

## Accumulation of Disadvantages: Prevalence and Categories of Old-Age Social Exclusion in Belgium

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**Accumulation of disadvantages: Prevalence and categories of old-age social exclusion in Belgium.**

**- ACCEPTED FOR PUBLICATION -**

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## **Abstract**

*This paper focuses on the prevalence and measurement of old-age social exclusion. Currently there is limited knowledge of the prevalence of old-age social exclusion in Belgium. Although studies have already shown that older adults can experience exclusion in more than one dimension, the multidimensional nature of social exclusion is often lost when constructing a scale. Consequently, this paper's aim is twofold. First, it examines the prevalence of different dimensions of old-age social exclusion in Flanders and Brussels and seeks to demonstrate the influence of applying different measurement thresholds. Second, this study develops an old-age social exclusion measure that preserves its multidimensionality. Descriptive and Latent Class Analysis were performed on the Belgian Ageing Studies data (2008–2014), a survey among home-dwelling older adults (60+ years) (N = 20,275; 80 municipalities). Findings revealed that older adults are mainly digitally excluded and excluded from the neighbourhood, civic participation, and social relations. More than 60% older adults experience exclusion in two or more dimensions. The use of different thresholds, however, leads to different interpretations concerning the prevalence of social exclusion. Results of the Latent Class Analysis revealed four categories of old-age exclusion: those at “low risk”, “the non-participating financially excluded”, “the environmentally excluded” and the “severely excluded”. The discussion emphasizes the importance of preserving a multidimensional perspective when studying social exclusion. When addressing old-age exclusion, policy should be sensitive to the diverse categories and realize that one-size-fits-all policies and interventions are no solution.*

**Keywords:** multiple social exclusion; old-age social exclusion; social exclusion measurement; Latent Class Analysis



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### **Abstract**

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### **1. Introduction**

Due to increased average life expectancy and decreased childbirth, fostered by medical and socio-economic developments, most European countries currently have to manage an ageing population. Reduced physical and mental health (Jokela et al. 2013; Kleiber and Nimrod 2009), decreased autonomy (Kneale 2012) and loss of a partner, family and friends (Becker et al. 2009; Rook 2009) are negative consequences of ageing and can be considered as potential risk factors for, or part of, social exclusion. In addition, age discrimination or ageism (Allan et al. 2014) and changing marital and family demographics (Gray et al. 2011) might influence the likelihood of an

older adult being socially excluded. Over the past decade, increasing research attention has been devoted to social exclusion in later life (e.g. Hrast et al. 2013; Walsh et al. 2014), leading to a diverse research field exploring different aspects of social exclusion and inclusion in later life (Van Regenmortel et al. 2016). Together with the increasing number of studies, different methods of operationalization of (old-age) social exclusion also exist (Levitas et al. 2007; Van Regenmortel et al. 2016). Social exclusion can be considered as a contested concept for which there is not always a clear distinction between dimensions, risk factors and outcomes (Van Regenmortel et al. 2016).

Although previous research is of great value, some shortcomings can be identified. First, for Belgium, insight into the old-age exclusion that includes different dimensions of exclusion is still lacking, as former studies have mainly focused on studying dimensions of exclusion separately, such as exclusion from financial resources (e.g. Dewilde 2012), exclusion from civic activities (e.g. Dury et al. 2015) or neighbourhood exclusion (e.g. Buffel et al. 2013). Second, although studies in the field of poverty have indicated the influence of different thresholds or cut-off criteria in the comparability and under- or overestimation of poverty rates (Burkhauser 2009; Treanor 2014), the influence of thresholds is as yet unexplored for social exclusion. Third, little research has focused on the development of social exclusion scales in specific sub-groups such as older adults (Labonté et al. 2011; Lombe and Sherraden 2008; Van Regenmortel et al. 2016). Fourth, when building a composite measure of social exclusion, the multidimensional character of social exclusion is often lost. Studies exploring bivariate associations between different dimensions have confirmed the interrelated nature of the dimensions (e.g. Scharf et al. 2005a), while composite measures give insight into the number of dimensions of exclusion (e.g. Kneale 2012; Mezey et al. 2013; Scharf et al. 2005a) or determine the level of social exclusion experienced in older people (e.g. van Bergen et al. 2014; Vrooman and Hoff 2013). However, no study has fully explored the co-occurrence of dimensions of exclusion and the combination of different dimensions. To overcome these shortcomings, this study examines the prevalence of the different dimensions of old-age social exclusion using different thresholds. Further, this study develops an old-age social exclusion measure that will provide insight into the co-occurrence of the different dimensions of social exclusion (Heap and Fors 2015; Scharf et al. 2005a).

## **2. Social exclusion in later life: a multidimensional concept**

Social exclusion originates from the French concept *les exclus*, which was used to describe people not protected by social insurance (Frégné 1999). Thereupon, the concept received various definitions and interpretations (for an overview see Levitas et al. 2007). Based on the diversity of literature on social exclusion, Levitas et al. (2007:

25) constructed the following definition: “*Social exclusion is a complex and multi-dimensional process. It involves the lack or denial of resources, rights, goods and services, and the inability to participate in the normal relationships and activities, available to the majority of people in a society, whether in economic, social, cultural or political arenas. It affects both the quality of life of individuals and the equity and cohesion of society as a whole.*” Accordingly, social exclusion is a multidimensional concept composed of different dimensions of disadvantage (Tsakoglou and Papadopoulos 2002; Vrooman and Hoff 2013), in which exclusion in one dimension can affect those in other dimensions and dimensions of disadvantage tend to co-occur (Heap and Fors 2015; Scharf et al. 2005a).

Although the concept of social exclusion is receiving growing research attention, the operationalization and the measurement of the concept is less developed (Pirani 2013; Van Regenmortel et al. 2016). Social exclusion can be measured at the individual level (i.e. the extent of social exclusion of an older person), as well as at the societal or aggregate level (i.e. reporting levels of social exclusion of a region or country) (Chakravarty and D’Ambrosio 2006; e.g. Coumans and Schmeets 2014; e.g. Giambona and Vassallo 2013). If measured at the individual level, some authors use one general measure of exclusion for all age groups (e.g. Pirani 2013), while others suggest the use of different measures according to the life cycle stage, as social exclusion is life cycle-sensitive and the risk of being socially excluded varies across the life course (Scutella and Wilkins 2010; e.g. Whelan and Maître 2008). Social exclusion seems to be pervasive in later life due to later life transitions, such as losing a partner, which might lead to multiple social exclusion (Becker et al. 2009). Many studies do not operationalize social exclusion in a way that resembles an older adult’s reality. Whereas labour market participation is, for instance, suitable for working-age adults, it is less straightforward for older adults (Levitas et al. 2007; Van Regenmortel et al. 2016). Conversely, for older age groups, access to services, access to transport, and neighbourhood inclusion gains importance (Kneale 2012; Scharf et al. 2005a), as they tend to age in place (Löfqvist et al. 2013; Phillipson et al. 1999), have to rely more on contacts in the immediate environment (Buffel et al. 2012), become more dependent, and face declining physical health and diminished mobility (Fortuijn et al. 2006; Kneale 2012). In a search for which dimensions are best to use when measuring social exclusion, a systematic review carried out by Van Regenmortel and colleagues (2016) revealed that a variation of 16 different dimensions was used to operationalize social exclusion in old age. Exclusion from civic participation was most often used, followed by exclusion from social relations, basic services or information, financial resources, material resources, neighbourhood and decent housing. Less frequently-used dimensions when operationalizing social exclusion were exclusion from health services, feelings of ageism, exclusion from transport, poor psychological wellbeing, exclusion from labour market

participation, self-reported exclusion, self-dependence and ostracism. In addition, digital exclusion appears to be a neglected dimension for social exclusion in later life (Van Regenmortel et al. 2016). Information and communication technology (ICT) can offer various advantages to older adults such as facilitating access to information and services (Larsson et al. 2013), reduce their feelings of loneliness (Cotton et al. 2013) and it can create new possibilities for social contact and support (Larsson et al. 2013; Nimrod 2014; Ofei-Dodoo et al. 2015). Therefore, the lack of ICT is a new potential dimension of social exclusion in later life.

