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Offspring and later-life loneliness in Eastern and Western Europe

Abstract

Later-life loneliness is increasingly recognized as an important public health issue. In this study, we examine whether having more children and grandchildren is protective against later life loneliness in a group of Eastern and Western European countries. Drawing on data from the Generation and Gender Surveys, we estimated logistic regression models of the likelihood of being lonely among men and women aged 65 and older. The results showed a negative association between number of children and loneliness among men and women in both Eastern-European and Western-European countries. A mediation analysis performed using the KHB decomposition method showed that grandparenthood status partly explained differences in the loneliness risks of childless women, mothers with one child and those with two or more children. Among men, the mediating role of grandparenthood was significant in Eastern Europe and marginally significant in Western countries. Given the relatively strong reliance of older people on the family in Eastern Europe, we expected that the protective effects of offspring on loneliness would be stronger in Eastern-European countries than in Western-European countries. This hypothesis was supported only in part by our results. The protective effect of having four or more children was larger in the East than in the West. Overall, our findings indicate that having close family members, including more children and at least one grandchild, has a protective effect against later-life loneliness in both country clusters considered.

Key words: loneliness, psychosocial wellbeing, isolation, mental health, ageing, intergenerational relations, grandparenthood

Introduction

Loneliness is not an inevitable part of later life, nor is the experience of loneliness restricted to older people. Nevertheless, later life is marked by an increased chance of experiencing events and circumstances, such as widowhood, onset of health limitations and financial hardship, which are associated with increased risks of loneliness, and the prevalence of loneliness among adults is often higher in older than in younger age groups (Nicolaisen/Thorsen 2014; Yang/Victor 2011). Not only is loneliness – a perceived deficit in the quality or quantity of social interaction – distressing and stigmatised, it is also asso-

ciated with adverse health conditions, including stress and inflammation, depression, heart disease, a range of other diseases and increased mortality risks (Cacioppo/Hughes/ Waite/Hawkley/Thisted 2006; Courtin/Knapp 2017; Hawkley/Cacioppo 2010; Holt-Lunstad/Smith/Baker/Harris/Stephenson 2015)

Levels of reported later-life loneliness tend to be higher in Southern than in Northern European countries (Fokkema/De Jong Gierveld/Dykstra 2012; Vozikaki/Papadaki/Linar-dakis,/Philalithis 2018), but an even more marked difference has been noted between Eastern and Western European countries (De Jong Gierveld/Dykstra/Schenk 2012; Hansen/Slagsvold 2016; Yang/Victor 2011). Explanations for these differences include a range of cultural, health related and socio-economic factors and the effects of the upheaval following the collapse of the Soviet Union; these may have been most challenging for older adults, especially as previous care systems and pensions were eroded (Botev 2012; Marmot/Bobak 2005).

Dykstra (2009) has argued that, when looking into regional loneliness differences, it should be recognised that the importance of particular individual-level predictors might vary across (clusters of) countries. As elaborated later, there are reasons for supposing that the protective role of offspring against later-life loneliness might be more pronounced in Eastern Europe than in Western Europe, given that Easter-European societies tend to be more family-oriented. In this study, we assess whether there are differences between Eastern-European and Western-European countries in the protective effects of having children and grandchildren against later-life loneliness. Disentangling the roles of children and grandchildren in shaping older adults' mental health is of increasing relevance. As a consequence of increasing longevity, family generations spend longer parts of their lives together, during which they may provide support for each other (Bengtson 2001).

Theoretical background

Next to partners and spouses, adult children are the most important source of emotional and practical support for older people (Dykstra 2015; Wolff/Kasper 2006). The presence of children increases opportunities for exchange and companionship, and may reassure parents that they have potential providers of support that they can fall back on in case of need (Evenson/Simon 2005; Grundy/Read 2012; Tosi/Grundy 2018). It is therefore not surprising that parents, and particularly mothers (Van den Broek 2017; Van den Broek/Grundy 2017), tend to be less lonely than their childless counterparts (De Jong Gierveld/Broese van Groenou/Hoogendoorn/Smit 2009; Pinquart/Sörensen 2001).

