Material Deprivation of Older Persons in Europe: a Multi-level Analysis of the Role of Social Protection Programmes

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Abstract

The focus of this article is on the role of welfare state arrangements on the material deprivation of older persons: we ask to what extent the social protection programmes mitigate the risk of material deprivation in old age. We use cross-sectional data from Wave 5 of the Survey of Health, Ageing and Retirement in Europe and the Material Deprivation Index to assess the associations between the material deprivation of older persons and a set of macro indicators which characterise the social protection programmes relevant for older persons. The findings show that higher old age and disability pensions, and greater expenditures for healthcare, housing and social exclusion are associated with lower risk of material deprivation of older persons. The study contributes to the still limited literature on the effects of institutional macro drivers, such as social protection expenditures, on the material deprivation of older persons in a cross-national perspective.

Keywords: material deprivation, social protection, older persons, multi-level analysis, Survey of Health, Ageing and Retirement in Europe.

Introduction

Over the last decade, there has been a significant increase in the analytical scrutiny of material deprivation. Among others, the Europe 2020 strategy (European Commission, 2010) and its social inclusion targets have given impetus to this scholarly development (e.g. Guio et al., 2016; Israel & Spannagel, 2019; Łuczak & Kalinowski, 2020). However, there are still relatively few studies which specifically investigate the material deprivation of older persons. One reason for this modest research attention may be the fact that compared to other age groups, the rate of the material deprivation of older persons has been generally lower in Europe. According to Eurostat data, the EU27 average share of 65+ population in material and social deprivation was 10.2% in 2024, compared to 12.2% for the 18–64 age group, and 13.7% for children less than 18 years.[1] However, the cross-country variation in the material and social deprivation rate of older persons in 2024 (from 2.1% in Luxembourg to 36.1% in Bulgaria) considerably exceeds the respective variation among active age and child populations (Eurostat, 2025). This observation appears to suggest that the welfare state may have a much larger role in buffering the risk of the material deprivation of older persons compared to those in other age groups.

Previous studies focusing on the material deprivation of older persons have mostly examined the links between individual and household characteristics and the risk of material deprivation (e.g., Bartlett, Frew & Gilroy, 2013; Hunkler et al., 2015). Sumil-Laanemaa et al. (2021), using the data of the Survey of Health, Ageing and Retirement in Europe (SHARE) and the SHARE-based Material Deprivation Index (MDI), analysed associations between individual socio-demographic risk factors (sex, age, education, household size and socio-economic status) and material deprivation among older persons, as well as the variation of these associations between regions with different welfare regimes. They noted a marked variation in material deprivation among the population aged 50 years and older across welfare clusters in Europe, with relatively high MDI levels in the Eastern and Southern clusters, and lower levels in the Northern and Western clusters. This finding also suggests that welfare arrangements play an important role in respect of material deprivation in later life.

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1 Source: Eurostat (ilc_mdsd07).

In the current article, we study the role of social protection programmes in modulating the material deprivation risk in old age using SHARE Wave 5 data from 14 countries, and the SHARE-based MDI. In particular, employing multilevel models, we investigate the associations between the generosity of social protection programmes and the risk of material deprivation in older age. The study contributes to the still-limited literature on the effects of institutional macro drivers, such as social protection expenditures, on the material deprivation of older persons in a cross-national perspective.

In a broader view, this study is guided by the notion that individual life outcomes in different domains, including inequalities, are largely shaped by institutional factors (e.g. Mayer, 2004; Lindemann & Saar, 2014).

Theoretical perspectives and earlier findings

Conceptualising material deprivation in older age

Material deprivation is generally conceptualised as a capacity failure leading to effective economic hardship and limited access to basic goods and services (Guio et al., 2020). Whereas material deprivation at times is contrasted against income-based poverty (e.g., Renahy et al., 2012), other authors regard the two concepts as complementary, as both capture failures to meet the needs of individuals at socially acceptable levels, albeit from different angles (Łuczak & Kalinowski, 2020). Notably, material deprivation is operationalised as a lack of affordability, inability to attain a particular level of functioning or possession due to a lack of financial resources, rather than due to personal choice or lifestyle preferences. In turn, financial distress is a key component of the quality of life of older persons (see e.g., Sakkeus, Saar & Rudissaar, 2023).

The interplay between material deprivation and income is not straightforward. Current income is one of many financial *resources,* while material deprivation refers to *actual achieved functioning* (Notten & Guio, 2020). Current disposable income may come from different sources, the main categories being work earnings, capital income and social transfers. While income is a necessary resource to purchase goods and services captured by the notion of material deprivation, other resources play a role either in supplementing or substituting current income (e.g., loans, savings, other assets which can be converted into cash, self-production, etc.), or moderating the conversion of income into the basket of goods and services. Notten and Guio (2020) also outline the role of conversion factors, such as personal skills, family support or other capacities, to transform available resources into achieved functioning. They also point out that the characteristics of state social protection systems may affect the relative importance of income for material deprivation. Public services which are provided free of charge or at a reduced price can be expected to reduce material deprivation by lowering the out-of-pocket household costs of services. Notten and Guio (2020) further suggest that social protection systems with a higher degree of decommodification – referring to the notion applied by Esping-Andersen (1990) – weaken the link between income and material deprivation. In a similar vein, Israel (2016) identified two main mechanisms that reduce deprivation, but do not directly impact disposable income: the provision of services which increase the purchasing power of households, and informal support from networks. This implies that social transfers are not the sole mechanism that can lift people out of deprivation.

The complexity in the relationship between income and material deprivation is important when attempting to interpret the role of social transfers (as a source of income) on material deprivation (as achieved functioning). While it is to be expected that social transfer programmes modulate the risk of material deprivation, the effect may depend on several confounding factors.

Regarding the operationalisation of material deprivation measurements, there is a growing consensus that the indicators of material deprivation are to be tailored to a specific age group. Such age-specific adjustments in measurement are motivated by several factors. On one hand, individual and household needs vary by age, as well as what may be considered a socially acceptable

level of functioning. On the other hand, the conditions shaping material wellbeing are also age-group specific. These factors warrant modifications to the material deprivation measurements to reflect the differing life circumstances, necessities and underlying causes of deprivation across age groups. The age-group specific approach towards material deprivation measurement, differentiating between children, working-age adults and pensioners has been analysed, for example, by McKnight et al. (2024) and the Department for Work and Pensions (2025). Bárcena-Martín et al. (2017) and Guio et al. (2020) have suggested adjustments to material deprivation indicators for children, while Adena, Myck and Oczkowska (2015) have applied modifications to measure material deprivation in older age. Myck et al. (2017) point out that the material conditions of older people are to a larger extent determined by the level of assets accumulated over their life course (in particular, housing and pension wealth), as well as by health and disability. Along the same lines, Dudek and Szczesny (2021) note that the lower material deprivation rates of older persons compared to younger age groups may, among others, relate to the fact that older persons on average have accumulated more resources during their lifetime, while on the other hand, their lower material needs and better budgeting skills may also be contributing factors.