### **3. Measuring social exclusion**

Current prevalence studies on social exclusion are difficult to compare due to differences in operationalization, analysis techniques (Van Regenmortel et al. 2016) and application of different threshold criteria (Levitas et al. 2007). Furthermore, in general, quantitative research addressing social exclusion in later life is lacking and scarcely applies validated measures for social exclusion or its subdimensions (Labonté et al. 2011; Lombe and Sherraden 2008; Ward et al. 2014). Finally, similar to arguments of Rose and colleagues (2009) in measuring material hardship, we can conclude that techniques for building a social exclusion scale do not fully explore the complexity and severity of the risk of social exclusion. Additive metrics solely counting the number of dimensions of exclusion (e.g. Kneale 2012; Mezey et al. 2013; Scharf et al. 2005a) or scales ranging from low to high levels of social exclusion (e.g. van Bergen et al. 2014; Vrooman and Hoff 2013) give valuable insights into the severity of the social exclusion level, but do not fully uncover the co-occurrence of different dimensions of social exclusion (Heap and Fors 2015) which has already been shown using bivariate analysis (e.g. Scharf et al. 2005a).

Methods applied to measure social exclusion are for example: nonlinear canonical correlation analysis (e.g. van Bergen et al. 2014; Vrooman and Hoff 2013), Schwarz's Bayesian criterion (e.g. Ogg 2005), measuring the number of dimensions of exclusion (e.g. Barnes et al. 2006; Kneale 2012; Lloyd et al. 2008; Mezey et al. 2013; Scharf et al. 2005a) and creating categories without a specific technical procedure (e.g. Saito et al. 2012; Whelan and Maître 2008). Compared to social exclusion, more theoretical and empirical consideration is given to the measurement of the related concept of poverty (Pirani 2013). Studies measuring poverty offer insights that might be valuable to be taken into account when measuring social exclusion in later life. For instance, Burkhauser (2009) and Treanor (2014) both emphasize that using different methods to measure material deprivation or poverty results in varying and incomparable findings. Consequently, they warn of the under- or overestimation of the proportion of people at risk of poverty, depending on different thresholds. For social exclusion, there is little consideration given to the threshold at which exclusion occurs. Some studies just describe the prevalence of the different subdimensions or



indicators (e.g. Lee et al. 2014). Other studies use a combination of thresholds or decision criteria. Scharf and colleagues (2005a) for instance, consider older adults as excluded from civic activities if they have never participated in any religious or community group meetings and if they have not taken part in any civic activities (from a list of 11) in the 3 years preceding the interview (e.g. voting in elections, taking part in fundraising initiatives etc.). While for exclusion from social relations respondents were considered as excluded on social relations if they were socially isolated, or were very severely lonely, or were unable to participate in two or more common social activities (Scharf et al., 2005a). A relative threshold can also be used to decide if older adults are excluded on a certain dimension. Barnes and colleagues (2006), for one, use a relative threshold: a respondent is excluded if they are amongst the 10% of respondents who had the highest indicators of exclusion.

#### **4. Data and methods**

##### **4.1. Data collection and sampling**

The data for this research were derived from the Belgian Ageing Studies (BAS) survey, a research project that has been running in municipalities in Flanders and Brussels (Belgium) since 2004. The project was set up in cooperation with the provincial government, local authorities and local senior organizations. The survey gathered information from home-dwelling residents aged 60 years or over using a structured questionnaire. The questionnaire consisted of different themes such as social, cultural and political participation, access to resources, health and perceived ageism. The questionnaire was designed to be self-administered, but volunteers were trained to clarify questions if requested by the participants. The respondents were informed about the voluntary nature of their participation, their right to refuse to participate, and the privacy of their responses. Each municipality decided freely to partake in the survey; therefore, municipalities were not randomly selected. In each municipality, home-dwelling persons aged 60 and older were randomly selected from municipal registers and stratified by age (60–69, 70–79, and 80+) and gender. Consequently, data were not representative at a national level, but every sample was representative of the specific municipality. Depending on the municipality, interviews were completed by 65–85% of the eligible persons who were contacted. Quota, however, were set and needed to be reached. A list of stratified randomised replacement addresses was provided to replace respondents refusing to participate or those that were unable to participate in the survey (De Donder et al. 2014).

For this article, we used data collected between 2008 and 2014. Cases with missing responses to the main measures (i.e. age and social exclusion dimensions) were excluded, leading to a sample size reduction from 36,282 to 20,275 respondents. In total, the used data set consisted of 20,275 older adults living in 80 different municipalities. Of the

total sample population, 51.2 % were women, 17% were highly educated, and 33.3% had a low level of education (i.e. no educational degree or primary education as highest degree). The mean age of the participants was 71.0 years; 49.1% of the respondents were between 60 and 69 years of age, 34.2% between 70 and 79 and 16.7% were 80 years or older. Most of the respondents were married (69.9%) and almost one-fifth was widowed (19.9%). Compared with the initial sample (N = 36,782), the final sample for this study (N = 20,275) consisted of fewer women (54.4%; 51.2%), and participants were slightly younger (60–69 years = 44.9%; 49.1%), more highly educated (14.2%; 17%) and consisted of fewer widowers (20.9%; 19.9%). As these differences were rather small and did not deviate much from the proportions in the general 60+ Flemish population, we decided this sample was useful and valuable and did not use weights. Table 1 shows the demographic characteristics of our sample, their general prevalence and the distribution among the different age strata.

<Insert Table 1 around here>

#### **4.2. Operationalization dimensions of old-age social exclusion**

Defining and operationalizing old-age social exclusion is not straightforward. This is because, firstly, it is a contested concept in which various definitions exist and there is a lack of clear distinctions between determinants, risk factors and dimensions (Van Regenmortel et al. 2016). Secondly, as social exclusion is a relative concept in which definitions vary over time, between countries and cultures etc., any definition is highly context-dependent (Room 1999; Van Regenmortel et al. 2016; Walsh et al. 2016). The dimensions covered by the BAS survey and included in this study were based on dimensions identified by the systematic review of Van Regenmortel and colleagues (2016). The dimensions included in our study are: civic participation, social relations, services, financial resources, neighbourhood, housing, perceived ageism and digital participation. An overview of the different dimensions and their subdimensions can be found in Figure 1. A table in Annex 1 concerning the operationalization provides more details of the different dimensions, their subdimensions and their indicators.

<Insert figure 1 around here>

Not all dimensions that have been identified in the systematic review (Van Regenmortel et al., 2016) were incorporated in this study. Some of the dimensions identified in the review were combined into one dimension in the model. This was the case for access to health services, transport and exclusion from basic services or information (dimension: services). In line with Barnes and colleagues (2006), Kneale (2012) and Scharf and colleagues (2005a), we do not consider aspects of psychological and physical health as a dimension of social

exclusion but as determinants. Furthermore, labour market participation was not included as a dimension of social exclusion in our study as only 4.7% of persons aged 65–69 are employed in Belgium (Eurostat 2015). We were unable to take into account material resources as a dimension of old-age exclusion as the BAS survey did not inquire about these aspects. Although few studies take digital exclusion into account when studying social exclusion in later life (Van Regenmortel et al. 2016), this study incorporated this dimension as explained above.

