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## When health drives digital engagement: a study of older Europeans

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### Extended abstract (4 pages)

The rapid digitalization of daily life has transformed how individuals communicate, access information, and participate in society. For older adults, this transformation presents both opportunities and challenges: while digital engagement can enhance autonomy, social connectedness, and access to health resources, many remain excluded from these benefits due to age-related health limitations and unequal digital skills. This study examines health as a determinant of internet use among older Europeans, focusing on how cognitive, sensory, and physical health conditions shape patterns of digital engagement.

### 1. Background and Justification

The digitalization of contemporary society has fundamentally transformed how individuals connect, access services, and maintain well-being, creating both opportunities and challenges for older adults who must adapt to rapidly evolving technological landscapes (Büchi, 2024). Digital participation has become a crucial component of active and healthy life, yet many older adults remain at risk of exclusion due to what scholars term the "age digital divide" in particular older individuals face disparities not merely in access, but in digital skills, frequency of use, and meaningful engagement with technology (Friemel, 2016; Scheerder et al., 2017).

The relationship between digital engagement and well-being in older age represents a complex interplay of cognitive, social, and health-related factors. Recent theoretical frameworks on digital well-being emphasize that the quality of digital practices matters as much for overall well-being as physical capacity to use technology, and that these practices interact dynamically with broader social determinants and health conditions (Büchi, 2024). Most existing studies emphasize either the "digital engagement → health outcomes" pathway or assume reciprocal effects, leaving the "health → digital engagement" direction relatively underexplored (Yu & Fiebig, 2020).

Empirical evidence supporting the relationships between digital engagement and health outcomes from longitudinal studies demonstrate that frequent internet users exhibit slower cognitive decline and reduced depressive symptoms, potentially because online activities provide sustained mental stimulation and facilitate maintenance of social connectedness (Liu et al., 2024).

Conversely, a growing body of empirical research documents the reverse direction, "health → digital engagement outcomes", verifying the existence of a disability digital divide, wherein individuals with functional impairments, sensory limitations, or activity-limiting conditions consistently report lower levels of digital access, device ownership, and technological proficiency

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(Vicente & López, 2010; Duplaga, 2017). This divide manifests across multiple dimensions of digital engagement and varies significantly by type and severity of health limitation.

Visual impairment represents one of the most extensively studied barriers to digital participation among older adults. Recent cross-sectional studies spanning multiple countries demonstrate that individuals with near visual impairment show significantly lower rates of device ownership and internet use across various online activities (Thomas et al., 2024; Lange et al., 2025). In Thailand, research among visually impaired individuals revealed that the severity of visual limitation, combined with socioeconomic factors, strongly predicted internet adoption and sustained use patterns (Phochai et al., 2024). Similarly, Spanish research on ICT usability challenges among people with visual disabilities identified persistent accessibility barriers that limit digital engagement despite available assistive technologies (Fuentes et al., 2022).

The disability digital divide extends beyond visual impairments to encompass broader patterns of functional limitation or subjective health status. In this sense, Johansson and colleagues (2021) found a negative association between subjective health measures or broad mental health indicators and digital engagement. Large-scale analyses using objective physical health indicators—including diagnosed chronic conditions, activities of daily living (ADL) and instrumental activities of daily living (IADL) limitations, and mobility restrictions—consistently document negative associations with device ownership and internet use frequency (Gell et al., 2015). These patterns persist across different welfare state regimes and national contexts, suggesting that health-related barriers to digital participation represent a fundamental challenge rather than context-specific phenomena (Alexopoulou et al., 2022).

While cross-sectional research has established robust associations between health status and digital engagement, the temporal ordering and causal direction of these relationships remain understudied. For instance, cross-lagged panel analyses from China indicate that internet use and cognitive performance mutually reinforce each other over time, with baseline cognitive function predicting subsequent digital engagement and vice versa (Yu & Fiebig, 2020). Studies on other dimensions of health are rare.

## **2. General Objective**

Building on the evidence reviewed above, this study seeks to address the empirical and theoretical gaps identified by examining the role of health as a determinant of digital participation in later life. Thus, the general research objective is: *To analyse the impact of physical health on internet use among older adults in Europe, examining how various aspects of health shape digital engagement.*

To operationalize this general objective, the study sets out the following specific objectives:

1. To explore how baseline physical health differences, as well as subsequent changes in health indicators - such as mobility limitations, visual impairments, and arthritis-, predict subsequent levels of internet use.
2. To assess cross-national and sociodemographic variations (by age group, education, and gender) in the relationship between physical health and internet use.

