage (Hiekel et al., 2014).

For each SHARE respondent, we construct an individual trajectory specifying employment, parenthood, and partnership states at each age between 15 and 49 years (both included).

3.2.3. Classification of countries

This paper accounts for the broader institutional context by distinguishing different European regions according to the type of family welfare regime in those regions (Fasang et al., 2012; Gumà et al., 2019; Komp-Leukkunen, 2019; Oláh et al., 2018). This permits summarising the general context (e.g., public policies, levels of gender equity, etc.) of European countries. Specifically, we grouped the 28 European countries into six generic clusters according to their type of family welfare regime²:

- *Social Democratic* (Denmark, Finland, and Sweden). These countries have a universalistic approach to social rights, comparatively generous social transfers, a commitment to full employment and income protection, and a strongly interventionist state (Esping-Andersen, 1990, 1999; Orloff, 1993). Their advanced social services allow women to combine work and childcare more easily than the other welfare states do (Anttonen & Sipilä, 1996; Anxo et al., 2011). In addition, they encourage gender equality both in the labour market and in family responsibilities, actively supporting dual-earner household arrangements (Korpi, 2000), especially in families with young children (Gauthier, 2002).
- *Liberal* (Ireland and Switzerland). The liberal welfare states are distinctive for most English-speaking countries and Switzerland, with the latter and Ireland being part of this study. These countries favour market mechanisms for welfare production and accept the resulting social inequalities (Esping-Andersen, 1990). The strong reliance on the market and the low levels of social-insurance provision constrain its citizens to participate in paid work (Esping-Andersen, 1990; Mayer, 2004). However, those with high incomes or wealth can access a wide range of services, which can allow their partner to withdraw from the labour market. As a result, gender differences in labour market participation and health outcomes are

¹ The category “Other” includes the following situations: “Sick or disabled”; “Leisure, travelling or doing nothing”; “Retired from work”; “Military services”; “War prisoner or equivalent”; “Managing your assets”; “Voluntary or community work”; “Forced labour or in jail”; “Exiled or banished”; “Labour camp”; “Concentration camp”; and “Other”.

² Israel was excluded from the analysis, due to ambiguous classification.

Table 1
Descriptive characteristics of the study sample (N=38,129).

	Whole sample			Men			Women		
	N = 38,129			N = 18,057			N = 20,072		
	N	% (mean)	(SD)	N	% (mean)	(SD)	N	% (mean)	(SD)
<i>Grip strength</i>	38,129	(33.84)	(12.14)	18,057	(42.39)	(10.72)	20,072	(26.15)	(7.20)
<i>Age</i>	38,129	(66.38)	(9.35)	18,057	(66.45)	(9.04)	20,072	(66.31)	(9.63)
<i>Gender</i>									
Men	18,057	47.36							
Women	20,072	52.64							
<i>Level of education</i>									
Low	14,044	36.83		6,171	34.18		7,873	39.22	
Medium	15,739	41.28		7,860	43.53		7,879	39.25	
High	8,346	21.89		4,026	22.30		4,320	21.52	
<i>Income quartiles</i>									
First	9,983	26.18		4,764	26.38		5,219	26.00	
Second	9,565	25.09		4,539	25.14		5,026	25.04	
Third	9,431	24.73		4,414	24.44		5,017	25.00	
Fourth	9,150	24.00		4,340	24.04		4,810	23.96	
<i>Partner in household</i>									
Living with a spouse	27,738	72.75		15,192	84.13		12,546	62.50	
Living as a single	10,391	27.25		2,865	15.87		7,526	37.50	
<i>SHARE wave</i>									
3	17,312	45.40		8,886	49.21		8,426	41.98	
7	20,817	54.60		9,171	50.79		11,646	58.02	
<i>Welfare cluster</i>									
Social Democratic	4,431	11.62		2,176	12.05		2,255	11.23	
Liberal	1,260	3.30		678	3.75		582	2.90	
Conservative	6,670	17.49		3,730	20.66		2,940	14.65	
Southern European	7,003	18.37		3,489	19.32		3,514	17.51	
Baltic	6,305	16.54		2,332	12.91		3,973	19.79	
CEE	12,460	32.68		5,652	31.30		6,808	33.92	
Childhood health:									
<i>General health</i>									
Excellent	13,155	34.50		6,697	37.09		6,458	32.17	
Very good	11,873	31.14		5,683	31.47		6,190	30.84	
Good	9,541	25.02		4,262	23.60		5,279	26.30	
Fair	2,665	6.99		1,070	5.93		1,595	7.95	
Poor	895	2.35		345	1.91		550	2.74	
<i>Missed school for 1 month or longer</i>									
No	34,539	90.58		16,414	90.90		18,125	90.30	
Yes	3,590	9.42		1,643	9.10		1,947	9.70	
<i>Confined to bed or home for 1 month or longer</i>									
No	34,998	91.79		16,632	92.11		18,366	91.50	
Yes	3,131	8.21		1,425	7.89		1,706	8.50	
<i>In hospital for 1 month or longer</i>									
No	35,933	94.24		17,012	94.21		18,921	94.27	
Yes	2,196	5.76		1,045	5.79		1,151	5.73	

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates.

Note: Unless otherwise indicated, values are reported in percentages.

common (Anttonen & Sipilä, 1996; Anxo et al., 2011; Corna & Sacker, 2013).

- *Conservative* (Austria, Belgium, France, Germany, Luxembourg, and the Netherlands). These countries are characterised by their “status differentiating” welfare packages in which benefits are often earnings-related, managed through the employer, and orientated towards maintaining existing social conditions (e.g., traditional gender roles). The role of the family is accentuated and the redistributive impact is minimal. However, the role of the market is marginalised. Due to the historic marginalisation of female workers and the existence of policies that encourage women to take care of family responsibilities, female labour market participation is low in these countries (Esping-Andersen, 1990).
- *Southern European* (Cyprus, Greece, Italy, Malta, Portugal, and Spain). These countries have been classified as distinct welfare state regimes because of their sub-protective and more fragmented systems of welfare provision and welfare services (Ferrera, 1996). Southern European countries are strongly familialistic and characterised by higher reliance on family support as a form of welfare provision compared to other European countries (Bambra, 2007b). The state support to families is extremely limited and women are

encouraged to take up the family and care responsibilities (Bambra, 2007b, 2007a).

- *Central and Eastern European (CEE)* (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia) and *Baltic* (Estonia, Latvia, and Lithuania). There is little agreement on how to classify post-socialist countries in terms of welfare state development (Esping-Andersen, 1999; Ferrera, 1996). Following the collapse of socialist communism, the labour markets of post-socialist countries shifted rapidly from closed to open employment systems (Deacon, 2000; Novak, 2004). Unemployment, which was previously almost non-existent, rapidly increased during the political and economic transition process. The economic transition has made skills acquired under socialism less marketable, which increased the uncertainty in employment careers (Standing, 1996). Despite these general characteristics, the two clusters are relatively heterogeneous and there are marked differences between the CEE and the Baltic countries. Overall, the CEE countries tend to have weaker employment protection legislation and more open employment relationships than the Baltic countries. The Baltic countries have stronger segmentation of the labour market and more stringent employment protection legislation, but it is often only weakly and selectively

applied (Cazes & Nesporova, 2004; Fasang et al., 2012; Saar et al., 2008).

3.2.4. Other variables

For the analyses of the association between work-family histories and subsequent health outcomes, we controlled for a number of individual and household factors measured at the time of the interview: respondent's age (range 50–101), marital status (living with a spouse, living as a single), respondent's education³, household income and wealth quartiles (country and wave-specific), country of residence, and SHARELIFE wave.

To control for health selection (Machû et al., 2022), this paper accounts for some measures of childhood health status: general health⁴ (six categories: “Excellent”; “Very good”; “Good”; “Fair”; and “Poor”); missed school for one month or longer⁵ (two categories: “yes” and “no”); confined to bed or home for one month or longer⁶ (two categories: “yes” and “no”); and in hospital for one month or longer⁷ (two categories: “yes” and “no”).