In our study, all dimensions, except digital exclusion, housing and ageism, consisted of different subdimensions, which in turn were composed of different variables. Exclusion from civic participation, for instance, comprised cultural, sports, social and volunteering participation. Exclusion from social relations comprised feelings of loneliness (emotional and social), exclusion from social contacts and exclusion from social support. Exclusion from services consisted of exclusion from health, mobility, leisure and basic services. For exclusion from financial resources, both objective (actual monthly household income) and subjective (do you manage you're your current household income?) assessments were included. Exclusion from the neighbourhood was based on how unsafe a respondent felt in the neighbourhood, how much they enjoyed living there, and how connected they felt to the neighbourhood. Exclusion from decent housing was measured by twelve indicators assessing the quality of the dwelling (e.g. house is difficult to heat, must use stairs to enter the house, and house is not burglar-proof). Ageism was determined by eight indicators (e.g. when times get rough, older people usually suffer worst and feeling that older people do not matter to society). For capturing digital exclusion, a variable assessing the Internet use of the respondent was included. To decide whether respondents were excluded from a particular dimension, we applied different thresholds. How thresholds were applied will be discussed in sections 4.3. and 5.1.

### **4.3. Analyses**

The analyses consisted of three steps. First, descriptive statistics were used to examine the current prevalence of different dimensions and multiple social exclusion. In the descriptive analysis, we used four different decision criteria, as found in the literature review, for determining whether a respondent was experiencing exclusion or not. Using threshold 1, respondents were considered as excluded of any particular dimension if they were excluded on at least *one* of the subdimensions or indicators (e.g. Scharf et al. 2005a: exclusion from social relations). For threshold 2, respondents were assessed as excluded if they were excluded on *all* subdimensions or indicators (e.g. Scharf et al. 2005a: exclusion from civic activities). Besides these two absolute thresholds, we applied two relative thresholds. One threshold was relative to the number of subdimensions or indicators and the final threshold was relative to the population of people aged 60 and over. For the third threshold, respondents were considered to be

excluded if they were excluded on at least half of the indicators. Similar to Barnes and colleagues (2006), threshold 4 considered respondents to be excluded if they were part of the 10% most excluded older adults. To define this threshold, percentiles of each dimension were calculated and the number of items matching the first percentile was considered as the cut-off level. Finally, for each threshold, we counted the number of dimensions that respondents were experiencing exclusion in, to give insight into multiple old-age social exclusion.

Second, to identify different categories of old-age exclusion, a Latent Class Analysis (LCA) was performed. As this study aims to obtain insight into the accumulation of disadvantages, building a classic scale or index as it has been done in previous studies (e.g. van Bergen et al. 2014; Vrooman and Hoff 2013) would not fully meet our needs. This would result in indicating whether older adults have high or low levels of social exclusion and, although these studies have proven to be valuable and useful, they do not deepen our knowledge of the co-occurrence of the different dimensions. Both additive measures (e.g. Kneale 2012; Mezey et al. 2013; Scharf et al. 2005a) and bivariate associations (e.g. Scharf et al. 2005a) have confirmed the multidimensional aspect of social exclusion, but little insight has been gained into which dimensions co-occur. LCA is a statistical method for analysing associations in multivariate categorical data and facilitates the development of latent classes or typologies (McCutcheon 1987). LCA can determine whether distinct types of old-age social exclusion exist and which combinations of dimensions of exclusion occur in older adults. LCA assumes local independence (Clogg 1995; McCutcheon 1987), which signifies that associations between manifest (or observed) variables are attributable to the latent variable (McCutcheon 1987). Latent class models can be defined by two parameters, namely (unconditional) probabilities of belonging to each latent class and by conditional response probabilities. In the case of having four manifest or observed variables ( $A$ ,  $B$ ,  $C$  and  $D$ ) with  $i$ ,  $j$ ,  $k$  and  $l$  categories, respectively, and one latent variable  $X$ , with  $t$  latent classes, this is formulated as per (Magidson and Vermunt 2004):

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

The latent class probability is the probability that a randomly selected observation in the sample is part of latent class  $t$  of latent variable  $X$ . The latent class probability indicates the size of latent class  $t$ . Another parameter is the conditional probability, which is the probability that a member of latent class  $t$  is part of a certain category of a manifest variable (Magidson and Vermunt 2004). These two parameters of the latent class model, namely conditional probabilities and latent class probabilities, were estimated by maximum likelihood estimation. To assess if the estimated model reproduced the observed frequency table adequately, goodness of fit indices were

calculated and the estimated frequencies were compared with the observed frequencies.  $L^2$  and chi-square were calculated based on this comparison. As the null hypotheses states that the estimated frequencies do not differ from the observed frequencies, the test should be non-significant ( $p > .05$ ) (McCutcheon 1987). Because of the large sample size ( $N = 20,275$ ), we did not use the traditional chi-square statistics since these tests are likely to be conservative with large sample sizes and sparse data (Magidson and Vermunt 2004; Nylund et al. 2007). This study used the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) of the L-square to assess the goodness of fit and compare different models. If both criteria showed negative values, the model was considered acceptable. The lower the AIC and the BIC, the better the model fits the data compared with other latent class models (Magidson and Vermunt 2004). The aim of LCA is to set the smallest number of latent classes  $T$  to account for the relationships among the manifest variables.

First, exploratory LCA starts with fitting the baseline model with no latent class, i.e. mutual independence among the variables. If this model has no adequate fit to the data, the next model with two latent classes is formulated and tested. Stepwise latent classes are added until an adequate fit is reached (Magidson and Vermunt 2004). LCA was performed using the software program LEM (Vermunt 1997).

For the third step, we used SPSS 23.00 to assign respondents to the category that most resembled their exclusion profile by modal assignment, i.e. cases were assigned to the class for which posterior probability was highest. Two sets of parameters are reported in this study. First, we report the relative class size of the sample as given in SPSS. Second, we report the conditional probability, derived from the LCA analysis in LEM, which refers to the probability of a respondent in a certain category being excluded (or not) from one of the exclusion dimensions. The conditional probabilities were compared with the population probability in order to give an indication of whether older adults in a certain category had a higher or lower probability of exclusion compared to the total sample.

## **5. Results**

### **5.1. Prevalence and thresholds**

Table 2 shows the prevalence of older adults experiencing different dimensions of social exclusion and the proportion of older adults experiencing multiple exclusion. In general, for threshold 1 (i.e. older adults were considered as excluded if they were excluded from at least one of the subdimensions) high levels of exclusion for the different dimensions was found. The results showed that 86.2% of older people experienced exclusion from civic participation and 87.4% felt excluded because of their age. The lowest levels of exclusion measured for

threshold 1 were exclusion from financial resources (23.5%) and services (25.1%). For this threshold, a high proportion of older adults also experienced a combination of different dimensions of disadvantage. Almost three quarters of the older population faced exclusion in at least four dimensions (71.1%) and 98.2% faced exclusion in more than one dimension.

Compared to threshold 1, prevalences resulting from threshold 2 (i.e. older adults were considered as excluded if they were excluded from all subdimensions) were much lower; only 10.3% older adults felt excluded due to ageism. The lowest prevalence was found for exclusion from social relations (0.1%), neighbourhood exclusion (0.5%), and exclusion from decent housing (0.5%). For threshold 2, almost no older adults were faced with exclusion in four or more dimensions (0.3%), and only 17.0% experienced exclusion in more than one dimension.

Threshold 3 (i.e. older adults were considered as excluded if they were excluded on half of the subdimensions or indicators) acted as a balance between threshold 1 and 2. At this threshold, 54.2% were excluded from civic participation, while 45.1% of respondents experienced age discrimination. The lowest prevalence was found for exclusion from housing (5.5%) and neighbourhood exclusion (6.3%). For threshold 3, 16.8% experienced exclusion in four or more dimensions and 67.2% were faced with exclusion in more than one dimension.

When threshold 4 (i.e. older adults were considered as excluded if they were part of the 10% most excluded respondents) was used, 40.1% of older adults experienced neighbourhood exclusion, followed by exclusion from social relations (31.1%) and civic participation (24.1%). For exclusion due to feelings of ageism, the smallest proportion of older adults was found (10.3%), followed by exclusion from services (10.8%). For threshold 4, almost 20% of the respondents experienced exclusion in four or more dimensions and 63.7% in more than one dimension. Digital exclusion also showed the highest levels of exclusion (64.2%).

