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Work inequalities in later life redefined by digitalization

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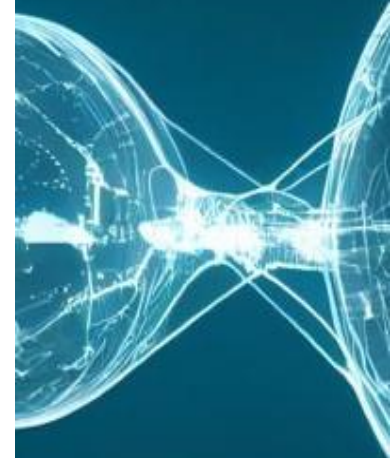
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Technostress in Academia: A Synthesis Study to Unveil Social Inequalities
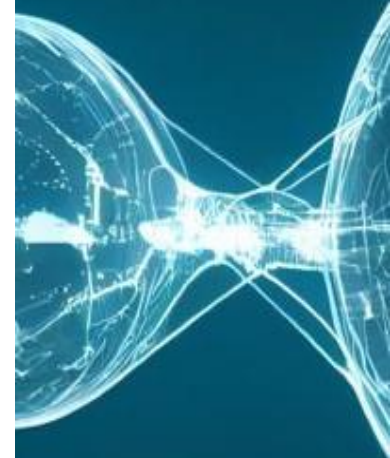
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Technostress in Academia: A Synthesis Study to Unveil Social Inequalities

Abstract. Social inequalities have been one of the main causes of concern in many national and international communities. While many grassroots societal reasons occur in front of our sight, digital and technological tools may also play an essential part in sparking some of the societal inequalities that we frequently fail to recognise. Similarly, the use of technology in our daily learning and instruction has grown to be so deeply ingrained that academic sectors would have major challenges without it. However, the influence of digitalization may occasionally be an impediment or cause harm to one of our society`s most vital sectors, notably academic institutes. According to research, older academics frequently concede that the rise of digital technology has resulted in major side effects such as technostress and anxiety. This goes beyond the benefits that technology provides us on a daily basis, including the assistance in teaching and learning.

Henceforth, there is a need for synthesis study on this topic, and it is urgent and relevant to determine how Academics are employing technology, the obstacles they confront, and how they are overcoming them in the short term. To look into the evidence, this study used a scoping review method, which yielded a total of 498 peer-reviewed papers from indexed databases. This study is intended to go further in supporting academics in addressing their well-being in later career stages that need greater emphasis and assistance by educational institutes and policymakers

Purpose: Behind the study

The initiative was developed within Working Group 01 (WG1) and by members who are interested in working on Digital Inequalities concerning the academic sector under the WG1 theme **'Digitalization and Social Inequalities'.** The need for synthesis on this initiative is urgent and relevant, as the influence of digitization may sometimes be an impediment or causing harm to one of the most important sectors in our society, namely universities.

The majority of us are academics who face obstacles in our later years. **We have seen that older academics often admit that the uprising of digital technology has resulted in serious side effects such as technostress and anxiety.** This goes beyond the benefits that technology provides us on a daily basis, including the assistance in teaching and learning.

This small scale collaboration of academics established within WG1 is **geographically** well positioned to study and identify the aftermath of technostress and challenges among older and aged academicians through research synthesis in existing literatures to come up with a **collective voice** and **experiences**, in addition to **proposing policies, remedies**, and **action strategies** to future academicians and policy makers.

Methodology

Research Questions

We have utilized the five stages of Arksey and O'Malley's (2005) Scoping review framework to do a knowledge synthesis.

2.1 Identifying the initial research questions

2.2 Identifying relevant studies

2.3 Study selection

2.4 Charting the data

2.5 Collating, summarizing and reporting the results

RQ1. What kind of technological tools (i.e., digital vs. analog) are associated with distress among senior academics?

RQ2: What types of health and educational challenges do senior academics experience as a result of their use of various technologies?

RQ3: How did the academics deal with the difficulties caused by technology?

Key Search Terms

Initial Search	Modified Search
("technostress" OR "techno-stress" OR "stress" OR "strain" OR "pressure" OR "tension" OR "anxiety" OR "worry" OR "distress" OR "burden" OR "discomfort" OR "nervousness" OR "unease" OR "apprehension" OR "agitation" OR "anguish") **AND** ("digital*" OR "platform*" OR "apps*" OR "tech*" OR "social media" OR "chat" OR "online*" OR "telemedicine" OR "cyber" OR "virtual" OR "computerized" OR "computerised" OR "electronic" OR "ICT") **AND** ("old* work*" OR "old* employee*" OR "old* profession*" OR "elder work*" OR "aging work*" OR "old* workforce" OR "aged work*" OR "senior work*") **AND** ("teach*" OR "educator*" OR "instructor*" OR "professor*" OR "tutor*" OR "mentor*" OR "academic*" OR "lecturer*" OR "trainer*" OR "pedago*" OR "master*" OR "academ*")	("technostress" OR "techno-stress" OR "stress" OR "strain" OR "pressure" OR "tension" OR "anxiety" OR "worry" OR "distress" OR "burden" OR "discomfort" OR "nervousness" OR "unease" OR "apprehension" OR "agitation" OR "anguish") **AND** ("digital*" OR "platform*" OR "apps*" OR "tech*" OR "social media" OR "chat" OR "online*" OR "telemedicine" OR "cyber" OR "virtual" OR "computerized" OR "computerised" OR "electronic" OR "ICT") **AND** ("teach*" OR "educator*" OR "instructor*" OR "professor*" OR "tutor*" OR "mentor*" OR "academic*" OR "lecturer*" OR "trainer*" OR "pedago*" OR "master*" OR "academ*")

Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Period	Last 40-50 years (Up to date)	
Language	English	Articles that were not peer-reviewed
Databases	Web of Science, Scopus, PubMed, Proquest, PsychAPA	
Study focus	Technostress, academics, older age	
Population	Academic workers 50+ and onward	

Study Selection

The search spanned the period was until 2023 to ensure that a historical overview of the field was possible. The review was performed in five interdisciplinary electronic databases: Web of Science (WoS), Scopus, Proquest, PsychAPA, PubMed. These scientific databases are comprehensive and have points of reference in studies involving a review of academic literature (Siekierski *et al.*, 2018).