Empirical studies of the drivers of material deprivation

In the past two decades there has been a noticeable increase in research on material deprivation and its determinants. The scholarly interest in material deprivation has been motivated by wide recognition of the multidimensional nature of poverty (Chakravarty & D'Ambrosio, 2006; Nolan & Whelan, 2010; Ayala, Jurado & Pérez-Mayo, 2011). This means that individuals with similar incomes may experience different levels of material hardship due to variation in accumulated resources, individual and household characteristics, social benefits, public services, and other factors. In the European Union, research into material deprivation gained additional relevance due to the inclusion of deprivation among the key indicators to monitor progress towards the poverty reduction target defined in the Europe 2020 strategy (Notten & Guio, 2020).

Much of earlier research on material deprivation focused on the role of individual and household characteristics as risk factors of deprivation (e.g., Tsakloglou & Papadopoulus, 2002; Muffels & Fouarge, 2004; Halleröd et al., 2006; Graaf-Zijl & Nolan, 2011; Atkinson & Marlier, 2010; Berthoud & Brian, 2011; De Neuborg et al., 2012). These studies revealed that a number of individual and household characteristics relate in a significant manner to material deprivation, with low education, low household income, unemployment, inactivity, poor health, lone parenthood, large number of dependent children, and migrant status being associated with elevated odds of deprivation. Studies comparing the effects of individual and household characteristics in different settings found that the relationship varies across countries and welfare regimes (Layte et al., 2001; Whelan et al., 2001; Figari, 2012; Sumil-Laanemaa et al., 2021). The latter findings highlighted the importance of macro-level factors in shaping the deprivation outcomes.

Early studies identified the effects of macro-level factors on material deprivation by estimating separate models classified by country or type of welfare regime (e.g., Gough et al., 1997; Lødemel, 1997). In more recent literature, multilevel models have become the main analytical tool for identifying the effects of macro and micro level factors on deprivation (e.g. Nelson, 2012; Whelan & Maître, 2013; Visser, Gesthuizen & Scheepers, 2014; Verbunt & Guio, 2019; Belau, 2024). These models partition the variation in the dependent variable into components associated with individual and household and country-level factors, elucidating their roles in shaping deprivation outcomes (Snijders & Bosker, 1999). Furthermore, multilevel models adequately estimate the parameter effects of higher-level factors, thus reducing the risk of rejecting the hypothesis of no relationship when the lack of association is in fact true. In Europe, empirical studies of macro-level drivers of material deprivation are mostly based on EU Statistics on Income and Living Conditions (Eurostat, 2022).

The selection of macro-level drivers of material deprivation examined depends on the research questions of the study. In this article, we focus on macro drivers that capture welfare state arrangements. As modern welfare states developed, the provision of protection against social risks shifted from the private sphere to public policy instruments. Therefore, it is to be expected that the

amount of total social spending (measured in terms of the percentage of GDP or expenditures per capita) is inversely related to material deprivation. Empirical results indeed almost unequivocally suggest that in countries where social expenditures are higher, the levels of deprivation tend to be lower (Nelson, 2012; Whelan & Maître, 2012; Visser, Gesthuizen & Scheepers, 2014; Bárcena-Martín et al., 2014, 2017; Saltkiel & Malmberg-Heimonen, 2019; Verbunt & Guio, 2019; Guio et al., 2020).

The role of social spending in mitigating deprivation is also evident in the subset of studies that have used cross-level interactions of the amounts of social expenditure with household and individual characteristics (Visser, Gesthuizen & Scheepers, 2014; Bárcena-Martín et al., 2014; Saltkiel & Malmberg-Heimonen, 2019). The results of these studies indicate that the inverse association with social expenditures is more pronounced among disadvantaged groups of the population, such as individuals with low educational attainment, long-standing health problems, or people in households with low income. In addition, the findings suggest that differences in material deprivation between disadvantaged and advantaged groups tend to be smaller in societies that invest more resources in social protection. This supports the notion that generous welfare states are more successful in reaching the groups at risk of material deprivation, hence reducing social inequalities.

Studies focusing on the relationship between overall social spending and material deprivation have, however, an important limitation, which arises from the fact that total spending is an aggregate of a range of social protection programmes related to unemployment, children, families, healthcare, disability, old age, housing, and social exclusion, the impact of which on deprivation may vary. To provide insight into the role of different programmes, researchers have examined the association of material deprivation with programme-specific expenditures. The picture that emerges from these studies is more nuanced than that for total spending. For instance, when comparing the effects of social programmes among the working-age population, Nelson (2012) found a significant inverse association of material deprivation with social assistance benefits, but not with expenditures related to active labour market policy and education. Israel and Spannagel (2018) reported that higher levels of social assistance and healthcare spending are related to significantly lower deprivation risks, while family and unemployment benefits are not. Regarding child deprivation, Bárcena-Martín et al. (2017) observed that the most effective social benefits are not those specifically targeted at children (child and family benefits), but sickness/disability and unemployment benefits. However, by contrast, Guio et al. (2020) found that social spending targeting families is related to lower child deprivation intensity.

The findings discussed above indicate that the links between material deprivation and social protection programmes are not uniform. The literature offers several explanations as to why the results vary across studies. First, social policy measures used in deprivation studies differ in how the levels of benefits and services (adequacy) and the effective population coverage is reflected (Israel and Spannagel, 2019). For example, social benefits expressed in purchasing power standards (PPS) per beneficiary explain differences in deprivation intensity more effectively than measures expressed as a percentage of GDP (Guio et al., 2020). The latter captures the relative size of benefits within the economy, whereas the former measures more directly their contribution to living standards. Further, Bárcena-Martín et al. (2014) explain differences in the effects of social programmes by the fact that policy instruments are rarely used in isolation. Therefore, the effect of a single benefit may be influenced by its combination with other policy instruments. Finally, the effect of social expenditure variables may also depend on the control variables included in the models. Verbunt and Guio (2019) found a negative relationship between deprivation and in-kind social spending, while the association with in-cash benefits appeared marginal. The authors explain the weaker performance of cash benefits on the basis of model specification: the models controlled for median household income, which also included in-cash benefits. In a similar vein, Guio et al. (2020) observed that cash transfers play a significant role only when household incomes at the micro level were excluded from the model. When household incomes were added to the model, spending on cash transfers played only a limited role.

Another important question that comparative studies of material deprivation seek to answer relates to the amount of between-country variation in deprivation explained by macro-level

factors. The results obtained from multilevel analyses show that, together with macro-economic factors, institutional factors related to welfare states are more important in explaining differences in material deprivation between countries than individual and household characteristics (Nelson, 2012; Visser, Gesthuizen & Scheepers, 2014; Bárcena-Martin et al., 2014, 2017; Verbunt & Guio, 2019). Furthermore, Whelan and Maître (2012) demonstrated that differences in deprivation related to welfare regimes can be largely accounted for by country-level variables and their interactions with individual and household characteristics. To sum up, these results suggest that welfare state arrangements are a major source of differences in the risk of material deprivation.

Although the age-specific nature of material deprivation is widely recognised, research on the role of macro-level factors has concentrated mostly on the working-age population, and to a lesser extent on children. In this context, very few studies have examined older age groups. Jehoel-Gijsbergs and Vrooman (2008), based on EU-SILC data on persons aged 55 and over, found that only a small part of the variation in social exclusion between countries can be attributed to differences in the composition of the population. The largest part of the variation was associated with differences in household income levels. Further, differences in GDP per capita, social spending per capita, life expectancy and income inequality explained only a smaller part of the between-country variation; the latter country trait had the highest contribution to the social exclusion of older persons. Combining material deprivation with social rights in the dependent variable, however, limits the relevance of these results in the context of deprivation research.