Having children also implies that one can eventually become a grandparent. The potential protective effect against loneliness of having grandchildren has received much less scholarly attention than the effects of having children. However, some studies have reported positive effects of providing grandchild care on health and subjective indicators of well-being. A longitudinal Chilean study, for example, found that provision of help to grandchildren benefited grandfathers' (but not grandmothers') psychosocial health (Grundy et al. 2012). In a European study, Di Gessa et al. (2016) found that providing grandchild care was associated with better self-rated health among older people, although they did not find any association with depressive symptoms. Other studies have suggested that

providing childcare may be a stimulating social activity that has beneficial effects on older people's cognitive ability (Arpino/Bordone 2014), health behaviours (Waite/Hughes/LaPierre/Luo 2007), and life satisfaction (Powdthavee 2011). Having grandchildren and providing care for them may make older people feel needed, and in this way provide a sense of purpose. Grandparenthood may also be protective against loneliness, regardless of whether grandchild care is provided. Adult children are less likely to live far away from their older parents (Van den Broek/Dykstra 2017; Van den Broek/Dykstra/Schenk 2014) and tend to have more contact with their parents if they have children themselves (Grundy/Shelton 2001; Knoester/Eggebeen 2006). Grandparenthood may also encourage people to look forward to the future (Rowe/Kahn 1998), all of which may be beneficial for mental well-being and protect against loneliness.

It appears counterintuitive that, within Europe, levels of later-life loneliness tend to be higher in regions in which levels of family contact and co-residence between older parents and their children are also higher (Vozikaki et al. 2018; Yang/Victor 2011). However, in more 'family orientated' societies (Reher 1998), such as those of Southern and Eastern Europe (Daatland/Herlofson/Lima 2011), individuals who lack important family resources may have fewer alternative sources of support and social interaction. Sparse family links may therefore be a stronger risk factor for loneliness in Eastern-European than in Western-European countries, especially as in Eastern Europe levels of interaction with friends are rather low in comparison with other European regions (Grundy/Murphy 2018). It has been argued that the erosion of care systems and the value of pensions has further reinforced familialism and the reliance on family supports in Eastern Europe (Castiglioni/Hărăguş/Faludi/Hărăguş 2016; Moor/Komter 2012; Saraceno/Keck 2010). Consistent with this argument, a recent study has shown that the protective effects of children on depressive symptoms were greater in Eastern Europe than in Western Europe (Grundy/Van den Broek/Keenan 2019).

In this paper, we use data from the Generations and Gender Surveys to analyse associations between loneliness and number of children and grandparent status. Based on the arguments outlined above, we expect (i) that having more children would be associated with a lower risk of loneliness, and (ii) that the protective effects of having more children may, in part, be explained by the fact that having more children increases the chance of being a grandparent. Given that the strong sense of family obligations and the eroded public support system for older persons encourage older adults in Eastern Europe to rely on family support, we furthermore expect (iii) that differences in risks of loneliness by number of children and by grandparenthood status would be more pronounced in Eastern-European countries than in Western-European countries.

We assess the links between number of offspring and loneliness separately for women and men, because of the gendered nature of family involvement. Women invest more in family relationships and play a larger role in caregiving activities, whether for children or other adults. The kin-keeping role of the mother means that women are more likely to maintain contact with kin and serve as generational bridges in grandparent-grandchild relationships. This may translate into closer and more satisfying bonds between children and parents, and between grandchildren and grandparents on the maternal side (Albertini/Tosi 2018; Chan/Elder 2000; Monserud 2008). Ties with children and grandchildren may be more meaningful and thus protective against later-life loneliness for women (Van den Broek

2017). Earlier research has shown that having a partner has primary importance for men (Dykstra/De Jong Gierveld 2004; Van den Broek 2017), who may obtain support from their children and grandchildren through the kin-keeping role of the spouse.

Data and methods

Data

We use harmonized data from Wave 1 of the Generations and Gender Surveys (GGS), a cross-national survey of nationally representative samples of respondents aged 18-80. Details of sampling and fieldwork procedures have been reported elsewhere (Vikat et al. 2007). This study focuses on loneliness in later-life. We therefore followed earlier work on later-life loneliness (e.g., Dahlberg/McKee 2014; Kamiya/Doyle/Henretta/Timonen 2014; Victor/Bowling 2012), and restricted our sample to people aged 65 and older. We used data on older people from twelve countries that we divided into two groups along geo-political lines. The first group included five Western European countries (Belgium, Germany, France, Norway, Sweden) and the second group included seven countries that were formerly part of the Soviet Union or the Eastern bloc (Bulgaria, Czech Republic, Georgia, Lithuania, Poland, Romania, Russia).

Baseline surveys in the selected countries were fielded between 2004 and 2013. Response rates ranged from 36% in Lithuania to 84% in Romania (Fokkema/Kveder/Hiekel/ Emery/Liefbroer 2016). Information on 14,117 women and 11,097 men aged 65-80 was available. After list-wise deletion of cases with missing information on variables of interest, a final analytical sample of 13,324 women and 10,183 men remained. We used the supplied country-specific weights in the multivariable analyses to adjust for potential non-response bias. Fokkema et al. (2016) have shown that these weights are effective in making the data more population representative in terms of age, sex, household structure and region.

