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The effect of adult children's outmigration on the mental health of older parents in Central
and Eastern Europe

Ph.D. Thesis Booklet

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1. Introduction

Depression in later life (LLD: late-life depression) is an increasingly pressing public health issue with aging population trends. Although prevalent, identifying depression in older adults has proved challenging because the symptoms are different from depression in younger group (Fiske et al., 2009; Blazer, 2003). Unlike depression in younger age groups, risk factors leading to the development of LLD include chronic diseases, disability, lower socio-economic status, weak social networks, disrupted family relations, and lack of intergenerational support (Blazer, 2003). Some investigations have proposed that Central and Eastern European (CEE) countries experience a more significant burden of LLD compared to Western European and Scandinavian countries (Hansen & Slagsvold, 2017).

The regional disparity between Western and Eastern European countries was linked to potential factors including poorer health, poorer living conditions, higher income inequalities, higher rates of bereavement in former socialist nations (Horackova et al., 2019; Kureková, 2011; Botev, 2011; Hansen & Slagsvold, 2017). It can be related to broader health and social care system factors including the accessibility of healthcare services, the policies governing depression treatment, the societal attitudes toward aging, mental health, health-seeking behaviours and less generous welfare programs (Van de Velde et al., 2010; Castro-Costa et al., 2007).

In particular, countries with more generous welfare programs at the national level tended to have lower rates of depression among older individuals (Kok et al., 2012). Based on the OECD report from 2023 regarding total long-term care spending as a percentage of GDP, most CEE countries, except for the Czech Republic (1.8%), allocate a lower percentage compared to the OECD average of 1.8%. Specifically, Poland, Romania, Bulgaria, and Croatia have rates lower than 0.5%, while Slovenia (1.4%), Lithuania (1.2%), Estonia (0.7%), Hungary (0.7%), Latvia (0.6%), Poland (0.5%), Romania (0.4%), Bulgaria (0.3%), and Croatia (0.2%) also fall below this average. These percentages are significantly lower than those of their Western and Nordic counterparts such as the Netherlands (4.4%), Norway (3.5%), Sweden (3.4%), and Denmark (3.2%). This discrepancy primarily reflects the formal care systems in the Western and Nordic countries contrasting with informal care arrangements that heavily rely on care provided by unpaid family members in CEE countries.

The demographic landscape in CEE countries has undergone significant shifts, marked by an increase in life expectancy and a decline in fertility rates over the past two decades (Botev, 2012). This trend has resulted in an aging population with a rising proportion of older adults and a decrease in the number of younger adults. As part of the EU's enlargement and accession process, several CEE countries, including the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia, became EU members in 2004. Subsequently, Bulgaria and Romania joined in 2007, followed by Croatia in 2013. The free movement of workers within the EU has led to a notable rise in labor mobility in many CEE countries, especially in Poland, Romania and Bulgaria (European Commission, 2022).

One notable consequence of out-migration is the phenomenon of 'left-behind parents', referring to those residing in their country of origin with one or more children migrated away (Abas, 2009; Antman, 2013; Conkova & King, 2019; Démurger, 2015). The geographic separation of adult children from their aging parents raises concerns about increased loneliness, social isolation, and the loss of practical and emotional support for the older generation left behind. The limited social security and public health infrastructure in migrant-sending communities may fail to detect the mental health burden of left-behind older adults, resulting in unexpected challenges for the original communities.

Insights from studies conducted in Poland, Lithuania, and Romania shed light on how left-behind parents address the challenges of geographic separation (Gedvilaite-Kordušiene, 2015; Krzyzowski & Mucha, 2014; Schröder-Butterfill & Schonheinz, 2019; Zimmer et al., 2014). While left-behind parents do not perceive themselves as 'orphan pensioners' or 'being discarded', the prolonged and accumulation of stresses over later life course may have a substantial mental health consequence (King & Vullnetari, 2006).

Research on the impact of adult children's outmigration on parental depression has yielded mixed results. Studies have either reported a negative effect (Antman, 2010, 2013, 2016 ; Guo et al., 2009; Li et al., 2020 ; Lu, 2012; Mosca & Barrett, 2016; Muhammad et al., 2022; Torres et al., 2018 ; Scheffel & Zhang, 2019), or a positive one (Abas et al., 2009, 2013 ; Yi et al., 2019), or no significant effect (Böhme et al., 2015; Ghimire et al., 2018; Gibson et al., 2011; Waidler et al., 2017; Yahirun & Arenas, 2018).