In the screening step, only records fulfilling the inclusive criteria, such as Article, Early Access, and English language were included.

During screening, the abstracts of those (n) articles will be analysed, and a further (n) articles will excluded if the content do not correspond with the scope of research questions. Following the recommendation of Okoli *et al.* (2015), because "*the process of excluding sources (and including respectively) has to be made as transparent as possible in order for the review to proof credibility*" (p.883), a detailed list of the excluded papers will be presented in a form of Appendix.

These articles will be excluded from the final screening because:

1) Older workers, technology and the balance of power: an ethical review,

2) Tarafdar, M., Tu, Q. and Ragu-Nathan, T.S. (2010). "Impact of Technostress on End-User Satisfaction and Performance." Journal of Management Information Systems, Vol. 27, No. 3, pp. 303-334.

3) On the Biology of Technostress: Literature Review and Research Agenda René Riedl University of Lin

Primary study: selection process

Data Sources	1st Stage (Screening)
Web of Science	215
Scopus	303
PubMed	89
PyschAPA	0
ProQuest	73

Future work: post-conference

1. Finalise the Primary Study (PS) selection.

2. To be eligible for inclusion, all research would go through a two-step peer-review procedure.

3. Establish a deadline for each task.

4. Data extraction rubrics will be developed in order to collect the relevant information and knowledge from the primary studies (PS).

5. Carry out the content analysis, and if possible, do a meta-ethnographic study.

6. Each team member would be assigned a role to complete the writing as a pair.

Dynamics of age and ageism in strategic workplace encounters

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Presentation based on PhD thesis:
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Dynamics of age and ageism in strategic workplace encounters

Abstract. In the global context of population aging, organizations grapple with managing their aging workforce and addressing age stereotypes. My research explores age and ageism through social interactions in the workplace, emphasizing how workers discursively mobilize age during strategic encounters. It adopts a discursive framework, viewing age and ageism as constructed through language and conversation.

The research has two aims: mapping the contribution of exploring ageism discursively and pinpointing how age and ageism play a role in strategic workplace encounters. Two types of encounters, performance appraisal interviews and job interviews, serve as focal points, with data sourced from video recordings in Italian companies. Analytical methods encompass membership categorization analysis, applied conversation analysis, and applied discursive psychology.

The collaborative construction of age and potential ageist narratives between managers-employees and recruiters-job applicants serves functional roles in achieving business objectives. This work contributes by shedding light on age and ageism in workplace encounters, emphasizing the importance of studying policies within their social contexts. It proposes contextualizing age management not only in organizational culture but also in specific practices and their institutional goals. This study challenges the notion of silent ageism in society, advocating for a discursive understanding of age, group membership, identities, and moral accountability. Recommendations for fostering diversity and inclusion in companies include accountability measures, education aboutage and ageism, and the development of policies and training grounded in interactional practices.

Dynamics of age and ageism in strategic workplace encounters

- Age and ageism are done in social interactions (Nikander, 2002).

- Age is dynamic (identity) (De Lange et al., 2021)

  - ✓ Psychological

  - ✓ Organisational

  - ✓ Functional

  - ✓ Life course …

- Age is relative to social, organisational and cultural environment.

- Ageism is relational (Gordon et al, 2016; Holstein & Gubrium, 2000).

"Doing age" approach

- Change in perspective from etic to emic approach to age, ageing and ageism in organisation.

- The leading questions:

  - ✓ How are age and ageism done in strategic social interactions at work **by workers themselves**?

  - ✓ How are age stereotypes mobilised and to achieve what action?

Approach and Methodology

- Social constructionism applied to age studies, social psychology, and organisation studies.

- Membership categorisation analysis and discursive psychology (Stokoe, 2012).

- Age as a membership category that establishes shared identity between persons and groups, which are based on taken for granted cultural norms.
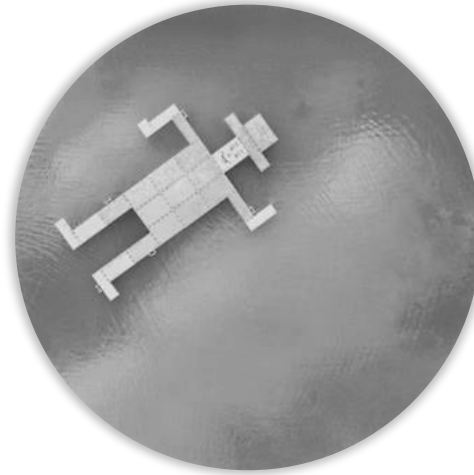
Strategic Workplace Interactions

- Performance appraisal interviews and job interviews

- (Identity) Gate keeping function (Erickson and Shultz, 1982)

- Organisations are done in and through the social interactions that happen within them (Heritage & Clayman, 2010)

- Data: video recordings of 24 job interviews + 12 performance appraisal interviews from Italy.

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- Ageing inside the organisation.

- Age and ageist sterotypes are relational and co-constructed by managers-employee and recruiter-job applicant.

- Ageist stereotypes are functional in impression management actions through co-membership building.

- Possible age norms are not challenged.

- Old age is silenced and distanced

Digitaliation and age inclusion in HR practices

DIGITALISAITON OF HR PRACTICES

- Age and co-membership are resources in strategic workplace encounters/HR encounters (attraction and similarity).

- In "digitalising" HR practices and using digital solutions to support the strategic decisions, we might reproduce inequal social structures (recruitment).

INSIGHTS FOR AGE INCLUSIVE WORKPLACE PRACTICES

1. Education about age and ageism from a bottom-up perspective and organisation-based.

2. Accountability – "put words into action".

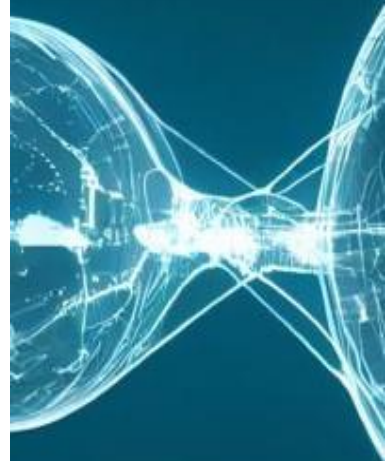3. Training for and on practice.

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Prescribable Digital Therapies
A New Frontier in Tackling Work Inequalities?

