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# Introducing the Social Integration Index for Older Europeans: The Role of Gender and Care Regimes

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## Abstract

Social integration is a critical factor in health and longevity among older adults, but an instrument for measuring and comparing social integration of older adults across European countries remains absent. In the present study, we investigate the social integration of people aged 50 years and over by adapting an index established by Berkman and Syme (*American Journal of Epidemiology*, 109(2):186–204, 1979) to the European context. Based on data collected in 2021 from the Survey of Health, Ageing, and Retirement in Europe (SHARE), we conducted a multivariate regression analysis to examine the social integration of women and men across care regimes. Our findings suggest that women are less socially integrated than men and that older adults in more ‘familialistic’ regimes tend to be less socially integrated. The gender gap in social integration differs across contexts. Women tend to be less socially integrated in family-oriented care regimes, presumably due to their role as primary caregivers, which can limit their opportunities for social activities outside of familial bonds. Our results highlight the importance of developing context-sensitive policies that promote social integration, particularly among women and older adults in family-oriented care regimes, thus offering a wide spectrum for cross-country comparative research on factors enabling social integration in different population groups in Europe’s ageing societies.

**Keywords** Social integration · Population aging · Care regimes · Family roles · Gender inequality · European-comparative study

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The world's rapidly aging population highlights the importance of identifying factors that promote healthy aging. One significant factor that impacts physical and mental health in old age is social relationships (Holt-Lunstad, 2018; Litwin et al., 2020; Litwin & Levinsky, 2023; Schmitz & Brandt, 2022). Social relationships is an overarching term that includes structural aspects (such as the size and diversity of one's social network), functional aspects (such as emotional or instrumental support), and the broader concept of social integration — which reflects the extent to which individuals are actively engaged in a variety of social roles and feel a sense of belonging to their social environment (Brisette et al., 2000; Holt-Lunstad & Lefler, 2021). While social networks and support represent the existence and quality of social ties, social integration captures the depth of one's involvement in social life and has been shown to be a particularly strong predictor of all-cause mortality, as well as a protective factor for health in old age and longevity (Barger, 2013; Berkman & Syme, 1979; Sarma et al., 2018). Notably, a meta-analysis of 148 prospective studies found that social integration was the strongest predictor of reduced mortality risk among various dimensions of social relationships, including network size and perceived social support (Holt-Lunstad et al., 2010).

Despite its importance, the concept of social integration lacks uniformity and has been measured in a variety of ways (Holt-Lunstad & Lefler, 2021). Moreover, limited attention has been directed toward social integration as a dependent variable — an outcome warranting consideration in its own right (Gracia & Herrero, 2004; Vitman et al., 2014) — and to its distribution across various countries (e.g., Banks et al., 2011). Existing studies (Barger, 2013; Ertel et al., 2008; Sarma et al., 2018) have focused solely on U.S. data, while Banks et al. (2011) compared the United States and Great Britain, excluding other European countries from their analysis.

In this study, we build upon the seminal work of Berkman (1978) and Berkman and Syme (1979), whose measure of social integration has been widely replicated but not yet applied in cross-national comparisons of welfare regimes (e.g., Chernoff, 2011; Li et al., 2018; Sarma et al., 2018; Tsai et al., 2014); we extend this line by examining differences across regimes and gender in Europe. Our first objective is to introduce the comprehensive index that has been proposed by Berkman and Syme (1979) in cross-national aging research among European countries, enabling a more in-depth understanding of the social integration of older adults. The second objective is to provide an illustration of its empirical potential. To that end, we analyze the social integration index across genders and European care regimes, both of which are recognized to have a profound influence on social embeddedness and relationships (e.g. Hansen & Slagsvold, 2016; Schwartz & Litwin, 2018; Cohn-Schwartz & Schmitz 2023). We use data from the Survey of Health, Ageing, and Retirement in Europe (SHARE) of men and women aged 50 years and above from 21 countries, which we clustered into four care regimes.

## 1 Social Integration in Later Life

Social integration can be defined as the degree to which individuals engage in diverse social relationships, such as participating in social activities and having a sense of belonging and identification with one's social roles. It is a multidimensional construct, encompassing various dimensions and is important in understanding social behavior and functioning (Berk-

man et al., 2000; Brissette et al., 2000; Holt-Lunstad & Lefler, 2021). While definitions may emphasize different aspects (such as the characteristics of the social network, social activities, or feelings of social connectedness), they have in common that both intimate and extended ties are involved (Berkman et al., 2000).

Aging is critical for social integration, as social relationships and engagement often change over the life course. Life transitions such as retirement, declining health, the loss of loved ones, and shifts in family dynamics can reshape social networks, potentially creating both opportunities and challenges in maintaining social integration (Wrzus et al., 2013). These changes often begin in midlife (around age 50) and continue into later life, gradually reshaping social integration trajectories (Börsch-Supan et al., 2013).

As noted, social integration entails multiple aspects and can therefore be measured in various ways (Holt-Lunstad & Lefler, 2021). While some studies focus on specific aspects of social relationships, the complexity of the concept requires a more comprehensive approach. One of the earliest and most significant tools for capturing this complexity is the Social Network Index, also known as the *Social Integration Index*. It was introduced by Berkman (1978) and Berkman and Syme (1979) in their seminal study on the association of social integration and mortality rates in the Alameda County Study. The index evaluates an individual's level of social integration based on four categories, reflecting both close and extended ties and considers the number and closeness of relationships: marital status, contact with family and friends, religious or voluntary affiliation and participation in social groups. This instrument is frequently used in countries all over the world to study the impact of social integration on the mental and physical health of older adults and is a strong predictor of all-cause mortality over long-term follow-up (Berkman et al., 2000, 2004; Chernoff, 2011; Li et al., 2018; Obisesan & Gillum, 2009; Sarma et al., 2018; Tsai et al., 2014).