Intergenerational support emerges as a pivotal determinant of parental mental health, particularly in relation to depressive symptoms. Many studies have reviewed how specific types of adult child-parent support exchange relate to parental depression including contact frequency (Buber & Engelhardt, 2008; Tosi & Grundy, 2019), instrumental, financial, and emotional support provision (Amy et al., 2008; Silverstein et al., 1996, 2006; Wolff & Agree, 2004; Djundeva et al., 2015) and emotional closeness (Silverstein et al., 2006; Zhang & Silverstein, 2022). Qualitative studies carried out in Poland, Lithuania, and Romania offer valuable insights into how these left-behind parents address the challenges posed by the geographic separation (Gedvilaite-Kordušiene, 2015; Krzyzowski & Mucha, 2014; Schröder-Butterfill & Schonheinz, 2019; Zimmer et al., 2014). While these studies provide valuable insights, these available studies used in-depth interview or case studies covered only a part of CEE countries, without incorporating mental health outcomes.

2. Study significance

Contrary to the growing literature on left-behind children and spouses, very few studies have been concerned with the left-behind older adults' population in CEE countries. Often CEE countries are left out from migration and late-life depression studies in Europe. Few studies available on the intergenerational care between out-migrated children and left behind parents. Therefore, this study is the first to empirically investigate the impacts of adult children's migration impacts on mental health of left behind older parents in all CEE countries, where data were available.

3. Purpose of the study

The study answers the following research questions and hypotheses. The first research question was "Is the presence of migrant adult children among older parents associated with higher levels of depression compared to those without migrant children?". Its hypothesis suggests that "Having all or some adult children out-migrated would increase depression among left-behind parents in CEE countries." The second research question was "Is there a significant association between intergenerational support factors and the level of depression among older adults?" Its hypothesis posits "Having more financial support, frequent contact and emotional closeness with their adult children is associated with lower levels of depression

among left-behind older parents in CEE countries.” The research objective is to predict the impact of adult children’s outmigration on depression of older parents. and to ascertain whether there exists a discernible intergenerational support impact such as financial support given to, received from the adult children, contact frequency and emotional closeness with adult children on the mental health of older adults with migrant adult children within the distinct categories of adult children’s migration status.

4. Study methods

4.1. Data and materials

This study used data from the eighth wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) conducted in 2019/2020 (Börsch-Supan, 2022; Börsch-Supan et al., 2013). SHARE is a multidisciplinary longitudinal panel survey of people aged 50 or over in 28 European countries and Israel, using nationally representative probability sampling from population registries or multistage sampling methods. This study was conducted as a secondary analysis. Access to the accredited SHARE Research Data Center was secured through an individual application and subsequent registration processes were successfully completed.

As per the OECD statistical definition (OECD, n.d.), CEE countries include Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. The overall sample from the 8th wave comprised 46500 respondents. Because our study focused on 11 CEE countries, another 19 European countries, which were not part of the CEE cluster in the SHARE data, were excluded ($n=28893$). In this study, left-behind parents were defined as older adults who had one or more adult children living at a distance from their household for at least the past two years, reflecting the biannual nature of data collection in the SHARE. The analytical sample size was 9133 respondents.

The main dependent measure of this study was depression, which was measured by Euro-D scale. This measure was developed by an European consortium to compare level of depression across European countries. A total score is ranging from 0 to 12, which indicate higher score for a higher level of depressive symptoms. Respondents were asked whether they experienced pessimism, depressive mood, suicidality, guilt, sleep difficulty, interest,

irritability, fatigue, concentration, enjoyment, appetite, and tearfulness during the previous month in the local language. Cronbach's alpha score in this study was 0.72.

The main independent measure was child outmigration status. To align with previous studies (Abas et al., 2013, 2009), we recategorized the original responses into four new categories: 1) no migrant child (all children in the same household as the parents), 2) all children within 500 km of the parental residence, 3) some children over 500 km away from the parental residence, 4) all children over 500 km away from parental residence. Using the furthest measured proximity, we operationalized migration over 500 km as long-distance migration.

Several intergenerational support variables were used to examine the impact of adult child out-migration on older parents' depression, including contact frequency with children, emotional closeness with children, financial support received from children, and financial support is given to children adopted from previous studies (Abas et al., 2009; Aichberger et al., 2010; Lu, 2012; Thapa et al., 2018).