In another study, drawing on data from SHARE, Najsztub, Bonfatti and Duda (2015) examined the link between welfare state programmes (total government social protection spending, public pension spending, housing and social exclusion spending, and public healthcare spending, all measured in terms of percentage of GDP) and macro-economic indicators (gross national income per capita and Gini coefficient). In regard to welfare state programmes, the authors found stronger associations of material deprivation with total social protection, housing and social exclusion, and public healthcare expenditures, whereas the relationship with pension spending was weaker. However, due to its methods of analysis (bivariate correlations), the study is seriously limited. In this article, we extend existing research by taking advantage of the SHARE Material Deprivation Index developed specifically for older age groups, and use multilevel techniques to model the relationship between material deprivation, on the one hand, and welfare state programmes, on the other.

Research questions and hypotheses

Our main scholarly interest in this article lies with the ways in which the cross-national differences in material deprivation of older persons may be related to the prevailing institutional arrangements of the welfare state. As modern welfare states emerged, social security arrangements related to old age shifted from the private sphere to public policy instruments. Consequently, older people rely heavily on the welfare state to protect them from material deprivation. Evidence suggests that in countries with lower social spending, people are at greater risk of being materially deprived (Kenworthy, Epstein & Duerr, 2011; Nelson, 2012; Bárcena-Martín et al., 2014; Saltkjel & Malmberg-Heimonen, 2017). Building on these insights, we investigate associations between domain-specific welfare arrangements and the material deprivation of older persons in European countries.

Our *first research question* asks: What is the association between material deprivation and the generosity of the various social programmes deemed relevant for the economic wellbeing of older persons? Guided by research reviewed in the previous section, we expect to find that more generous domain-specific social programmes (old age, disability, health, housing and social exclusion benefits) are associated with lower levels of material deprivation risk among the older (65+) population (hypothesis H1). We also examine whether our results remain unaltered when the influence of various social programmes is considered jointly. Since social protection programmes are generally not developed and implemented in isolation from each other, we anticipate that the joint consideration reduces the estimated effect sizes of single social programmes (hypothesis H2).

Our *second research question* asks: To what extent do the differences in the generosity of social programmes contribute to the variation in the material deprivation of older persons between geographical regions? Based on previous studies, our assertion is that contextual differences in the generosity of social programmes account for a much larger share of cross-country variation in deprivation than differences in population composition in relation to individual and household characteristics such as gender, age, education, labour market status, health, etc., and household income (hypothesis H3).

Data, variables and methods

The data used in this study come from the Survey of Health, Ageing and Retirement in Europe (SHARE). The survey produces internationally comparable cross-sectional and longitudinal data on a wide range of issues related to ageing and its effects on individuals in different societal contexts, with a main focus on health, socio-economic circumstances, and social networks. In SHARE, individuals aged 50 years or older, as well as their partners, are interviewed face-to-face using computer-assisted personal interviewing.

We use data from the SHARE Wave 5, which was carried out in 2013 (Börsch-Supan et al., 2013), and is the only wave that provides information for the construction of the Material Deprivation Index (MDI).[2] The MDI is based on eleven items that refer to a household's (in)ability to meet basic needs and resolve financial difficulties (Bertoni et al., 2015). Basic needs are operationalised by the ability to: (1) have meat, fish or chicken; and (2) fruits or vegetables, in the diet at least three times a week; (3) purchase necessary groceries and household supplies; (4) pay for adequate heating; (5) replace worn-out shoes; and (6) clothes; (7) purchase new glasses when needed; and (8) see a doctor; and (9) dentist. Items related to financial difficulties include the inability to afford: (10) a week-long holiday; and (11) to pay unexpected expenses without borrowing.[3] For goods and services, the respondents could indicate whether not purchasing them was related to financial or other reasons. The majority (9 out of 11) of the deprivation items refer to difficulties in meeting basic needs, whereas two items relate to unexpected needs and social participation. The MDI does not explicitly differentiate between individual-level and household-level deprivation items, although 4 out of the 11 deprivation items refer to the household-level needs while the remaining 7 items cover individual-level needs. Compared with material deprivation indicators employed in the EU-SILC, the SHARE MDI does not consider the ability to afford consumer durables such as cars, furniture and similar items. Instead, the MDI concentrates more on basic needs. Arguably, this makes the MDI more suitable for measuring material deprivation among older persons (Adena, Myck & Oczkowska, 2015).

The material deprivation items were operationalised by means of binary variables. The MDI was computed as the weighted sum of these variables. The resulting MDI yields a score between 0 and 1 (for additional information on weighting schemes and the Index, see Bertoni et al., 2015). For the purpose of this study, a binary dependent variable is constructed on the basis of the MDI, which is set at 1 if the respondent scored higher than zero on material deprivation, and 0 otherwise. This means that respondents are classified as deprived as soon as they report an inability to afford one of the eleven items that the MDI measure is based on.

In investigating the factors that influence material deprivation, we focus on persons aged 65 and older, because we are particularly interested in the role of social protection programmes in shaping the material deprivation risk in old age. Overall, the SHARE Wave 5 dataset consists of 31,487 respondents of 65 years of age or older. Prior to the analysis, people with missing values on the dependent variable (3.9%) were removed from the data. Our working sample contains 30,269 individuals living in Denmark, Sweden, the Netherlands, Italy, Spain, Estonia, Slovenia, Czech

2 SHARE Release Guide 9.0.0 (2024), page 63. See: https://share-eric.eu/fileadmin/user_upload/Release_Guides/SHARE_release_guide_9-0-0.pdf

3 For details on questionnaire design see Myck, Oczkowska & Duda (2015) and Adena, Myck & Oczkowska (2015).

Republic, Belgium, France, Germany, Austria, Switzerland, and Luxembourg.[4]

Earlier studies that have investigated the impact of welfare state arrangements on material deprivation have commonly applied social spending as a percentage of GDP, either in total (e.g., Whelan & Maître, 2012; Bárcena-Martín et al., 2014) or by branch (e.g., Kis, Özdemir & Ward, 2015; Najsztub, Bonfatti & Duda, 2015; Israel & Spannagel, 2019). Nelson (2012) points out that beyond reflecting differences in social policy, the size of social spending is also affected by the business cycle and the population structure. To address the differences in the population structure, the average expenditure per beneficiary can be used instead of expenditure as a percentage of GDP. Guio et al. (2020) note that while gross public spending has been commonly used in analyses of welfare states, national differences in taxation may also alter the picture. This can be addressed by using the data on net social spending, available for all EU countries from 2010 onwards. Kis, Özdemir and Ward (2015) caution that public spending on healthcare may not be the best explanatory variable in countries where out-of-pocket payments form a large share of health expenditures. This can be addressed by including the total spending on healthcare in the analysis.

To capture the level of economic affluence, the usual practice in the literature has been to use GDP per capita in purchasing power parities (PPP). Kis, Özdemir and Ward (2015) point out that as the material deprivation rate differentiates between affordable and non-affordable goods, it may be expected that macro indicators which reflect the wealth of countries and their distribution are associated with the material deprivation rates of these countries.