Measures

Loneliness was measured using the shortened version of the De Jong Gierveld loneliness scale (De Jong Gierveld/Van Tilburg 2006). Translations of this scale have been tested for reliability and validity on GGS data for two of the Western and three of the Eastern countries we consider here (De Jong Gierveld/Van Tilburg 2010). This scale contains three negatively formulated items ("I experience a general sense of emptiness", "I miss having people around", and "Often, I feel rejected") and three positively formulated items ("There are plenty of people that I can lean on in case of trouble", "There are many people that I can count on completely", and "There are enough people that I feel close to"), all of which have response categories of "yes", "no" or "more or less" and refer to the current state of respondents' lives. We derived a loneliness scale score ranging from 0 (not lonely) to 6 (intensely lonely) by summing up the neutral and positive answers ("more or less", "yes") on the negatively formulated items and neutral and negative answers ("more or less", "no") on

the positively formulated items. This score was skewed. Therefore, we dichotomised it distinguishing between those with scores of less than 2, defined as not being lonely, and those with scores of 2 or more, defined as being lonely. This approach is consistent with the manual of the scale (De Jong Gierveld/Van Tilburg 1999), and has been taken in several other studies (cf. Nicolaisen/Thorsen 2014; Prieto-Flores/Forjaz/Fernandez-Mayoralas/Rojo-Perez/ Martinez-Martin 2011; Van den Broek 2017).

The main explanatory variables of interest were number of children and grandparenthood status. Given that non-linear effects of fertility on psycho-social wellbeing have been reported in earlier studies (e.g., Kravdal/Grundy/Skirbekk 2015), we treated number of living children as a categorical variable, with categories of 0, 1, 2, 3, and 4+ children (cf. Grundy et al. 2019). Living children included social (e.g. step) as well as biological children. We also included a dummy variable indicating whether or not respondents had ever experienced the death of a child. We derived a dichotomous variable indicating whether or not the respondent had one or more grandchildren. Again, this was self-defined and therefore includes social (e.g., grandchildren of current partner) as well as biological grandchildren.

We adjusted for a range of variables known to be associated both with family composition and with loneliness. These included partnership status, age, educational level, and current perceived financial and health status. Partnership status was dichotomised into living with a spouse or partner (hereafter referred to as partnered) or not. Age in years was included as a continuous variable. We coded educational attainment in accordance with the International Standard Classification of Education (ISCED-97) distinguishing between those with low (ISCED 0-2; pre-primary to lower secondary); medium (ISCED 3-4; upper secondary to post-secondary non-tertiary) or high (ISCED 5-6; tertiary) levels of education. Perceived financial difficulty was dichotomised into having difficulty/not having difficulty based on responses to the question "Thinking of your household's total monthly income, is your household able to make ends meet?" We coded respondents who reported having "some difficulty", " difficulty" or "great difficulty" into the 'has difficulty' group and those who reported making ends meet "fairly easily", "easily", or "very easily" into the 'do difficulty' category. The Romanian questionnaire additionally included the response "neither with difficulty nor easily", which we coded as not having difficulty. Health status indicators considered were self-reported long-standing illness and need for regular help with personal care, such as eating, getting up, dressing, bathing, or using the toilet. Both of these were binary indicators (yes/no).

Methods

We estimated a series of country fixed effects binary logit models to test our hypotheses. All models were estimated with robust standard errors to correct for potential heteroscedasticity (White 1980). We estimated models for Eastern and Western European countries separately, and subsequently tested whether the impact of particular individual-level predictors varied significantly between East and West. We conducted formal tests of mediation using Karlson, Holm and Breen's KHB decomposition method (Kohler/Karlson/ Holm 2011) to assess to what extent effects of childlessness on reported loneliness were mediated by grandparenthood status. The KHB method is suitable for the analysis of me-

diation in non-linear models, because it accounts for the attenuation bias that may occur in such models. As considered earlier, we undertook all analyses separately for men and women, because of known gender differences in the antecedents of loneliness (Dykstra/ De Jong Gierveld 2004; Pinquart/Sörensen 2001; Van den Broek 2017).

Results

Descriptive results

Sample characteristics are presented in Table 1. Consistent with the findings of earlier research (De Jong Gierveld et al. 2012; Hansen/Slagsvold 2016; Yang/Victor 2011), the prevalence of loneliness was significantly higher in the Eastern than the Western-European country group for both women (χ^2 (1, n=13,324)=912.32, p < .001) and men (χ^2 (1, n=10,183)=764.31, p < .001). Compared to their counterparts in the Eastern-European country group, men in the Western-European country group were somewhat less likely to live with a partner (χ^2 (1, n=10,183)=11.73, p < .001). Women in the Western-European group were, however, much more likely to be partnered than women in the Eastern-European group (χ^2 (1, n=13,324)=114.49, p < .001)). This reflects high levels of mortality, and in particular, high excess male mortality, with a concomitant higher prevalence of widowhood, in many Eastern countries.