João Rocha Gomes

Faculdade de Medicina
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Prescribable Digital Therapies

A New Frontier in Tackling Work Inequalities?

Abstract. Digital therapeutics (DTx) offer promising solutions for various health conditions, including mental health issues like PTSD and insomnia, chronic diseases such as diabetes and hypertension, and behavioral changes like smoking cessation. Their effectiveness varies; some conditions require concurrent medication use, while others benefit solely from DTx. However, challenges persist, particularly for older workers, including age-related health issues, limited healthcare access, and workplace ageism. Additionally, the cost-effectiveness and regulatory aspects of DTx, such as the absence of mandatory preclinical evaluations, complicate their widespread adoption. Europe is responding with specific assessment frameworks and regulatory measures to integrate DTx into healthcare systems.

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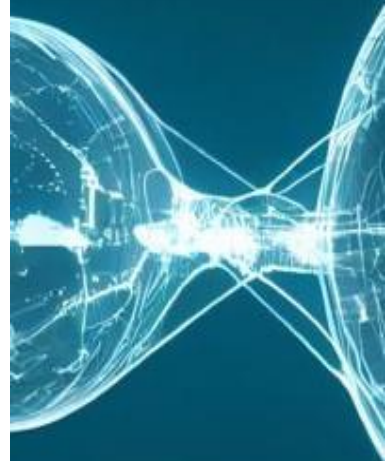
Definition

Digital therapeutics (DTx) are a subset of digital health which refer to "**evidence-based therapeutic interventions** driven by high-quality software programs to **prevent, manage, or treat a medical disorder or disease**" (Martin, 2020).

318,000 Health Apps / Tools

85% of health apps have fewer than 5,000 downloads[1]

>600 published studies on digital health app efficacy[1]

Dozens of patient-facing apps with FDA Clearance;
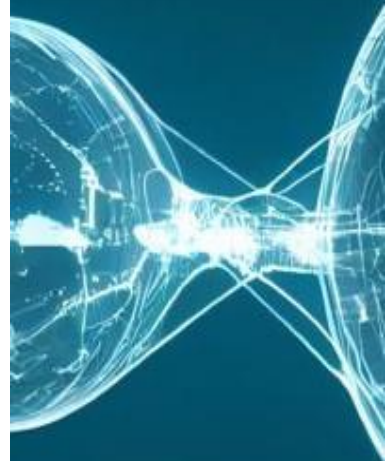< 5 with a "label"

? address key access, interoperability, privacy & security concerns

Starting Point for Digital

Digital Therapeutics / validated Apps

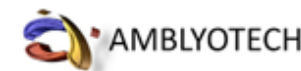(1) IQVIA Institute for Human Data Science. The Growing Value of Digital Health. Nov 2017.