The independent variables of main interest in this study characterise the generosity of social protection programmes which, as revealed by studies reviewed earlier in the article, play an important role in shaping differences in the material deprivation risks across countries. More specifically, to characterise the generosity of social protection programmes, we use four country-level variables – net old age pensions per beneficiary in PPP, net disability pensions per beneficiary in PPP, total healthcare expenditures as a percentage of GDP, and expenditures for social exclusion and housing as a percentage of GDP.

Old age and disability pensions protect individuals against the risks linked to old age and the loss or decrease of work ability, respectively. Old age pensions provide either income replacement for those who have retired from earlier employment, or income maintenance after retirement age. Disability pensions provide income replacement or income maintenance to persons below the retirement age whose ability to work is impaired beyond a certain level laid down by legislation. To characterise the generosity of old age and disability pension programmes, we opt for average benefits per beneficiary, since these indicators are not confounded by differences in the proportion of recipients among the population. To account for variation in taxation and cost of living, we use the net expenditures on pensions adjusted to differences in purchasing power; the net expenditures are divided by the number of pension recipients.[5] Finally, to facilitate the interpretation of the regression coefficients, the amount of benefits is divided by 1000.

To characterise the generosity of health care programmes, we use health care expenditures measured as a percentage of GDP.[6] More specifically, we opt for total expenditures, which cover both public and private expenditures. It is generally established that the *per capita* spending on healthcare is substantially higher for individuals aged 65 and older than for younger individuals (e.g., Papanicolas et al., 2020). However, comparative data on *per capita* health expenditure by age for all SHARE countries was not available to give a more precise measure of healthcare generosity.

4 The fifth wave of SHARE also had data on Israel. However, as our research focus is on Europe, Israel is not included in the analysis.

5 The data are derived from Eurostat database tables "spr_net_ben" and "spr_pns_ben". According to the ESSPROS methodology (European Commission, 2022), the old age function effectively includes three categories of benefits: old-age pension, anticipated old-age pension and partial pension. The disability function includes two categories of benefits: disability pension and early retirement benefit due to reduced capacity to work. According to ESSPROS, disability pensions paid to beneficiaries over the retirement age are recorded under old age pensions.

6 The data are derived from the OECD health statistics database (OECD, 2023).

Housing and social exclusion programmes are designed to support housing costs and provide subsistence allowances to households when other income maintenance schemes have not proved sufficient. Housing and social exclusion programmes explicitly target groups which are at greater risk of social exclusion and deprivation (European Commission, 2019). Similar to the case of healthcare programmes, in this study, the generosity of housing and social exclusion programmes is measured by the percentage of GDP allocated to them.

To more precisely identify the association between the generosity of social programmes and material deprivation risk, we use two country-level control variables – GDP per capita measured in PPP, and the income quintile share ratio (S80/S20) in the age group 65+.[7] These two contextual variables are included as controls for between-country differences in economic affluence and income inequality, which may potentially confound the relationship between material deprivation and our main independent variables. It has been demonstrated (e.g., Scharpf, 1997; Goudswaard & van Riel, 2008) that the more affluent European countries (measured by GDP per capita) have proportionately higher total public social expenditures than less affluent countries, indicating that the relative size of welfare state programmes generally increases as countries become more affluent. However, the association may not apply for different social programmes. We also control for the impact of income inequality, as some earlier studies have established a positive association between income inequality and material deprivation (Calvert & Nolan, 2012; Nolan & Whelan, 2014). As income inequality likely depends on benefit levels, it could be considered a potential mediator. Adding it to the model, the result would show the direct effect of social programmes, excluding the indirect effect operating through income inequality.

Table 1 shows the values of our contextual variables, and information derived from Eurostat database for the year 2013. The data show that the generosity of social programmes varies considerably between countries. Even after adjusting for differences in taxation and purchasing power, old age pension benefits in the more affluent countries in our study exceed those in less affluent countries up to six times. In relative terms, even larger contrasts can be observed in the share of GDP allocated to housing and social exclusion programmes, as well as in disability pensions.

Table 1. Descriptive statistics of country-level variables, SHARE countries, 2013

Country	Net old age pensions per beneficiary, 1000 euros PPP	Net disability pensions per beneficiary, 1000 euros PPP	Total health care expenditures, % GDP	Housing and social exclusion expenditures, % GDP	GDP per capita, 1000 euros PPP	Income quintile ratio, age group 65+
Austria	18.5	21.7	10.3	0.6	34.6	4.1
Belgium	18.3	13.2	10.6	1.0	31.5	3.1
Czech Republic	5.6	5.3	7.8	0.6	22.0	2.4
Denmark	20.4	50.4	10.2	2.2	26.8	3.0
Estonia	3.9	3.4	6.0	0.1	19.9	3.1
France	15.4	17.1	11.4	1.7	28.5	4.3
Germany	11.6	26.5	10.9	0.8	32.5	3.8
Italy	14.5	18.3	8.8	0.2	26.0	4.4

7 S80/S20 is calculated as the ratio of total income received by 20% of the population aged 65+ with the highest income (the top quintile) to that received by 20% of the same population with the lowest income (the bottom quintile). All incomes are compiled as equivalised disposable incomes.

Luxembourg	24.1	62.0	5.5	0.8	68.7	4.1
The Netherlands	15.6	81.7	10.6	1.9	35.5	3.2
Slovenia	7.4	15.8	6.4	0.7	24.4	3.6
Spain	14.5	16.2	9.0	0.3	23.4	4.5
Sweden	20.6	37.7	10.9	1.2	26.0	3.4
Switzerland	19.3	29.6	11.3	0.6	43.4	4.5

Source: Eurostat database (2023)

To account for variation in material deprivation risks at the individual level, we use socio-demographic variables, which have been identified in previous studies as significant factors related to the risk of material deprivation among older persons (Jehoel-Gijsbers & Vrooman, 2008; Sumil-Laanemaa et al., 2021). Our set of socio-demographic variables includes gender, age group, living arrangements, number of children, education, labour market status, number of chronic diseases, prevalence of limitations in daily activities,[8] area of residence, nativity, and net household wealth divided by the square root of the household members (OECD, 2008). Table 2 shows the percentage distributions of individual and household-level variables in the countries included in our study.

To investigate the association between the generosity of social programmes and the risk of material deprivation, we employ multilevel models. This approach allows us to take into account that observations on the micro level (individuals) are nested in macro-level units (countries). As a result, individuals from the same macro-level units may resemble each other more in respect to deprivation than individuals who live in different units. Ignoring such intra-cluster correlation would lead to an overestimation of the effects of contextual variables. The number of countries in the SHARE Wave 5 is fairly small. Elff et al. (2021) suggest that multilevel models with only a few categories in the grouping variable can be used with a restricted maximum likelihood estimator (REML). We therefore opt for a linear regression with binary dependent variable, also known as a linear probability model (see also Mood, 2010), and fit the mixed effects linear regression using an REML estimator. For model fitting, we use Stata's 'mixed' command which offers methods for small-sample inference, also known as denominator-degrees-of-freedom adjustments. From the available options we use the Satterthwaite method for such adjustments.

In the next section, we present estimates from a series of multilevel regression models with country-level random effects. We begin with the null model with no explanatory variables included. At each of the following steps, we add individual-level variables and the net household wealth to account for variations in these characteristics. Further, our main independent variables, which characterise the generosity of various social programmes, are included in a stepwise procedure. Finally, we add macro-level variables to control for differences between countries in economic affluence and income inequality.