Consistent with documented past differences in family building patterns and mortality (Coleman 1996), there were notable differences between the two country groups in number of living children. Women and men in the Eastern-European country group were more likely than their counterparts in the Western-European country group to have one or two children, whereas childlessness and high parity were both more prevalent in the Western-European group. These differences in distributions by number of children were statistically significant for both women (χ^2 (4, n=13,324)=341.81, p < .001) and men (χ^2 (4, n=10,183)=266.68, p < .001). Women (χ^2 (1, n=13,324)=50.38, p < .001) and men (χ^2 (1, n=10,183)=102.17, p < .001) in the Western-European country group were less likely than their counterparts in the Eastern-European country group to have grandchildren, again as would be expected given the higher prevalence of childlessness and later age of childbearing in the Western countries (Grundy/Foverskov 2016).

Table 1: Sample characteristics; means and percentages

| | Women | | Men | |
	East	West	East	West
Lonely	73.1	43.3	71.0	40.7
Number of children:				
Childless	12.7	15.3	11.2	16.6
1 child	26.6	17.0	22.8	14.6
2 children	38.0	30.5	41.7	32.7
3 children	13.8	21.3	15.5	21.6
4+ children	8.9	16.0	8.7	14.6
Has at least one grandchild	84.2	78.8	83.7	75.1
Lives with partner	42.1	52.9	80.7	77.8
Age	71.1	71.4	71.0	71.0
(standard deviation)	(4.1)	(4.4)	(4.2)	(4.3)
Education:				
ISCED 0-2	54.8	47.4	45.4	35.3
ISCED 3-4	33.4	38.7	38.0	43.5
ISCED 5-6	11.8	13.9	16.6	21.2
Deceased child	11.2	7.2	7.8	4.6
Difficulty making ends meet	80.5	24.0	73.8	18.6
Long-standing illness	62.9	45.1	51.1	41.3
Needs help with personal care	5.2	2.4	5.6	2.2
Country:				
Bulgaria	16.5		18.6	
Czech Republic	9.9		8.1	
Georgia	12.1		13.6	
Lithuania	13.6		12.9	
Poland	21.0		20.9	
Romania	14.2		15.9	
Russia	12.6		9.9	
Belgium		11.7		13.5
France		20.9		19.0
Germany		22.1		20.1
Norway		26.4		27.2
Sweden		18.9		20.2
Number of observations	9,062	4,262	6,219	3,964

Notes: Data are from Generations and Gender Surveys, Wave 1; weighted.

Results of multivariate analyses

Women

Results of the logistic regression analyses of loneliness among women are presented in Table 2. Model 1 includes all co-variates except the grandchild indicator, which was added in Model 2. The model shows that women in both country groups were less likely to report loneliness when they were partnered. Compared with mothers of two children, childless women and those with only one child were more, and mothers of four or more children less, likely to report loneliness. In the Eastern group mothers of three children

were also less likely to report loneliness than mothers of two. The effect of large family size on loneliness was significantly stronger for women in the Eastern-European group than for their counterparts in the Western-European group.

Results from Model 1 further show that older age, lower levels of educational attainment, perceived financial strain, and having a long-standing illness were associated with a higher loneliness risk in both country groups. In the Eastern-European country group being in need of help with personal care was also significantly associated with a raised loneliness risk.

Table 2:	Coefficient estimates from logistic regression models for loneliness among women