3.3. Statistical analysis

Sequence analysis. Work-family life courses were determined using a longitudinal technique called multichannel sequence analysis (MCSQA) (Gauthier et al., 2010; Pollock, 2007). This tool uses whole work-family life courses as the unit of analysis, allowing for the investigation of the timing, order, and duration of events. MCSQA provides a more nuanced account of life course experiences, recognising work and family states as interdependent life domains (Barban & Billari, 2012; Gauthier et al., 2010). More practically, the technique compares each sequence to all other sequences in the dataset and measures the (dis)similarity of individuals' biographical sequences (Abbott & Tsay, 2000). The particular method of sequence analysis used in this study is Dynamic Hamming (Lesnard, 2010) which better distinguishes respondents based on the timing of states within the life course than standard algorithms (Aisenbrey & Fasang, 2010; Lesnard, 2010). The work-family statuses considered in our analysis account for employment, parenthood, and partnership histories from age 15 to 49. MCSQA was conducted separately for men and women and performed using the TraMineR package in R (Gabadinho et al., 2011). Graphs are based on the SADI package (Halpin, 2017) in Stata 17.

Cluster Analysis. We used hierarchical cluster analysis to group sequences into different clusters based on Ward's linkage procedure. To identify the most appropriate number of clusters, for both men and women, we compared solutions between 2 and 20 clusters and evaluated each cluster solution in terms of its content validity, the size of the clusters, and whether a higher cluster solution added another cluster of theoretical relevance. On this basis, we opted for a 12-cluster solution for men and a 15-cluster solution for women. To reach this conclusion, we adopted frequently used quality measures and cluster cut-off criteria, including the Average Silhouette Width (ASW) and Point Biserial

Correlation (PBC) that identify the most discriminant number of groups (Hennig & Liao, 2013; Studer, 2013). The cluster quality measures indicated that six-, ten-, twelve-, and eighteen-cluster solutions would be suitable for our sample of men (see [Supplementary Material, Figure A1](#)). For women, they suggested five-, ten-, fifteen-, and seventeen-cluster solutions (see [Supplementary Material, Figure A2](#)). The 12-cluster solution for men and the 15-cluster solution for women, we believe, provided meaningful types that were also distinctively different from the others. Anything less than that threw away information about variability, anything more than that resulted in overly complex classifications of work-family life courses. Cluster analysis was conducted using the WeightedCluster package in R (Studer, 2013).

Regression analysis. To investigate the relationships between work-family life courses and subsequent later life health, we estimated a series of multivariable regression models to predict which work-family clusters were related to grip strength at the time of the interview. In addition to work-family life courses, the regression models include all the control variables above-mentioned. Additionally, we formally tested whether the association between work-family life courses and health varied across welfare clusters, by including interaction terms for work-family life courses and welfare clusters. To ease the interpretation of the statistical interactions, we presented contrasts of marginal effects (i.e., average marginal differences) in graphical form, along with their 95% confidence intervals. All data were analysed using R 4.1.2 (multichannel sequence analysis and cluster analysis) and Stata 17 (descriptive and multivariable analyses).

4. Results

4.1. Descriptive analyses of work-family combinations

The cluster analysis based on sequence analysis resulted in 12 clusters of work-family life courses for men and 15 clusters for women. [Figs. 1 and 2](#) present chronograms for each identified cluster of work-family life courses respectively for men and women, displaying the proportion of each work-family combination by year between age 15 and 49 years. Some clusters had similar employment trajectories but differed in their family trajectories (i.e., parenthood and partnership) and vice versa. The distribution and the description of men's and women's work-family life courses are shown in [Table 2](#), while [Table 3](#) shows the distribution of the work-family life course patterns across the six welfare clusters. [Supplementary Tables A3–A8](#) show the average number of years spent in each employment, partnership, and parenthood state between ages 15 and 49 and for each work-family cluster.

[Fig. 1](#) shows, for men, a series of clusters primarily characterised by continuous full-time (FT) employment throughout the life course, only differentiated by the timing of entry into the labour market, fatherhood, or partnership. The only exceptions to this pattern are the cluster of men with unstable employment trajectories (“Unstable Work, Large Family, Partnered”) and the cluster of men continuously working part-time (PT) (“Work PT, Large Family, Unstable Partnership”). The latter is the smallest cluster of the male sample ($n = 87$). Next to the two clusters of childless individuals (i.e., “Work FT, Childless, Partnered” and “Work FT, Childless, Single”), the life course type named “Work FT, Delayed Family Transitions” is the cluster with the largest number of childless men.

[Fig. 2](#) shows that women's work-family life course types are more heterogeneous than those of men. Besides the clusters of childless women (“Work FT, Childless, Partnered” and “Work FT, Childless, Single”) which are also present in the male sample, we find two clusters of women continuously engaged mostly in unpaid domestic work and differentiated only by the timing of entry into motherhood (clusters “Family Care, Large Family Early, Partnered” and “Family Care, Large Family Late, Partnered”). The cluster “Work Break, Large Family, Partnered” identifies women who left employment when they had children and returned to the labour market after a few years. A set of three

³ The exact question wording was: “The next set of questions is about your health during your childhood. By childhood we mean from when you were born up until, and including, when you were age 15. Would you say that your health during your childhood was in general excellent, very good, good, fair, or poor?”

⁴ The exact question wording was: “Did you ever miss school for a month or more because of a health condition during childhood (that is, from when you were born up to and including age 15)?”

⁵ The exact question wording was: “(During your childhood, because of a health condition,) were you ever confined to bed or home for one month or more?”

⁶ The exact question wording was: “(During your childhood, because of a health condition,) were you ever in hospital for one month or more?”

⁷ Education was based on the international classification ISCED-97 and refers to the respondent's highest level of education. We classified education as low (ISCED 0, 1, and 2), medium (ISCED 3 and 4), and high (ISCED 5 and 6).



Fig. 1. Clusters of work-family life courses. Chronograms for men (N=18,057).

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates.