Better Therapeutics' AspyreRx - Diabetes

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Wysa - Cognitive Behavioural Therapy
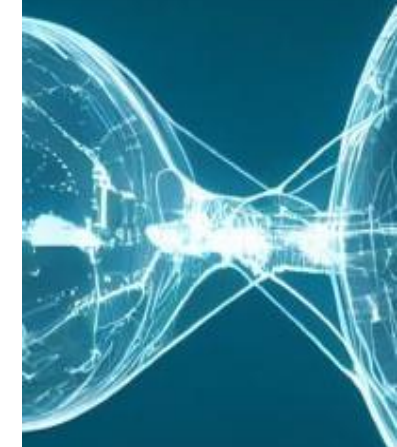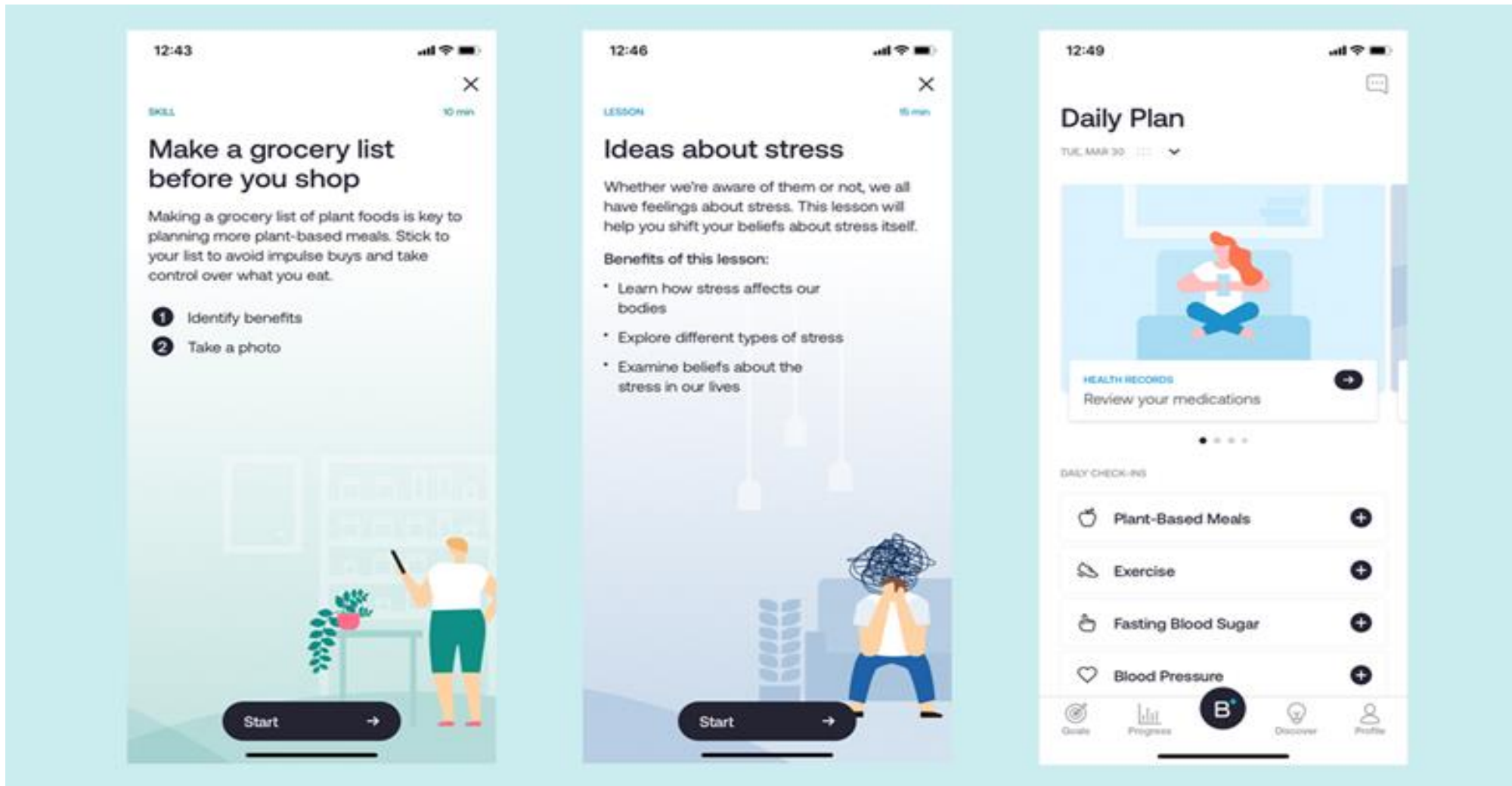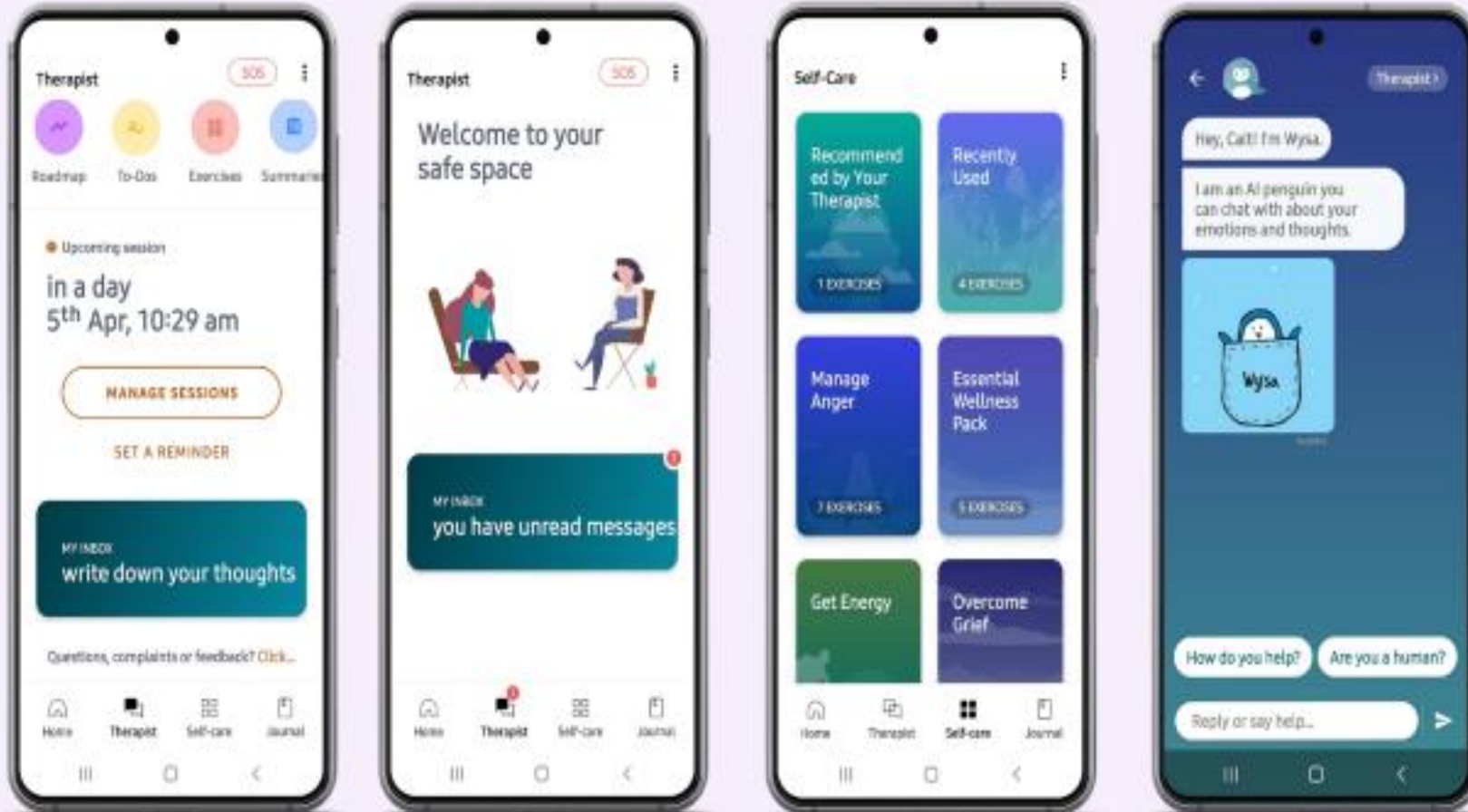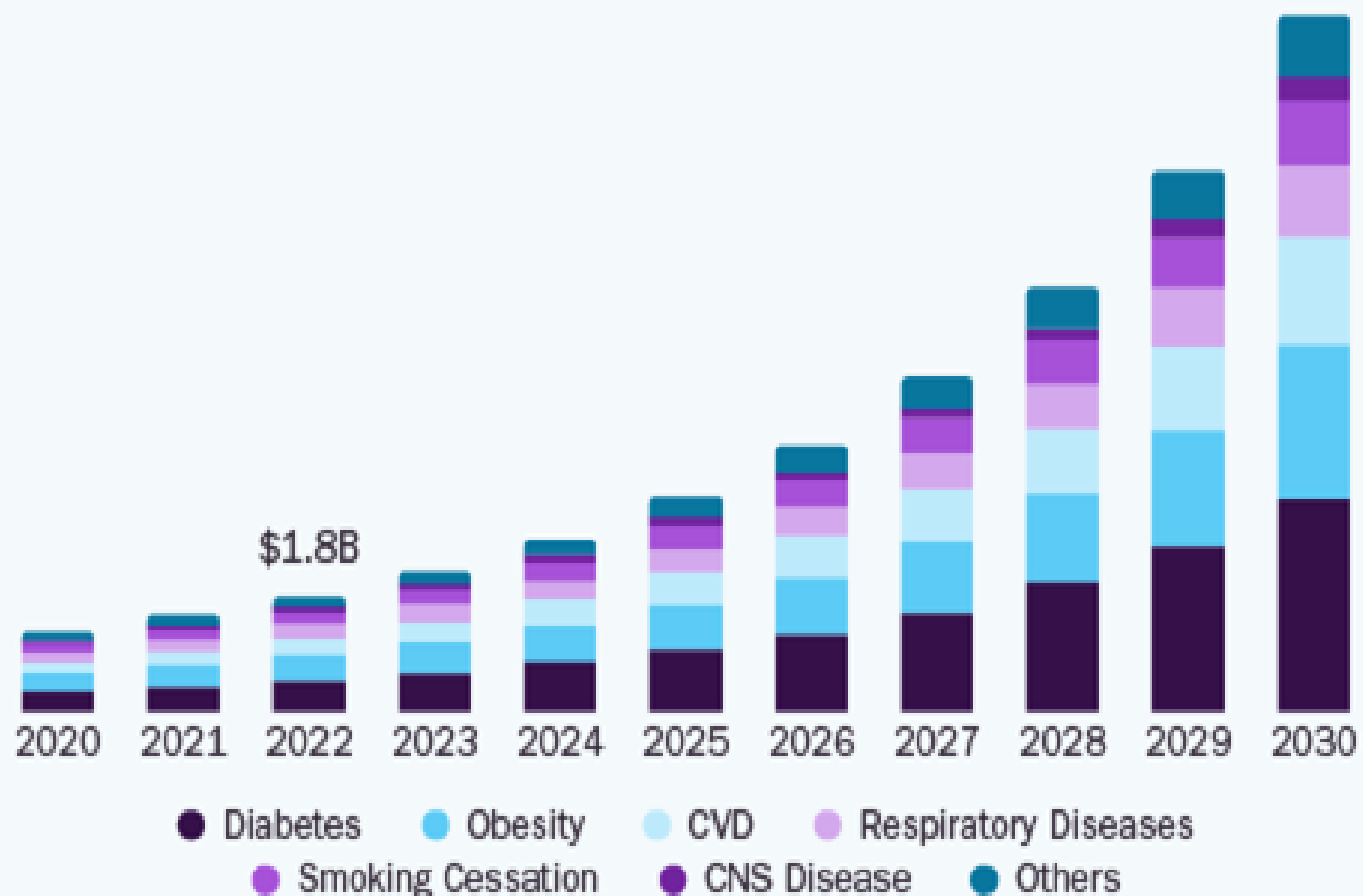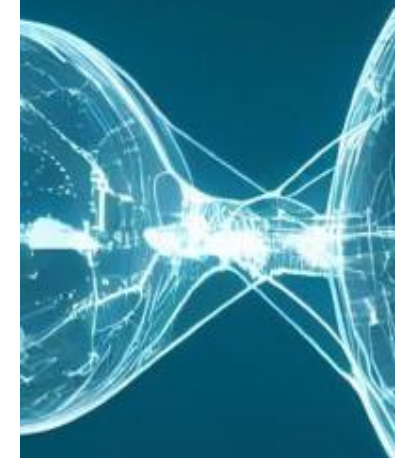
Effectiveness and Efficiency

