Associations between internet use, internalized ageism and mental health during COVID-19 pandemic among older adults in the Nordic-Baltic region

Gabriele Gudynaite, Olga Zamalijeva, Antanas Kairys and Vilmante Pakalniskiene

Abstract

Purpose – *Limited internet use and experience of ageism may have made older adults more vulnerable to the effects of the COVID-19 pandemic, yet studies often lack integration of internalized ageism and regional comparisons. Therefore, this study aimed to investigate the associations between internet use, internalized ageism and mental health outcomes during the COVID-19 pandemic among older adults in the Nordic-Baltic region.*

Design/methodology/approach – *Data from the Survey of Health, Ageing, and Retirement in Europe Corona Survey 2 was used for this study, including 7263 individuals aged 65 and above from the Nordic and Baltic regions. Multivariate binary logistic regression analysis was conducted to evaluate how internet use and internalized ageism predict anxiety and depressive symptoms among older adults during the COVID-19 pandemic. Control variables included age, gender, having a partner living in the household, employment status and self-rated health.*

Findings – *The study found that limited internet use was associated with depressive symptoms among older adults in the whole sample, while internalized ageism predicted both the depressive and anxiety symptoms. Regional differences were observed: internet use predicted depressive symptoms in the Baltic but not in the Nordic region, while internalized ageism predicted anxiety symptoms in the Baltic but not in the Nordic region.*

Originality/value – *This study provides a unique regional perspective by comparing the Nordic and Baltic regions and also highlights internalized ageism, a less-represented factor in mental health research regarding older adults during the pandemic.*

Keywords *Internet use, Internalized ageism, Mental health, Older adults, Nordic-Baltic region, SHARE*

Paper type *Research paper*

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Introduction

The COVID-19 pandemic impacted mental health globally, intensifying psychological distress, increasing social isolation, and disrupting daily routines (Charles *et al.*, 2020; Mendez-Lopez *et al.*, 2022). However, certain populations were affected by these risks to a greater extent, with low-income individuals, racial and ethnic minorities and older adults being particularly vulnerable (Kantamneni, 2020; Mubarak and Suomi, 2022). Among older adults, symptoms of depression and anxiety became especially pronounced, closely linked to increased health risks, reduced social contact, and declines in overall well-being (Benke *et al.*, 2020; Bergman *et al.*, 2020; Tyler *et al.*, 2021). Moreover, the pandemic brought attention to specific mental health factors in later life that may continue to shape older adults' well-being today.

Older adults faced distinct challenges during the pandemic, including heightened health risks, limited access to health services and social isolation (Bergman *et al.*, 2020; Tyler *et al.*, 2021).

Limited mobility and reduced face-to-face contact made internet use essential, but the digital divide among older adults increased social isolation and reduced access to services, posing a risk to their mental health (Mubarak and Suomi, 2022; Razai *et al.*, 2020). At the same time, ageism intensified and became more evident, since media narratives and policies often framed older adults as uniformly frail and vulnerable, reinforcing negative stereotypes and intensifying ageist attitudes (Bergman *et al.*, 2020; Hopf *et al.*, 2021; Naughton *et al.*, 2021). Alongside these psychosocial risks, demographic factors such as age, gender, and subjective health may also have influenced their overall vulnerability (Lovik *et al.*, 2023; Yu *et al.*, 2024), although existing findings remain mixed (Zheng *et al.*, 2023). Mental health in later life is a growing public health concern (Global Burden of Disease Collaborative Network, 2024), and the COVID-19 crisis intensified and brought new visibility to the digital exclusion and ageism that continue to shape older adults' well-being in the post-pandemic world.