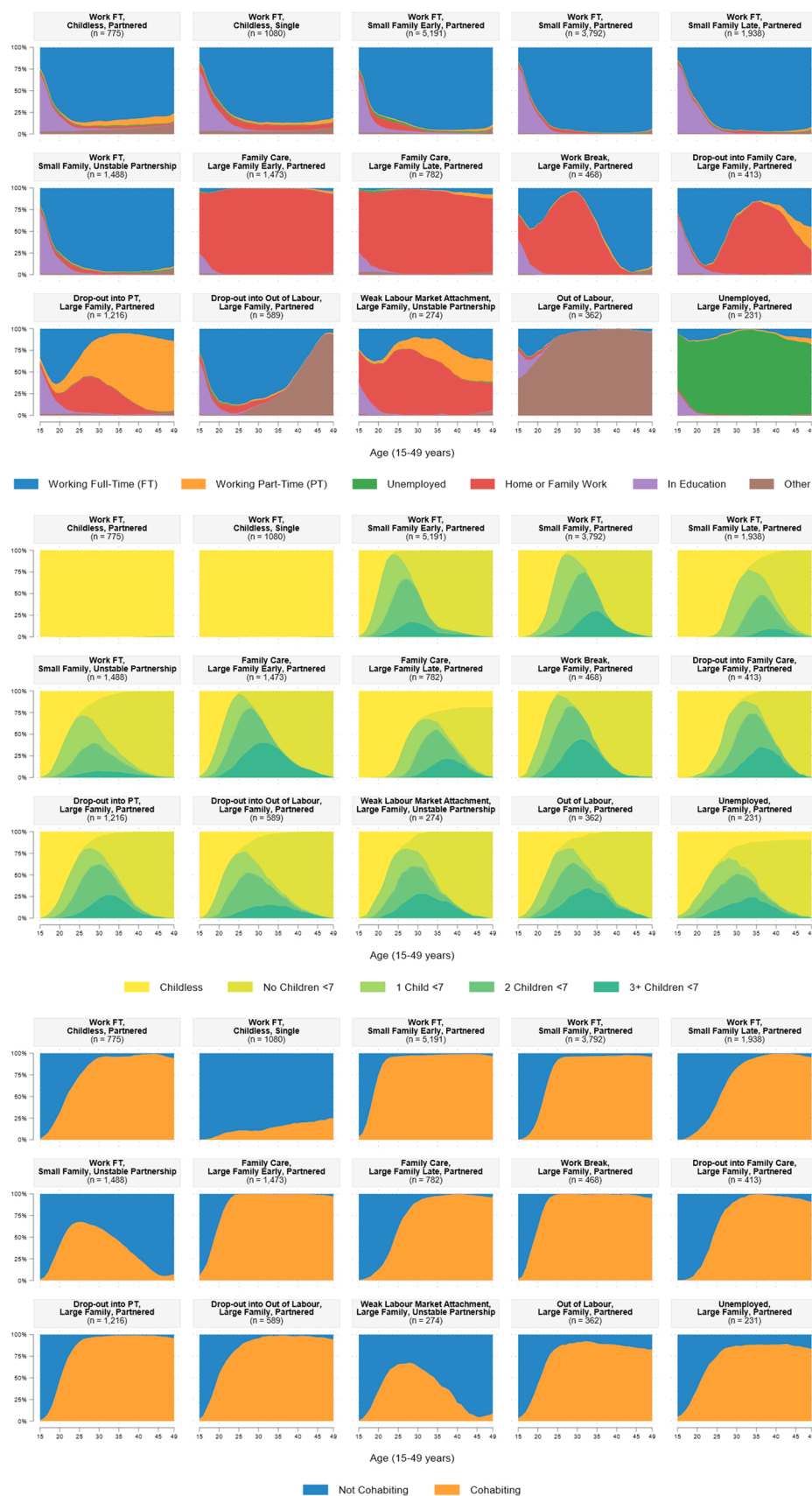


Fig. 2. Clusters of work-family life courses. Chronograms for women (N=20,072).

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates.

Table 2

Sample distributions for work-family life course types and associated description of the sequences (N=26,267).

Men (N = 18,057)				Women (N = 20,072)			
Work-family life course	Description (ages 15-49)	N	%	Work-family life course	Description (ages 15-49)	N	%
'Work FT, Childless, Partnered'	FT employment; cohabiting from mid 20 s; childless/childfree.	1,023	5.67	'Work FT, Childless, Partnered'	FT employment; cohabiting from mid 20 s; childless/childfree.	775	3.86
'Work FT, Childless, Single'	Full-time (FT) employment; no partnership; childless/childfree.	812	4.5	'Work FT, Childless, Single'	Full-time (FT) employment; no partnership; childless/childfree.	1,080	5.38
'Work FT, Small Family, Partnered'	FT employment; two children (first child from early 20 s); cohabiting from early 20 s.	4,758	26.35	'Work FT, Small Family Early, Partnered'	FT employment; two children (first child from early 20 s); cohabiting from early 20 s.	5,191	25.86
'Work FT, Small Family Late, Partnered'	FT employment; two children (first child from mid 30 s); cohabiting from late 20 s.	1,220	6.76	'Work FT, Small Family, Partnered'	FT employment; two children (first child from mid 20 s); cohabiting from mid 20 s.	3,792	18.89
'Work FT, Large Family, Unstable Partnership'	FT employment; three or more children (first child from early 20 s); singlehood until 20 s, then cohabiting to approximately age 45, then singlehood.	761	4.21	'Work FT, Small Family Late, Partnered'	FT employment; two children (first child from late 20 s); cohabiting from late 20 s.	1,938	9.66
'Work FT, Late Family Formation'	FT employment; three or more children (first child from early 30 s); cohabiting from late 20 s.	3,408	18.87	'Work FT, Small Family, Unstable Partnership'	FT employment; two children (first child from early 20 s); singlehood until 20 s, then cohabiting to approximately age 40, then singlehood.	1,488	7.41
'Work FT, Large Family Early, Partnered'	FT employment; three or more children (first child from teenage years); cohabiting from early 20 s.	1,814	10.05	'Family Care, Large Family Early, Partnered'	Home or family work; three or more children (first child from early 20 s); cohabiting from early 20 s.	1,473	7.34
'Work FT, Large Family Late, Partnered'	FT employment; three or more children (first child from late 20 s); cohabiting from early 20 s.	2,057	11.39	'Family Care, Large Family Late, Partnered'	Home or family work; three or more children (first child from early 30 s); cohabiting from early 30 s.	782	3.90
'Work FT, Delayed Family Transitions'	FT employment; three or more children (first child from late 30 s); cohabitation from late 30 s.	482	2.67	'Work Break, Large Family, Partnered'	Non-employed during child-rearing years; return into FT employment after child-rearing; three or more children (first child from early 20 s); cohabiting from early 20 s.	468	2.33
'Extended Education, Large Family, Partnered'	Slow school-to-work transition (i.e., extended education, then FT employment); three or more children (first child from late 20 s); cohabiting from late 20 s.	1,074	5.95	'Drop-out into Family Care, Large Family, Partnered'	Withdraw over time from FT to home or family work; two or more children (first child from late 20 s); cohabiting from late 20 s.	413	2.06
'Unstable Work, Large Family, Partnered'	FT employment with a mix of different states out of the labour market (e.g., military services; retirement; volunteering, etc.); three or more children (first children from early 20 s); cohabiting from early 20 s.	561	3.11	'Drop-out into PT, Large Family, Partnered'	Withdraw from FT to PT after child-rearing years, with career interruptions (home or family work) during child-rearing years; three or more children (first child from early 20 s); cohabiting from early 20 s.	1,216	6.06
'Work PT, Large Family, Unstable Partnership'	Part-time (PT) employment; three or more children (first child from late 20 s); unstable cohabitation trajectories.	87	0.48	'Drop-out into Out of Labour, Large Family, Partnered'	Withdraw over time from FT to Other (i.e., out of the labour force); two or more children (first child from early 20 s); cohabiting from early 20 s.	589	2.93
				'Weak Labour Market Attachment, Large Family, Unstable Partnership'	Mostly home or family work; three or more children (first child from early 20 s); unstable cohabitation trajectories.	274	1.37
				'Out of Labour, Large Family, Partnered'	Continuously out of the labour force (other states); three or more children (first child from mid 20 s); cohabiting from mid 20 s with some marital interruptions.	362	1.80
				'Unemployed, Large Family, Partnered'	Continuously unemployed; three or more children (first child from early 20 s); cohabiting from early 20 s with some marital interruptions.	231	1.15

clusters identifies women with children who worked full-time with little or no interruptions during child-rearing but then left the labour market and ended up in unpaid domestic work ("Drop-out into Family Care, Large Family, Partnered"), part-time employment ("Drop-out into PT, Large Family, Partnered"), or out of the labour market for other reasons ("Drop-out into Out of Labour, Large Family, Partnered"). Other clusters worth mentioning identified women with a relatively high proportion of part-time or family work after the birth of children and unstable cohabitation trajectories ("Weak Labour Market Attachment, Large Family, Unstable Partnership"), women continuously out of the labour market for reasons other than education, unemployment, or family work ("Out of Labour, Large Family, Partnered"), and women continuously unemployed ("Unemployed, Large Family, Partnered"). The latter are

the three smallest clusters in the female sample.

4.2. Associations between work-family life courses and health

4.2.1. Men

Table 4 shows the results of multivariable models examining the association between life course types and grip strength (GS) for men. Before running regression analyses, an a priori decision was made to select the life course cluster that best represented a typical work-family life course trajectory as the reference category for the main independent variable. For men, we used the life course type "Work FT, Small Family, Partnered" as the reference category. This cluster also had the highest level of frequency as compared to the other categories. Table 4 shows

Table 3

Percentage distribution over the work-family life course types, by welfare cluster (column percentages).