1) Mental health conditions: including post-traumatic stress disorder (PTSD) and insomnia

2) Chronic diseases: such as diabetes, low back pain and hypertension

3) Behavioural changes: like cessation of addictions, such as smoking

For some conditions the benefits materialise when used <u>together with medication</u> (Nomura et al., 2022), while others can benefit from <u>only the digital solution</u>, such as those with mental conditions (Garnefski et al., 2011)

Challenges Facing Older Workers:

- Age-related health conditions and chronic diseases

- Decreased access to supportive healthcare

- Age discrimination and bias in the workplace

Cost-effectiveness of low-priced technological interventions is not always evident and may even drive increased demand, leading to higher overall healthcare spending (Prodan et al., 2022)

Despite promising impact, digital behavioral health therapeutics have yet to see widespread uptake in practice (Labinsky et al., 2022)

Methodology for Clinical Evaluation

1) DTx, being based on software, are **NOT required to undergo mandatory preclinical evaluations similar to drugs** (Sverdlov et al., 2018).

2) The inherent properties of DTx as medical devices make it **challenging to execute blinding and assign comparators**, which are essential elements in drug clinical trials (Lutz et al., 2022)

> **evidence supporting the positive healthcare effects of these tools is often lacking** (Lutz et al., 2022)

User-Centeredness

1) patients become **active participants** in their own healthcare instead of being passive recipients

2) offer **personalized interventions** that can be tailored to specific patient needs, promoting engagement and flexibility

Design	Values	Dynamism

Context of Use	Individual Experiences

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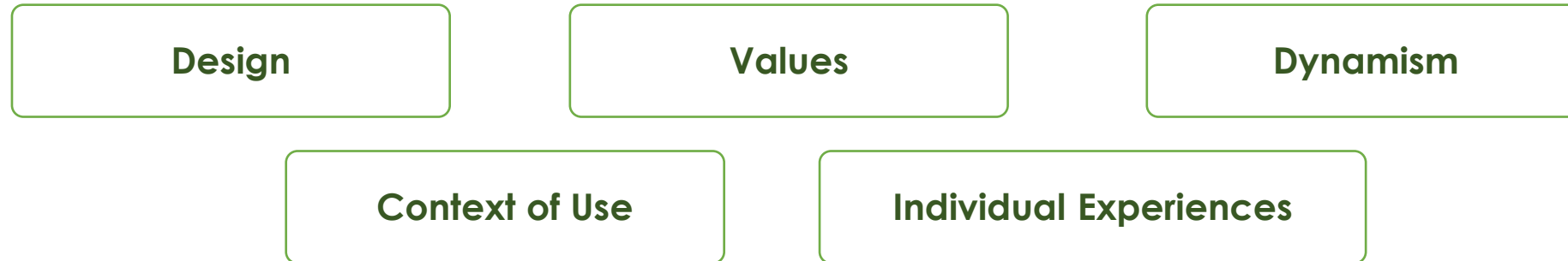
Policy and Regulatory Aspects

1) Europe: European Regulation on Medical Devices 2017/745 (MDR), 2021

2) USA: Policy for Device Software Functions and Mobile Medical Apps, by the Food and Drug Administration (FDA), 2019

Despite the existence of certain procedures in several European countries regarding the marketing authorization and reimbursement of DTx, these **initiatives remain uncoordinated** (Crisafulli et al., 2022).