<Insert table 2 around here>

The two absolute thresholds (thresholds 1 and 2) can be considered as two extremes. Either exclusion in one subdimension or indicator leads to exclusion in one domain (threshold 1) or exclusion in all subdimensions or indicators results in exclusion on one domain (threshold 2). Threshold 1 results in high old-age social exclusion prevalences ranging between 23.5% and 87.4%. In contrast, threshold 2 is the most rigorous. Applying this threshold results in low levels of old-age social exclusion (0.1%–10.3%). One of the main disadvantages of these two absolute thresholds is that they are dependent on the number of items or subdimensions used, meaning that

one item will have a different influence in different dimensions. Applying threshold 3, which is relative to the number of items used, shows prevalences in between these two extremes (5.5%–54.2%). Applying threshold 3, which is relative to the number of items used, shows prevalences in between these two extremes (5.5%–54.2%). One of the main drawbacks of this threshold is that its probability remains dependent on the number of items for (small) even numbers of items or subdimensions. Given the high variation in number of items and subdimensions for the different dimensions of old-age social exclusion, a threshold relative to the number of items or subdimensions is less recommended. Threshold 4 shows prevalences between 10.3% and 40.1%. Not only are prevalences of the different dimensions modified according to the use of different thresholds, but also the ranking of occurrence of different dimensions changes. For threshold 1, most respondents are excluded in the field of ageism (87.4%) and civic participation (86.2%) and the smallest number of respondents experienced exclusion from financial resources (23.5%). For threshold 2, the most frequently occurring dimensions were ageism (10.3%) and financial resources (5.6%), and the least frequently-occurring was exclusion from social relations (0.1%). When applying threshold 3, most respondents experienced exclusion from civic participation (54.2%) and felt excluded due to ageism (45.1%) and the fewest respondents were excluded from decent housing (5.5%). Deciding the cut-off level depending on the sample, as is done in threshold 4, results in the majority of respondents experiencing exclusion from the neighbourhood (40.1%) and civic participation (24.1%). When applying threshold 4, feeling excluded because of ageism was experienced the least frequently (10.3%).

## **5.2. Categories of old-age social exclusion**

In the second phase of this research we continued with prevalence rates derived from threshold 4. This threshold facilitates comparison and is already used in other research (Barnes et al. 2006). Although multiple exclusion as calculated in this study gives an indication of the multidimensional feature of social exclusion, namely the number of dimensions in which older adults are excluded, it remains unclear which dimensions of exclusion in older adults co-occur and how these are interrelated. Therefore, we built an old-age social exclusion measure that maintains this information by using LCA.

As the independence model (i.e. the model in which no latent class was considered) did not exceed the .05  $p$ -value for the L-square and both the AIC and BIC did not show negative values, it was hypothesized that underlying latent class(es) were present. Stepwise, latent classes were added until an acceptable fit was reached. We explored models with 3 to 8 latent classes. A latent class model with four classes was found to have a good fit, as this model showed negative values for BIC and AIC ( $L^2 = 358.17$ ;  $p < .001$ ;  $df = 220$ ; AIC =  $-81.83$ ; BIC =  $-1823.60$ ).

Adding latent classes to the four class model improved the AIC value, but did not improve the BIC value. Relative class size and conditional probabilities (probability of an individual in this class being excluded on a certain dimension) are reported in Table 3.

<Insert Table 3 around here>

Four categories of old-age social exclusion appeared. More than four out of ten older adults (category 1 = 45.7%) had a low risk of being socially excluded as they had, compared to the population total, lower probabilities of being excluded from one of the eight exclusion dimensions. We consider this category to be at “low risk” of old-age social exclusion. More than one out of four older adults (category 2 = 25.5%) had a high probability of digital exclusion. In addition, they had a higher probability of being excluded from civic participation and financial resources compared to the population total. We named this category as the “non-participating financially excluded”. In category 3, 12.5% of older adults experienced a combination of a higher probability of neighbourhood exclusion and exclusion from social relations with a higher probability of experiencing feelings of ageism and exclusion from services and decent housing. We named this category the “environmentally excluded”. More than 15% of older adults (category 4 = 16.2%) experienced, compared to the population total, a higher probability of combined exclusion in all dimensions of old-age social exclusion. This category of older adults can be seen as “severely excluded”.

## **6. Discussion**

This paper aimed to contribute to the growing field of research on social exclusion in later life. Social exclusion in this study is considered as a multidimensional phenomenon involving the *lack or denial of resources and the inability to participate in relationships and activities (economic, social, cultural, political field) available to the majority of the population* (Levitas et al. 2007:25). This study provides valuable scientific knowledge on methodological challenges in measuring the prevalence and co-occurrence of dimensions of exclusion. This study shows that the use of different thresholds leads to different prevalences of old-age social exclusion. As it is not possible to set an absolute level of exclusion on any dimension, old-age social exclusion depends on the operationalization and definition of social exclusion and where the threshold is set. Applying different thresholds therefore results in different results and conclusions, which might lead to different policy actions. In this study, we continue applying threshold 4, which is in line with the work of Barnes and colleagues (2006). By altering the thresholds, the proportion of people excluded changes; therefore, we cannot affirm that one dimension of exclusion



is more severely present than others. The thresholds are, however, valuable and useful. Setting the threshold at 10% facilitates comparisons between studies, over time and within groups in a certain study (Barnes et al. 2006).

Looking at the prevalence of different dimensions of social exclusion in the case of threshold 4, older adults are most excluded from digital participation (i.e. Internet use). Our findings are in line with previous research pointing to low digital participation in later life (Blank and Groselj 2014; Wagner et al. 2010). In addition, home-dwelling older adults in Flanders and Brussels are mostly excluded from the neighbourhood, social relations and civic participation. Although it is difficult to compare different studies due to differences in respondents' age, researched area, operationalization of social exclusion and different thresholds (Levitas et al. 2007; Van Regenmortel et al. 2016), our findings seem to be partly in line with the study of Scharf and colleagues (2005a), demonstrating that exclusion from social relations is the dimension that affects most older adults. However, our findings also contrast to those of their study in which civic participation and neighbourhood exclusion were the least frequently occurring dimensions of old-age social exclusion (Scharf et al. 2005a). Barnes and colleagues (2006) found little variation in the prevalence of different dimensions in the general older population (all are around 10%), which is in contrast with the results presented here, which often exceed 10%. Also, higher proportions of multiple exclusion were found compared to studies in the UK (Barnes et al. 2006; Scharf et al. 2005a). In our study, more than six out of ten home-dwelling older adults experienced exclusion in two or more dimensions.