	Welfare Cluster						
	Social Democratic	Liberal	Conservative	Southern European	Baltic	CEE	Total
Men's work-family life course type							
'Work FT, Childless, Partnered'	6.30	6.78	7.00	5.76	4.50	4.83	5.67
'Work FT, Childless, Single'	4.23	6.34	4.53	5.04	3.73	4.33	4.50
'Work FT, Small Family, Partnered'	21.78	12.83	23.14	20.06	28.90	34.68	26.35
'Work FT, Small Family Late, Partnered'	7.95	10.47	6.89	9.89	4.59	4.72	6.76
'Work FT, Large Family, Unstable Partnership'	4.69	4.42	4.29	3.07	6.90	3.56	4.21
'Work FT, Late Family Formation'	16.64	22.86	18.95	25.59	17.20	15.75	18.87
'Work FT, Large Family Early, Partnered'	9.79	7.82	10.13	5.96	12.31	11.94	10.05
'Work FT, Large Family Late, Partnered'	12.36	14.60	12.87	13.90	9.48	8.90	11.39
'Work FT, Delayed Family Transitions'	3.58	4.28	2.60	3.73	2.06	1.77	2.67
'Extended Education, Large Family, Partnered'	10.29	6.64	7.51	3.27	7.38	4.23	5.95
'Unstable Work, Large Family, Partnered'	1.98	1.92	1.47	2.87	2.62	5.11	3.11
'Work PT, Large Family, Unstable Partnership'	0.41	1.03	0.62	0.86	0.34	0.18	0.48
Total	100	100	100	100	100	100	100
N	2,176	678	3,730	3,489	2,332	5,652	18,057
Women's work-family life course type							
'Work FT, Childless, Partnered'	4.70	5.84	5.51	2.79	2.69	3.94	3.86
'Work FT, Childless, Single'	5.54	14.09	7.38	7.31	5.11	2.88	5.38
'Work FT, Small Family Early, Partnered'	21.51	3.95	14.76	11.04	30.66	38.82	25.86
'Work FT, Small Family, Partnered'	19.25	7.90	13.54	10.84	27.81	20.98	18.89
'Work FT, Small Family Late, Partnered'	13.97	6.36	7.59	7.43	14.12	7.95	9.66
'Work FT, Small Family, Unstable Partnership'	7.14	2.58	6.26	3.13	13.54	7.05	7.41
'Family Care, Large Family Early, Partnered'	1.51	4.12	6.97	22.74	0.10	5.98	7.34
'Family Care, Large Family Late, Partnered'	0.71	3.09	3.40	15.85	0.10	1.28	3.90
'Work Break, Large Family, Partnered'	2.88	2.23	2.99	3.53	0.88	2.10	2.33
'Drop-out into Family Care, Large Family, Partnered'	2.31	11.51	4.22	2.28	1.16	0.65	2.06
'Drop-out into PT, Large Family, Partnered'	15.70	27.49	17.72	2.93	0.60	0.79	6.06
'Drop-out into Out of Labour, Large Family, Partnered'	2.00	3.26	2.24	2.53	2.16	4.17	2.93
'Weak Labour Market Attachment, Large Family, Unstable Partnership'	1.20	3.78	2.76	2.33	0.38	0.69	1.37
'Out of Labour, Large Family, Partnered'	1.24	3.09	4.12	1.99	0.55	1.51	1.80
'Unemployed, Large Family, Partnered'	0.35	0.69	0.54	3.27	0.13	1.22	1.15
Total	100	100	100	100	100	100	100
N	2,255	582	2,940	3,514	3,973	6,808	20,072

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates.

that continuously partnered fathers with weak labour market attachment (cluster "Unstable Work, Large Family, Partnered") have weaker GS in later life as compared to men who did work continuously over the life course. More precisely, the GS of employed fathers with two children (reference category) exceeds the GS of fathers with weak labour market attachment by approximately 1.7 kilograms (Table 4; $b = -1.682$; 95% CIs: -2.548, -0.815; $p < 0.001$). In addition, working fathers belonging to the cluster "Work FT, Delayed Family Transitions" have a weaker GS than those in the reference category (Table 4; $b = -1.828$; 95% CIs: -2.628, -1.028; $p < 0.001$). Interestingly, despite the level of statistical significance remaining at 10%, the life course types "Work FT, Large Family Late, Partnered" and "Work PT, Large Family, Unstable Partnership" are associated with weaker GS (respectively, $b = -0.425$; 95% CIs: -0.878, 0.028; $p < 0.10$; and $b = -1.872$; 95% CIs: -3.888, 0.144; $p < 0.10$). Finally, while being childless with stable cohabitation trajectories showed no difference to the reference category, being both childless and single was negatively associated with GS (Table 4; $b = -1.474$; 95% CIs: -2.251, -0.697; $p < 0.001$). All other differences between life course clusters for men are not statistically significant.

To investigate whether the associations between work-family life courses and health differed by welfare context, we estimated a set of regression models with interaction terms between life course types and welfare clusters. The interaction plots in Figs. 3 and 4 report – for each welfare cluster – the contrast of marginal effects, that is, the discrete change between belonging to the reference category "Work FT, Small Family, Partnered" and the other subset of categories of the main independent variable. Fig. 3 presents the point estimates and 95% confidence intervals for the coefficients of life course type on GS for men, by welfare cluster (full model estimates and contrasts of margins in tabular form are shown in Supplementary Tables A1 and A2). With some geographical variations, the results from Fig. 3 support the findings

reported in Table 4. When interacting life course types with each welfare cluster, the contrast of margins shows that the negative association between weak labour market attachment (cluster "Unstable Work, Large Family, Partnered") and GS is in the expected direction in all the welfare clusters but statistically significant only in Liberal (difference = -3.840; 95% CIs: -7.542, -0.138; $p < 0.05$), Conservative (difference = -3.663; 95% CIs: -6.082, -1.244; $p < 0.01$), and CEE countries (difference = -1.655; 95% CIs: -2.890, -0.421; $p < 0.01$). Delayed family transitions (both in terms of parenthood and partnership) are generally associated with a weaker GS. For example, belonging to the cluster "Work FT, Delayed Family Transitions" is negatively associated with GS in Social Democratic (difference = -2.803; 95% CIs: -5.206, -0.400; $p < 0.05$), Baltic (difference = -2.350; 95% CIs: -4.586, -0.114; $p < 0.05$), and CEE countries (difference = -2.704; 95% CIs: -4.340, -1.068; $p < 0.01$). Similarly, a slow transition into parenthood (cluster "Work FT, Small Family Late, Partnered") is associated with weak GS in Liberal countries (difference = -3.099; 95% CIs: -5.804, -0.393; $p < 0.05$). In the case of larger families (with 3 or more children), when the family transitions are delayed (cluster "Work FT, Large Family Late, Partnered"), this is associated with an even weaker GS in Liberal countries (difference = -3.285; 95% CIs: -5.493, -1.077; $p < 0.01$), and to a lesser extent in Southern European countries (difference = -1.948; 95% CIs: -2.977, -0.919; $p < 0.001$). Slow school-to-work transitions (cluster "Extended Education, Large Family, Partnered") resulted associated with better GS in CEE countries (difference = 1.453; 95% CIs: 0.186, 2.721; $p < 0.05$). Single childless men (cluster "Work FT, Childless, Single") report weaker GS in the Social Democratic (difference = -2.569; 95% CIs: -4.776, -0.363; $p < 0.05$), Liberal (difference = -3.836; 95% CIs: -6.565, -1.108; $p < 0.01$), and Conservative countries (difference = -4.438; 95% CIs: -5.963, -2.912; $p < 0.001$). Finally, compared with the reference category, men belonging to the cluster "Work FT, Childless, Partnered"

Table 4

Associations between work-family life course type and grip strength in older ages (higher = better): results of linear regression analyses (Men).