Sociodemographic, physical and cognitive health, functional disability, and social network variables were included as covariates, as they were known to affect depressive symptoms in older adults (Abas et al., 2013; Aichberger et al., 2010; Ghimire et al., 2018; Lu, 2012; Thapa et al., 2018).

4.2. Statistical analysis

Descriptive statistics including frequencies, proportions, and means (\pm SD) were done for main measures. To minimize the effect of selective nonresponse and panel attrition, we applied calibrated, cross-sectional individual level weights provided by SHARE. Analysis of covariance (ANCOVA) was applied to assess differences in depression across all four child migration categories. Socio-demographic variables such as age, gender, education, relationship, employment, economic status, residence area as well as somatic comorbidities, functional disability, physical inactivity, social network size and satisfaction, were included as covariates. Post hoc differences across child migration categories were assessed by using the Least Significant Difference (LSD) post-hoc test to compare differences between pairs of groups in the child migration status variable. To predict depression, hierarchical linear

regression was used. To understand and compare the unique contribution of non-sociodemographic predictors, we also developed and compared four regression models separately for each child migration group. Statistical analyses were performed using SPSS Statistics, Windows version 25. Tests used for hypothesis testing were one-tailed, with a significance level of 0.05.

5. Results

5.1. Sample description

A total of 9133 older adults were eligible for the study, and their sample characteristics are displayed in Table 1. The average age of the participants was 71.00 years, with a standard deviation of 9.71. Among them, 68.37% identified as female, and 43.80% reported having no partner. Regarding education, 24.40% had attained a higher education level. In terms of employment status, only 26.25% were currently working, whereas the majority, accounting for 73.75%, were either not working or had retired. 53.38% of participants mentioned experiencing difficulty in making ends meet, and 63.08% resided in rural areas. On average, participants had 2.16 children ($SD=1.09$). Participants had an average Euro-D score of 2.78 ($SD=2.42$), which measures depression symptoms.

Table 2 shows the distinctions in sample characteristics based on the migration status of adult children. Out of 9133 parents in our study, 11.3% had no migrant child, i.e., all children live in the same household as parents, 72.0% had all out-migrated children within 500 km, 12.2% had some children over 500 km away, and 4.5% had all children living more than 500 km away. Regarding depression score, individuals with some children living over 500 km and those with all children living over 500 km reported mean Euro-D scores of 3.0 ($SD=2.4$) and 3.0 ($SD=2.5$), while individuals without migrant children and those with all children living within 500 km reported mean Euro-D scores of 2.7 ($SD=2.4$) and 2.8 ($SD=2.4$), respectively.

Table 1. Unweighted total sample characteristics

| Variable | Total sample ($n=9133$) |
|--|---------------------------|
| Age, mean (<i>SD</i>) | 71.00 (9.71) |
| Gender, female, % | 69.37 |
| Education, higher, % | 24.40 |
| Employment, working, % | 26.25 |
| Relationship, no partner, % | 43.80 |
| Ability to make ends meet, with difficulty, % | 53.38 |
| Residence, rural, % | 63.08 |
| Number of children, mean (<i>SD</i>) | 2.16 (1.09) |
| Number of chronic diseases, mean (<i>SD</i>) | 2.09 (1.70) |
| Verbal fluency, mean (<i>SD</i>) | 19.48 (7.71) |
| Delayed recall, mean (<i>SD</i>) | 3.59 (2.11) |
| Limited daily activities (ADL), mean (<i>SD</i>) | 0.32 (0.99) |
| Disability in instrumental daily activities (iADL), mean (<i>SD</i>) | 0.69 (1.72) |
| Physical inactivity, inactive, % | 15.56 |
| Social network size, mean (<i>SD</i>) | 2.48 (1.44) |
| Social network satisfaction, mean (<i>SD</i>) | 9.03 (1.42) |
| Financial support received from children, mean (<i>SD</i>) | 0.05 (0.19) |
| Financial support given to children, mean (<i>SD</i>) | 0.09 (0.26) |
| Contact frequency, mean (<i>SD</i>) | 1.73 (0.90) |
| Emotional closeness, mean (<i>SD</i>) | 3.48 (0.59) |
| Euro-D, mean (<i>SD</i>) | 2.78 (2.42) |
| Child migration status, No migrant child, % | 11.30 |
| All in locality, % | 71.98 |
| Some children over 500km away, % | 12.20 |
| All children over 500km away, % | 4.52 |