Given its decisive role for health and well-being, examining the determinants of social integration is crucial. Previous studies have identified several individual and contextual characteristics that predict social integration (Wanchai & Phrompayak, 2019). Berkman and colleagues (2000) proposed a conceptual model that explains the formation of social networks and their impact on individuals, suggesting a cascading causal process in which social relationships influence health, beginning with macrosocial factors and ending with psychobiological processes. According to this model, social networks are embedded within broader social and cultural contexts, where factors such as political economy, social stratification, and gender roles shape the structure of social networks and ultimately impact social integration. In line with this model, we focus on two key — gender and care regimes — that are likely to influence social integration in interdependent ways (see, e.g., Herlofson & Brandt, 2020; Floridi et al., 2021).

## 1.1 Gender and Social Integration

Gender plays an important role in determining social integration as it shapes the social roles, expectations, and opportunities of individuals throughout their lives. A vast body of literature has consistently demonstrated gender differences in several dimensions of social relationships (Fischer & Beresford, 2015; McLaughlin et al., 2010; Naud et al., 2021; Schwartz & Litwin, 2018; Tomioka et al., 2017). Specifically, the types and number of ties can vary between genders, which could potentially affect social integration that is composed of the number of both close and extended ties. Due to the lack of literature that directly investi-

gates gender differences in social integration during old age, we will elaborate on gender differences in various types of social relationships.

Women tend to have greater social networks that include more close connections and encompass more diverse relationships (such as family, friends, other relationships) than men in all stages of life (Fischer & Beresford, 2015; Schwartz & Litwin, 2018). With aging, men tend to have closer emotional ties with primary group members, such as spouses and children, and they report having fewer close friends than women (Campos-Castillo et al., 2020). Thus, as individuals age, the gender in social relationships gap tends to widen, since men's networks are more likely to incorporate work-related contacts into their networks, which deteriorate easily upon retirement (Kalmijn, 2012).

However, women tend to be more involved in intense support and care with family members, particularly during certain phases of life (Román & Gracia, 2022). Previous research has well-documented women's significant role as caregivers and kin-keepers, indicating that they tend to provide more frequent and demanding care to family members compared to men (Herlofson & Brandt, 2020; Ogg & Renaut, 2006; Rosenthal, 1985). During the second half of life, in particular, women are more likely to provide informal care to other adults like their frail parents or parents-in-law (Agree & Glaser, 2009; Haberkern et al., 2015; Lorenz et al., 2006). Additionally, grandparents, and most often grandmothers, play a crucial role in providing childcare to employed mothers, especially those in low-income families or when women work long hours (Gray, 2009). This involvement in care for children and older kin helps maintain valuable intergenerational bonds, but it may also hinder social activities outside of the family.

Outside their close circle, older women may face greater perceived barriers to participating in social activities despite generally being more interested in community activities than men (Naud et al., 2021). Older women tend to engage more in activities with their family and friends, while men tend to prefer participating in group activities, such as physical activities with others (Gilmour, 2012).

A few studies have utilized Berkman's index to investigate social integration and mortality, treating gender as a control variable but not as the main variable of interest. Such studies have demonstrated that women usually obtain lower scores on the index, which suggests that they have lower social integration than men (Banks et al., 2011; Berkman et al., 2004; Ertel et al., 2008). In summary, research has shown that women tend to have more intimate connections and more diverse close social networks. However, in later life, their emphasis on family ties may result in an overall lower social integration than men.

## 1.2 Care Regimes and Social Integration

The societal context can also play a crucial role for social integration; levels of social capital and the characteristics of relationships may vary across different countries (Litwin & Levinsky, 2022; Rostila et al., 2015; van Oorschot & Arts, 2005). For example, studies have shown significant differences between Mediterranean, Western and Northern European social life, that cover various aspects of lifestyle, social networks, and welfare systems (Haynes et al., 2014; Litwin, 2010; Viazzo, 2003). The Mediterranean countries tend to be more family-oriented in culture and relationships than Northern Europe (Kalmijn & Saraceno, 2008). Older adults support their parents in Mediterranean countries more than their counterparts in Northern Europe (Daatland & Herlofson, 2003). In contrast, Northern

European countries have higher participation rates in voluntary work than the Mediterranean region, even after adjusting for age and health status (Erlinghagen & Hank, 2006). Moreover, individuals from Northern European countries indicate less loneliness and higher levels of social integration despite having smaller families and less interaction within their households, which is often attributed to cultural differences in expectations regarding the quantity and quality of social ties (Litwin, 2010). Compared to Northern and Mediterranean countries, Western European countries such as Germany and France exhibit moderate levels of close friendships and family ties, falling within a middle range relative to other European regions (Haynes et al., 2014). It should be noted that studies have identified differences between European countries, but the Eastern European region in particular has received little attention in previous studies.