	Grip Strength (GS)	
	b	95% CIs
<i>Work-Family Life Course Type (ref.: Work FT, Small Family, Partnered)</i>		
Work FT, Childless, Partnered	-0.285	-0.936, 0.367
Work FT, Childless, Single	-1.474***	-2.251, -0.697
Work FT, Small Family Late, Partnered	-0.053	-0.606, 0.499
Work FT, Large Family, Unstable Partnership	-0.428	-1.141, 0.285
Work FT, Late Family Formation	-0.278	-0.669, 0.113
Work FT, Large Family Early, Partnered	-0.275	-0.766, 0.216
Work FT, Large Family Late, Partnered	-0.425+	-0.878, 0.028
Work FT, Delayed Family Transitions	-1.828***	-2.628, -1.028
Extended Education, Large Family, Partnered	0.025	-0.559, 0.610
Unstable Work, Large Family, Partnered	-1.682***	-2.548, -0.815
Work PT, Large Family, Unstable Partnership	-1.872+	-3.888, 0.144
Age	-0.578***	-0.594, -0.563
<i>Level of education (ref.: Low)</i>		
Medium	0.881***	0.565, 1.197
High	0.804***	0.405, 1.203
<i>Income quartiles (ref.: First)</i>		
Second	0.962***	0.590, 1.333
Third	1.357***	0.966, 1.749
Fourth	1.764***	1.361, 2.167
<i>Living with a spouse (ref.: Yes)</i>		
No	-0.611**	-1.022, -0.200
<i>Wave (ref.: 3)</i>		
7	-1.346***	-1.672, -1.019
<i>Welfare Cluster (ref.: Social Democratic)</i>		
Liberal	-2.940***	-3.665, -2.215
Conservative	-1.442***	-1.939, -0.946
Southern European	-5.085***	-5.599, -4.570
Baltic	-0.028	-0.597, 0.541
CEE	-2.872***	-3.353, -2.390
Childhood health		
<i>General health (ref.: Excellent)</i>		
Very good	-0.280+	-0.598, 0.037
Good	-0.427*	-0.781, -0.073
Fair	-1.082***	-1.681, -0.484
Poor	-1.561**	-2.577, -0.545
<i>Missed school for 1 month or longer (ref.: No)</i>		
Yes	0.256	-0.430, 0.943
<i>Confined to bed or home for 1 month or longer (ref.: No)</i>		
Yes	0.760*	0.038, 1.482
<i>In hospital for 1 month or longer (ref.: No)</i>		
Yes	-0.350	-0.993, 0.293
Constant	82.904***	81.703, 84.104
AIC	130,235.009	
BIC	130,484.650	
r ²	0.311	
Observations	18,057	

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates.

Note: 95% confidence intervals in second column. Ref.: reference category; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

report on average 3.13 fewer kilograms in the GS score than those who belong to the reference category (difference = -3.132; 95% CIs: -6.063, -0.2; p<0.05) in the Liberal welfare cluster.

4.2.2. Women

Table 5 shows the results of multivariable models predicting GS for women. As is the case for men, we assigned the most common life course type as the reference category for consistency of interpretation. Therefore, we used the "Work FT, Small Family Early, Partnered" life course type as the reference group for the regression analyses. Findings from Table 5 indicate that women who do not participate in the labour market, as well as those who have a weak labour market attachment, have a weaker GS relative to the reference category of full-time

employed women with two children. For example, belonging to the cluster "Family Care, Large Family Late, Partnered" is associated with 0.58 fewer kilograms in the GS score than those who belong to the reference category (Table 5; b = -0.582; 95% CIs: -1.086, -0.078; p<0.05). Similarly, a weaker GS is associated with the clusters "Family Care, Large Family Early, Partnered" (Table 5; b = -0.746; 95% CIs: -1.134, -0.358; p<0.001) and "Out of Labour, Large Family, Partnered" (Table 5; b = -0.876; 95% CIs: -1.618, -0.133; p<0.05). Withdrawing over time from full-time employment to family work (cluster "Drop-out into Family Care, Large Family, Partnered" or part-time employment (cluster "Drop-out into PT, Large Family, Partnered") is not associated with GS. However, those belonging to the cluster "Drop-out into Out of Labour, Large Family, Partnered" report 1.28 fewer kilograms in GS than those who belong to the reference category (Table 5; b = -1.182; 95% CIs: -1.774, -0.590; p<0.001). Women in full-time employment with family transitions in their mid-20s (cluster "Work FT, Small Family, Partnered") have a stronger GS relative to the reference category (Table 5; b = 0.346; 95% CIs: 0.085, 0.607; p<0.01), but the effect size is rather small. Childless women, either continuously cohabiting (cluster "Work FT, Childless, Partnered") or not (cluster "Work FT, Childless, Single"), have a weaker GS relative to the reference category of full-time employed women with children (respectively, Table 5; b = -0.599; 95% CIs: -1.051, -0.148; p<0.01; and b = -0.438; 95% CIs: -0.873, -0.003; p<0.05). This translates into a difference of about 0.60 kilograms in GS for partnered women and 0.44 for childless single women. All other differences between clusters for women are not statistically significant.

Fig. 4 shows the contrasts of margins of the interaction terms between life course types and welfare clusters for women (full model estimates and contrasts of margins in tabular form are shown in Supplementary Tables A3 and A4). Results from Fig. 4 indicate that mothers belonging to the life course types characterised by sustained periods outside the labour market have a weaker GS than full-time working mothers in various welfare contexts. For example, women belonging to the life course cluster "Family Care, Large Family Early, Partnered" and living in Southern European and CEE countries reported a weaker GS than those in the category of full-time working mothers (i. e., "Work FT, Small Family Early, Partnered") (respectively, difference = -0.796; 95% CIs: -1.507, -0.085; p<0.05; and difference = -0.914; 95% CIs: -1.624, -0.204; p<0.05). Similarly, mothers belonging to the life-course cluster "Family Care, Large Family Late, Partnered" and living in Liberal and CEE countries report a weaker GS than those in the reference category (respectively, difference = -1.535; 95% CIs: -3.014, -0.057; p<0.05; and difference = -3.811; 95% CIs: -7.536, -0.086; p<0.05). Mothers in CEE countries with a weak labour market attachment and unstable partnerships, belonging to the life course type denominated "Weak Labour Market Attachment, Large Family, Unstable Partnership" report a weaker GS than full-time working mothers in the reference category (difference = -1.852; 95% CIs: -3.696, -0.009; p<0.05). Likewise, mothers belonging to the life course type "Out of Labour, Large Family, Partnered" and living in Social Democratic countries report about 3.5 fewer kilograms in GS than those who belong to the reference category (difference = -3.504; 95% CIs: -6.700, -0.309; p<0.05). Life courses characterised by prolonged episodes of unemployment (cluster "Unemployed, Large Family, Partnered") are associated with weaker GS in Liberal countries (difference = -6.113; 95% CIs: -11.652, -0.573; p<0.05). Similar results are found in the case of those belonging to the cluster "Drop-out into Out of Labour, Large Family, Partnered" and living in Liberal (difference = -6.273; 95% CIs: -9.457, -3.089; p<0.001), Baltic (difference = -3.242; 95% CIs: -4.960, -1.523; p<0.001), and CEE countries (difference = -1.277; 95% CIs: -2.085, -0.469; p<0.01). Women who withdraw from full-time to part-time employment after child-rearing years (cluster "Drop-out into PT, Large Family, Partnered") report a weaker GS in Baltic countries (difference = -2.216; 95% CIs: -4.365, -0.066; p<0.05). In Social Democratic countries, women who left employment when they had children but returned to work full-time afterwards ("Work Break, Large Family, Partnered")