| | East (n=9,062) | | | | West (n=4,262) | | | |
| | Model 1 | | Model 2 | | Model 1 | | Model 2 | |
	B	[95% CI]	B	[95% CI]	B	[95% CI]	B	[95% CI]
Number of children:								
Childless	0.72***	[0.52,0.92]	0.37**	[0.11,0.63]	0.51***	[0.30,0.73]	0.30*	[0.00,0.59]
1 child	0.29***	[0.14,0.43]	0.24**	[0.09,0.39]	0.50***	[0.29,0.70]	0.46***	[0.25,0.67]
2 children	Ref.		Ref.		Ref.		Ref.	
3 children	-0.20*	[-0.36,-0.04]	-0.19*	[-0.35,-0.03]	-0.17	[-0.37,0.02]	-0.16	[-0.36,0.03]
4+ children	**-0.74***	[-0.93,-0.55]	**-0.73***	[-0.92,-0.54]	**-0.32**	[-0.54,-0.10]	**-0.31**	[-0.52,-0.09]
Has at least one grandchild			-0.47***	[-0.70,-0.24]			-0.26*	[-0.51,-0.02]
Lives with partner	-0.45***	[-0.56,-0.33]	-0.44***	[-0.56,-0.33]	-0.44***	[-0.59,-0.30]	-0.44***	[-0.58,-0.29]
Age	0.02*	[0.00,0.03]	0.02*	[0.00,0.03]	0.02*	[0.00,0.03]	0.02*	[0.00,0.04]
Education:								
ISCED 0-2	Ref.		Ref.		Ref.		Ref.	
ISCED 3-4	**-0.29***	[-0.41,-0.16]	**-0.29***	[-0.42,-0.16]	**0.04**	[-0.12,0.20]	**0.04**	[-0.13,0.20]
ISCED 5-6	-0.43***	[-0.61,-0.25]	-0.44***	[-0.63,-0.26]	-0.26*	[-0.47,-0.05]	-0.27**	[-0.48,-0.07]
Deceased child	0.06	[-0.12,0.23]	0.10	[-0.07,0.28]	0.14	[-0.12,0.40]	0.15	[-0.11,0.41]
Difficulty making ends meet	0.64***	[0.50,0.77]	0.63***	[0.50,0.77]	0.60***	[0.43,0.76]	0.60***	[0.43,0.77]
Long-standing illness	0.24***	[0.12,0.36]	0.24***	[0.13,0.36]	0.30***	[0.17,0.44]	0.31***	[0.17,0.45]
Needs help with personal care	0.68***	[0.36,1.01]	0.69***	[0.36,1.01]	0.43	[-0.01,0.87]	0.44	[-0.01,0.88]
Country specific intercepts:								
Bulgaria	-0.12	[-1.12,0.89]	0.26	[-0.77,1.28]				
Czech Republic	-0.59	[-1.61,0.42]	-0.22	[-1.25,0.81]				
Georgia	0.56	[-0.46,1.58]	0.94	[-0.11,1.98]				
Lithuania	-0.27	[-1.27,0.72]	0.09	[-0.93,1.11]				
Poland	-1.43**	[-2.44,-0.42]	-1.06*	[-2.09,-0.04]				
Romania	0.22	[-0.77,1.22]	0.58	[-0.44,1.59]				
Russia	-0.77	[-1.77,0.24]	-0.36	[-1.39,0.66]				
Belgium					-1.77**	[-3.00,-0.54]	-1.59*	[-2.83,-0.35]
France					-1.62**	[-2.83,-0.41]	-1.44*	[-2.67,-0.22]
Germany					-1.64**	[-2.85,-0.43]	-1.48*	[-2.70,-0.26]
Norway					-2.08***	[-3.29,-0.86]	-1.90**	[-3.13,-0.67]
Sweden					-1.20	[-2.42,0.02]	-1.02	[-2.25,0.21]

Notes: Data are from Generations and Gender Surveys, Wave 1; weighted; robust standard errors; coefficient estimates that differ significantly (p <.05) between Eastern-European and Western-European country groups are in bold; * p < .05, ** p < .01; *** p < .001.

In the second model, we added the variable indicating whether or not respondents were grandmothers. Being a grandmother was associated with lower odds of loneliness in both country groups. Consistent with our expectations, mediation analyses using the KHB decomposition method showed that for women in both country groups, differences in the prevalence of grandparenthood partly accounted for the higher loneliness risk of childless

women (West: Δb=0.22; 95% CI: 0.01, 0.42; p < .05; East: Δb=0.35; 95% CI: 0.18, 0.53; p < .001). Differences in grandparenthood status also seemed to explain some of the loneliness risk differences between women with two children and women with one child (East: Δb=.05; 95% CI: .02, .08; p < .01), although this was only of borderline significance in the Western-European country group (West: Δb=.05; 95% CI: -0.00, 0.08; p =.051). Grandparenthood did not account for differences in loneliness between mothers of two children and mothers with larger family sizes, however. In both country groups, a large majority of mothers with two or more children had at least one grandchild.