8 Global Activity Limitation Index (GALI) as validated by Jagger et al. (2010).

Table 2. Descriptive statistics (%) of individual-level variables for the 65+ population, SHARE countries, 2013

Variables	AT	BE	CH	CZ	DE	DK	EE	ES	FR	IT	LU	NL	SE	SI
Individual- and household-level variables														
Gender														
Female	56.3	54.5	51.2	57.5	49.7	51.8	61.0	53.2	57.7	52.1	49.0	52.2	52.4	57.7
Age group														
Age 65–79	80.3	75.1	79.5	83.3	80.9	80.0	76.4	69.8	71.8	79.6	78.2	82.0	80.1	74.6
Age 80+	19.7	24.9	20.5	16.7	19.1	20.0	23.6	30.2	28.2	20.4	21.8	18.0	19.9	25.4
Living arrangements														
Living alone	34.3	30.1	26.1	28.7	23.6	30.2	30.0	17.6	34.8	20.7	24.0	26.8	25.8	24.3
Couple	53.5	61.1	67.1	53.9	68.5	67.2	54.9	55.0	55.8	51.6	64.4	68.4	70.9	53.6
Couple with others	7.8	5.2	4.5	9.7	5.6	1.5	7.2	19.0	4.6	20.3	7.9	3.1	2.2	13.0
Single with others	4.4	3.5	2.3	7.7	2.4	1.1	7.9	8.5	4.7	7.4	3.7	1.7	1.1	9.1
Number of children														
Childless	11.1	11.5	14.2	4.0	10.3	8.1	10.0	8.4	9.9	11.4	12.7	7.3	7.0	6.3
1 child	21.2	20.0	14.9	17.7	21.6	12.8	24.7	15.2	17.0	17.9	21.6	10.6	13.6	20.2
2 children	33.5	31.0	37.1	51.3	37.6	40.1	41.7	33.2	34.3	39.4	41.8	42.7	43.8	49.8
3–4 children	27.8	30.7	29.1	24.2	26.0	34.1	19.7	31.8	31.1	25.9	21.2	31.3	30.2	21.5
5+ children	6.2	6.6	4.6	2.6	4.5	4.7	3.9	8.9	7.5	5.1	2.7	8.0	5.2	2.2
Education														
Low education	27.9	47.2	23.9	43.7	16.3	23.9	37.8	86.7	54.3	79.3	52.6	53.1	44.5	40.4
Medium education	47.7	24.3	62.2	43.4	55.0	40.8	42.1	6.0	28.4	15.3	33.2	22.7	29.7	43.5
High education	24.4	28.5	13.9	12.9	28.7	35.3	20.1	7.3	17.3	5.4	14.3	24.2	25.8	16.1
Labour market status														
Retired	83.1	79.5	72.5	87.7	84.5	80.9	82.4	67.4	89.7	74.2	75.6	76.0	77.9	86.5
Employed	6.3	6.3	20.6	12.2	11.2	16.2	16.2	4.3	5.5	4.5	3.2	10.1	21.7	1.7
Homemaker	9.9	12.2	6.0	0.0	3.5	0.5	0.1	22.9	3.9	17.3	19.2	11.1	0.0	9.2
Other activity	0.6	1.8	0.7	0.0	0.7	2.3	1.2	5.3	0.8	3.9	1.9	2.7	0.4	2.5
Area of residence														
City	22.9	11.1	7.2	14.4	14.4	10.1	21.6	16.6	7.5	8.7	9.6	8.4	12.1	10.9
Suburb	11.9	14.2	9.3	9.7	10.6	19.2	1.3	6.4	9.6	10.6	18.6	28.3	15.7	7.4
Large town	7.9	13.2	8.6	20.5	7.9	21.7	17.2	23.0	11.0	17.1	13.9	22.8	31.8	9.3

Small town	13.0	34.6	20.7	25.6	27.0	27.0	28.2	44.9	25.0	24.1	17.0	18.5	20.6	19.2
Rural	43.4	26.4	52.2	28.0	39.2	21.5	30.6	6.6	46.8	37.2	38.9	21.7	15.8	51.0
Health														
Activity limitation	51.2	52.8	34.0	56.9	55.8	39.6	67.8	46.5	53.2	53.3	50.3	51.8	42.1	54.9
Chronic disease	51.2	59.6	41.8	66.8	63.0	56.5	59.8	65.3	57.3	55.1	71.2	46.3	54.2	55.8
Nativity														
Migrant	10.7	10.2	18.8	6.7	15.2	6.0	26.7	3.1	15.1	2.5	28.0	7.9	9.1	9.6
Household wealth														
Net household wealth per hh member, 1000 euros PPP	198.2	369.6	706.3	76.6	200.3	400.5	89.6	275.6	349.5	248.8	829.9	238.9	373.5	152.4
Respondents														
Number of respondents	2,252	2,494	1,519	2,453	2,327	1,746	3,225	3,135	2,265	2,397	624	1,854	2,544	1,434

Source: SHARE database, authors' calculations

Results

To begin with descriptive findings, we ranked (from low to high) the countries according to the mean value of our dependent variable, which is set at "1" if the respondent scored higher than "0" on the SHARE Material Deprivation Index, and "0" otherwise (Figure 1).

It is apparent from this figure that among the older population, material deprivation is rather widespread in Europe, with nearly half of the respondents aged 65+ exhibiting a positive MDI score. In line with previous research (Jehoel-Gisbergs & Vrooman, 2008; Israel & Spannagel, 2019; Sumil-Laanemaa et al., 2021), our results show marked contrasts in the prevalence of material deprivation. Across countries, the proportion of older persons with a positive MDI score ranges from 22% in Denmark to 87% in Estonia.

In addition, the evidence in Figure 1 reveals considerable differences in the levels of material deprivation across larger groups of countries, categorised as Northern, Western, Southern and Eastern Europe.[9] Older people in the countries of Northern Europe and Western Europe are noticeably less materially deprived than their counterparts in Southern and Eastern Europe. The observed pattern lends support to the notion that welfare regimes and the institutional arrangements related to them play an important role in protecting older persons against the risk of material deprivation.

9 Austria, Belgium, France, Germany, Luxembourg and Switzerland are included in the Western cluster. Denmark, Sweden, and the Netherlands make up the Northern cluster. The inclusion of the Netherlands in the Northern cluster is supported by analyses of the Dutch welfare state (Sapir, 2006; Eleveld & van Vliet, 2013). Similarly, Najsztub, Bonfatti & Duda (2015) position the Netherlands in the Northern cluster. The Southern cluster is comprised of Italy and Spain. The Eastern cluster consists of the Czech Republic, Estonia and Slovenia.