The measurement of old-age exclusion in categories of exclusion extends existing research findings that indicate the overlapping nature of dimensions of social exclusion (Scharf et al. 2005a). Consistent with the consensus of social exclusion as a multidimensional concept (Tsakloglou and Papadopoulos 2002; Vrooman and Hoff 2013), empirical research has shown that there are significant interrelations between different dimensions of social exclusion such as cultural activities and local services, civic activities/access to information and social relationships, social relations and material resources, social relations and basic services and social relations and neighbourhood (Kneale 2012; Scharf et al. 2005a). This, however, remained limited to the association of two dimensions out of a larger number of dimensions and gave no insight into the co-occurrence of different dimensions. Most measurements on social exclusion created an index, by counting the number of dimensions people were excluded from (e.g. Kneale 2012; Mezey et al. 2013; Scharf et al. 2005a). Our study identifies four categories of old-age social exclusion in which dimensions of exclusion are combined. The most prominent category is those at "low risk" of old-age social exclusion and consists of older adults that are not very likely to be excluded from any of the eight dimensions. The second major category we named "the non-participating

financially excluded” and consists of older adults that are more likely to be digitally excluded and have a higher probability of exclusion from civic participation and financial resources. The third category encompasses “the severely excluded” as these older adults are more likely to be excluded from all eight dimensions. The “environmentally excluded” is the smallest category and consists of older adults who are (digitally and civically) participating and have, compared to the population total, a lower probability to experience financial exclusion. They are however very likely to be excluded from social relations, the neighbourhood, services, decent housing and have a higher probability of experiencing feelings of ageism. The main conclusion of this LCA is that different types of old-age social exclusion exist, which emphasizes even more the complex nature of social exclusion in later life. This calls for the implementation of different interventions and prevention campaigns, as social exclusion cannot be tackled by *catch-all policies* (Scharf et al. 2005b). At present, social exclusion among older adults receives little attention in Belgian and Flemish policy, with the most attention being given to child poverty (e.g. Noppe et al. 2016; Pannecoucke et al. 2014), despite the challenge formulated by the European Commission to address poverty and social exclusion throughout all life stages (European Commission 2014). Furthermore, current Belgian monitoring measures mainly focus on poverty, financial and material deprivation, housing and low work intensity (e.g. Dierckx et al. 2015; Pannecoucke et al. 2014); to a lesser extent, they also pay attention to indicators such as civic participation (e.g. Noppe et al. 2016) and almost no focus is devoted to the combination of different disadvantages. Although our results show that exclusion from financial resources is present in two out of four categories, the remaining dimensions of exclusion should be included in monitoring measures. We confirm the interrelated nature of dimensions of exclusion in this study; consequently, we not only plead for an extension of monitoring measures, but also for cross-over and collaboration between policy domains, as interventions and policies to reduce old-age social exclusion might be less successful without dealing with the interrelations between dimensions of exclusion as shown in this study (Kneale 2012). As suggested by Barnes and colleagues (2006) this can, for instance, be done by developing or strengthening coordinated policy at the local level in which all relevant agencies undertake action to tackle old-age exclusion.

First, it might be interesting to add some subdimensions to exclusion such as enriching financial exclusion with exclusion from material resources (e.g. having central heating, use of a telephone, access to a car) and to include a more diversified operationalization of digital exclusion, as digital exclusion is more than simply accessing the Internet (Blank and Groselj 2014) and because these dimensions appear to be important in several categories. Second, although the use of relative thresholds has its advantages and has proven to be valuable, many other thresholds are possible. Moreover, a combination of different thresholds could be used, depending on which

dimensions suggest a potential pathway for further exploration. Scharf and colleagues (2005a) for instance use both threshold 1 and 2 depending on the dimension. In our opinion, a Delphi process with experts and stakeholders in the field of old-age social exclusion could be conducted as has been carried out in other studies regarding frailty for instance (e.g. Rodríguez-Mañas et al. 2013). Third, as the life course has become less standardized due to societal developments in the field of the labour market (e.g. increased flexibility) and extensive diversification in family organisation (e.g. increased divorce rates) (Beck 1986), it has led to unequal distribution of resources not only among social strata, such as social class, but inequalities are also related to events and transitions in the life course leading to dynamics in and out of poverty and social exclusion. Currently, this life course perspective has not been adequately taken into account when studying (old-age) social exclusion and there is a need to further incorporate this perspective into old-age social exclusion in order to gain insight into which life course events lead to or protect from social exclusion (Vandecasteele 2010; Van Regenmortel et al. 2016). Likewise, as this research only focused on the current accumulation of dimensions of exclusion it might also be of value to study the accumulation of disadvantages throughout a lifetime (Dannefer 2003). Fourth, as unit non-response is often related with older age and lower SES (Helasoja et al. 2002; Wilks et al. 2007) and data were cleaned by listwise deletion (indicators of age and old-age social exclusion) there is a chance that the old-age social exclusion figures presented are underestimated. This is also the case because ethnic minorities are underrepresented in the sample (De Donder et al. 2014). Future research could collaborate with relevant community organisations and use snowballing techniques to obtain sufficient numbers of older ethnic minorities to reduce this gap (e.g. Scharf et al. 2005a; Sin 2004). Fifth, this study was limited to home-dwelling older adults. It might, however, be interesting to compare the prevalence of old-age social exclusion from home- versus institution-dwelling older adults. Currently, it remains unclear which, and to which extent, older adults in a nursing home experience old-age exclusion. Research already demonstrates that the social relations of older adults in nursing homes are mobilised rather than that they are being excluded from social relations (Cavalli et al. 2007). In contrast, a study by Moreira and colleagues (2015) showed a low quality of life in institutionalised older adults, which might relate to their level of exclusion (Bayram et al. 2010). This could be explored by future research. Finally, as the risk and meaning of social exclusion changes across the life course (Scutella and Wilkins, 2010) future research could assess if measurement invariance could be established (i.e. if the latent class model has the same meaning for different age groups, or men and women), which can be done by conducting a multigroup Latent Class Analysis approach (Kankaraš et al. 2010).

## **7. Conclusion**

This research shows the prevalence of different dimensions of exclusion in Flanders and Brussels among older adults. Older people in this study were mostly excluded from (digital) participation, social relations and the neighbourhood. As applying different thresholds leads to varying proportions of older adults facing social exclusion, we suggest that in further research, a threshold relative to the population under study, which indicates the 10% most excluded older adults, should be used in line with the work of Barnes and colleagues (2006). We confirm that social exclusion is a multidimensional concept, i.e. combining disadvantages in different fields, which on the one hand shows that more than 60% of older adults experience exclusion in two or more dimensions. On the other hand, this study distinguishes four different categories of old-age social exclusion, namely older adults at low risk of old-age exclusion, “non-participating financially excluded” older adults, “environmentally excluded” older adults and those “severely excluded”. This variation in old-age social exclusion calls for a tailored approach to the prevention of and fight against old-age social exclusion.