Several theories could be used to explain the relevance of digital engagement and ageism for older adults' mental health. According to the *Self-determination theory* (Deci and Ryan, 1985), human well-being depends on fulfilling three psychological needs: autonomy, competence, and relatedness. Research confirms that disruption of these needs during the pandemic led to mental health challenges (Liu *et al.*, 2024). Digital engagement, such as internet use, may help to support autonomy by aiding hobbies and daily tasks, competence through learning opportunities, and relatedness by fascilitating social connections (Augner, 2022; Köttl, Cohn-Schwart, *et al.*, 2021). As for ageism, the *Stereotype embodiment theory* (Levy, 2009) suggests that internalization of societal ageing stereotypes shapes older adults' self-perceptions and behaviors, leading them to act in line with these stereotypes. Over time, this can undermine autonomy, competence, and relatedness (Köttl *et al.*, 2023; Zhang *et al.*, 2019). In this theoretical context, internet use and internalized ageism may represent significant and potentially contrasting factors affecting older adults' mental health. Examining them together is particularly important given their potential interaction: internalized ageism may contribute to the digital divide (Köttl, Gallistl, *et al.*, 2021), while limited internet use may, in turn, reinforce ageism (Köttl, Cohn-Schwart, *et al.*, 2021). Despite this, to our knowledge, these factors have not yet been investigated together in relation to older adults' mental health during the pandemic.

It is also important to consider how they may be shaped by the broader sociocultural context in which they unfold, as cultural, social, and economic conditions influenced the pandemic's impact on mental health (Kotera *et al.*, 2021). Comparing the Baltic and Nordic countries could be particularly relevant given their distinct welfare models, digital infrastructure, and policy environments. The Nordic countries are characterized by strong welfare systems and well-established digital inclusion initiatives (Bambra, 2011; Hilmarsson, 2021), which may support older adults' psychological needs, e.g., fostering relatedness through online social connections, or autonomy through independent use of online services. In contrast, the Baltic countries face more limited mental health infrastructure, greater digital skill gaps, and weaker social support systems (Stumbrys *et al.*, 2022; Vyriausybės strateginės analizės centras, 2020), potentially disrupting the psychological needs. Views on ageing have also historically been observed to be more negative in postsocialist countries (Rychtaříková, 2019). Such contextual differences could shape both internet use and internalized ageism, as well as their influence on the mental health of older adults. Despite this, to our knowledge, no prior studies have directly compared these dynamics between the Nordic and Baltic regions during the COVID-19 pandemic.

Purpose of the present study

While the pandemic highlighted limited internet use and internalized ageism as mental health risks for older adults, few studies have examined them together during this period. These risks may persist beyond the pandemic, yet limited research hinders the development of effective support strategies. Regional differences between the Nordic and

Baltic countries may also shape these risks, offering opportunities for more targeted policy and practice. To address this, the present study aimed to investigate the relationships between internet use, internalized ageism and mental health outcomes among older adults in the Nordic-Baltic region during the COVID-19 pandemic. The study also examined the role of other age-related factors, including age, gender, partnership status, employment status and self-rated health.

Methods

Sample

This study utilized a multinational database from The Survey of Health, Ageing and Retirement in Europe (SHARE), comprising longitudinal micro-level data from individuals and their partners aged 50 and older. SHARE collects data from 28 countries, including almost all European Union member states, Switzerland and Israel, with data collection taking place every two years (Börsch-Supan *et al.*, 2013). The current study used data from SHARE wave 9th, COVID-19 Survey 2 (Bergmann, 2024; SHARE-ERIC, 2024), collected from June to August of 2021, including questionnaires about the pandemic's impact on older adults' health, economic and social conditions. The SHARE project received approval from the Ethics Council of the Max Planck Society. The research was confirmed to comply with relevant ethical guidelines, including the Declaration of Helsinki.

Measures

Dependent variables

The dependent variables were binary. In the SHARE questionnaire, depression symptoms were measured by asking participants if they have felt sad or depressed in the last month. Anxiety was assessed by inquiring if they have felt nervous, anxious or on edge in the last month. The exact coding values of the variables are presented in Table 1.

Independent variables

The independent variables were also binary. Internet use was measured by asking if, since the outbreak of COVID-19, participants have used the Internet for emailing, searching for information, making purchases or any other purpose at least once.