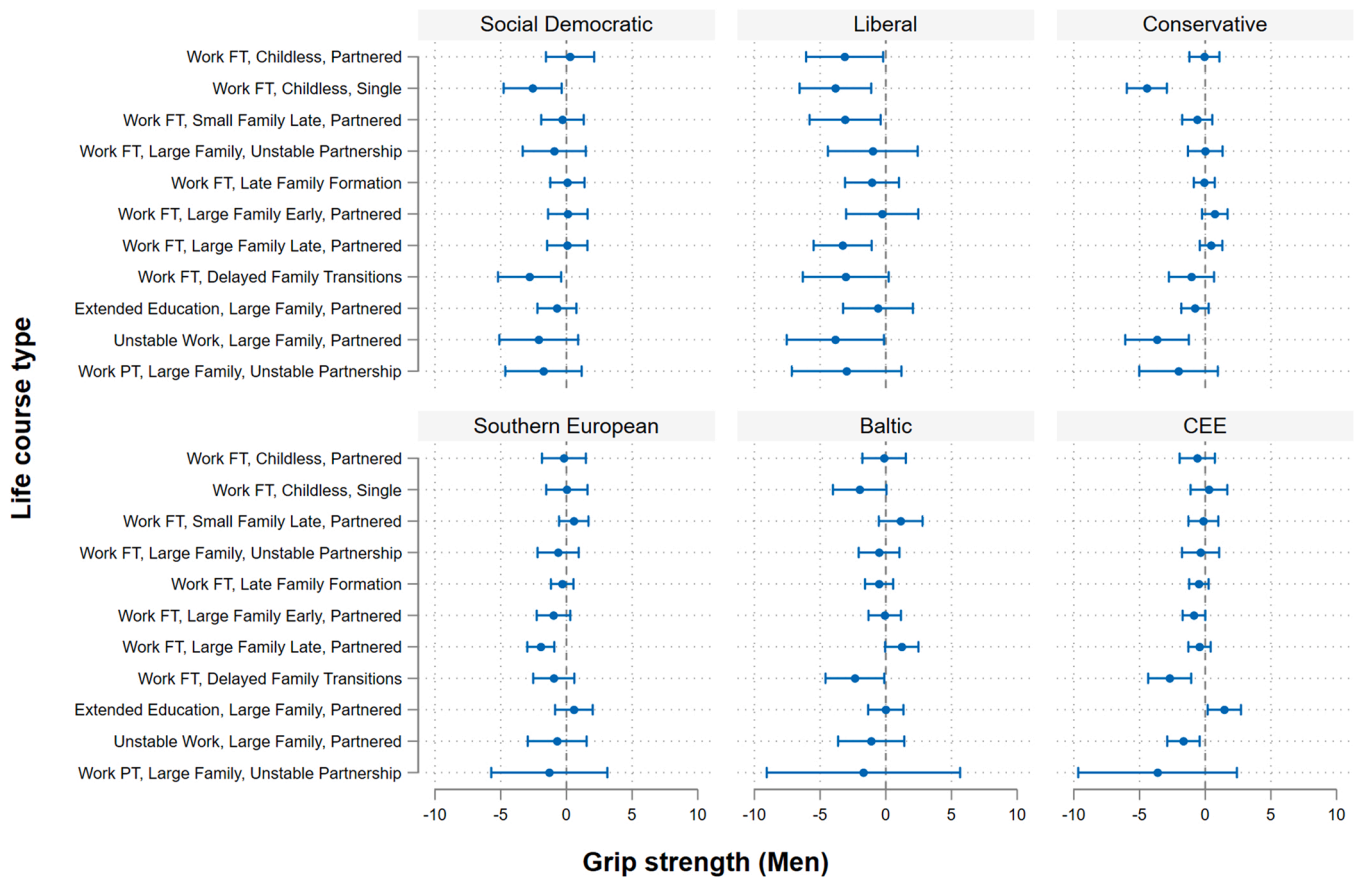


Fig. 3. Contrasts of conditional marginal effects for life course type on grip strength (GS) with 95 per cent confidence intervals (men).

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates. Notes: Average marginal differences with respect to life course type "Work FT, Small Family Late, Partnered". Differences in GS are expressed in kilograms. Estimates are based on regression models reported in Table A3 of the online appendix. Positive values of GS indicate better health.

report a stronger GS than those in the reference category (difference = 1.445; 95% CIs: 0.079, 2.812; $p < 0.05$). Combining full-time employment with late experiences of child-rearing (i.e., life course type "Work FT, Small Family Late, Partnered") is associated with weaker GS for women living in Social Democratic countries compared with the reference category (difference = -1.441; 95% CIs: -2.405, -0.478; $p < 0.01$). Belonging to the cluster of single, childless women (cluster "Work FT, Childless, Single") is associated with lower GS in Social Democratic countries (difference = -1.879; 95% CIs: -3.187, -0.571; $p < 0.01$).

5. Discussion

This study draws on previous literature suggesting that exposure to adverse early-life combinations of paid work, parenthood, and partnership affect chronic stress and allostatic load (e.g., Lin et al., 2022; McCrory et al., 2019; Nusslock & Miller, 2016; Wahrendorf et al., 2022), inflammation and dysfunction in the immune system (e.g., Danese & McEwen, 2012; Fagundes et al., 2013), that in turn cause damage to skeletal muscle and physical functioning later in life (e.g., Dalle et al., 2022; Kamper et al., 2021). However, given the lack of studies focusing on this topic (Machû et al., 2022), it is important to deepen our understanding of how early-life trajectories of work and family domains affect physical functioning in later life. This is especially relevant against the background of ongoing changes in gender roles and increasing labour market insecurity for both genders. It is in light of this reasoning that this study extends prior knowledge.

Using a large set of retrospective information from the Survey of Health, Ageing and Retirement in Europe (SHARE), we identified a series of life course types employing multichannel sequence analysis

(MCSQA) and assessed how specific combinations of paid work, parenthood, and partnership between the ages 15 and 49 influence physical functioning for men and women, and across different institutional contexts (i.e., welfare states). We tested these associations on an objective measure of general physical health (i.e., grip strength) in six different European welfare state clusters (Social Democratic, Liberal, Conservative, Southern European, Baltic, and Central and Eastern European).

Three important groups of findings can be derived from the present research. The first finding is consistent with the theories on stress exposure (e.g., Pearlin, 2010; Pearlin et al., 1981) and cumulative disadvantages (Bartley & Plewis, 2002; McDonough et al., 2015), which suggest that early-life combinations of adversities in work and family domains increase chronic stress with detrimental consequences on later-life physical health. Our results indicated that for men the most important predictors for poor physical health in later life are life courses characterised by unstable employment (i.e., characterised by many episodes out of the labour market for reasons other than education, training or unemployment) or prolonged childlessness combined with an absent (or delayed) transition to a partnership. For women, it is more detrimental to physical health either having a life course characterised by long episodes out of the labour market (for reasons other than education, family work, or unemployment) – including a withdrawal over time from full-time employment to out of the labour force – or experiencing early motherhood, a high number of children, and continuous home or family work. Similarly, the life courses of childless men and women are generally associated with poorer physical health. For both men and women, therefore, these results do not support the *role conflict* hypothesis (Hypothesis 1a). To further substantiate these findings, this