## References

- Allan, L. J., Johnson, J.A., & Emerson, S.D. (2014). The role of individual difference variables in ageism. *Personality and Individual Differences, 59*, 32–37. <https://doi.org/10.1016/j.paid.2013.10.027>
- Barnes, M., Blom, A., Cox, K., Lessof, C., & Walker, A. (2006). *The Social Exclusion of Older People: Evidence from the first wave of the English Longitudinal Study of Ageing (ELSA)*. London: Office of the Deputy Prime Minister.
- Bayram, N., Bilgel, F., & Bilgel, N.G. (2010). Social Exclusion and Quality of Life: An Empirical Study from Turkey. *Social Indicators Research, 105*(1), 109–120.
- Beck, U. (1986). *Risikogesellschaft. Auf dem Weg in eine andere Moderne*. Frankfurt: Suhrkamp.
- Becker, E., Boreham, R., & National Centre for Social Research. (2009). *Understanding the risks of social exclusion across the life course: Older age*. London: Social Exclusion Task Force.
- Blank, G., & Groselj, D. (2014). Dimensions of Internet use: amount, variety, and types. *Information, Communication & Society, 17*(4), 417–435.
- Buffel, T., Phillipson, C., & Scharf, T. (2013). Experiences of neighbourhood exclusion and inclusion among older people living in deprived inner-city areas in Belgium and England. *Ageing & Society, 33*(1), 89–109.
- Buffel, T., Verté, D., De Donder, L., De Witte, N., Dury, S., Vanwing, T., et al. (2012). Theorising the relationship between older people and their immediate social living environment. *International Journal of Lifelong Education, 31*(1), 13–32.
- Burkhauser, R. V. (2009). Deconstructing European Poverty Measures: What Relative and Absolute Scales Measure. *Journal of Policy Analysis and Management, 28*(4), 715–725.
- Cavalli, S., Bickel, J.F., & Lalive D'Epinay, J. (2007). Exclusion in very old age: The impact of three critical life events. *International Journal of Ageing and Later Life, 2*(1), 9–31.
- Chakravarty, S.R., & D'Ambrosio, C. (2006). The measurement of social exclusion. *Review of Income and Wealth, 52*(3), 377–398.
- Clogg, C.C. (1995). Latent class models. In G. Arminger, C.C. Clogg, & M. E. Sobel (Eds.), *Handbook of statistical modeling for the social and behavioral sciences* (pp. 311 – 359). New York: Plenum.
- Coumans, M., & Schmeets, H. (2014). The Socially Excluded in the Netherlands: The Development of an Overall Index. *Social Indicators Research, 122*(3), 779–805.
- Dannefer, D. (2003). Cumulative Advantage/Disadvantage and the Life Course: Cross-Fertilizing Age and Social Science Theory. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 58*(6), S327–S337.
- De Donder, L., De Witte, N., Dury, S., Buffel, T., Brosens, D., Smetcoren, A.S., et al. (2015). Feelings of Unsafety among Older People: Psychometric Properties of the EFU-scale. *Procedia - Social and Behavioral Sciences, 191*, 1095–1101.
- De Donder, L., De Witte, N., Verté, D., Dury, S., Buffel, T., Smetcoren, A.S., et al. (2014). Developing Evidence-Based Age-Friendly Policies: A Participatory Research Project. In *SAGE Research Methods Cases*. London: SAGE Publications, Ltd.
- De Jong Gierveld, J. & Tilburg, T.V. (2006). A 6-Item Scale for Overall, Emotional, and Social Loneliness Confirmatory Tests on Survey Data. *Research on Aging, 28*(5), 582–598.
- Dewilde, C. (2012). Lifecourse determinants and incomes in retirement: Belgium and the United Kingdom compared. *Ageing & Society, 32*(4), 587–615.
- Dierckx, D., Coene, J., & Raeymaeckers, P. (2015). *Armoede en sociale uitsluiting: Jaarboek 2014*. Leuven: Acco.
- Dury, S., De Donder, L., De Witte, N., Brosens, D., Smetcoren, A.S., Van Regenmortel, S., et al. (2015). Is volunteering in later life impeded or stimulated by other activities? *Research on Aging*. <https://doi.org/10.1177/0164027515574777>
- European Commission. (2014). Tacking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth. European Commission. [http://ec.europa.eu/europe2020/pdf/europe2020stocktaking\\_en.pdf](http://ec.europa.eu/europe2020/pdf/europe2020stocktaking_en.pdf). Accessed 24 June 2014.
- Eurostat. (2015). Labour force survey statistics – transitions from work to retirement. Eurostat. [http://ec.europa.eu/eurostat/statistics-explained/index.php/Labour\\_force\\_survey\\_statistics\\_-\\_transition\\_from\\_work\\_to\\_retirement/](http://ec.europa.eu/eurostat/statistics-explained/index.php/Labour_force_survey_statistics_-_transition_from_work_to_retirement/) Accessed 9th December 2015.
- Fortuijn, J. D., van der Meer, M., Burholt, V., Ferring, D., Quattrini, S., Hallberg, I. R., et al. (2006). The activity patterns of older adults: a cross-sectional study in six European countries. *Population, Space and Place, 12*(5), 353–369.
- Frégné, C. (1999). *Sociologie de l'exclusion*. Paris: L'Harmattan.
- Giambona, F., & Vassallo, E. (2013). Composite Indicator of Social Inclusion for European Countries. *Social Indicators Research, 116*(1), 269–293.
- Gray, M., De Vaus, D., Qu, L., & Stanton, D. (2011). Divorce and the wellbeing of older Australians. *Ageing & Society, 31*(03), 475–498.
- Heap, J., & Fors, S. (2015). Duration and Accumulation of Disadvantages in Old Age. *Social Indicators Research, 123*(2), 411–429.

- Helasoja V, Prättälä R, Dregval L, Kasmel A, & Pudule I. (2002). Late response and item non-response in Finbalt Health Monitor. *European Journal of Public Health, 12*, 117-123.
- Hrast, M.F., Mrak, A.K., & Rakar, T. (2013). Social exclusion of elderly in Central and Eastern Europe. *International Journal of Social Economics, 40*(11), 971–989.
- Jokela, M., Batty, G.D., & Kivimäki, M. (2013). Ageing and the prevalence and treatment of mental health problems. *Psychological Medicine, 43*(10), 2037–2045.
- Kankaraš, M., Moors, G.B., & Vermunt, J.K. (2010). Testing for Measurement Invariance With Latent Class Analysis. In E. Davidov, P. Schmidt, & J. Billiet (Eds.), *Cross-Cultural Analysis. Methods and Applications* (pp.359-84). New York/Sussex: Routledge. Taylor & Francis Group.
- Kleiber, D. A., & Nimrod, G. (2009). "I can't be very sad": constraint and adaptation in the leisure of a "learning in retirement" group. *Leisure Studies, 28*(1), 67–83.
- Kneale, D. (2012). *Is social exclusion still important for older people?* London: The International Longevity Centre.
- Labonté, R.N., Hadi, A., & Kauffmann, X. E. (2011). *Indicators of Social Exclusion and Inclusion: A Critical and Comparative Analysis of the Literature. Working Papers Volume 2, number 8*. Ottawa: Globalization and Health Equity Research Unit, Institute of Population Health, University of Ottawa.
- Larsson, E., Larsson-Lund, M., & Nilsson, I. (2013). Internet Based Activities (IBAs): Seniors' Experiences of the Conditions Required for the Performance of and the Influence of these Conditions on their Own Participation in Society. *Educational Gerontology, 39*(3), 155–167.
- Lee, Y., Hong, P. Y. P., & Harm, Y. (2014). Poverty Among Korean Immigrant Older Adults: Examining the Effects of Social Exclusion. *Journal of Social Service Research, 40*(4), 385–401.
- Levitas, R., Pantazis, C., Fahmy, E., Gordon, D., Lloyd, E., & Patsios, D. (2007). *The multi-dimensional analysis of social exclusion*. Bristol: Department of Sociology and School for Social Policy Townsend Center for the International Study of Poverty and Bristol Institute for Public Affairs University of Bristol.
- Lloyd, C., Waghorn, G., Best, M., & Germell, S. (2008). Reliability of a composite measure of social inclusion for people with psychiatric disabilities. *Australian Occupational Therapy Journal, 55*(1), 47–56.
- Löfqvist, C., Granbom, M., Himmelsbach, I., Iwarsson, S., Oswald, F., & Haak, M. (2013). Voices on Relocation and Aging in Place in Very Old Age—A Complex and Ambivalent Matter. *The Gerontologist, 53*(6), 919–927.
- Lombe, M., & Sherraden, M. (2008). Inclusion in the Policy Process: An Agenda for Participation of the Marginalized. *Journal of Policy Practice, 7*(2-3), 199–213.
- Magidson, J., & Vermunt, J.K. (2004). Latent class models. In D. Kaplan (Eds.), *The Sage Handbook of Quantitative Methodology for the Social Sciences* (pp. 175-198). Thousand Oaks: Sage Publications.
- McCutcheon, A. L. (1987). *Latent Class Analysis*. SAGE Publications.
- Mezey, G., White, S., Thachil, A., Berg, R., Kallumparam, S., Nasiruddin, O., et al. (2013). Development and preliminary validation of a measure of social inclusion for use in people with mental health problems: The SInQUE. *International Journal of Social Psychiatry, 59*(5), 501–507.
- Moreira, P. de A., Roriz, A. K. C., Mello, A. L., & Ramos, L. B. (2015). Quality of Life of Institutionalized Elderly in Brazil. *Social Indicators Research, 126*(1), 187–197.
- Nimrod, G. (2014). The benefits of and constraints to participation in seniors' online communities. *Leisure Studies, 33*(3), 247–266.
- Noppe, J., Vergeynst, T., & Jacques A. (2016). *Vlaamse Armoedemonitor*. Brussel: Studiedienst Vlaamse Regering.
- Nylund, K.L., Asparouhov, T., & Muthén, B.O. (2007). Latent Class Analysis and Growth Mixture Modeling: A Monte Carlo Simulation Study. *Structural Equation Modeling, 14*(4), 535-569.
- Ofei-Doodoo, S., Medvene, L.J., Nilsen, K.M., Smith, R.A., & DiLollo, A. (2015). Exploring the Potential of Computers to Enrich Home and Community-Based Services Clients' Social Networks. *Educational Gerontology, 41*(3), 216–225.
- Ogg, J. (2005). Social exclusion and insecurity among older Europeans: the influence of welfare regimes. *Ageing and Society, 25*(1), 69–90.
- Pannecoucke, I., Lahaye, W., Vranken, J., & Van Rossem, R. (2014). *Armoede in België. Jaarboek 2014*. Gent: Academia Press.
- Phillipson, C., Bernard, M., Phillips, J., & Ogg, J. (1999). Older people's experiences of community life: patterns of neighbouring in three urban areas. *The Sociological Review, 47*(4), 715–743.
- Pirani, E. (2013). Evaluating contemporary social exclusion in Europe: a hierarchical latent class approach. *Quality & Quantity, 47*(2), 923–941.
- Rodríguez-Mañas, L., Féart, C., Mann, G., Viña, J., Chatterji, S., Chodzko-Zajko, W., et al. (2013). Searching for an Operational Definition of Frailty: A Delphi Method Based Consensus Statement. The Frailty Operative Definition-Consensus Conference Project. *The Journals of Gerontology: Series A, 68*(1), 62–67.
- Rook, K.S. (2009). Gaps in social support resources in later life: An adaptational challenge in need of further research. *Journal of Social and Personal Relationships, 26*(1), 103–112.
- Room, G.J. (1999). Social exclusion, solidarity and the challenge of globalization. *International Journal of Social Welfare, 8*(3), 166–174.