Men

Table 3:   Coefficient estimates from logistic regression models for loneliness among men

| | East (n=6,219) | | | | West (n=3,964) | | | |
| | Model 1 | | Model 2 | | Model 1 | | Model 2 | |
	B	[95% CI]	B	[95% CI]	B	[95% CI]	B	[95% CI]
Number of children:								
Childless	0.65***	[0.41,0.90]	0.40*	[0.09,0.70]	0.48***	[0.26,0.70]	0.28	[-0.02,0.58]
1 child	0.25**	[0.08,0.42]	0.21*	[0.03,0.38]	0.32**	[0.09,0.55]	0.28*	[0.05,0.51]
2 children	Ref.		Ref.		Ref.		Ref.	
3 children	-0.34***	[-0.53,-0.16]	-0.33***	[-0.52,-0.15]	-0.30**	[-0.51,-0.09]	-0.29**	[-0.50,-0.08]
4+ children	-0.42***	[-0.65,-0.20]	-0.41***	[-0.64,-0.19]	-0.27*	[-0.50,-0.04]	-0.26*	[-0.49,-0.03]
Has at least one grandchild			-0.34**	[-0.58,-0.11]			-0.24	[-0.48,0.00]
Lives with partner	-0.92***	[-1.10,-0.73]	-0.91***	[-1.10,-0.72]	-0.71***	[-0.89,-0.53]	-0.70***	[-0.88,-0.52]
Age	0.01	[-0.01,0.03]	0.01	[-0.00,0.03]	-0.01	[-0.03,0.01]	-0.01	[-0.02,0.01]
Education:								
ISCED 0-2	Ref.		Ref.		Ref.		Ref.	
ISCED 3-4	-0.16*	[-0.31,-0.02]	-0.16*	[-0.31,-0.02]	-0.10	[-0.28,0.08]	-0.10	[-0.28,0.08]
ISCED 5-6	-0.25*	[-0.44,-0.06]	-0.26**	[-0.45,-0.06]	-0.28**	[-0.49,-0.08]	-0.29**	[-0.50,-0.08]
Deceased child	0.05	[-0.20,0.29]	0.10	[-0.15,0.34]	0.12	[-0.22,0.47]	0.13	[-0.22,0.47]
Difficulty making ends meet	0.56***	[0.42,0.71]	0.57***	[0.42,0.72]	0.49***	[0.30,0.67]	0.49***	[0.30,0.68]
Long-standing illness	0.27***	[0.13,0.40]	0.27***	[0.14,0.40]	0.23**	[0.08,0.38]	0.23**	[0.08,0.38]
Needs help with personal care	0.64***	[0.29,0.99]	0.65***	[0.30,1.00]	0.28	[-0.25,0.80]	0.26	[-0.27,0.79]
Country specific intercepts:								
Bulgaria	0.85	[-0.30,2.00]	1.06	[-0.10,2.22]				
Czech Republic	0.50	[-0.67,1.67]	0.71	[-0.47,1.89]				
Georgia	1.48*	[0.33,2.63]	1.69**	[0.52,2.85]				
Lithuania	0.68	[-0.46,1.82]	0.89	[-0.26,2.04]				
Poland	-0.58	[-1.73,0.57]	-0.38	[-1.54,0.78]				
Romania	1.16*	[0.02,2.31]	1.36*	[0.20,2.51]				
Russia	0.13	[-1.03,1.29]	0.36	[-0.81,1.53]				
Belgium					0.40	[-0.87,1.68]	0.51	[-0.77,1.80]
France					0.52	[-0.75,1.79]	0.62	[-0.65,1.89]
Germany					0.60	[-0.67,1.86]	0.69	[-0.58,1.96]
Norway					0.27	[-0.99,1.53]	0.37	[-0.89,1.63]
Sweden					1.50*	[0.24,2.76]	1.60*	[0.33,2.86]

Notes: Data are from Generations and Gender Surveys, Wave 1; weighted; robust standard errors; coefficient estimates that differ significantly (p <.05) between Eastern-European and Western-European country groups are in bold; * p < .05, ** p < .01; *** p < .001.

Table 3 presents results for men. Results from Model 1 show that childless men and men with only one child were more likely to report loneliness than their counterparts with two

children. Moreover, a further protective effect of having three or four or more children was found across country groupings.

As for women, living without a spouse or partner, financial difficulties, having a long-standing illness, and having low as opposed to high educational attainment were associated with a higher likelihood of loneliness for men in both country groups. Needing help with personal care was associated with a higher loneliness risk, but this was only statistically significant in the Eastern-European country group.

Model 2 shows that having grandchildren was associated with a lower loneliness risk for men in the Eastern-European country group. In the Western-European country group, the protective effect of having grandchildren was not statistically significant. The addition of grandparenthood status significantly attenuated the effects of childlessness ($\Delta b=0.25$; 95% CI: 0.08, 0.43; $p < .01$) and of having one child ($\Delta b=.05$; 95% CI: 0.01, 0.09; $p < .05$) in the Eastern-European country group. In the Western-European country group, grandparenthood status did not significantly explain any of the loneliness risk differences by family size.