The internalized ageism variable was computed using subjective and chronological age. Subjective age was assessed by asking participants: "Many people feel older or younger than they actually are, what age do you feel?". We hypothesized that feeling older than one's chronological age could indicate internalized ageism, as subjective age can reflect internalized age-related stereotypes and negative self-perceptions of ageing (Gendron *et al.*, 2018). While some older adults report feeling younger as a way of resisting ageist stereotypes, others may internalize negative societal views and come to perceive themselves as "too old", which may manifest in an older subjective age (Ishikawa, 2023). The variable was computed by subtracting subjective age from chronological age and recoded into binary variable to indicate the presence or absence of internalized ageism.

Control variables

The study included socio-demographic variables as controls, such as gender, having a partner living in the same household, and employment status (all binary), as well as age (continuous) and self-rated health measured using four categories (excellent/very good, good, fair, poor).

Statistical analysis

The statistical analysis was conducted using IBM SPSS Statistics 28. To evaluate the predictive variables, we conducted a multivariate binary logistic regression analysis. The logistic regression model provided adjusted odds ratios (ORs) with 95% confidence intervals (CIs), which indicate the strength and direction of the associations. Variables with p-values < 0.05 were considered statistically significant predictors. The missing cases were handled using listwise deletion.

Results

Descriptive statistics

Participants' age ranged from 65 to 102 years [M (SD) = 75.39 (7.18)], with a similar mean age in the Nordic region [M (SD) = 74.49 (6.74)], and in the Baltic region [M (SD) = 75.96 (7.39)]. Overall, 38.7% of the respondents were male, with 44.8% in the Nordic region and 34.7% in the Baltics. A total of 59.2% of all participants had partner living in household, including 70.7% in the Nordics and 51.8% in the Baltics. 9.2% of participants were employed, with 6.9% in the Nordic region and 10.8% in the Baltics.

Overall, just over half of the respondents used the internet since the outbreak (56%). In the Nordic region, 75.4% had used the internet, compared to 43.5% in the Baltic region. About one-third of respondents reported depressive symptoms (29.6%) and anxiety (31.1%). In the Nordic region, 19.5% reported depressive symptoms and 24.9% reported anxiety, compared with 36.1% and 35.2% in the Baltics, respectively. Only 5.7% of participants were classified as having internalized ageism. However, the proportion was considerably lower in the Nordics (2.2%), than in the Baltics (8.1%).

Regression analyses

Table 1 displays the results of binary logistic regression analyses predicting depression and anxiety symptoms by region. In the whole sample and both Nordic and Baltic countries, the Hosmer–Lemeshow tests showed good fit. Overall models were significant, with Nagelkerke R^2 ranging from 0.13 to 0.19, and overall correct classification rates between 69.4% and 81.2%.

In this model, limited internet use was significantly associated with higher odds of depressive symptoms in the whole sample by 15% and in the Baltic countries by 18%, but not significantly in the Nordic countries. Internalized ageism was another significant predictor, positively associated with the odds of depressive symptoms in all groups: by 79% in the whole sample, by 73% in the Baltic countries, and nearly doubling the odds in the Nordic countries. Among the control variables, female gender, not having a partner in the household, and poor or fair self-rated health (SRH) (compared to very good/excellent SRH) significantly associated with the higher odds of depressive symptoms in the whole sample and in both regions.

The binary logistic regression analysis predicting anxiety by region showed that the models fit the data well. In the whole sample, Nordic and Baltic countries, the Hosmer–Lemeshow tests were insignificant, suggesting good fit. Models were significant, with Nagelkerke R^2 ranging from 0.11–0.13 and correct classification rates between 67.8% and 76.0%.

However, in this model, limited internet use was not significantly associated with the odds of experiencing anxiety in any group. In contrast, internalized ageism was associated with higher odds to experience anxiety by 74% in the whole sample and in the Baltic countries, while not significantly in Nordic countries. Among the control variables, female gender and poor or fair SRH (compared to very good/excellent SRH) were significantly associated with higher odds of anxiety across the whole sample. Age was a significant predictor in the whole sample and in the Baltic countries, but not significant in the Nordic countries.