Various factors may contribute to the differences in social networks among European countries. While some studies emphasize the role of culture, social norms, and expectations (Litwin, 2010), others argue that welfare provision also plays a significant role. By providing services that promote social interaction and participation in social activities, the welfare state can help older adults integrate into society (Hansen & Slagsvold, 2016; Rosstila et al., 2015). A different approach focuses on welfare policies and services that reduce families' care responsibilities towards children and older adults. The impact of welfare system policies on family care and well-being is widely recognized in the literature (Bordone et al., 2017; Hank & Buber, 2009; Herlofson & Brandt, 2020; Kalmijn & Saraceno, 2008; Wagner & Brandt, 2018). However, it remains unclear whether the related different means and services for outsourcing care are a driving factor behind increased social connections and integration. In the next section, we seek to review the care regimes that evolved from gender-based perspectives on family roles. By doing so, we hope to shed light on the intersection of our two key dimensions, gender and care regimes, and explore their potential impact on social integration.

### 1.3 The Gender-Care Regimes Intersection: Between Family and State

Welfare regimes have been widely studied in comparative social policy research, with Esping-Andersen's (1990) initial classification of welfare states into three models — liberal, conservative, and social democratic — being the most recognized. However, this classification has been criticized for neglecting the gender perspective. In view of the feminist perspective, scholars have proposed alternative typologies that incorporate the extent to which welfare state arrangements promote women's autonomy and economic independence from the family (Bambra, 2007; Leitner, 2003).

One crucial concept emerging from these alternative typologies is the axis “familialism–defamilialisation,” which refers to the degree to which the welfare state encourages individuals to achieve independence from family relationships (Verbakel et al., 2023). Following Leitner's (2003) work, Saraceno and Keck (2010, 2011) proposed a typology that is based on care welfare for Europe and reflects the degree to which public policies support gender equity in work and care. Countries with a high degree of familialism rely primarily on families to provide care without public alternatives or financial support, similar to a traditional family role. De-familialised countries have universal public care services to reduce families' care responsibilities, while a ‘supported familialistic’ regime offers financial compensation to family caregivers, similar to an egalitarian family role. They also identified one

mixed welfare policy pattern among European countries (Herlofson & Brandt, 2020; Saraceno & Keck, 2011). The dichotomy of familialisation- defamilialisation operates on two levels. Firstly, it pertains to the norms and policies that shape and recognize the degree and duration of familial interdependencies. Secondly, it concerns how these norms and policies foster or discourage gender-specific behaviors towards caregiving responsibilities. From the gender roles perspective, since women are usually the primary caregivers in families, the term familialisation denotes the degree to which women are responsible for providing care in a family, and the extent to which men are acknowledged for their caregiving roles within the family (Leitner, 2003).

Research has shown that women tend to shoulder a greater share of care provision to their family members than men, regardless of the level of public services available. However, the quality and availability of care services can significantly impact the size of the gender gap (Da Roit et al., 2015; Herlofson & Brandt, 2020; Leitner, 2003; Schmid et al., 2012). That is, welfare policies that provide services to support individuals independently of their family members can help reduce the burden of domestic responsibilities and promote gender equality, as well as women's financial independence. In contrast, policies that prioritize familial responsibilities tend to reinforce the traditional caring role of the family and can exacerbate gender inequality as women are typically responsible for the majority of care provision.

Following this rationale, care regimes affect gender roles, and in turn, shape the focus of individual relationships. Previous research explored how welfare care policy can influence the gender gap focusing on paid work (Saraceno & Keck, 2011) or subjective well-being (Floridi et al., 2021), while the topic of social networks has been subject to only limited scientific inquiry. We argue that care regimes are crucial in shaping gendered patterns of social integration, as they affect women's participation in the workforce and their care responsibilities in the family context (Komp-Leukkunen, 2019), thus impacting their social integration until older age. In countries where women participate less in the workforce and take on more homemaking roles, they may experience lower social integration outside the familial context. Conversely, in countries where women participate more in the workforce throughout their lives, women may as a broader social network and perform more social activities outside the family context, as they accumulate larger and more diverse social relationships through work (Cohn-Schwartz & Naegele, 2023). In line with these considerations, one study found that in more egalitarian countries, men take on more home-related responsibilities, potentially leading to less of a gender gap in social connections outside the home (Levtov et al., 2014). A recent study conducted by Cohn-Schwartz and Schmitz (2024) found that the societal context plays a significant role in shaping the social relationships of both older men and women. The study showed that in egalitarian countries, older women have larger social networks including a higher number of friends, while in traditional countries, women have more family members in their networks. However, the study focuses on national gender role attitudes and did not consider the link between care regimes and further dimensions of social integration.

Building on previous findings, we expect a positive association between the extent to which gender and care regimes liberate individuals from traditional family roles and the level of social integration. Consequently, we have formulated the following hypotheses: (a) older women are less socially integrated than men, (b) higher levels of de-familialisation go along with greater social integration irrespective of gender, and (c) the intersection of gender and care regimes shapes social integration among older adults. Specifically, in care

regimes that prioritize family care, the gender gap in social integration is more pronounced compared to de-familialised regimes.

## 2 Methods

### 2.1 Sample

The study utilizes SHARE data, which is a biennial panel survey of community-dwelling adults aged 50 and older and their spouses of any age. The survey is based on a probability sample of the population in each country (Börsch-Supan et al., 2013) and the data is provided free of charge for scientific use. The current analysis used data from 21 countries that participated in the ninth wave of data collection in 2021, namely Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden, and Switzerland. Countries that were not included in the original studies on the typology of care regimes by Saraceno and Keck (2010, 2011) and Herlofson and Brandt (2020) were also not included in the present study (Israel, Portugal, Greece, Croatia, Bulgaria, Malta, and Romania).