- Rose, R.A., Parish, S. L., & Yoo, J. P. (2009). Measuring Material Hardship among the US Population of Women with Disabilities Using Latent Class Analysis. *Social Indicators Research*, 94(3), 391–415.
- Saito, M., Kondo, N., Kondo, K., Ojima, T., & Hirai, H. (2012). Gender differences on the impacts of social exclusion on mortality among older Japanese: AGES cohort study. *Social Science & Medicine*, 75(5), 940–945.
- Scharf, T., Phillipson, C., & Smith A.E. (2005b). *Multiple exclusion and quality of life amongst excluded older people in disadvantaged neighbourhoods*. London: Office of the Deputy Prime Minister.
- Scharf, T., Phillipson, C., & Smith, A. E. (2005a). Social exclusion of older people in deprived urban communities of England. *European Journal of Ageing*, 2(2), 76–87.
- Scutella, R., & Wilkins, R. (2010). Measuring Social Exclusion in Australia: Assessing Existing Data Sources. *Australian Economic Review*, 43(4), 449–463.
- Sin, C. (2004). Sampling Minority Ethnic Older People in Britain. *Ageing and Society*, 24(2), 257–277.
- Treanor, M. C. (2014). Deprived or not deprived? Comparing the measured extent of material deprivation using the UK government's and the Poverty and Social Exclusion surveys' method of calculating material deprivation. *Quality & Quantity*, 48(3), 1337–1346.
- Tsakoglou, P., & Papadopoulos, F. (2002). Aggregate level and determining factors of social exclusion in twelve European countries. *Journal of European Social Policy*, 12(3), 211–225.
- van Bergen, A. P. L., Hoff, S. J. M., van Ameijden, E. J. C., & van Hemert, A. M. (2014). Measuring Social Exclusion in Routine Public Health Surveys: Construction of a Multidimensional Instrument. *Plos One*, 9(5), e98680. <http://dx.doi.org/10.1371/journal.pone.0098680>
- Vandecasteele, L. (2010). Poverty Trajectories After Risky Life Course Events in Different European Welfare Regimes. *European Societies*, 12(2), 257–278.
- Van Regenmortel, S., De Donder, L., Dury, S., Smetcoren, A.S., De Witte, N., & Verté, D. (2016). Social Exclusion in Later Life: A Systematic Review of the Literature. *Journal of Population Ageing*. <https://doi.org/10.1007/s12062-016-9145-3>
- Vermunt, J.K (1997). *LEM 1.0: A general program for the analysis of categorical data*. Tilburg: Tilburg University.
- Vrooman, J. C., & Hoff, S. J. M. (2013). The Disadvantaged Among the Dutch: A Survey Approach to the Multidimensional Measurement of Social Exclusion. *Social Indicators Research*, 113(3), 1261–1287.
- Wagner, N., Hassanein, K., & Head, M. (2010). Computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior*, 26(5), 870–882.
- Walsh, K., O'Shea, E., Scharf, T., & Shucksmith, M. (2014). Exploring the Impact of Informal Practices on Social Exclusion and Age-Friendliness for Older People in Rural Communities. *Journal of Community & Applied Social Psychology*, 24(1), 37–49.
- Walsh, K., Scharf, T., & Keating, N. (2016). Social exclusion of older persons: a scoping review and conceptual framework. *European Journal of Ageing*, <https://doi.org/10.1007/s10433-016-0398-8>
- Ward, P., Walsh, K., & Scharf, T. (2014). *Measuring Old-Age Social Exclusion in a Cross-Border Context. Findings of a comparative secondary analysis in Ireland and Northern Ireland*. Galway, Ireland: Irish Centre for Social Gerontology.
- Whelan, C. T., & Maître, B. (2008). “New” and “Old” Social Risks: Life Cycle and Social Class Perspectives on Social Exclusion in Ireland. *Economic & Social Review*, 39(2), 131-156.
- Wilks R, Younger N, Mullings J, Zohoori N, Figueroa P, Tulloch-Reid M, et al.(2007). Factors affecting study efficiency and item non-response in health surveys in developing countries: the Jamaica national healthy lifestyle survey. *BMC Medical Research Methodology*, 7(13) doi:10.1186/1471-2288-7-13.

Old-Age Social Exclusion	
<p>Cultural participation</p> <p>Sports participation</p> <p>Social participation</p> <p>Volunteering participation</p>	<p><b>Civic Participation</b></p>
<p>Emotional loneliness</p> <p>Social loneliness</p> <p>Social contacts</p> <p>Social support</p>	<p><b>Social Relations</b></p>
<p>Health services</p> <p>Mobility services</p> <p>Leisure services</p> <p>Basic services</p>	<p><b>Services</b></p>
<p>Household income</p> <p>Perceived income adequacy</p>	<p><b>Financial</b></p>
<p>Feelings of unsafety</p> <p>Enjoyment living in the neighbourhood</p> <p>Feelings of connection to the neighbourhood</p>	<p><b>Neighbourhood</b></p>
<p>Dwelling is too big</p> <p>Dwelling is in a bad condition/poorly kept</p> <p>Presence of stairs before entering the dwelling</p> <p>Thresholds (inside or outside) are too high</p> <p>Presence of stairs inside the dwelling</p> <p>Need to take stairs when going to the toilet</p> <p>Dwelling is too expensive</p> <p>Dwelling is not burglar-proof</p> <p>Dwelling is not comfortable</p> <p>Dwelling is not sound-proof</p> <p>Dwelling is difficult to heat</p> <p>Lack of facilities in the dwelling</p>	<p><b>Housing</b></p>
<p>When times get rough, elderly people usually suffer worst</p> <p>The elderly are a separate group in society with their own interest</p> <p>Society is especially focused on youngsters, the interests of older people are not taken into account</p> <p>Some people act like I don't have anything left to contribute to society now that I'm older</p> <p>I have this feeling that older people do not matter to society</p> <p>The elderly should have much more of a say in what is being organized for them</p> <p>Since I'm older, I have regularly noticed that people no longer take me seriously</p> <p>I have the feeling that the aged are often being considered less important</p>	<p><b>Ageism</b></p>
	<p><b>Digital Participation</b></p> <p>Internet use</p>