Table 1 Results of multivariate binary logistic regression predicting depression and anxiety symptoms by region

Independent variables	*Whole sample*	*Nordic*	*Baltic*	*Whole sample*	*Nordic*	*Baltic*
	OR [95%CI] Outcome: depression symptoms			*OR [95%CI] Outcome: anxiety symptoms*		
Internalized ageism (0 = no, 1 = yes)	1,79*** [1,43; 2,25]	1,95* [1,12; 3,39]	1,73*** [1,34; 2,22]	1,74*** [1,39; 2,17]	1,63 [0,95; 2,81]	1,74*** [1,36; 2,22]
Internet use (0 = no, 1 = yes)	0,85** [0,74; 0,96]	0,98 [0,77; 1,24]	0,82* [0,70; 0,96]	0,99 [0,87; 1,12]	1,16 [0,93; 1,46]	0,89 [0,76; 1,04]
Age	1,00 [1,00; 1,01]	1,00 [0,98; 1,01]	1,01 [1,00; 1,02]	0,99** [0,98; 1,00]	0,99 [0,97; 1,00]	0,99* [0,98; 1,00]
Gender (0 = male, 1 = female)	1,55*** [1,37; 1,76]	1,61*** [1,30; 1,98]	1,50*** [1,28; 1,76]	1,73*** [1,54; 1,96]	1,91*** [1,58; 2,32]	1,64*** [1,41; 1,92]
Employment status (0 = unemployed, 1 = employed)	0,89 [0,72; 1,12]	0,63 [0,37; 1,08]	0,97 [0,75; 1,25]	0,99 [0,81; 1,21]	0,81 [0,53; 1,25]	1,14 [0,90; 1,44]
Has partner in HH (0 = no, 1 = yes)	0,74*** [0,65; 0,83]	0,66*** [0,53; 0,82]	0,77** [0,66; 0,90]	1,06 [0,94; 1,20]	1,02 [0,83; 1,25]	1,04 [0,90; 1,21]
Self-rated health						
Poor vs. very good/excellent	10,97*** [8,51; 14,14]	8,67*** [5,73; 13,12]	9,23*** [5,42; 15,71]	8,64*** [6,82; 10,94]	7,72*** [5,16; 11,55]	6,41*** [4,00; 10,29]
Fair vs. very good/excellent	4,15*** [3,35; 5,15]	3,77*** [2,84; 5,00]	3,43*** [2,06; 5,70]	3,69*** [3,04; 4,48]	4,55*** [3,51; 5,89]	2,55*** [1,63; 3,99]
Good vs. very good/excellent	1,79*** [1,43; 2,26]	2,05*** [1,56; 2,70]	1,31 [0,77; 2,22]	1,96*** [1,60; 2,40]	2,39*** [1,87; 3,05]	1,23 [0,78; 1,95]
Hosmer-Lemeshow χ^2 (df;p)	4,69 (8; 0,79)	1,43 (8; 0,99)	6,10 (8; 0,64)	4,26 (8; 0,83)	9,47 (8; 0,30)	7,40 (8; 0,49)
Model χ^2 (df)	999,52*** (9)	233,75*** (9)	553,827*** (9)	668,06*** (9)	243,59*** (9)	3,54,63*** (9)
Nagelkerke R^2	0,19	0,13	0,17	0,13	0,13	0,11
Correctly predicted presense of symptoms	25,50%	8,50%	32,60%	20,20%	7,80%	26,40%
Correctly predicted absense of symptoms	94,10%	98,50%	90,00%	94,00%	98,10%	90,40%
Overall correct predictions	74,10%	81,20%	69,40%	71,10%	76,00%	67,80%

Note(s): *$p < 0{,}050$, **$p < 0{,}010$, ***$p < 0{,}001$

Source(s): Author's own work

Discussion

The aim of this study was to examine the associations between internet use, internalized ageism and mental health outcomes during the COVID-19 pandemic among older adults in the Nordic-Baltic region. After adjusting for age-specific factors we found that older adults who had not used the internet since the outbreak were more likely to report depressive symptoms. In contrast, limited internet use was not significantly related to anxiety across the whole sample. Internalized ageism was significantly associated with both depressive symptoms and anxiety across the entire sample. Considering regional differences, limited internet use did not predict depressive symptoms in the Nordic region but did in the Baltics. Similarly, internalized ageism did not predict anxiety in the Nordic region but did in the Baltics. Detailed results are listed and explained individually.