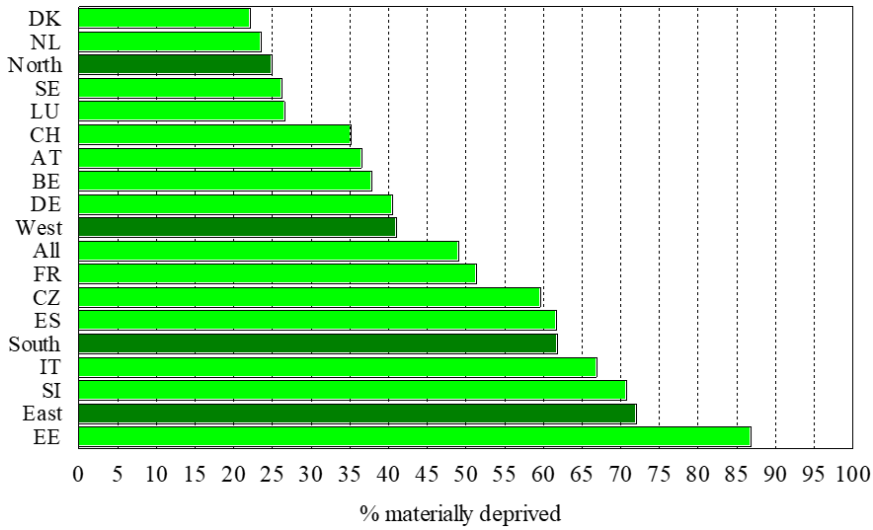

Figure 1. The proportion of materially deprived for the population aged 65+, SHARE countries, 2013

Source: SHARE database, authors' calculations

In what follows, we examine the extent to which the variation of older people's material deprivation across countries is associated with country-level differences in the generosity of various social protection programmes, overall economic affluence, and income inequality. For this purpose, we estimated a series of random effects linear regression models (Table 3). In these models, the intercept is allowed to vary from one country to another, while the slopes are fixed.

The first model (M1) lacks independent variables, and is used to benchmark the amount of variation at the country level. The intraclass correlation coefficient (ICC) of the first model is 0.163, which means that 16.3% of the total variation in material deprivation is attributable to between-group variance at the country level.

The second model (M2) includes a set of individual-level characteristics of the respondents, such as gender, age group, living arrangements, number of children, education, labour market status, number of chronic diseases, prevalence of activity limitations, area of residence, and native/immigrant origin. Compared to the null model, about 17% of between-group variance is explained in M2 by the addition of individual-level predictors. This indicates that differences in the composition of the older population in terms of individual-level characteristics account for a relatively minor part of the variance in material deprivation between countries.

Most of the individual-level characteristics have effects that might be expected from analyses of material deprivation based on the SHARE data for older people (Sumil-Laanemaa et al., 2021). Regarding demographic characteristics, individuals over 80 years of age are less likely to be materially deprived than those aged 65–79, while there is no statistically significant difference between women and men. Older individuals living as a couple have lower risks of material deprivation than their counterparts living alone, whereas other living arrangements are not associated with significant difference in deprivation risk from the reference group (individuals living alone). Individuals with three or more children have an elevated risk of material deprivation relative to those with a smaller number of offspring. Regarding socio-economic characteristics, older individuals with low or medium education are at significantly greater risk of being materially deprived than those with high levels of education. Homemakers and individuals not employed for other reasons have an increased risk of deprivation compared to the reference group (retirees), whereas the opposite is true for older individuals who are employed. Furthermore, having chronic diseases and activity limitations significantly adds to the risk of material deprivation. Older individuals living in cities appear less likely to be deprived than their counterparts in rural areas. Finally, immigrants have an increased risk of being materially deprived compared with native-borns.

In the third model (M3), the net household wealth is added to individual-level characteristics. As one might expect, higher wealth entails a statistically significant decrease in the risk of material deprivation. Its inclusion in the model also leads to some changes in the effects of other individual-level characteristics (living arrangements, area of residence). However, at the country level, the inclusion of the net wealth per household member does not result in a substantial increase in the overall explanatory power of the model: in model M3, individual-level characteristics together explain 27% of the between-group variance of the null model. Comparing models M3 and M2 shows that variation in household wealth plays only a limited role in shaping differences between the countries in the material deprivation of the 65+ population, as the added variables explain about 12% of M2 between-group variance.

Table 3. Regression results for material deprivation, (multilevel linear models) for the population aged 65+, SHARE countries, 2013

Variables	M1	M2	M3	M4	M5	M6	M7	M8	M9
Individual- and household-level variables									
Gender (males=ref.)									
Female		-0.003	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
Age group (65–79=ref.)									
80+		-0.024***	-0.024***	-0.024***	-0.024***	-0.024***	-0.024***	-0.024***	-0.024***
Living arrangements (living alone=ref.)									
Couple		-0.108***	-0.105***	-0.105***	-0.105***	-0.105***	-0.105***	-0.105***	-0.105***
Couple with others		-0.018	-0.022*	-0.022*	-0.022*	-0.022*	-0.022*	-0.022*	-0.023*
Single with others		0.016	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Number of children (2 children=ref.)									
Childless		-0.004	-0.004	-0.005	-0.005	-0.004	-0.004	-0.004	-0.004
1 child		0.007	0.007	0.007	0.006	0.007	0.006	0.006	0.006
3–4 children		0.043***	0.042***	0.042***	0.042***	0.042***	0.042***	0.042***	0.042***
5+ children		0.114***	0.108***	0.108***	0.108***	0.108***	0.108***	0.108***	0.108***
Education (high=ref.)									
Low		0.163***	0.142***	0.143***	0.143***	0.142***	0.142***	0.143***	0.142***
Medium		0.075***	0.062***	0.062***	0.062***	0.062***	0.062***	0.062***	0.062***
Labour market status (retired=ref.)									
Employed		-0.034***	-0.021*	-0.025*	-0.021*	-0.021*	-0.021*	-0.021*	-0.021*
Homemaker		0.026*	0.032**	0.032**	0.032**	0.032**	0.031**	0.032**	0.031**
Other		0.086***	0.086***	0.087***	0.087***	0.086***	0.086***	0.087***	0.086***
Multiple chronic diseases (no=ref.)									
Yes		0.031***	0.029***	0.029***	0.029***	0.029***	0.029***	0.029***	0.029***
Activity limitations (no=ref.)									
Yes		0.101***	0.098***	0.098***	0.098***	0.098***	0.098***	0.098***	0.098***
Area of residence (rural area=ref.)									
City		-0.035***	-0.038***	-0.038***	-0.038***	-0.038***	-0.038***	-0.038***	-0.038***
Suburb		-0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Large town		-0.013	-0.019*	-0.019*	-0.019*	-0.019*	-0.019*	-0.019*	-0.019*
Small town		-0.015*	-0.019**	-0.019**	-0.019**	-0.019**	-0.019**	-0.019**	-0.019**

Nativity (native=ref.)									
Immigrant		0.073***	0.068***	0.068***	0.068***	0.068***	0.068***	0.068***	0.068***
Wealth									
Net household wealth per hh member, 1000€ PPP			-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
Country-level variables									
Old age pensions per beneficiary, 1000s € PPP				-0.024***				-0.012*	-0.011*
Disability pensions per beneficiary, 1000s € PPP					-0.006***			-0.003*	-0.003*
Health expenditures, % GDP						-0.045*		-0.020	-0.036**
Social exclusion and housing benefits, % GDP							-0.187**	-0.037	0.011
GDP per capita, 1000s € PPP									-0.004
Income quintile ratio, age group 65+									0.088**
Intercept	0.462***	0.347***	0.398***	0.752***	0.570***	0.816***	0.568***	0.889***	0.759***
Intercept variance	0.041	0.034	0.030	0.011	0.013	0.023	0.017	0.005	0.003
Residual variance	0.210	0.197	0.194	0.194	0.194	0.194	0.194	0.194	0.194
ICC	0.163	0.147	0.134	0.053	0.062	0.107	0.082	0.027	0.014

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

Source: SHARE database, authors' calculations

Furthermore, models M4–M7 include contextual variables measuring the generosity of various social programmes deemed important as country-level factors shaping the material deprivation among the older population. To examine the association between each programme and the risk of deprivation, the contextual variables were entered into the model one at a time. The modelling results for all four social programmes considered are in the expected direction. Larger net old age pensions and disability pensions per beneficiary, higher spending on health, and higher spending on social exclusion and housing are associated with lower levels of material deprivation.