Predicted probabilities of loneliness

In order to facilitate an easier interpretation of the results of our logistic regression, we calculated the predicted probabilities of loneliness by partner status, parity and grandparenthood status for both women and men in the two country clusters. We set the values for these three variables at distinct values and used observed values for each case for all other covariates included in Model 2. We then computed the predicted probability of loneliness for each case with the fixed and observed values of variables, and subsequently averaged the predicted values. All this was done using the margins command in Stata 15.1 (Williams 2012).

Women's predicted probabilities of loneliness are presented in the left-hand panel of Figure 1. Women in the Eastern-European country group had a considerably higher predicted probability of loneliness than their counterparts in the Western-European country group in all subgroups. In both country groupings the partnered had a lower predicted probability of loneliness than the unpartnered (West: Average Marginal Effect (AME)=-10.0%, 95% CI: -13.3%, -6.7%, $p < .001$; East: AME=-7.5%, 95% CI: -9.5%, -5.5%, $p < .001$). Having two children versus none (West: AME=-6.9%, 95% CI: -13.8%, -0.1%, $p < .05$; East: AME=-4.8%, 95% CI: -8.4%, -1.2%, $p < .01$) and additionally having one of more grandchildren (West: AME=-6.0%, 95% CI: -11.7%, -0.3%, $p < .05$; East: AME=-7.5%, 95% CI: -10.9%, -4.1%, $p < .001$) lowered the predicted probability of loneliness further.

Figure 1:   Predicted probability of loneliness by presence of partner, children and grandchildren

■ Eastern-European countries
● Western-European countries
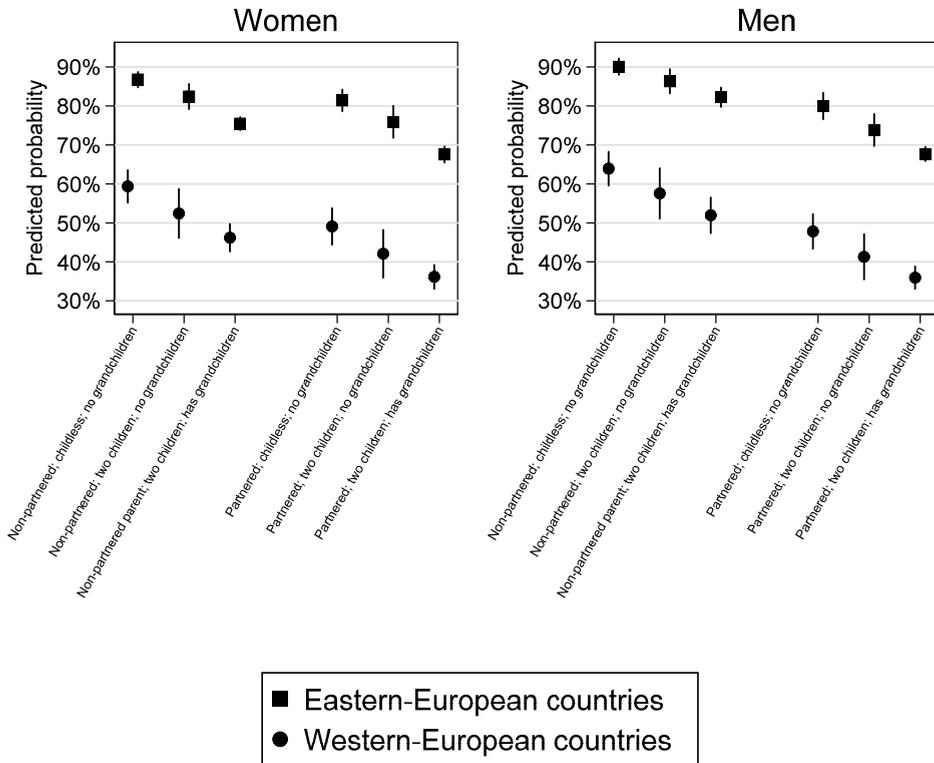
The right-hand panel of Figure 1 shows the predicted probabilities of loneliness by partner status, parity and grandparenthood status for men. Patterns are largely similar to those found among women. In both the Eastern-European and the Western-European country groups men who were living with a spouse or partner had a much lower predicted probability of loneliness than their counterparts who did not (West: AME=-15.8%, 95% CI: -19.9%, -11.7%, p < .05; East: AME=-14.1%, 95% CI: -16.7%, -11.6%, p < .001). In the Eastern-European country group, fathers of two were significantly less likely to be lonely than childless men (AME=-5.7%, 95% CI: -10.1%, -1.3%, p < .05), and having grandchildren was also associated with a significantly lower probability of loneliness (AME= -5.8%, 95% CI: -9.4%, -2.1%, p < .01). Patterns for men in the Western-European country group appeared to be largely similar. However, the loneliness risk differences between childless men and fathers of two men (AME=-6.4%, 95% CI: -13.3%, 0.4%, p = .06), and between fathers of two with and without grandchildren (AME=-5.4%, 95% CI: -10.9%, 0.1%, p = .06) were not statistically significant at the conventional alpha level of 5 percent in the Western-European country group.