We included all respondents aged 50 years and over to capture the broader spectrum of social integration dynamics that begin in midlife and continue throughout later life. As previously discussed, the determination of when old age begins remains an open question. To account for transitions in social roles and networks that may start before formal retirement, we have chosen to include individuals aged 50 and above, capturing both pre-retirement and early retirement stages. The analytical sample for this study comprised 53,944 respondents aged 50 and older who had provided complete responses to the social network module and all study variables.

### 2.2 Social Integration

The study focuses on social integration, which was measured by calculating the Social Network Index from Berkman and Syme (Berkman, 1978; Berkman & Syme, 1979) for Europe. This index evaluates an individual's level of social integration by considering various factors, and comprises two categories of social ties: close ties and extended ties (Table 1).

The measurement of close ties was based on two key questions: relationship status and frequency of contact. The first question focused on the individual's relationship status, specifically whether they had a partner in the household or not. The second question examined the frequency of contact with close family members or friends over the past 12 months, asking how often the respondent interacted with these individuals, with options ranging from daily contact to less than once a month or no contact at all. Close ties are further classified into three subcategories – (1) low - individuals without a partner in the household and without friends or relatives, or individuals without a partner in the household but with one or two friends or relatives seen at least once a month, or individuals who have a partner in the household but without friends or relatives. (2) medium - individuals who have a partner in the household and between one to two friends or relatives seen frequently, or without a partner in the household and more than three friends or relatives seen frequently. (3) high

**Table 1** The categories that comprise the social integration index. Value of social integration Index<sup>a</sup>, n, (% from total)

		Close ties			Total
		Low	Medium	High	
<i>Extended ties</i>	Neither	<b>1</b> 6,503 (11.70)	<b>2</b> 13,186 (23.72)	<b>4</b> 8,099 (14.57)	27,788 (49.99)
	Social groups only	<b>2</b> 2,459 (4.42)	<b>3</b> 8,388 (15.09)	<b>4</b> 8,671 (15.60)	19,518 (35.11)
	Voluntary or charity work only	<b>2</b> 333 (0.60)	<b>3</b> 964 (1.73)	<b>4</b> 742 (1.33)	2,039 (3.67)
	Voluntary or charity work and social groups	<b>2</b> 581 (1.05)	<b>4</b> 2,517 (4.53)	<b>4</b> 3,147 (5.66)	6,245 (11.23)
	Total	9,876 (17.77)	25,055 (45.07)	20,659 (37.16)	55,590 (100.00)

<sup>a</sup> The value of the Social Integration Index ranges from 1 (low integration) to 4 (high integration) based on a combined assessment of respondents' integration in both close and extended ties, as presented in the cells of the table

- individuals who have a partner in the household and more than three friends or relatives seen frequently.

The measurement of extended ties was based on the question “Which of the activities listed, if any, you have you done in the last twelve months?” Respondents were asked to select from a list of activities, including voluntary or charity work, educational or training courses, sports or social clubs, political or community-related organizations, and playing card games or chess. The extended ties category includes four subcategories – (1) individuals who do not participate in any social group. (2) Participation in social groups such as educational or training courses, sports, social clubs, political or community-related organizations, or playing card or table games. (3) Engagement in voluntary or charity work, but not in other social groups. (4) Participation in a social group and a voluntary or charity work. The social integration index was constructed following the approach of Berkman and Syme (1979), with one key modification in extended ties: while the original index included religious participation (e.g., frequency of church visits) as a measure of social integration, our index replaces this with voluntary or charity work due to data availability in SHARE.

According to Berkman and Syme (1979) the intersection of responses from both dimensions, close and extended ties, was segmented into four levels of social integration on a 1–4 scale, ranging from low to high integration. The current study is the first to incorporate the Social Integration Index as part of SHARE; The construction of the instrument is thoroughly documented elsewhere (Gruber et al., 2024). Table 1 presents the distribution of the Social Integration Index, categorized by close ties (low, medium, high) and extended ties (social group participation and/or voluntary or charity work). The first group — those who didn't have extended ties and a low level of close ties — comprised 11.5% of the sample. The second group – having extended ties (social groups only and/or voluntary or charity work) and having low levels of close ties or not having extended ties but having medium levels of close ties – comprised 29.4% of the sample. The third group – being a member of one type of extended ties (social groups only or voluntary or charity work) and having

medium levels of close ties – made up 16.9% of the sample. The fourth group – having both types of extended ties and having medium levels of close ties or having high levels of close ties – made up 42% of the sample. Additional tables are included in the Supplementary Material, presenting the social integration index separately by gender.

### 2.3 Gender and Care Regimes

Our analysis focuses on two key dimensions - gender and care regimes. The data included 22,830 men and 31,114 women across 21 European countries, which were categorized into four different care regimes. Country classification was based directly on the groupings proposed by Saraceno and Keck (2010, 2011) and Herlofson and Brandt (2020), who used comparative policy analyses of childcare and eldercare systems to define these regimes. The first group of countries includes Denmark and Sweden, which are characterized by strong de-familialisation and weak supported familialism, and is known as the *de-familialised* regime ( $n=4,486$ ). These countries have extensive formal childcare services and state-supported eldercare, minimizing family caregiving responsibilities. The second group, the *familialised* regime, consisting of Greece, Italy, Spain, Poland, and Latvia, has low scores on most indicators, signifying weak de-familialisation and weak supported familialism ( $n=14,015$ ). In these countries, families bear the primary responsibility for both childcare and eldercare, with limited formal support.