Due to variation in measurement units, the effect sizes of the different social programmes are not easy to compare. Even so, pairwise comparisons can be undertaken for programmes with similar units of measurement. The regression coefficients indicate that the deprivation-reducing effect of old age pensions substantially exceeds that of disability pensions. The stronger effect of old age pensions plausibly follows from the fact that old age pensions play a much more central role in the income maintenance of the older population than disability pensions. Regarding other programmes addressed in this study, the deprivation-reducing effect associated with social exclusion and housing expenditures appears significantly larger than that of healthcare expenditures. This may be due to the fact that social exclusion and housing programmes are more precisely targeted than healthcare programmes at the sub-groups of the population at higher risk of material deprivation.

Between-group variance in models M4–M7 reveals that our main contextual variables are more efficient in explaining country differences in the material deprivation of older persons than individual-level characteristics and household wealth. As noted above, the former and the latter together explained 26% of the variance in material deprivation between countries. After the inclusion of old age pension benefits to the model (M4), the proportion of explained between-group variance against the null model increases to 73%. In models with disability pensions (M5) and healthcare expenditures (M6), the explanatory variables account for 68% and 44% of the between-group variance, respectively. In model M7, which considers social exclusion and housing expenditures, 56% of the variance between countries is explained. Compared to the model with individual and household-level explanatory variables only (M3), the proportion of explained country-level variance increased between 2.9 and 3.6 times when the generosity of different social programmes was considered.

In models M4–M7, the effects of different social programmes were estimated separately. However, social protection programmes are not developed and implemented in isolation from one another, but form more comprehensive social models (e.g. Aiginger & Leoni, 2009) in which various benefit schemes interact, with complementing and substituting effects across schemes. As a result, the effects related to the generosity of programmes, estimated in models M4–M7, may reflect not only the relevance of a particular programme, but may also be affected by other programmes running at the same time. To account for this, in the next model (M8), different social programmes are considered jointly. Adjustment for the influence of other programmes leads to substantively important changes in the results. Compared to models M4–M7, the effect size of old age pensions and disability pensions, and health care expenditures is approximately halved. However, despite the decrease, these programmes maintain a statistically significant negative association with material deprivation. This suggests that the generosity of old age pensions and disability pensions exert an independent deprivation-reducing influence among the older population. The effect of healthcare expenditures is also reduced by half and becomes statistically insignificant in model M8. Adjusting for the influence of other programmes leads to a major reduction in the effect size of the social exclusion and housing expenditures. As a result, the association with material deprivation loses statistical significance. As expected, the between-group variance in the joint model is substantially reduced compared to the previous models. Adding variables for the generosity of four social programmes to the model increases the proportion of explained variation between countries to 88%.

At the last step, we included GDP per capita and income quintile ratio among older persons in the model (M9). The purpose of adding these two contextual variables is to control for the economic affluence and income equality of the countries. It may be assumed that the wealthier the country, the better the opportunities to allocate resources to various social programmes. Furthermore, the county's greater prosperity can reduce the risk of material deprivation. Higher income inequality tends to be coupled with lower taxes, which may restrict the amount of resources governments can direct to social needs, including the alleviation of material deprivation. Greater inequality in incomes also means that segments of the population with low incomes and at risk of material deprivation are larger. Due to these reasons, the association between the generosity of social programmes and material deprivation may change once differences between countries in terms of economic affluence and/or income inequality are taken into account. Results obtained from model M9 support the above expectation. After adding the controls to the model, the effect of old age

pensions decreased slightly. A change in the effect size is observed for social exclusion and housing expenditures, but the effect of this variable already fell below the level of statistical significance in the previous model (M8). For healthcare expenditures, a shift in the direction of strengthening the effect is observed from model M8 to model M9, restoring its statistical significance.

The absence of marked changes in the association between the generosity of social programmes and material deprivation does not mean that our control variables themselves are unrelated to the latter. Results from model M9 show a positive relationship between income inequality and deprivation: the greater the income quintile ratio among older people, the higher their likelihood is of being materially deprived. In terms of GDP per capita, the sign of the regression coefficient suggests that economic affluence is inversely related to material deprivation. However, the effect fails to reach statistical significance. We believe that this may be due to the fact that a substantial part of the total effect of GDP per capita on material deprivation risk is mediated by the generosity of social programmes; that is, the generosity of social programmes is on the causal pathway from economic affluence to lower material deprivation.

The inclusion of controls for economic affluence and income equality in the model further increases the proportion of country-level variance explained by independent variables. In model M9, the independent and control variables together account for 93% of variance in material deprivation at the level of countries. This suggests that our final model adequately highlights the link between social programmes and differences in the material deprivation of older persons.

Summary and discussion of the findings

In this article, we investigated the material deprivation of older persons using the SHARE data on 14 countries in Europe. The study focused on the relationship between the generosity of domain-specific social programmes and the risk of individuals aged 65 or older of being materially deprived. In the context of research on material deprivation, the contribution of our study is derived from several sources. First, the SHARE Material Deprivation Index employed in this study is specifically designed to consider the material needs of older persons (Adena, Myck & Oczkowska, 2015). Second, to date, only a few comparative studies of material deprivation have been conducted on the basis of SHARE data. To the best of our knowledge, most of the existing SHARE-based studies of material deprivation (Bertoni et al., 2015; Franzese, 2015; Hunkler et al., 2015; Sumil-Laanemaa et al., 2021) have not scrutinised the role of institutional factors. Finally, previous research on the institutional factors of material deprivation (Nelson, 2012; Bárcena-Martín et al., 2014; Bárcena-Martín et al., 2017; Guio et al., 2020) has not focused on the older population as a separate target group to study.

To analyse the role of domain-specific social programmes, we estimated a series of multi-level linear regression models. In the models, the independent variables of main interest characterised the generosity of various domain-specific social programmes, while the dependent variable indicated material deprivation for older individuals. The models included country-level controls for economic affluence and income inequality, and a set of individual and household-level characteristics.

A number of findings emerged from the study. In line with previous research (Jehoel-Gijsbers & Vrooman, 2008; Sumil-Laanemaa et al., 2021), we found large contrasts in the risk of material deprivation among older persons between countries and regions in Europe. Older people in Northern Europe and Western Europe appear less materially deprived than their counterparts in Southern and Eastern Europe. The presence of these marked differences is in accordance with the notion that welfare regimes and the institutional arrangements related to them play a salient role in shaping the risk of material deprivation.

The results lend support to our first hypothesis (H1) that the generosity of domain-specific social programmes exhibits a significant relationship with the material deprivation of older persons. Our findings show that higher old age and disability pensions, greater expenditures for healthcare,

housing and social exclusion, measured in terms of the percentage of GDP, are associated with lower risk of material deprivation.