The study found that older adults who had not used the internet since the COVID-19 outbreak were more likely to report depressive symptoms. This aligns with prior research emphasizing the importance of internet use for older people's mental health during the pandemic (Dziedzic *et al.*, 2021; Kirkland *et al.*, 2023). Internet use could have supported mental health during lockdowns and reduced in-person contact, as those less digitally proficient faced difficulties accessing information and services, disrupting their routines (Khalili-Mahani *et al.*, 2022), impacting their autonomy and access to general and mental healthcare (Spanakis *et al.*, 2021). This digital exclusion was shown to contribute to frustration, low self-esteem and negative mental health indicators (Augner, 2022; Nedeljko *et al.*, 2022). During the time of restrictions, internet use also helped to maintain relatedness by reducing social isolation and loneliness (Nedeljko *et al.*, 2022; Wester *et al.*, 2022), both recognized as contributing factors to depression in older adults (Dziedzic *et al.*, 2021; Kirkland *et al.*, 2023). Thus, older adults who did not use the internet were possibly disadvantaged and experienced depressive symptoms.

Limited internet use was not a significant predictor of anxiety symptoms, contradicting other research (Yu *et al.*, 2024). This suggests that while internet use may have protected older adults from depression, its relationship with anxiety was less clear or influenced by other factors. While it helped maintain relatedness and autonomy through social connections and access to information, it may not have addressed underlying anxiety causes in older adults, such as health concerns or uncertainty (del-Valle *et al.*, 2022; Gosselin *et al.*, 2022). Additionally, internet use could have contributed to misinformation and distressing news, increasing anxiety (Baerg and Bruchmann, 2022). This may explain the differing associations of internet use with anxiety versus depression among older adults during the pandemic.

Several socio-demographic factors, such as age, gender, partnership status, and self-rated health, have emerged as determinants of older adults' mental health during the COVID-19 pandemic, consistent with other studies (Lovik *et al.*, 2023; Yu *et al.*, 2024). Poorer self-rated health was found to be the strongest predictor, potentially because declines in subjective health during the pandemic may have heightened vulnerability and intensified psychological distress (Lüdecke and Knesebeck, 2023).The study also revealed the less studied determinant of internalized ageism, showing that older adults with internalized ageism experienced anxiety and depressive symptoms. These findings align with previous research about the negative effects of ageism on mental health during the pandemic (Bergman *et al.*, 2020; Hopf *et al.*, 2021), indicating that internalized ageism might be an important mental health factor for older adults. It may have exacerbated feelings of social disconnection and burden, contributing to loneliness and low self-esteem (Naughton *et al.*, 2023; Neves *et al.*, 2023), thereby affecting competence and relatedness. The increased sense of vulnerability to the pandemic's impacts or reluctance to seek mental healthcare, both of which associated with ageism (Hopf *et al.*, 2021; Naughton *et al.*, 2023; Polacsek *et al.*, 2019), could have further influenced the fulfillment of psychological needs, amplifying symptoms. This highlights the importance of addressing internalized ageism in older adults' mental health.

Considering regional variations, we found that limited internet use was significantly related with depressive symptoms in the Baltic region, but not in the Nordic region. Differences in lockdown measures and social support may have influenced these outcomes. Baltic countries implemented stricter lockdown measures, potentially increasing reliance on technology for communication, whereas Nordic countries had more lenient measures and support for in-person activities (Aknin *et al.*, 2022; Webb, 2021). In addition, strong social welfare systems and accessible healthcare in Nordics could have helped older adults cope with stress and loneliness (Aidukaite *et al.*, 2021; Bambra, 2011; Jensen *et al.*, 2017), thereby supporting their psychological needs and attenuating the effect of internet use alone. Finally, older people digital exclusion is greater in some Baltic countries (Vyriausybės strateginės analizės centras, 2020), while Nordic countries generally exhibit higher digital adoption (Grym *et al.*, 2018), which could have impacted the benefits from internet use. These regional variations may explain the different associations between internet use and mental health outcomes observed in this study.