The remaining countries were divided into two clusters. One cluster is characterized by weak de-familialisation but strong *supported familialism*, including Germany, Austria, Luxembourg, Hungary, Estonia, Lithuania, Slovakia, and the Czech Republic ( $n=19,300$ ). In these countries, families remain the primary providers of both eldercare and childcare, but policies are designed to support family caregivers through financial assistance, leave policies, and other measures that facilitate the balance between caregiving and employment, particularly for women. The other cluster includes countries that are harder to categorize and are thus described by Saraceno and Keck (2011) as “internally divergent” or the *mixed* regime, such as France, Belgium, Switzerland, Slovenia, Finland, and the Netherlands. These countries may be characterized by strong de-familialisation in eldercare and strong familialisation in childcare, or vice versa ( $n=16,143$ ).

### 2.4 Control Variables

Our models control for age, number of children, financial capacity, education level, employment status, mobility limitations, depressive symptoms, self-rated health, alcohol use, BMI, and urban vs. rural residence. *Age* was measured in years as a continuous variable. *Number of children* was recorded as a continuous variable, representing the total number of children reported by the respondent. *Financial capacity* was measured by the household's ability to make ends meet, which was rated on a scale of 1 (easily) to 4 (with great difficulties). *Education level* was determined by the International Standard Classification of Education (ISCED), which is an ordinal scale developed by the UNESCO (2006) for international comparisons, ranging from 0 (early childhood education) to 6 (tertiary education). *Employment status* was coded as a binary variable, distinguishing between employed (1) and not employed (0) respondents. *Mobility limitations* was measured by the number of limitations related to mobility, arm function, and fine motor skills, with scores ranged from 0 to 10.

*Depressive symptoms* were measured using the Euro-D scale, which assesses the presence of up to 12 depressive symptoms (Prince, 2002). *Self-rated health* was recorded on a 5-point scale, ranging from 1 (poor) to 5 (excellent). *Alcohol use* was coded as a binary variable, indicating whether the respondent consumed at least one alcoholic drink in the past week. *BMI* was calculated based on self-reported height and weight. Lastly, *Urban vs. rural residence* was defined as a dichotomous variable, distinguishing between individuals living in urban and rural areas.

## 2.5 Statistical Analysis

At first, we provided descriptive statistics about the sample's background characteristics. Next, we explored how each study variable is related to the social integration index by applying Pearson's coefficient. We estimated a series of multivariate linear models in four stages to examine social integration. We used multiple imputation techniques with multivariate regression imputation in all regression analyses to account for missing data. We estimated a series of hierarchical linear regression models, introducing variables in a step-wise manner. In the first model (Model A), we considered gender differences. In the second model (Model B), we added care regimes. In the third model (Model C), we included interactions between care regimes and gender. In the final model (Model D), we incorporated the covariates age, number of children, financial capacity, education level, employment status, mobility limitations, depressive symptoms, self-rated health, alcohol use, BMI and urban vs. rural residence. We conducted our data analysis using STATA version 15.1.

## 3 Results

The majority of the sample was female (57%). Most participants (36%) resided in countries characterized by supported familialism, while the lowest proportion (8%) were from de-familialised countries. The mean age was 72 years, with an average of approximately two children. Most participants had attained secondary education. Regarding employment, 22% were employed, and on average, they reported good financial capacity. They had relatively few mobility limitations and low levels of depressive symptoms, while their self-rated health was moderate.

In terms of lifestyle factors, 49% had consumed at least one alcoholic beverage in the past week, and the average BMI was 27, within the normal range. Regarding residence, 65% lived in urban areas. The participants' average social integration score was 2.9 out of 4, indicating a relatively high sense of integration. Detailed statistical results by gender are presented in Table 2.

Table 3 demonstrates the correlations between social integration and key study variables, categorized by gender. Negative associations were observed between social integration and both familialised and supported familialism regimes; however, the association with supported familialism was significant only for women. In contrast, mixed and de-familialised regimes were positively associated with social integration. Overall, the associations were stronger for women than for men across all care regimes.

The bivariate analysis also revealed distinct associations between social integration and background characteristics. Positive correlations were found between social integration

**Table 2** Europeans aged 50 and older: univariate description of the sample variables and background characteristics by gender

Characteristic (range)	Male N (%)	Female N (%)	Total N (%)
Familialised	6,496 (26.16)	8,825 (26.42)	15,321 (26.31)
Supported familialism	8,520 (34.31)	12,177 (36.46)	20,697 (35.54)
Mixed	7,641 (30.77)	9,813 (29.38)	17,454 (29.97)
De-familialised	2,179 (8.77)	2,584 (7.74)	4,763 (8.18)
	<b>Mean (sd)</b>	<b>Mean (sd)</b>	<b>Mean (sd)</b>
Age (50–108)	72.32 (9.42)	72.31 (10.10)	72.32 (9.82)
Number of children (0–17)	2.07 (1.29)	2.08 (1.26)	2.08 (1.27)
Financial capacity (1–4)	2.99 (0.92)	2.88 (0.94)	2.93 (0.94)
Education level (0–6)	3.24 (1.36)	3.09 (1.38)	3.15 (1.38)
Employment status (0/1)	0.24	0.21 (0.41)	0.22 (0.42)
Mobility limitations (0–10)	1.35 (2.17)	1.97 (2.53)	1.70 (2.40)
Depressive symptoms (0–12)	1.99 (2.03)	2.74 (2.31)	2.42 (2.23)
Self-rated health (1–5)	3.18 (1.01)	3.22 (1.01)	3.20 (1.01)
Alcohol use (0/1)	0.61 (0.49)	0.40 (0.49)	0.49 (0.50)
BMI (13–60)	27.33 (4.20)	26.91 (5.10)	27.09 (4.74)
Urban vs. rural residence (1/0)	0.64 (0.48)	0.66 (0.47)	0.65 (0.48)
Social integration (1–4)	2.98 (1.01)	2.82 (1.12)	2.89 (1.08)