Table 2. Unweighted sample characteristics by adult children migration status

| Variable | No migrant child (n=1,032) | All within 500 km (n=6,574) | Some over 500 km (n=1,114) | All over 500 km (n=413) | <i>F/χ²</i> | <i>p</i> value |
|---|----------------------------------|-----------------------------------|----------------------------------|-------------------------------|------------------------|----------------|
| Age, mean (<i>SD</i>) | 68 (10.6) | 72 (9.5) | 68 (9.2) | 68 (8.7) | 82.876 | <0.001 |
| Gender, female, % | 66 | 70 | 69 | 67 | 10.963 | 0.002 |
| Education, higher, % | 24 | 24 | 26 | 32 | 15.297 | 0.002 |
| Employment status, working, % | 37 | 23 | 35 | 34 | 158.304 | <0.001 |
| Relationship status, no partner, % | 38 | 45 | 37 | 46 | 39.930 | <0.001 |
| Ability to make ends meet, with difficulty, % | 58 | 51 | 61 | 57 | 44.814 | <0.001 |
| Residence, rural, % | 67 | 63 | 66 | 50 | 37.008 | <0.001 |
| Number of Chronic illnesses, mean (<i>SD</i>) | 1.9 (1.7) | 2.2 (1.7) | 1.9 (1.6) | 1.8 (1.6) | 15.978 | <0.001 |
| Verbal fluency, mean (<i>SD</i>) | 19.6 (7.9) | 19.6 (7.7) | 18.7 (7.3) | 19.9 (8.9) | 4.830 | 0.002 |
| Delayed recall, mean (<i>SD</i>) | 3.6 (2.2) | 3.6 (2.1) | 3.4 (2.1) | 3.9 (2.1) | 5.476 | 0.001 |
| Limited daily activities (ADL), mean (<i>SD</i>) | 0.3 (1.1) | 0.3 (1.0) | 0.3 (1.0) | 0.3 (1.0) | 0.209 | 0.890 |
| Disability in instrumental daily activities (iADL), mean (<i>SD</i>) | 0.8 (2.0) | 0.7(1.7) | 0.5 (1.5) | 0.4 (1.3) | 8.908 | <0.001 |
| Physical inactivity, inactive, % | 16 | 15 | 14 | 14 | 13 | 0.116 |
| Social network size, mean (<i>SD</i>) | 2.3 (1.3) | 2.6 (1.4) | 2.3 (1.5) | 2.2 (1.4) | 22.899 | <0.001 |
| Social network satisfaction, mean (<i>SD</i>) | 9.0 (1.4) | 9.0 (1.4) | 9.1 (1.5) | 8.9 (1.6) | 2.899 | 0.034 |

| | | | | | | |
|--|----------------|----------------|----------------|----------------|---------|--------|
| Number of children, mean (<i>SD</i>) | 1.8 (1.1) | 2.1 (1.0) | 2.9 (1.3) | 1.7 (0.9) | 239.817 | <0.001 |
| Financial support received from children, mean (<i>SD</i>) | 0.03 (0.16) | 0.04 (0.19) | 0.05 (0.17) | 0.14 (0.33) | 33.539 | <0.001 |
| Financial support given to children, mean (<i>SD</i>) | 0.07 (0.24) | 0.09 (0.26) | 0.07 (0.22) | 0.10 (0.29) | 3.801 | 0.010 |
| Emotional closeness with children, mean (<i>SD</i>) | 3.5 (0.6) | 3.5 (0.6) | 3.4 (0.6) | 3.4 (0.7) | 8.500 | <0.001 |
| Child contact frequency, mean (<i>SD</i>) | 1.0 (0.2) | 1.8 (0.9) | 1.9 (0.9) | 2.5 (1.3) | 275.459 | <0.001 |
| Euro-D, mean (<i>SD</i>) | 2.7 (2.4) | 2.8 (2.4) | 3.0 (2.4) | 3.0 (2.5) | 4.665 | 0.003 |

5.2. Association between child migration status and depression

Results of the ANCOVA (Table 3) analysis revealed significant differences in parents' levels of depression across child migration categories ($F=8.80$, $p < 0.001$) after controlling for all covariates including age, gender, education, relationship, employment, economic hardship, residence, number of children, number of chronic diseases, ADLs, IADLs, verbal fluency, delayed recall words, physical inactivity, social network size, and satisfaction on social network quality. The full model was significant ($F=14.46$, $p < 0.001$) and explained 29.4% of the variance in parental depression.