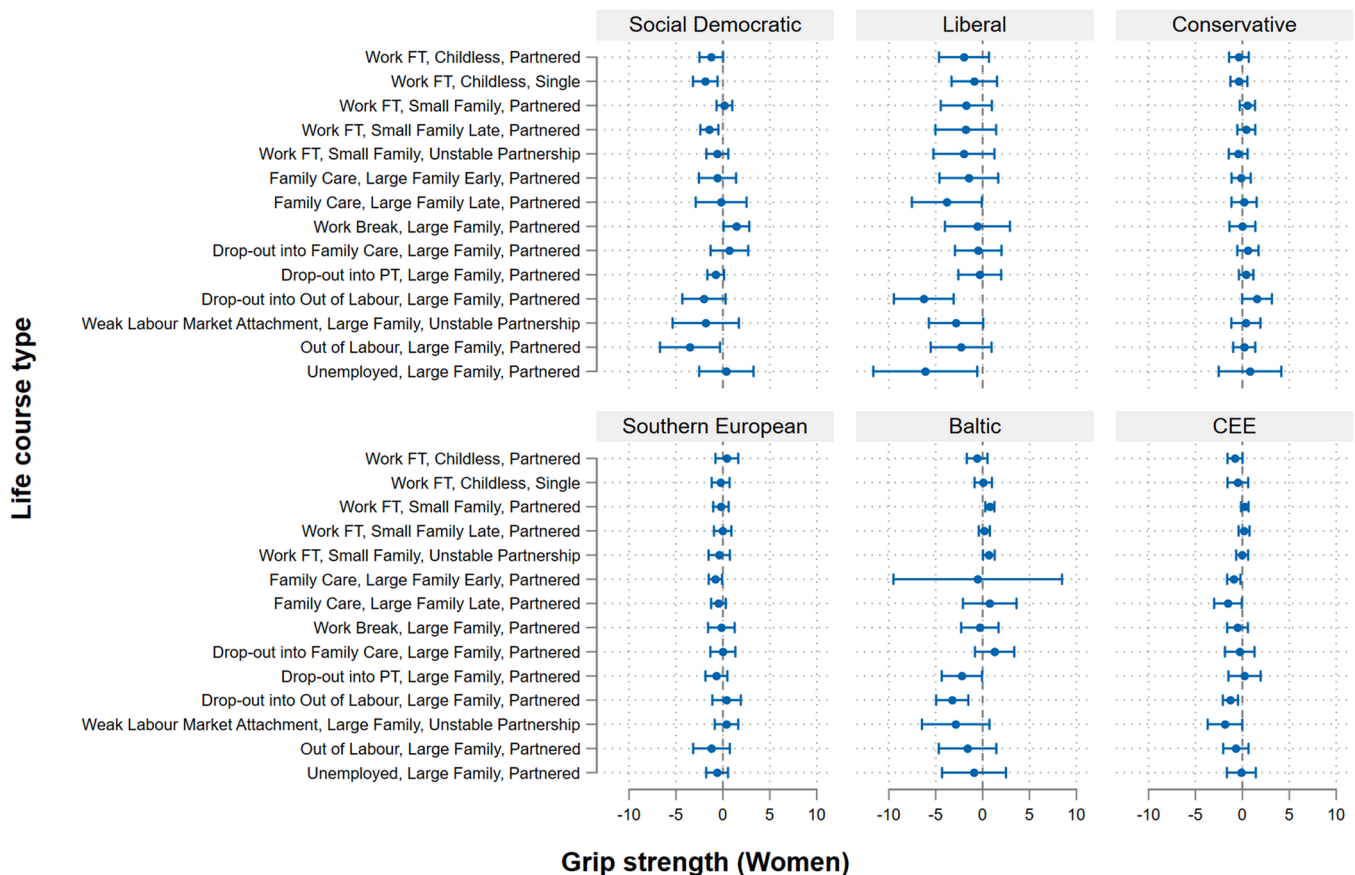


Fig. 4. Contrasts of conditional marginal effects for life course type on grip strength (GS) with 95 per cent confidence intervals (Women).

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates. Notes: Average marginal differences with respect to life course type "Work FT, Small Family Early, Partnered". Differences in GS are expressed in kilograms. Estimates are based on regression models reported in Table A4 of the online appendix. Positive values of GS indicate better health.

study urges the need for future studies to account for objective measures of the stress response, such as inflammatory markers (Kamper et al., 2021; Lacey et al., 2016; Schaap et al., 2006).

Rather, our study showed that mothers' and fathers' life courses characterised by long or repeated periods out of the labour market are associated with poor physical functioning as compared to parents with strong labour market attachment. For both men and women, this finding tends to support the *role enhancement* theory (Barnett and Hyde 2001; Lahelma et al., 2002; Nordenmark, 2004) and corroborates our second hypothesis suggesting that the combination of multiple social roles throughout the life course increases the levels of physical functioning later in life (**Hypothesis 1b**). This finding is in line with other studies looking at self-reported general health and mental well-being (Comolli et al., 2022; Engels et al., 2021; Tosi & Grundy, 2019; Zella & Harper, 2018, 2020), biomarkers of metabolic syndrome (McMunn et al., 2016), inflammation and stress (Lacey et al., 2016), or mortality (McKetta et al., 2018; Sabbath et al., 2015). Therefore, these findings can be extended to both older men and women and objective measures of general physical health, such as grip strength.

Contrary to our expectations, work-family trajectories characterised by the absence of a stable partnership are not associated with poor physical health conditions in old age (**Hypothesis 1c**). Some extant research shows that union dissolution trajectories might be linked to depression or other adverse health conditions in mid-life (Lacey et al., 2016, 2017; McDonough et al., 2015). However, our results are in line with other studies finding a lack of association between adverse partnership histories and objective markers of health (cf. McMunn et al., 2016). The only exception to this pattern is that our results indicated that while childlessness was generally associated with poor physical

health for both single and partnered women, this was not the case for childless men in stable partnerships. Consistent with this finding, our study showed that men's family trajectories characterised by prolonged childlessness and delayed partnership transitions are linked with worse physical functioning later in life. Similarly to previous studies (e.g., Quashie et al., 2020), our results suggest that childlessness may be associated with worse health conditions depending on gender and the institutional contexts under examination, as well as on the presence or absence of a marital partner.

The second finding supports the hypothesis that work-related strains can have stronger health consequences for men than for women (**Hypothesis 2a**). Our results showed that for men the influence of unstable working careers is stronger than for any other female adverse life course. This might suggest that the impact of employment stress on physical functioning can be more consistent for men, a result that may be due to a higher importance of the employment role for men. For example, according to the Social Production Function (SPF) theory (Lindenberg, 1996, 2013; Steverink, 2014; Steverink & Lindenberg, 2006), the need for status (i.e., the need to be recognised because of one's relative social position) is mainly met in social situations such as at work. Employment-related achievements, skills, or assets can be seen as the primary source for fulfilment of the need for status. Consequently, stress as a result of negative experiences concerning work-related life course events (e.g., episodes of unemployment or long periods out of the labour market) is considered stress related to the fulfilment of the need for status. Our study provides further evidence for a gendered psychophysiological stress response linking early-life labour market-related strains with later-life physical health (Frone, 2000; Steverink et al., 2011; Wahrendorf et al., 2020). On the other hand, life courses mainly

Table 5

Associations between work-family life course type and grip strength in older ages (higher = better): results of linear regression analyses (Women).

	Grip Strength (GS)	
	b	95% CIs
<i>Work-Family Life Course Type (ref.: Work FT, Small Family Early, Partnered)</i>		
Work FT, Childless, Partnered	-0.599**	-1.051,-0.148
Work FT, Childless, Single	-0.438*	-0.873,-0.003
Work FT, Small Family, Partnered	0.346**	0.085,0.607
Work FT, Small Family Late, Partnered	-0.103	-0.434,0.227
Work FT, Small Family, Unstable Partnership	0.039	-0.332,0.411
Family Care, Large Family Early, Partnered	-0.746***	-1.134,-0.358
Family Care, Large Family Late, Partnered	-0.582*	-1.086,-0.078
Work Break, Large Family, Partnered	-0.004	-0.618,0.609
Drop-out into Family Care, Large Family, Partnered	0.420	-0.187,1.028
Drop-out into PT, Large Family, Partnered	-0.042	-0.451,0.367
Drop-out into Out of Labour, Large Family, Partnered	-1.182***	-1.774,-0.590
Weak Labour Market Attachment, Large Family, Unstable Partnership	-0.611	-1.409,0.187
Out of Labour, Large Family, Partnered	-0.876*	-1.618,-0.133
Unemployed, Large Family, Partnered	-0.375	-1.196,0.447
Age	-0.321***	-0.332,-0.311
<i>Level of education (ref.: Low)</i>		
Medium	0.717***	0.499,0.935
High	1.076***	0.801,1.350
<i>Income quartiles (ref.: First)</i>		
Second	0.473***	0.220,0.727
Third	0.585***	0.315,0.854
Fourth	0.579***	0.297,0.861
<i>Living with a spouse (ref.: Yes)</i>		
No	-0.313**	-0.533,-0.093
<i>Wave (ref.: 3)</i>		
7	-0.928***	-1.155,-0.701
<i>Welfare Cluster (ref.: Social Democratic)</i>		
Liberal	-1.320***	-1.873,-0.768
Conservative	-0.382*	-0.745,-0.018
Southern European	-2.803***	-3.171,-2.434
Baltic	1.351***	0.988,1.715
CEE	-0.416*	-0.748,-0.083
Childhood health		
<i>General health (ref.: Excellent)</i>		
Very good	-0.261*	-0.478,-0.044
Good	-0.318**	-0.551,-0.086
Fair	-1.205***	-1.563,-0.847
Poor	-1.480***	-2.056,-0.904
<i>Missed school for 1 month or longer (ref.: No)</i>		
Yes	-0.262	-0.702,0.179
<i>Confined to bed or home for 1 month or longer (ref.: No)</i>		
Yes	0.302	-0.166,0.769
<i>In hospital for 1 month or longer (ref.: No)</i>		
Yes	0.033	-0.399,0.465
Constant	48.073***	47.254,48.892
AIC	130,017.743	
BIC	130,294.491	
r ²	0.267	
Observations	20,072	

Source: Data are from SHARELIFE's Job Episodes Panel, release 8.0.0 (Brugiavini et al., 2019). Own estimates.