Notes: sd = standard deviation

**Table 3** Bivariate associations between the study variables and social integration index by gender

	Social integration		
	Male	Female	Total
<b>Care regimes<sup>a</sup></b>			
Familialised	-0.137***	-0.173***	-0.158***
Supported familialism	-0.010	-0.028***	-0.022***
Mixed	0.086***	0.117***	0.105***
De-familialised	0.089***	0.113***	0.116***
Age	-0.123***	-0.326***	-0.250***
Number of children	0.168***	0.136***	0.147***
Financial capacity	0.251***	0.295***	0.280***
Education level	0.194***	0.249***	0.230***
Employment status (employed) <sup>a</sup>	0.048***	0.166***	0.060***
Mobility limitations	-0.16***	-0.262***	-0.230***
Depressive symptoms	-0.169***	-0.206***	-0.200***
Self-rated health	0.197***	0.255***	0.232***
Alcohol use	0.191***	0.266***	-0.244***
BMI	0.012**	-0.019***	-0.003
Urban vs. rural residence <sup>a</sup>	-0.006*	-0.040*	-0.026*

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

<sup>a</sup> the categorical care regime variable was coded as four dummy variables for the bivariate analysis. For binary variables, point-biserial correlations were calculated

and financial capacity, education level, employment status, number of children, self-rated health, and alcohol consumption, with stronger effects generally observed among women. Conversely, negative associations were observed between social integration and age, mobility limitations, and depressive symptoms. Older individuals, particularly women, as well as those experiencing physical or mental health challenges, reported lower levels of social

integration. A small negative effect was also found for urban residence, while the relationship between BMI and social integration was weak and inconsistent across genders.

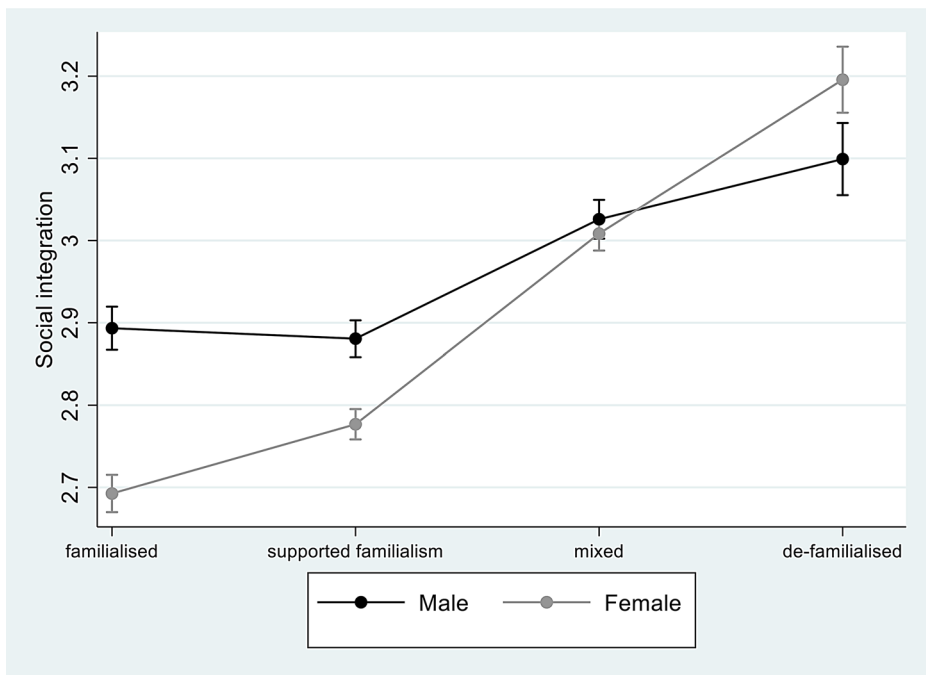
Table 4 presents the results of the multivariate regression analyses. Model A estimates gender differences in social integration without adjusting for further covariates. Women were less integrated than men. This model accounted for 0.5% of the variance in social integration. In Model B, care regimes were added to the analysis. Compared to the familialised regime, all other three regimes were positively related to social integration. The explained variance increased to 4.4%. In Model C, interactions between care regimes and gender were added. All three interactions were found to be significant, with an explained variance of 4.5%. In Model D, additional covariates were introduced, including age, number of children, financial capacity, education, employment status, mobility limitations, depressive symptoms, self-rated health, alcohol use, BMI, and urban versus rural residence. Financial capacity and education remained positively associated with social integration, while age, mobility limitations, and depressive symptoms were negatively related. Employment status, in contrast, was negatively associated with social integration. Notably, the gender gap in social integration was substantially reduced after controlling for these factors, though interactions between gender and care regimes remained significant. This model accounted for 18.9% of the variance in social integration.