Following the ANCOVA analysis, the post hoc pairwise comparisons using the Least Significant Difference (LSD) test were conducted to compare differences across child migration categories. The comparisons revealed that older parents with some children living over 500 km (mean=3.27, SD=0.08) and those with all children living over 500 km (mean=3.38, SD=0.16) had significantly higher depressive symptoms than those with no migrant child (mean=2.79, SD=0.08) ($p=0.004$) and those with all their children living within locality (mean=2.93, SD=0.04) ($p=0.003$). However, no significant differences in depression were observed between those with no migrant children and those with all children within locality.

Additionally, there were no significant differences observed between those with some children living over 500 km and those with all children living over 500 km.

Table 3. Association between child migration status and depression ($n=9133$)

| Child migration status | Mean \pm SD | Depression F test | Pairwise comparisons |
|------------------------|-----------------|-------------------|----------------------|
| No migrant child (1) | 2.79 \pm 0.08 | | 1<3***, 1<4*** |
| All in locality (2) | 2.93 \pm 0.04 | | 2<3***, 2<4** |
| Some over 500km (3) | 3.27 \pm 0.08 | 8.802*** | 3>1***, 3>2*** |
| All over 500km (4) | 3.38 \pm 0.16 | | 4>1***, 4>2** |

Notes: age, gender, education, relationship, employment, economic hardship, residence, number of children, number of chronic diseases, ADLs, iADLs, verbal fluency, delayed recall words, physical inactivity, social network size, and satisfaction on social network quality are used as covariates. LSD post-hoc test was conducted for pairwise comparisons. Data weighted. * $p<0.05$ ** $p<0.01$ *** $p<0.001$.

5.3. Multivariate regression model for older adults' depression

Table 4 shows multivariate stepwise linear regression results for intergenerational support variables on depression among older parents using entire sample of 9133 after adjusting for sociodemographic and other covariates. The analysis involved sequential steps, with Step 1 accounting for sociodemographic and health-related variables. Factors such as age, gender, education, relationships status, employment, economic hardship, rural-urban residence, the number of children, number of chronic diseases, ADLs, IADLs, verbal fluency, delayed recall words, physical inactivity, social network size, and social network satisfaction were assessed. In Step 2, additional variables related to intergenerational support were introduced. Financial support received from children did not show significant association ($b=0.28$, $p=0.19$), while financial support given to children ($b=0.30$, $p=0.04$), contact frequency ($b=-0.10$, $p=0.03$), and emotional closeness ($b=-0.17$, $p=0.01$) emerged as significant predictors of depression among older adults. In the final step (3), migration status variables were included. Results indicated that having adult children living within 500 km did not significantly impact older adults' depression ($b=0.15$, $p=0.20$). However, having some children living over 500 km ($b=0.48$, $p=0.00$) and having all children living over 500 km ($b=0.59$, $p=0.01$) were significantly associated with increased levels of depression among older adults.

Table 4. Multivariate, stepwise hierarchical regression for older adults' depression

| Variable | b (unstandardized) weight | p value |
|--|------------------------------|---------|
| Step 1 | | |
| Intercept | 3.82 | < 0.001 |
| Age | -0.01 | 0.32 |
| Gender | 0.73 | < 0.001 |
| Education | -0.15 | 0.17 |
| Relationship | -0.22 | 0.01 |
| Employment | 0.27 | 0.01 |
| Economic hardship | 0.57 | < 0.001 |
| Rural-urban residence | -0.02 | 0.82 |
| Number of children | 0.04 | 0.24 |
| Number of chronic diseases | 0.28 | < 0.001 |
| ADLs ^a | 0.13 | 0.01 |
| IADLs ^b | 0.33 | < 0.001 |
| Verbal fluency | -0.01 | 0.12 |
| Delayed recall words | -0.22 | < 0.001 |
| Physical inactivity | 0.11 | 0.26 |
| Social network size | -0.10 | < 0.001 |
| Social network satisfaction | -0.21 | < 0.001 |
| Step 2 | | |
| Financial support received from children | 0.28 | 0.19 |
| Financial support given to children | 0.30 | 0.04 |
| Contact frequency | -0.10 | 0.03 |
| Emotional closeness | -0.17 | 0.01 |
| Step 3 | | |
| All in household (ref.) | | |
| All within 500km | 0.15 | 0.20 |
| Some over 500km | 0.48 | 0.00 |
| All over 500km | 0.59 | 0.01 |