Note: 95% confidence intervals in second column. Ref.: reference category; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

characterised by strains in the family domain (e.g., childlessness, early or late transition to parenthood, single parenthood, a high number of children, etc.) resulted to be associated with poorer physical functioning for both men and women (**Hypothesis 2b**).

In line with recent comparative research examining the links between life course types and women's well-being (e.g., Zella & Harper, 2018, 2020), the third finding provides evidence that the institutional context plays an important role in shaping the relationships between life course types and physical health in later life (**Hypothesis 3**). For

example, men's unstable employment and delayed transitions into family roles were associated with worse physical health in the Liberal, Conservative, Southern, Baltic, and CEE countries. Similarly, sustained periods outside the labour market were more often associated with mothers' poor physical functioning in Liberal, Baltic, and CEE countries. Our results also showed that a complete drop-out from the labour market after child-rearing might be more strongly associated with worse physical health for women living in certain institutional contexts than in others (i.e., Liberal, Baltic, and Central and Eastern European countries). Conversely, mothers' re-entry into the labour market after a temporary break from child-rearing is associated with improved women's physical functioning in Social Democratic countries. Marginally protective and more fragmented systems of welfare provision, not particularly favourable to families with young children (Gauthier, 2002; Guo & Gilbert, 2007; Pfau-Effinger, 2005), could make individuals more vulnerable to stress and ultimately lead to worse physical health outcomes in later life (cf. Pearlin et al., 1990). In line with some recent empirical evidence (e.g., Engels et al., 2021; Zella & Harper, 2018, 2020), our results showed that policies in countries that are more inclined to promote combinations of work and family responsibilities can play a role in protecting parents from adverse health effects at older ages.

6. Strengths and limitations

The present study has some important limitations that should be considered for future studies. First, this study is based on a secondary analysis of employment and family histories and we recognise the problems with the analysis of retrospective data, including memory errors. However, retrospective SHARE data are overall strongly reliable regarding the information about the time of occurrence of the events, with less than 10% recall errors over all events (Garrouste & Paccagnella, 2011).

Second, our study does not assess health repeatedly over time, potentially exposing our results to the problem of reverse causality. Lacey et al. (2017), for example, showed that in some cases health differences observed after the assessment of work-family trajectories were already present before the start of these trajectories. We tried to limit this potential bias by accounting for all the available measures of childhood health status present in the SHARE data, regarding the period between 0 to 15 years and therefore preceding the assessment of work-family trajectories. These measures included self-reported general health and the experience of the following events because of a health condition: missing school for one month or longer, being confined to bed or home for one month, or being in hospital for one month or longer. Our study stresses the need to better account for how early-life health may select individuals into particular work-family trajectories and how this can continue to affect future health differently for men and women (Lacey et al. 2017; Tattarini & Grotti, 2022). Reverse causation can be better addressed for example by including more objective markers of childhood health in the analytical models than the ones we have used in the present study.

Third, the sample size of a few countries under analysis was rather small. Similarly, some of the work-family life courses were rare and resulted in a low number of observations per category (particularly the cluster of men with prolonged periods of part-time work). In addition, countries participating in the third wave of SHARE (i.e., Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Poland, Spain, Sweden, and Switzerland) might be affected by attrition issues. These and other issues might potentially lead to biased estimates and problems with the calculation of standard errors.

Fourth, our study does not offer a detailed investigation of cohort differences. A number of the countries under analysis, namely those belonging to Central and Eastern Europe and the Baltic region, have been characterised by a variety of major political changes after the fall of the Soviet Union and the subsequent economic crisis of the 1990s. Even

if they belong to the same geographical region, older cohorts have experienced their working and family careers in very different institutional contexts than their younger counterparts. As some additional analyses have shown, this could lead to a dissimilar impact of work-family life courses on health conditions for different birth cohorts. Our research recommends that future studies should carefully establish whether the same work-family arrangement can produce the same consequences within different institutional contexts and for different birth cohorts. As SHARE continues with further waves, the potential for more nuanced analyses of family, employment, and health will increase considerably.

Despite these limitations, we believe that our study makes a substantial contribution to the existing literature and our understanding of the complex relationships between work-family life courses, gender, and physical health in later life. The main contribution of the present study is threefold.

Firstly, the study adopted a holistic approach that takes into account men's and women's entire trajectories and combinations of both work and family domains by using a refined multichannel sequence analysis technique. Our approach to the life course distinguished simultaneously three different dimensions of work and family spheres: employment, parenthood, and partnerships. More specifically, we applied multichannel sequence analysis (MCSQA) to identify the life course types of women and men born 1908-1967. To do so, we used Lesnard's dynamic Hamming algorithm (Lesnard, 2010) and cluster analysis on rich retrospective data drawn from the most recent waves of the Survey of Health, Ageing and Retirement in Europe (SHARE). This holistic approach allowed us to more precisely focus on the process (timing) and the interaction/interdependence of the three life domains over a key phase of men's and women's adulthood (Aisenbrey & Fasang, 2010; Lesnard, 2010). This was particularly relevant for the scope of our study because the exact timing of events (e.g., the transitions to parenthood) within sequences was of specific theoretical importance.

Secondly, the study adopted a broader view than previous research, by expanding the research questions to an objective measure of muscle strength and overall physical functioning (i.e., grip strength). Grip strength has become a widely accepted measure of general physical health with an independent explanatory power (Andersen-Ranberg et al., 2009; Hank et al., 2009; Leopold, 2018, 2019; Rijk et al., 2016; Wahrendorf et al., 2020). Grip strength is objectively assessed by a dynamometer, avoiding biases that might arise in self-reports. This was particularly important as physical decline had to be measured and this measure has a great advantage over scales of physical functioning like self-reported limitations in activities of daily living (ADL) (Leopold, 2018, 2019; Oksuzyan et al., 2019; Spitzer & Weber, 2019). This measure is further predictive of physical vulnerability and mortality (Andersen-Ranberg et al., 2009; Hank et al., 2009; Jürges, 2007; Rijk et al., 2016), indicating that grip strength is related to health status more generally. By looking at this measure of health, this study will help to come to a wider agreement about the impact of work-family life courses on the physical dimension of men's and women's health in later life (Machū et al., 2022).

Thirdly, the study assessed the impact of early-life combinations of work and family responsibilities on subsequent physical health by using rich cross-national longitudinal life course data. This permitted the identification of time patterns of work and family life courses for both men and women among nationally representative samples of older adults living in 28 European countries. This allowed the adoption of a broader international view than previous studies, which mostly focus on single-country analyses (e.g., Engels et al., 2019; Zella & Harper, 2018) or systematically exclude Eastern European countries (for a review, see Machū et al., 2022). These data allowed us to analyse the relationship

between work-family life courses and health outcomes in later life by combining micro and macro determinants of health, showing how multiple combinations of paid work and family circumstances are of different importance for the physical functioning of women and men living in six different European welfare clusters: Social Democratic, Liberal, Conservative, Southern European, Baltic, and Central and Eastern European (CEE). Considering the vast cross-country differences in social stratification and welfare state institutions, having extended the analysis beyond a single-country to a cross-national comparative investigation, our study advanced the understanding of how the later-life health effects of combining work and family responsibilities emerge, and under which conditions they can be expected to change. In addition, given the early stage of research on post-socialist welfare states, the inclusion of the Baltic and CEE countries is a specific strength of our study (Machū et al., 2022).

7. Conclusion

The present study extends previous research on gender and health in later life by considering how different combinations of work and family trajectories along the life course are related to objective physical health in six different European welfare contexts, including post-socialist welfare states such as the Baltic and Central and Eastern European countries. One of the main contributions of this study is that it unveils several international patterns of the associations between work-family life courses and physical functioning at older ages. The study highlights the crucial role of gender in the examination of how early-life trajectories of employment, parenthood, and partnership influence subsequent physical health later in life.

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Appendix. Supplementary material

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.alcr.2022.100495](https://doi.org/10.1016/j.alcr.2022.100495).

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