Figure 1 illustrates the graphical representation of the interaction between the gender and care regimes based on Model D, showing that in *familialised* and *supported familial-*

**Table 4** OLS regressions of predictors of social integration among Europeans aged 50+ ( $N=58,235$ )

Variables	Model A	Model B	Model C	Model D
	$\beta$	$\beta$	$\beta$	$\beta$
<b>Gender</b> (female)	-0.078***	-0.074***	-0.077***	-0.025***
<b>Care regimes</b>				
(Reference: Familialised)				
Supported familialism		0.124***	0.123***	-0.015**
Mixed		0.207***	0.207***	0.075***
De-familialised		0.182***	0.184***	0.069***
<b>Interactions</b>				
Supported familialism*female			0.016**	0.024***
Mixed*female			0.035***	0.039***
De-familialised*female			0.039***	0.033***
<b>Covariates</b>				
Age				-0.241***
Number of children				0.171***
Financial capacity				0.210***
Education				0.083***
Employment status (employed)				-0.165***
Mobility limitations				-0.101
Depressive symptoms				-0.066***
Self-rated health				0.039***
Alcohol use				0.131***
BMI				-0.004
Urban vs. rural residence				-0.007
R-squared	0.005	0.044	0.045	0.189

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



**Fig. 1** Gender and care regimes interaction

*ism* regimes, men were more socially integrated than women. However, the gender gap is more pronounced in the *familialised* regime. In the *mixed* regime, there were almost no gender differences in social integration. Conversely, in *de-familialised* regimes, the differences between men and women reversed, with women being more integrated than men.

To ensure the robustness of our findings, we conducted additional analyses using probit models (Available upon request). These analyses yielded results consistent with those obtained from the multivariate linear regression models, reinforcing the reliability of our conclusions.

## 4 Discussion

In this study, we aimed to investigate the social integration of older adults across European regimes using the Social Integration Index established by Berkman (1978) and Berkman and Syme (1979). Our findings provide significant insights into how care regimes can shape gendered patterns of social integration among older adults. During times of rapid socio-demographic change across Europe's aging societies, maintaining social integration throughout the life course is crucial for aging well. However, there are significant social inequalities in the resources available for social participation and integration, not only between different socio-economic groups but also between genders and care regimes. By adapting the index to a comparative setting across Europe, we have demonstrated not only

the methodological value of the Social Integration Index for international studies but also its utility in exploring these complex interrelations.

The study findings support all of our hypotheses. First, as per our first hypothesis, the findings revealed a consistent gender gap in social integration, with women being less integrated than men. As previously noted, while women typically have broader and deeper social connections than men throughout their lives (Fischer & Beresford, 2015; Schwartz & Litwin, 2018), this advantage does not always manifest in greater social engagement. The few studies focusing on social integration and controlling for gender have shown that women tend to be less socially engaged (Banks et al., 2011; Berkman et al., 2004; Ertel et al., 2008). Our examination of social integration between men and women reinforces this idea and highlights this clear social disparity; Despite their substantial potential for building relationships throughout their lives, women generally experience lower levels of social integration in old age. We hypothesize that this finding reflects a social phenomenon where older women are encouraged to invest their time in family roles. As a result, this may limit their availability and opportunities to engage in social activities and seek relationships outside the family, as will be demonstrated in our third interaction hypothesis.

It is crucial, however, to account for additional structural dimensions in the Social Integration Index. For instance, given that women tend to outlive their partners (e.g. Zarulli et al., 2018), and partnership status is one of the indicators of social integration, it could be argued that lower integration among older women is a demographic inevitability rather than a social phenomenon. However, while widowhood may partially explain gender differences, it does not negate the broader reality that older women experience lower levels of social integration across multiple dimensions, including weaker social networks and reduced participation in formal and informal social activities. This reinforces the need to view integration not merely as an outcome of life-course transitions but as a socially structured phenomenon.

Second, our analysis revealed that social integration is linked to care regimes, with people living in familialised care regimes having the lowest levels of social integration and those living in de-familialised care regimes being most socially integrated, which supports our second hypothesis. In other words, older adults residing in de-familialised regimes, where state-provided care services are more prevalent and the reliance on family for care is minimized, exhibited higher levels of social integration. This may imply that when older adults are less burdened by extensive caregiving responsibilities, they have increased opportunities and resources to participate in social activities, thereby enhancing their social integration. Conversely, those in familialised regimes, where family members are expected to provide most of the care, showed the lowest levels of social integration. It supports the argument that welfare policies promoting individual independence from family care can enhance social relations by providing older adults with the necessary support to engage in diverse activities (Saraceno & Keck, 2011).

It is important to note that our analysis compares care regimes rather than individual countries. Care regimes encompass diverse national policies, institutional structures, and cultural norms that shape social integration in distinct ways. These variations may influence both the experience of integration and access to social resources across different populations. Future analyses using the Social Integration Index should take these structural differences into account to ensure that cross-national comparisons adequately reflect the contextual factors shaping social connectedness in later life.