Note: Dependent variable: older parent's depression. Data weighted. a = Activities of Daily Living, b = Institutional Activities of Daily Living. Adjusted R square: 0.289 for Step 1, 0.292 for Step 2, 0.294 for Step 3

5.4. Intergenerational support predicting parent depression in each adult children migration categories

Individual multivariate linear regression models (Table 5) developed for each child migration status showed the unique impact of intergenerational support within each group. All models were significant and explained 29, 33, 34 and 54 per cent of the variance in parental depression respectively. For older parents with no migrant children, greater levels of emotional closeness with their children decreased depressive symptoms by about half a point ($b=-0.44$, $p< 0.05$). However, receiving more financial support from their children increased parents' depression by over one and a half points ($b=1.64$, $p< 0.05$). Increased contact frequency, another significant predictor of depression, decreased parental depression when all children lived locally ($b=-0.14$, $p< 0.05$) or were all more than 500 km away ($b=-0.46$, $p< 0.05$). In contrast, greater contact frequency increased depression in older parents with some children living over 500 km away ($b=0.36$, $p< 0.01$).

Table 5. Individual regression models for child migration categories predicting parent depression.

| Category | No migrant child | | All within 500 km | | Some over 500 km | | All over 500 km | |
|--|-------------------------------|------|-------------------------------|------|-------------------------------|------|-------------------------------|------|
| Model | $R^2 = 0.34$, $p < 0.001$ | | $R^2 = 0.29$, $p < 0.001$ | | $R^2 = 0.33$, $p < 0.001$ | | $R^2 = 0.54$, $p < 0.001$ | |
| Variables | b | p | b | p | b | p | b | p |
| | weight* | | weight | | weight | | weight | |
| Financial support received from children | 1.64 | 0.03 | 0.53 | 0.06 | 0.26 | 0.62 | -0.14 | 0.80 |
| Financial support given to children | 0.83 | 0.06 | 0.10 | 0.58 | 0.72 | 0.09 | 0.01 | 1.00 |
| Contact frequency | -0.55 | 0.80 | -0.14 | 0.01 | 0.36 | 0.00 | -0.46 | 0.02 |
| Emotional closeness | -0.44 | 0.02 | -0.12 | 0.16 | -0.20 | 0.23 | -0.61 | 0.10 |

Note: Dependent variable: older parent depression. Adjusted for age, gender, education, relationship status, economic difficulties, employment status, number of children, rural-urban residence, physical inactivity, chronic disease number, adl, iadl, verbal fluency, delayed word recall, social network size, satisfaction of social network Data weighted. * Unstandardized regression coefficient.

6. Discussion

This study aimed to examine the effects of adult children's out-migration on the mental health of older adults in CEE countries and sought to explore what role intergenerational support has in promoting positive mental health outcomes. The main findings of this study and their implications are as follows.

Firstly, this study found that older parents whose adult children migrated over 500 km from their households were at a higher risk for depression, compared to those without a migrant child. However, there was no significant difference in depression levels between those with all children within 500 km and those with no migrant child, suggesting that short-distance migration does not negatively impact the mental health of older parents. This could be due to the ease of maintaining regular physical contacts and providing timely support for adult children living within 500 km. Despite the free mobility policy enforced within the EU, irregular physical contacts between children and parents increased the negative impact of long-distance migration (beyond 500km) on depression and mental health of older adults. Overall, these findings highlight the impact of outmigration has on mental health of older parents in CEE countries and underscore the importance of intergenerational support.

Furthermore, to improve the mental health outcomes of left-behind parents in CEE countries, public health services may be advised to incorporate assessments that focus on the impact of adult children migration (Kureková, 2011). Migrant-sending countries and communities should allocate more resources towards these programs to meet the mental health needs of left-behind parents. Moreover, future research and policy efforts should devote attention to the challenges faced by the burgeoning group of older adults being left behind by adult children's outmigration.

Secondly, as for intergenerational support, this study revealed that parent-child contact frequency and emotional closeness both had a significant impact on reducing depression among older adults. On the other hand, providing financial support to adult children was found to significantly increase depression, while receiving financial support from adult children had no significant effect on their parents' depression. This pattern aligns with prior studies highlighting the greater impact of psychological support in improving the mental health of

older adults when compared to material or instrumental support (Gur-Yaish et al., 2013; Merz & Huxhold, 2010).