In line with our second hypothesis (H2), the effect sizes of domain-specific social programmes mostly decreased when the programmes were considered jointly. Even though we did not formally test the change in the effects for pension benefits, the effect size was halved, and the p-values increased noticeably. This finding corroborates the notion that social programmes are not developed in isolation, but are formed and operate in the context of wider social models (Aiginger & Leoni, 2009). Notwithstanding the decrease in the effect size, however, a statistically significant inverse relationship persisted between the generosity of old age pensions and disability pensions, on the one hand, and the risk of material deprivation of older persons, on the other. For healthcare expenditures, as well as housing and social exclusion, adjustment for the effects of other social programmes rendered the association with material deprivation statistically insignificant. After country-level controls were added to the model, the significance of the effect of health expenditures was restored. We believe that the relatively weak association, which was not statistically significant in some models, may be due to our use of total healthcare expenditures in this study. In future research, the effects of public and private healthcare expenditures could be examined separately.

The results also confirm our third hypothesis (H3), according to which differences in the generosity of social programmes account for a much larger share of cross-country variation in material deprivation than differences in individual and household-level characteristics.

The modelling results showed some changes in the effects of social programmes when economic affluence, measured in terms of GDP per capita, and income inequality, operationalised by means of an income quintile ratio among older persons, were considered. This suggests that the association with the generosity of social programmes is moderately affected by differences in economic affluence and income inequality between countries. The results also showed that higher income inequality among older persons is associated with higher deprivation risks. Regarding economic affluence, the higher GDP per capita is associated with slightly lower odds of deprivation, but the effect is not statistically significant.

In the final model, the share of explained variance in the material deprivation risk between countries reached 93%. This suggests that our study has succeeded in identifying important contextual factors that underlie much of the variation in material deprivation among older people between countries in contemporary Europe. Furthermore, a relatively small increment in the proportion of explained variance when macro-economic control variables are added to the model can be regarded as further evidence of the salient role of social programmes in shaping cross-regional and cross-national differences in the material deprivation of older people.

The conclusions that may be drawn from this study can be summarised as follows. In contemporary Europe, the generosity of social programmes that cover large segments of the population is associated with lower risks of material deprivation for older people. A large proportion of cross-country differences in material deprivation among the population aged 65 or older can be linked to variation in the levels of old age pensions, disability pensions, and to varying resources allocated to the provision of healthcare. The main scholarly contribution of this study arises from identifying institutional factors that are significantly related to material deprivation among the older population. Our study also expands existing knowledge by revealing the importance of larger healthcare expenditures for the material deprivation of older persons, next to the provision of old age and disability pensions, after controlling for the economic affluence and income inequality of the countries. In the policy context, our findings suggest that investments in social protection programmes, as well as reductions in income inequality, have the potential to lower the risk of material deprivation among the older population.

This study has some important limitations. First, the independent variables used in our models are somewhat crude. Aside from the old age pensions, the schemes of disability benefits, healthcare expenditures, and resources allocated to housing and social exclusion do not exclusively target the older population. Furthermore, it is possible that some more specific features of the pension schemes may be more closely related to the deprivation risks than the average benefits used in

our study. This possibility is corroborated by the EU Pension Adequacy Report which, based on a descriptive account, concluded that material deprivation in old age only weakly and indirectly depends on pension expenditure, being mediated by the redistributive features of the pension schemes (European Commission, 2021). Due to the relatively crude measures of social programmes, our study cannot provide in-depth insights into the mechanisms that link the generosity of social programmes to the material deprivation of older people. Nevertheless, our measures are more specific than the total social spending or total social transfers used in a number of previous studies that have investigated the macro-level factors of material deprivation (Chzhen & Bradshaw, 2012; Bárcena-Martín et al., 2014; Chzhen, 2014; Visser, Gesthuizen & Scheepers, 2014; Saltkjel & Malmberg-Heimonen, 2017).

Guio et al. (2020) note that when looking at the national average in social spending per capita, the expenditure approach does not account for variations in the treatment of households by composition or social situation. This is due to the fact that social spending on any branch of social protection is influenced not only by benefit generosity, but also by entitlement/qualification conditions, which determine the eligible categories. However, such conditions, and accordingly the eligible groups, vary significantly across countries.

Regarding the dependent variable, we used a relatively liberal definition of material deprivation that includes some rather mild forms. This choice was motivated by our intention to maintain comparability with a recent study of material deprivation that used the same data and a similar binary specification of the dependent variable (Sumil-Laanemaa et al., 2021). In future research, it would be worthwhile to consider alternative specifications of the dependent variable.

Another limitation arises from cross-sectional data, which is widely used in comparative analyses of material deprivation. The conceptual model underlying deprivation research presumes a causality: risk factors are considered to increase the likelihood of being materially deprived, while preventive factors are seen to decrease it. However, the relationships between deprivation and its factors may, in fact, be reciprocal. For instance, being materially deprived can be a consequence of ill health, but material deprivation can also lead to a deterioration in one's physical or psychological wellbeing. This is a serious problem that should not be ignored, but it is also not easily overcome. To solve this problem, longitudinal data with a sufficient time lag between causes and consequences are needed, ideally those providing evidence on policy reforms that potentially impact deprivation risks. Since the SHARE data on material deprivation are cross-sectional, measured in a single panel wave, we were not able to explore such reciprocal effects in our analysis. Regardless, we believe that this shortcoming does not invalidate the main results obtained in this study because the risks of material deprivation relate to individual experiences, while our independent variables pertain to the institutional context. If the causal mechanisms are in operation, it is more likely that they run from the latter to the former than in the opposite direction.

Finally, in this study we did not investigate how the generosity of domain-specific social programmes interacts with macro-economic conditions and individual or household-level characteristics. While social protection programmes have an important role in mitigating the material deprivation in older age, these programmes have not been able to fully mitigate the social risks individuals accumulated over their life course. Previous research has shown that low overall levels of social protection is more likely to lead to economic deprivation in settings in which the macro-economic situation is worse than in contexts with better macro-economic circumstances (Visser, Gesthuizen & Scheepers, 2014). There is also evidence that more generous social spending is associated with a lower risk of material deprivation, particularly among disadvantaged groups, such as people with low education and low income, unemployed people, people with ill health, lone parents, etc. (Nelson, 2012; Saltkjel & Malmberg-Heimonen, 2017; Israel & Spannagel, 2019). In line with the latter studies, Verbunt and Guio (2019) found that the pro-poorness of social spending explains more between-country differences in the risk of poverty than the size of social spending. However, none of these studies have focused on older persons. As a consequence, we lack empirical knowledge of how the interplay between the generosity of social programmes and material deprivation varies across sub-groups of the older population and how it depends on the macro-economic circumstances of countries. These are topics that need to be pursued in future research.

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Acknowledgements

This study was supported by the Estonian Research Council (grants PRG71 and PRG2248) and by the Estonian Centre of Excellence in Energy Efficiency, ENER (grant TK230) funded by the Estonian Ministry of Education and Research.

The study uses data from the Survey of Health, Ageing and Retirement in Europe (SHARE) Wave 5 (DOI: https://doi.org/10.6103/SHARE.w5.900).