Finally, we found that internalized ageism had a stronger association with anxiety in the Baltics than in the Nordics. This is a novel observation comparing these regions. We hypothesize that regional social differences may have influenced the fulfillment of psychological needs. In the Baltic countries, less supportive cultural attitudes toward ageing, disparities in social protection and healthcare (Aidukaite *et al.*, 2021; Rychtaříková, 2019) could have made the associations between internalized ageism and anxiety more pronounced. Baltic healthcare systems may also face more challenges in addressing older adults' psychological needs (Stumbrys *et al.*, 2022). In contrast, Nordic countries promote active ageing, strong social support and positive ageing attitudes (Kalfoss, 2017), potentially buffering the effects of ageism on anxiety. These factors may help to explain regional variations in how internalized ageism related to older adults' experience of anxiety.

Strengths and limitations

A limitation of this study is the reliance on binary and single-item measures for key variables, which may not capture the full complexity of these constructs. However, single-item indicators have been used in previous research to study them, particularly in large-scale or time-sensitive studies (Klun *et al.*, 2025; Torres *et al.*, 2024). In addition, the cross-sectional design of the study limits causal inference and inherent regional differences in internet use and mental health may not be fully captured. Future research should employ more comprehensive statistical analyses to evaluate the predictive power and robustness of these associations. Moreover, the lack of a specific scale for measuring internalized ageism may confound results, though efforts were made to address this by acknowledging the associations between subjective age and internalized ageism (Gendron, 2022; Ishikawa, 2023). As such, the findings should be interpreted with caution and seen as exploratory, highlighting the need for future studies using valid measures and more rigorous analytical methods.

Nevertheless, supported by high-quality, population-representative SHARE data suited for cross-national comparison, this study offers several important insights despite its limitations. Grounded in the COVID-19 context, it highlights the potential protective role of internet use and draws attention to internalized ageism, a largely underexplored factor in older adults' mental health. By examining regional differences between the Nordic and Baltic countries, the study also shows how digital engagement and internalized ageism may vary across sociocultural contexts. As the pandemic intensified both digital reliance and ageist attitudes, these findings remain relevant in the post-pandemic period and underscore the need for continued research on structural and psychosocial determinants of older adults' mental well-being.

Implications

Although exploratory, these findings point to several practical and policy-relevant implications. Strengthening digital inclusion through funded digital literacy programs and trained digital

support staff may help protect older adults' mental health, and clinicians should treat digital exclusion as a potential risk factor by referring patients to appropriate services. Internalized ageism is also important, and psychoeducational interventions or positive ageing workshops could help reduce harmful age-related beliefs. Intergenerational digital literacy initiatives may serve as a dual strategy by improving digital skills and reducing ageist attitudes. Regionally, the Baltics may benefit most from integrating digital support and ageism-focused interventions into mental health care, while Nordic countries could prioritize raising awareness of internalized ageism within established service structures.

Conclusions and future directions

In conclusion, this study examined the associations between internet use, internalized ageism, and mental health outcomes. The findings revealed that limited internet use was associated with depressive symptoms, particularly in the Baltic region, while internalized ageism predicted both depressive and anxiety symptoms, with the link to anxiety again significant in the Baltics. These findings underscore the potentially protective and harmful impacts of digital engagement and internalized ageism, while also providing a novel comparison between the Nordic and Baltic regions.

Overall, the study offers exploratory insights that remain relevant beyond the pandemic. Both internet use and internalized ageism warrant greater attention in research on older adults' mental health, as one may be protective while the other may increase risk. Future studies should use more comprehensive measures and analytical approaches, and further explore the interrelation between internalized ageism and digital engagement. As their significance may vary across socioeconomic and cultural contexts, greater attention to regional differences could support more tailored policies and practices aimed at improving older adults' mental well-being.

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