Thirdly, out of the four regression models predicting depression by child migration status, this study identified two distinct effects of financial support received from children and emotional closeness for the parents without migrant children. Among this group, emotional closeness with their children significantly reduced the risk of depression by bolstering parents' feelings of self-efficacy, fostering a sense of intimacy and trust with their adult children (Lin & Chen, 2018). Conversely, financial support received from their children increased the risk of depression for parents without migrant children. Although the causal link between financial support received and depression cannot be ascertained in this research, some studies have reported that receiving financial support from adult children can evoke feelings of burden, leading to excessive guilt and shame among older parents (Shiraz et al., 2020; Silverstein, et al., 2013).

Fourthly, for individuals whose children have migrated more than 500 km away, the frequency of parent-child contact emerges as a key predictor of depression. Interestingly, factors such as financial exchanges with children and emotional closeness with them show no significant association with parental depression within this group. These findings resonate with prior studies emphasizing the positive effects of maintaining close contact with adult children (Buber & Engelhardt, 2008; Lawton et al., 1994). Tosi and Grundy (2019) assert that sustained close contact with adult children can bolster the psychological security of older parents, particularly in societies undergoing rapid transformations and lacking robust public support systems, as evidenced in their research in Bulgaria, Georgia, and Russia.

Furthermore, in CEE countries where filial piety is a prevailing social norm, parents and children may feel obligated to uphold frequent contacts, irrespective of the quality of their relationship (Van Gaalen & Dykstra, 2006). In essence, the frequency of contact between parent and child reflects a normative or foundational aspect of intergenerational solidarity within the cultural context of CEE countries. This discovery not only highlights the cultural aspect at play but also presents a practical intervention avenue. In an era with diverse communication modes such as telephone calls, emails, and social media, this becomes

especially relevant, particularly during travel restrictions imposed by pandemics like Covid-19, providing valuable measures to enhance the mental health outcomes of older parents.

However, contact frequency when some children resided more than 500 km away had an opposite effect. Parents who maintained more frequent contact with their children in this category displayed higher levels of depressive symptoms. This finding has not been observed elsewhere in the literature. Future research is recommended to identify underlying explanations for this outcome. This study has been looking at different variables and their influence on contact frequency in the study sample, but a deeper analysis would be out of scope for this paper.

Future studies may improve the child outmigration categories because the category of ‘some children over 500km’ seems to compress a significant volume of information. This study adopted the categories to maintain alignment with other studies and to provide an operational definition for left-behind older parents regardless living arrangements. For future studies may categorize the child outmigration using merged factors in conjunction with widowhood or declining physical health condition to identify clear target group.

Fifthly, those with some or all adult children migrated over 500 km differed in many ways from those with all adult children living in the same household or within 500 km. The left-behind parents with some or all adult children migrated over 500 km were more likely to have higher educational attainment, fewer chronic diseases, better cognitive function, and were less disabled in instrumental daily activities. They tended to be healthier overall but experienced higher levels of depressive symptoms compared to parents whose adult children lived nearby. They also reported more frequent contact with their children and received more financial support.

These findings suggest that the impact of adult children's migration may be underestimated. Because their decision to move away may be influenced by their parents' health status and adult children are less inclined to live far from their parents if the latter have health issues. Additionally, there is a strong association between depression and physical health; hence, the absence of pre-existing physical health conditions could amplify the effects of long-distance adult-child migration. Among the left-behind parents with some or all of their

children over 500 km, those experiencing lower levels of physical activity, poorer physical health, lower satisfaction with their social network, and weaker emotional closeness with their children were found to be more vulnerable compared to others who were not.

7. Limitations

Despite the valuable insights gained from this study, there are several limitations that warrant consideration. First, findings of this study were based on cross-sectional data and as such, causation between adult child migration and depressive symptoms in older adults cannot be discerned. Secondly, the study's scope was constrained by the inability to comprehensively examine the spectrum of adult children's migration and its association with older adults' depression. Thirdly, the reliance on self-reported measures and information from older adults may have introduced potential biases owing to factors such as cognitive impairment, disability, or respondents' lack of awareness regarding medication use. Fourthly, the author acknowledges that older adults are a heterogeneous population with diverse characteristics such as age, gender, education, income, and number of children, which may influence the effects of adult child migration on depression. While covariates have been employed to control for heterogeneity, these statistical approaches provided only secondary techniques over appropriate sample selection. Fifthly, the study's secondary data analysis approach resulted in that the author had no control over the data collection and its quality. An additional limitation of the current study is its inability to account for between-country variations in CEE countries.