*As DTx are still relatively new, some european countries have introduced **assessment frameworks for these tools in addition to complying with MDR** (Yan et al., 2021)*

1) Belgium: mHealthBELGIUM platform - pilot projects on DTx

2) France: legal framework for the evaluation, approval, and reimbursement

3) Germany: Specific DTx legislation (DiGA, Digitale Gesundheitsanwendungen)

4) Spain: mConnecta platform - interoperable infrastructure

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The DiGA framework

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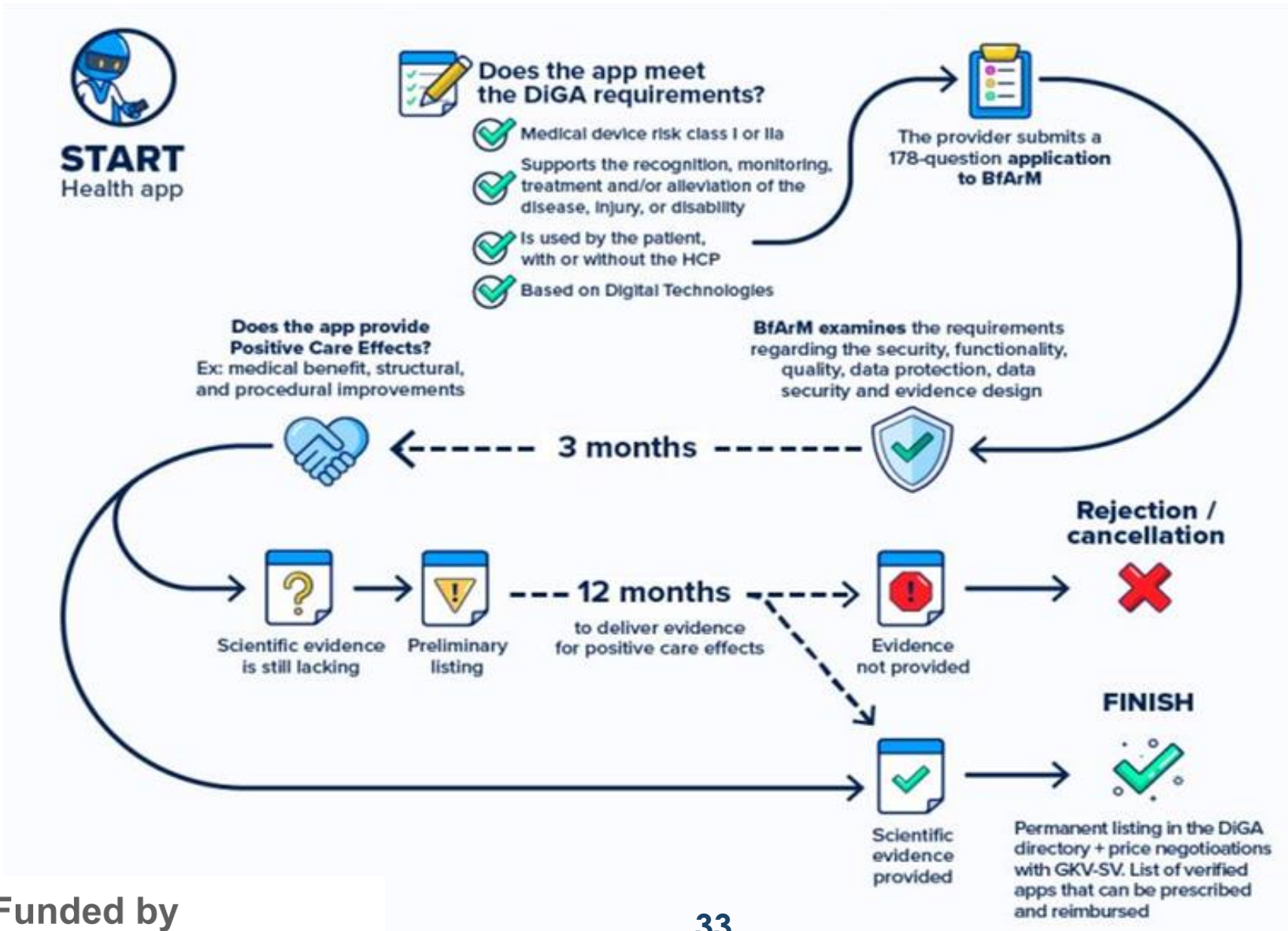
Digital therapeutics-related clinical research studies