Discussion

In the current study, we examined potential protective effects of offspring on later-life loneliness in Eastern and Western Europe. Earlier research suggests that older persons, particularly women, are less lonely when they have (more) children (Pinquart/Sörensen 2001; Van den Broek 2017). We argued that this might, in part, be because with a greater number of children comes a higher probability for older persons to be grandparents. Compared to the scholarly attention paid to links between parenthood and loneliness, research on the potential protective effect against loneliness of having grandchildren has thus far been scarce. However, grandchildren may provide a sense of purpose, encourage older people to look forward to the future, and intensify the bonds with children and so the impacts of this relationship deserve attention.

Consistent with the findings of earlier research (De Jong Gierveld et al. 2012; Hansen/Slagsvold 2016; Yang/Victor 2011), the current study shows that prevalence of loneliness is much higher in Eastern than in Western Europe. In line with the plea by Dykstra (2009), we assessed whether the importance of a particular individual-level factor in shaping loneliness, namely the presence of offspring, differed between Eastern-European and Western-European countries. Given the relatively strong reliance of older people on the family in Eastern Europe, we expected that the protective effects of offspring on loneliness would be stronger in Eastern-European countries than in Western-European countries. We therefore estimated models stratified by country cluster and conducted formal tests of differences in coefficient estimates to test this expectation.

The current study confirmed findings reported in earlier work on the protective effects of close family against loneliness (Fernández-Alonso/Trabalón-Pastor/Vara/Chedraui/Pérez-López 2017; Hansen/Slagsvold/Moum 2009; Van den Broek 2017; Victor/Yang 2012). Consistent with our expectations, women and men in both Eastern-European and Western-European countries were more likely to be lonely when they were childless or had only one child rather than two. Having at least three or, in the case of women in Western Europe, four children as opposed to two was associated with a further reduction of the loneliness risk. We also found a protective effect of being a grandparent, although this effect was only borderline significant among Western-European men. As we expected, the detrimental effects of childlessness and of having only one child as opposed to having two children were to a substantial extent attributable to differences in grandparenthood status among women in both country groups and among Eastern-European men. Our expectation that the protective effects of offspring on loneliness would be stronger in Eastern-European countries than in Western-European countries was supported only in part by the results of our analyses. For women, the protective effect of having four or more children, as opposed to two, was larger in the East than in the West.

This study has a number of limitations. Firstly, the analysis is cross-sectional. Although the GGS is a longitudinal study, at the time of writing harmonised longitudinal data were available for only a small sub-set of countries. Moreover, in the theoretical background section we presented reasons why we expected grandparenthood status to explain part of the protective effects of number of children on loneliness. We expected this to be related to a heightened sense of purpose, a stronger tendency to look forward to the future (Rowe/Kahn 1998), and closer proximity to children (Van den Broek/Dykstra 2017; Van den Broek et al.

2014) and more frequent contact with children (Grundy/Shelton 2001; Knoester/Eggebeen 2006). We could, however, not test whether these reasons effectively underlay the effects of grandparenthood reported here. Information on contact frequency with children was, for instance, not available for all countries included in our analyses, and questions about the extent to which respondents looked forward to the future were not collected at all. Also, information about contacts with friends and engagement in social activities was not available. This is unfortunate, because part of the reason why we expected offspring to be particularly important for older persons in Eastern Europe was the low level of interaction with friends in this part of Europe (cf. Grundy/Murphy 2018). Additionally and importantly, there may be important unobserved variables which influence both family composition and loneliness. For example personality type may influence both chances of marriage, preferences about family size and propensity for loneliness.

Loneliness in later life is increasingly recognized as an important public health issue, as it is associated with concurrent and subsequent indicators of poor health and with mortality. The results presented here indicate that the absence of offspring is a strong risk factor for later-life loneliness. This is, moreover, not just the case in Eastern-European societies that tend to be family-oriented, and where the erosion of pension and care systems has further reinforced older people's reliance on their families. In the Western-European context, where welfare state arrangements are more generous and norms of family obligation tend to be weaker, older people without offspring are also at increased risk of loneliness.

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