8. Conclusion

As migration continues to be a prevailing trend in an increasingly globalized world, it stands out as a significant explanatory variable in understanding the complexities of mental health in older populations. Hence, the author argues for future research endeavors to incorporate measures that specifically assess the influence and unique contribution of adult child migration on the mental health of parents in migrant-sending communities. By doing so, researchers can gain more specific understanding of the multifaceted factors influencing depression among older adults, contributing to the development of targeted interventions and policy recommendations.

In conclusion, this study contributes valuable insights about the relationship between adult child migration and the mental health of older adults in CEE countries. The implications extend beyond the realms of academia, calling for concerted efforts to address the mental health challenges faced by older individuals left behind due to migration. As we navigate an era of increased global mobility, understanding and mitigating the impact of migration on the mental health of older adults becomes not only a scholarly pursuit but a societal imperative.

9. Summary of novel findings

1. This study introduces a novel finding revealing a significant association between the migratory distances of adult children and the manifestation of depressive symptoms in older adults within CEE countries. Specifically, older adults with adult children who migrated over 500 km away exhibited a higher susceptibility to depressive symptoms compared to those without such extensive migratory distances. This sheds light on the nuanced impact of geographical separation on the mental health of older parents, emphasizing the need for targeted interventions and support systems. This is the first study contributes to the knowledge whether depression of older adults left behind is associated with adult children migration in CEE region.
2. An innovative aspect of this research lies in uncovering the effects of intergenerational support associated with the migration status of adult children on the mental health of older adults. This study found that emotional closeness was a key predictor of depression regardless of migration status.
3. The frequency of parent-child contact was significantly contributed to reducing depression among older adults. In the analysis of parent with migrant children, the parent-child contact frequency emerged as a pivotal predictor of depression. Frequent parent-child contact is strongly associated with a substantial reduction in parental depression, particularly for those with all children migrated over 500km.
4. The impact of contact frequency on depression among older parents whose children have migrated varies significantly depending on the status of migration. Surprisingly, for those whose children have migrated more than 500km away, increased contact

frequency significantly reduced depression levels. However, a contrasting effect was observed for individuals with some of their children migrated the same distance; increased contact frequency was associated with higher levels of depression. This paradoxical finding underscores the complexity of the relationship between contact frequency and depression in the context of adult children's migration. Future research is imperative to investigate deeper into this contradiction, examining the underlying mechanisms and potential moderating factors that may elucidate these divergent outcomes. Such investigations are crucial for developing nuanced understandings of the interplay between contact frequency and mental health outcomes among older parents left behind by migrating children.

5. These study results underscore a crucial policy implication—promoting intergenerational contacts could notably benefit left-behind parents, especially those with children living far away. These findings provide valuable insights into the complex dynamics of intergenerational support, particularly in the context of adult children migration in CEE countries. The implications extend to the development of targeted strategies that consider the unique needs of older adults in the face of evolving family structures in the region.
6. This study contributes a distinctive perspective by positioning global migration trends as a significant explanatory variable in understanding the mental health complexities of older adults in CEE countries. Given the increasing globalization and mobility, the migration of adult children emerges as a pivotal factor influencing the mental health landscape of the elderly. The author advocates for future research to explicitly incorporate measures assessing the influence and unique contribution of adult child migration, recognizing it as a key element in shaping the mental health outcomes of older adults in migrant-sending communities. This novel perspective calls for comprehensive investigations into the evolving nature of migration and its implications for the mental health of older populations.

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11. List of publications: Articles, abstracts, and presentations

Lee, H., Kim, J., & Zrínyi, M. (2024). Mental health effects of adult children's outmigration on older parents in Central and Eastern Europe. *Aging & Mental Health*, 28(2), 353–359. DOI: 10.1080/13607863.2023.2260327 (IF: 3.52)

Lee, H., Kim, J., & Zrínyi, M. (2023). Mental health of older parents with migrant adult-children in Europe. *European Journal of Public Health*, 33(2), October 2023, ckad160.143, <https://doi.org/10.1093/eurpub/ckad160.143>

Lee, H. (2021). Mental health impact of adult children's out-migration to elderly parents in Central and Eastern Europe. 10th Jubilee Interdisciplinary Doctoral Conference, Pecs, Hungary. *Book of abstracts*, p. 278, 1p.

Lee, H. (2020). Effects of socioeconomic position on depression of the elderly in rural Thailand. X. Scientific forum, Doctoral School of Health Sciences, Pecs, Hungary.