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Pilot
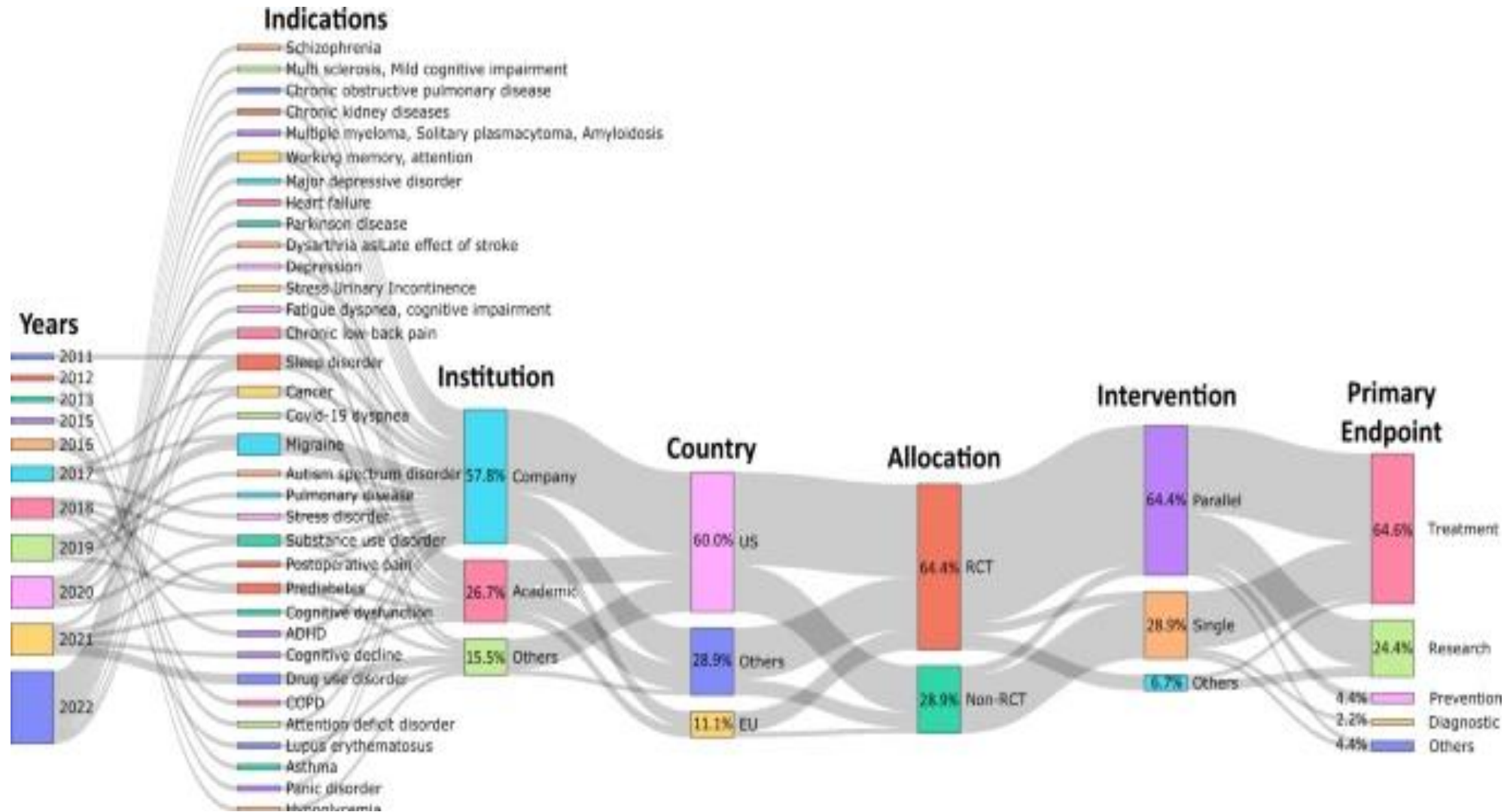
Exploratory study conducted in October 2022 in a Obs&Gynae facility, Berlin (DE)c

1) There is still a **lack of knowledge of what DiGAs are**, particularly among healthcare users. However, this reality is also seen among some healthcare professionals, despite recent changes in this trend.

2) The **number of DiGAs prescriptions is still low in comparison to the prescription of regular medicines**: around 90% of appointments resulting in the prescription of medicines, while around 5% of appointments see DiGAs prescribed (n=40).

3) The **number of existing apps is still heavily linked to the specialities and limited to specific pathologies**. However, the prescription of some apps is independent of the initial setting.

4) **Digital literacy** and **access to technology** were a strong criterion to determine the (im)possibility to prescribe a DiGA.

Work Inequalities in Later Life

Potential for reducing healthcare costs
for both employees and employers?
Value-driven care?

**Reimbursement and sustainability
models for DTx**

Potential to reduce healthcare disparities
among different socioeconomic and
demographic groups?

**Patient-Centeredness in Prescription Digital
Therapeutics: An Evaluation of User
Satisfaction and Adherence**

Expected Limitations

1) Lack of **standardization** in terms of regulatory and ethical guidelines;
2) **Multidisciplinary** field - coordinating these different perspectives and ensuring effective communication;
3) Developing evidence-based, safe, and effective DTx that meet the needs and preferences of patients requires a **deep understanding of the underlying medical conditions** and the associated treatment options;
4) **Data collection/availability.**

The Use of Technological Tools Among Older Workers Affects On Health, And Technostress

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The Use of Technological Tools Among Older Workers Affects On Health, And Technostress

Abstract. The global population is ageing, life expectancy is gradually increasing, and employment is extended. We used an integrative literature review to study how using technological tools impacts the quality of working life among older workers.The integrative literature review method following PRISMA guidelines was used. The selection of articles in English was made according to the following inclusion criteria: scientific papers, content relevance, and topicality. The literature search covered the bibliographic-catalogue databases Web of Science, PubMed, and Scopus. After selection, a qualitative content analysis was applied to the data. From the initial twelve articles, we gained insight into how using technological tools impacts the quality of working life among older workers through a substantive analysis of the articles. Two content categories were identified: health of older workers and technostress.

Regarding the impact on health, studies have focussed on various health outcomes like sleeping quality, mental health, workability arthritis as a chronic condition, physical and quality of life in older community-dwelling low-income, diet, physical activity, stress and tobacco use, stress, and job quality.

Studies regarding technostress that we identified show mixed effects of significant and non-significant effects. Digital technologies can potentially improve the quality of working life among older workers but are currently under-researched. Further research is needed to develop effective interventions and evaluate their impact on the quality of life of older workers.

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Integrative Literature Review

- The research used a descriptive method, an integrative literature review, allowing us to gain new knowledge about the research problem through reviewing, critiquing, and synthesizing the studied literature (Torraco, 2016) under PRISMA guidelines (Page et al., 2021).

- An integrative review is a specific review method that summarizes past empirical or theoretical literature to provide a greater comprehensive understanding of a particular phenomenon or healthcare problem (Broome 1993) and allows the inclusion of multiple methodologies to capture the context, processes, and subjective elements of studies addressing a problem (Whittemore & Knafl, 2005).

- Specifically, we used integrative literature review to critique and synthesize representative literature for quality of working life for older workers, and to draw insight on what are the dimension of this phenomenon for older workers when technological tools are involved (Elsbach & Kinppenberg, 2018).

Theoretical Backgrounds – Ageing of Population

- Population aging refers to the increasing proportion of older individuals in a population (United Nations, 2019).

- There were 90.5 million older people aged 65+ living in the EU27 at the start of 2019; this equated to approximately one fifth (20.3 %) of the total population (Eurostat, 2020).

- An aging population presents challenges for healthcare systems, pension systems, and labour markets, as well as for families and communities (United Nations, 2019).

- Extended working life refers to the need for people to work beyond the traditional retirement age of 65 years (Weiss et al., 2022). The increase in life expectancy has resulted in people living longer and healthier lives, which has led to the need for extended working life (Christensen et al., 2009).