Figure 1. Operationalization old-age social exclusion



Table 1. Demographic characteristics final sample (N = 20,275)

	Categories	%	60–69	70–79	80+
Gender	Male	48.8%	52.5%	48.8%	37.7%
	Female	51.2%	47.5%	51.2%	62.3%
Educational level	High educated (>18y)	17%	22.9%	12.9%	8.5%
	Middle educated	50.3%	54.4%	52.7%	60%
	Low educated (until age of 12)	33.3%	22.7%	39.8%	51.5%
Marital status	Married	69.9%	78.6%	70.1%	43.9%
	Widowed	19.9%	8.9%	21.7%	48.7%
	Divorced	4.4%	6.4%	2.9%	1.5%
	Never married	3.5%	3.2%	3.6%	4.2%
	Living together	2.1%	2.8%	1.5%	1.2%
	Nun	.2%	.1%	.3%	.5%
Total			49.1%	34.2%	16.7%

Table 2. Prevalence of social exclusion dimensions and multiple exclusion (N = 20,275)

	Absolute		Relative to	Relative to
	Threshold 1	Threshold 2	number of items	sample
<b>Dimensions old-age social exclusion</b>				
Exclusion from civic participation	86.2%	5.5%	54.2%	24.1%
Exclusion from social relations	31.1%	0.1%	8.7%	31.1%
Exclusion from services	25.1%	1.8%	10.8%	10.8%
Exclusion from financial resources	23.5%	5.6%	23.5%	23.5%
Neighbourhood exclusion	40.1%	0.5%	6.3%	40.1%
Exclusion from decent housing	73.2%	0.5%	5.5%	15.2%
Ageism	87.4%	10.3%	45.1%	10.3%
Digital exclusion	64.2%	64.2%	64.2%	64.2%
<b>Number of dimensions excluded on</b>				
0	.1%	31.5%	11.8%	12.1%
1	1.7%	51.5%	21.0%	24.2%
2	8.1%	14.1%	27.3%	25.0%
3	18.9%	2.4%	23.1%	19.6%
4	26.7%	.3%	12.0%	11.7%
5	24.3%	.0%	3.8%	5.2%
6	14.2%	.0%	.9%	1.8%
7	5.1%	-	.2%	.3%
8	0.8%	-	.0%	.1%

Table 3. Categories of old-age social exclusion: Latent Class Analysis (N = 20,275)

Category	Low risk	Non-participating financially excluded	Environmentally excluded	Severely excluded	Population total
Relative class size SPSS	45.7%	25.5%	12.5%	16.2%	
Probability of experiencing					
Exclusion from civic participation	4.6%	31.7%	12.6%	65.8%	24.1%
Exclusion from social relations	12.5%	26.3%	56.6%	52.9%	31.1%
Exclusion from services	9.6%	8.1%	14.6%	13.5%	10.8%
Exclusion from financial resources	8.3%	34.5%	17.5%	44.7%	23.5%
Neighbourhood exclusion	22.6%	27.8%	58.8%	79.4%	40.1%
Exclusion from decent housing	9.2%	14.1%	18.5%	26.3%	15.2%
Ageism	2.3%	9.2%	15.7%	24.0%	10.3%
Digital exclusion	36.7%	97.7%	39.8%	94.4%	64.2%

## Annex 1

### Operationalization of indicators of old-age social exclusion

<b>Dimension of social exclusion</b>	<b>Subdimension/indicators</b>	
Exclusion from civic participation	No cultural participation	Did not attend any of the twenty cultural events at least once in the preceding year
	No sports participation	Does not engage in any sports activity
Exclusion from social relations	No social participation	Is not a member of at least one of the twenty associations
	No volunteering participation	Does not engage in any of the ten volunteering activities
	Very emotionally lonely	Derived from the six items scale for loneliness (Gierveld and Tilburg 2006). If respondents indicated for each of the three emotional loneliness indicators that they were lonely, they were assessed as very emotionally lonely.
	Very socially lonely	Derived from the six items scale for loneliness (Gierveld and Tilburg 2006). If respondents indicated for each of the three social loneliness variables that they were lonely, they were assessed as very socially lonely.
	Exclusion from social contacts	If respondents did not have at least once-a-month contact with their children, grandchildren (nuclear family), brothers, sisters, other family members (extended family), friends or neighbours they were considered as excluded from social contacts.
	Exclusion from social support	If respondents could not count on support of their partner, daughter, son, daughter-in-law, son-in-law, grandchildren (nuclear family), sister, brother, other family members (extended family), friends or neighbours they were considered as excluded from social support.
Exclusion from services	Exclusion from health services	Respondents were considered as excluded from health services if they lacked a general practitioner and pharmacy in their neighbourhood.
	Exclusion from mobility services	Respondents were considered as excluded from mobility services if they lacked sitting benches, public toilets, public transport, bus stops and pedestrian crossings in their neighbourhood.
	Exclusion from leisure services	Respondents were considered as excluded from leisure services if they lacked a service centre, a sports centre, a swimming pool, a library, a neighbourhood centre, a movie theatre, a theatre and a pub in their neighbourhood.
	Exclusion from basic services	Respondents were considered as excluded from basic services if they lacked a grocery store, a bank, a butcher's shop, a bakery shop, a mobile shop and a post office in their neighbourhood.

(Continued) Operationalization of indicators of social exclusion in later life

<b>Dimension of social exclusion</b>	<b>Subdimension/indicators</b>	
Exclusion from financial resources	Very low financial resources	Respondents were considered as having very low financial resources if their net monthly household income was between €500 and €999.
	Difficult to manage with the household income	Respondents were considered as excluded if they indicated if it was (very) hard to get by financially.
Neighbourhood exclusion	Feelings of unsafety	Respondents were considered as having feelings of unsafety if they (totally) agreed on all of the eight indicators of the EFU scale (De Donder et al. 2015)
	Low enjoyment living in the neighbourhood	Respondents with low enjoyment of living in the neighbourhood indicated that they (totally) did not like living in their neighbourhood.
Exclusion from decent housing	Low feelings of connection to the neighbourhood	Respondents with low feelings of connection to the neighbourhood indicated that they felt little to no connection with their neighbourhood.
	Dwelling is too big	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Dwelling is in a bad condition/poorly kept	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Presence of stairs before entering the dwelling	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Thresholds (inside or outside) are too high	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Presence of stairs inside the dwelling	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Need to take stairs when going to the toilet	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Dwelling is too expensive	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Dwelling is not burglar-proof	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
	Dwelling is not comfortable	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.
Dwelling is not sound-proof	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.	
Dwelling is difficult to heat	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.	
	There is a lack of facilities in the dwelling	Respondents were considered excluded if they indicated that this statement was rather or completely applicable.

(Continued) Operationalization of indicators of social exclusion in later life

<b>Dimension of social exclusion</b>	<b>Subdimension/indicators</b>	
Ageism	When times get rough, elderly people usually suffer worst	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	The elderly are a separate group in society with their own interests	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	Society is especially focused on youngsters, the interests of the elderly are not taken into account	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	Some people act like I don't have anything left to contribute to society now that I'm older	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	I have this feeling that older people do not matter to society	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	The elderly should have much more of a say in what is being organised for them	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	Since I'm older, I have regularly noticed that people no longer take me seriously	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
	I have the feeling that the aged are often being considered less important or treated unfairly compared to other groups of people	Respondents were considered excluded if they indicated that they (completely) agreed with this statement.
Digital exclusion	Respondents were assessed as being digitally excluded if they never used the Internet.	