Third, in accordance with our last hypothesis, the interaction effects between gender and care regimes provide deeper insights into the dynamics of social integration. In more familialised regimes, the gender gap in social integration was more pronounced, with men being more integrated than women. This disparity can be attributed to the heavier caregiving burdens placed on women in these regimes, limiting their opportunities for meaningful and sustained social connectedness. Women tend to assume more intense family care responsibilities throughout their lives, particularly in later life, resulting in fewer resources to invest in social relationships. Conversely, in de-familialised regimes, where state support is robust, women were found to be more socially integrated than men. This reversal may indicate that in environments where women receive adequate support to balance caregiving with other activities, they can achieve higher levels of social integration. This interpretation does not suggest that family ties inherently hinder social integration. Rather, we refer to caregiving responsibilities—such as providing care for a spouse, elderly parent, or grandchildren—that are often disproportionately placed on women in familialist welfare care regimes. These responsibilities can significantly constrain individuals' time and energy, thereby limiting their ability to engage in a wide range of social relationships. As such, traditional gender roles may restrict overall social integration—both in close relationships (with family and friends) and in broader community engagement—by reducing opportunities for diverse and meaningful social involvement, as reflected in the Social Integration Index.

These findings highlight the crucial role of state support in mitigating the negative impact of traditional gender roles on women's social integration, and are consistent with previous research that analyzed the role of culture (Litwin, 2010), welfare state services (Hansen & Slagsvold, 2016; Rostila et al., 2015), and care policies (Bordone et al., 2017; Hank & Buber, 2009; Herlofson & Brandt, 2020; Kalmijn & Saraceno, 2008; Wagner & Brandt, 2018) on outcomes related to social integration, such as well-being, loneliness, and health. It is the intersection between gender and welfare state that significantly impacts the social integration of older women, irrespective of other differential socio-economic resources which were accounted for.

#### 4.1 Implications

Our research underscores the necessity of developing nuanced policies that facilitate social integration, especially among older women in family-oriented care regimes. Policies that support families, such as providing assistance with children in the afternoons and during vacations to replace grandmothers aiding their grandchildren, could assist older women in easing their family responsibilities. Offering public childcare to employed mothers, particularly those in low-income families or those working non-standard hours, as well as providing respite care and flexible working arrangements, may help not only the mothers but also alleviate the constraints of caregiving responsibilities on older women within families and promote social integration. Moreover, fostering community-based programs that encourage social participation among older adults can be advantageous in establishing new cultural norms in family-oriented countries. Such programs may involve neighbourhood-based social groups tailored to shared interests, fostering engagement and connection. Additionally, practitioners working with older adults can encourage volunteerism and develop structured opportunities for later-life volunteering, such as roles in healthcare, education, or other community initiatives. Our findings show that it is also essential to consider dimensions of

social inequality, such as financial constraints and health limitations, which often intersect with gender. Women, in particular, may face greater economic insecurity in later life due to lower lifetime earnings and pension gaps (Rowold et al., 2024), limiting their ability to engage in social life. Health disparities further exacerbate these challenges, as women are more likely to experience chronic conditions and reduced mental health (Schmitz & Lazerevič, 2020) that can hinder active engagement. Addressing these inequalities through accessible and inclusive programs can ensure that opportunities for social participation are available to all older adults, regardless of their financial or health status.

## 4.2 Limitations

Every study comes with limitations. First, the current paper has applied linear regression models, although these models typically require data at the interval scale level. The social integration index has only four distinct categories, which would normally require a non-linear model for ordinal scale data. We adhered to the linear model because of its easier interpretation, but also included an ordered probit model as a robustness analysis, which yielded similar results. Second, as noted, in adapting the social integration index from Berkman and Syme (1979) to the European context, a modification was necessary. While the original index uses the number of church visits (which was an appropriate measure of social integration in the 1970s United States), our index uses voluntary or charity work instead, adaptation that became necessary due to data availability in SHARE. Third, a common criticism when applying concepts, methods, or in our case, an index developed in a single country to countries with different cultural backgrounds, is ethnocentrism (Keith, 2019). Being developed in the United States, the index is based on how social integration is envisaged in that country. In some sense, it assumes that having ties outside the family (in addition to close family ties) is preferable. However, we argue that research has clearly shown that it is indeed beneficial to have bonds outside the family, and to have both close and loose ties, since people scoring high on this social integration index are typically healthier and live longer.

## 4.3 Future Research Directions

This study opens several avenues for future research. First, the current study can't make causal claims; there is a need to explore the causal mechanisms underlying the observed relationships in order to better understand what are the exact services and goods that are the most effective in achieving the social integration of older citizens. In addition, longitudinal studies could provide deeper insights into how changes in welfare policies impact social integration over time. Finally, examining the role of other socio-cultural factors, such as social norms and community structures, could offer a more nuanced understanding of social integration in different contexts. The social integration index offers numerous possibilities for future research in cross-country comparative studies using the SHARE data.

## 5 Conclusion

The current study introduces the Social Integration Index for use in European countries, establishing a comprehensive measure to compare social integration among older adults across different countries. We demonstrated the utility of this measurement across various care regimes and between genders. Our findings indicate that gender and care regimes significantly influence social integration among older adults in Europe, underscoring the need for policies that support social participation and reduce caregiving burdens, particularly for women. Although our cross-sectional approach with a condensed indicator across broad care regimes does not allow for analysis of causal relationships, the observed correlations provide valuable insights for evidence-based policy advice. Specifically, the more de-familialised a welfare state, the higher the social integration of both men and women, and the smaller the gender gaps in social integration. Our results highlight the importance of developing context-sensitive policies that promote social integration.

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**Data Availability** This study is based on data from the Survey of Health, Ageing and Retirement in Europe (SHARE). The SHARE data are publicly available for research purposes upon registration via the SHARE Research Data Center at <http://www.share-project.org>.

## Declarations

**Conflict of Interest** The authors declare that they have no conflict of interest.

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