## **3. Data and Methods**

The study will employ data from SHARE Waves 5–9 - except wave 7- (2017–2022), covering adults aged 50+ across more than 25 European countries. The analytic sample comprises 75,485 individuals aged 50 years and above who participated in at least two consecutive waves, allowing the estimation of within-person change over time.

As the outcome variable depicting **digital engagement**, we selected *recent internet use*, repeated in all waves under studied. As for our predictors of **physical health**, we will use 3 variables: mobility (physical inactivity), vision impairment (self-rated eyesight reading) and arthritis (diagnosed rheumatoid arthritis). **Control variables** include: age, gender, education, country-group, relationship status, and other chronic conditions.

## Methods

We begin with descriptive statistics to characterise patterns of internet use across countries, age groups, educational levels, and gender, as well as distributions of physical health indicators. These descriptive results provide an overview of health and digital engagement among older Europeans, identifying baseline differences between internet users and non-users.

To examine how changes in physical health influence internet use over time, we estimate individual fixed-effects models with a lagged outcome variable. Although we are not directly interested in the reversed relationship, i.e. the effect of internet use on health, we will estimate a cross-lagged model within a ML-SEM framework. This approach controls for all time-invariant individual characteristics and prior levels of internet use, and allows for reverse causality, thereby isolating the within-person effect of health changes on subsequent digital engagement. This specification allows for testing whether improvements or deteriorations in physical health are associated with subsequent changes in internet use.

To explore the dynamics of digital engagement in greater depth, analyses will be also conducted separately for two groups: 1) Individuals who were not using the internet at baseline, to estimate the probability of starting to use it in later waves; and 2) Individuals who were using the internet at baseline, to estimate the probability of stopping internet use over time. These transition models assess how baseline health differences and changes in physical health predict the likelihood of adoption or disruption of internet use, offering complementary insights into the mechanisms linking health and digital engagement among older adults.

## 4. Expected Results

We expect to observe that declines in physical health are expected to reduce subsequent digital use, confirming the Disability Digital Divide. These patterns may vary by gender, education, and age group, revealing internal digital divides among older Europeans. This study will contribute with robust evidence to the relationship of digital appropriation and health in older age, and more generally to the framework of Disability Digital Divide. Tables 1 to 3 show preliminary descriptives of the sample selected for our study, and the subsequent changes between waves of the selected indicators.

**Table 1. Sample observed at least twice in four waves by age group.**

Age group	Wave of observation				Total
	5	6	8	9	
50	26.76	22.65	14.63	9.01	18.38
60	36.24	36.44	35.39	35.05	35.8
70	25.52	26.78	31.89	35.4	29.81
80	10.47	12.35	15.58	17.53	13.94
90+	1.02	1.78	2.51	3.01	2.07
Total	49,792	57,665	47,259	51,875	206,591

Source: SHARE dataset (waves 5, 6, 8 & 9)

Note: sample of observations corresponds to 75.485 individuals

**Table 2. Individuals with diagnosed rheumatoid arthritis according to their use of internet, by wave and age group.**

Diagnosed rheumatoid arthritis		age groups					Total
		internet use	50	60	70	80	
Wave 5	Yes	62.63	41.85	19.85	6.47	4.94	31.68
	No	37.37	58.15	80.15	93.53	95.06	68.32
	Total	100	100	100	100	100	100
Wave 9	Yes	80.4	68.56	46.08	19.03	6.49	44.8
	No	19.6	31.44	53.92	80.97	93.51	55.2
	Total	100	100	100	100	100	100

Source: SHARE dataset (waves 5, 6, 8 & 9)

**Table 3. Individuals' level of eyesight reading by their use of internet and wave.**

level of eyesight reading		use of internet			use of internet				
		Yes	No	Total	Yes	No	Total		
Wave 5	Excellent	73.15	26.85	100	Wave 9	Excellent	82.04	17.96	100
	Very good	59.39	40.61	100		Very good	71.94	28.06	100
	Good	46.12	53.88	100		Good	55.61	44.39	100
	Fair	37.24	62.76	100		Fair	43.09	56.91	100
	Poor	34.93	65.07	100		Poor	31.8	68.2	100
	Total	52.34	47.66	100		Total	61.01	38.99	100

Source: SHARE dataset (waves 5, 6, 8 & 9)

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