Older Workers and Technological Tools

- The use of technological tools, smartphones, computers, and the internet has become an integral part of our daily routine (i.e., at work).

- Technology is an umbrella term for the application of knowledge, techniques and systems for practical purposes and can be analog or digital (LaMeres, 2017).

- Analog technologies refer to the use of specific tools on continuous frequency that improve quality of life (i.e., old-style radio, types of sensors) while

- Digital technologies refer to data manipulation, storage, transmission and processing data in digital format to allow dynamic quality of life (i.e., web-based platforms, smartphones, computers, digital cameras, digital videos/audios, etc.), and each type of technology have their advantages and disadvantages.

- The impact of technology is not only limited to younger generations but also has a significant influence on the quality of life of older workers (Giuseppina et al., 2020).

Quality of (Working) Life

- Quality of working life is a multidimensional concept similar to quality of life, encompassing physical, psychological, social, and environmental aspects (Post, 2014).

- The impact of technology on the quality of life of older workers is an important issue, as they are a significant segment of the workforce and are often overlooked when it comes to technological advancements (Gorbunova & Tsukanova, 2018).

- The use of technology has brought about significant changes in the workplace, including increased efficiency, faster communication, and more flexibility (Davis et al., 2019).

- For example, technology has the potential to improve the quality of life of older workers by providing them with greater flexibility and opportunities to work from home (Pit et al., 2021).

- All in all, technology can facilitate communication and collaboration, which can enhance job satisfaction and reduce social isolation (Chen & Schulz, 2016).

Purpose of Research

The purpose of an integrative literature review is to describe how the use of technology in older workers can affect their quality of life. The aim is to identify how use of technological tool improves quality of working life among older workers.

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Inclusion/Exclusion Criteria

The literature search included bibliographic-catalogue databases Web of Science (Web of Science Core Collection, BIOSIS Citation Index, Current Contents Connect, Data Citation Index, Derwent Innovations Index, KCI- Korean Journal Database, Medline, Russian Science Citation Index), PubMed, and Scopus. When searching the literature, we considered inclusion and exclusion criteria (Table 1).

Table 1: Inclusion and exclusion criteria

Criterion	Inclusion criteria	Exclusion criteria
Field	The impact of technological tools on quality of working life for older employees	Other
Population	Older workers over 50 years old	Younger than 50 years old
Language	English	Any other language
Type of papers	Peer-reviewed	No peer-review
Type of publication	Quantitative and qualitative	Theoretic, reviews, synthesis

Search Query

To search for literature in English, we used the following keywords in different combinations: older worker*, older employees, quality of working life, and technology. Keywords were combined with Boolean operators (AND, OR) into different combinations (Table 1.). The literature search ran until 6 April 2023. We selected evidence that was published in credible and international journals that were peer reviewed.

Table 2: Search strategy with Boolean logical operators

Database	PubMed	WoS	Scopus
Search strategy	(older worker*) OR (older employees) AND (quality of working life) AND (technology)	((((TS=(OLDER WORKER*)) OR TS=(OLDER EMPLOYEES)) AND TS=(quality of working life)) AND TS=(technology))	Older worker" OR " older employees" AND " quality of working life" AND "technology"
Registers	87	99	92

PRISMA Diagram

Articles identified through searching PubMed database (n = 87)

Articles identified through searching WoS databases (n = 99)

Articles identified through searching Scopus databases (n = 92)

Identification

Articles screened by title and abstract (n =278)

Duplicates removed (n = 56)

(Sistematic) literature review excluded (n=32)

Screening

Articles screened by title and abstract (n =190)

Articles excluded as irrelevant on basis of title and abstract (n=153)

Articles without any technological tools (analog or digital) (n = 25)

Eligibility

Reviews included (n = 12)

Inclusion

45

Literature Review of Findings

Among twelve research studies, 11 studies utilised quantitative research design. Further, about 4 studies utilised cross-sectional design, about 8 studies adopted a survey questionnaire, and one study adopted an index, one with experimental design and one with a control trialled. Moreover, in the twelve articles, about six studies are sociological research, five are health studies, and one study is psychological. Additionally, most of the studies have their focus on older works over 50.

Author(s)	N	Design	Instruments	Age category	Population	Technological tools	Type of technology	Purpose	Positive/ Negative/Mixed Effects
Cook et al. (2015)	278	Quantitative	Stress; Diet; Physical activity; Aging beliefs; Tobacco use.	50-68	Office workers	Web-based health program (HealthyPast50)	Digital	Testing a Web-based health program for older workers (HealthyPast50) to improve health outcomes like diet, physical activity, stress, and tobacco use.	The program is positive and effective, especially for behavioural change, self-efficacy, planning healthy eating and mild exercise. Some other significant results were also found for eating practices, exercise self-efficacy, exercise planning and ageing beliefs.
Gonzales and Morer (2015)	N/A	Qualitative	Inclusivity; Knowledge work.	24-35 36-59 60-70	Product designers	Ergonomic designs	Analog	The study's main purpose is to propose and test a theoretical framework for developing a guidance tool for assisting designers in improving the ergonomics and quality of the work environment (i.e., tools, workstations, and workspace) for older workers.	First study: Ergonomic designs were being used incorrectly due to a lack of consistency in tool adjustments. Older knowledge workers could not fully benefit from an ergonomic workstation, and users of all ages and workspaces faced similar challenges. Second study: All participants considered the context and user of the designed product, emphasizing the importance of field research and rich information. Experienced designers were found to be more selective in their use of tools and information compared to novices.
Nimrod (2018)	537	Quantitative	Overload Invasion Complexity Privacy Inclusion	60 and over	Older adults, Internet users from Israeli	ICT	Digital	The article aims to draw attention to the previously neglected negative impact of Information and Communication Technology (ICT) use on older adults' well-being.	Technostress is a significant issue among older adults, with respondents' total technostress scores reflecting a broad range of stress levels among older Internet users. The study identified five potential stressors: techno-complexity, techno-invasion, techno-overload, techno-uncertainty, and techno-insecurity.
Andersen and Sundstrup (2019)	15,721	Quantitative	Age-discrimination; Personal economy; Gradual retirement;	50 and over	Danish older workers	N/A		The main goal of this study is to explore the push-and-stay	No specific results are described about the impact of technology on older workers.

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			Competencies and continued education Return-to-work; Job satisfaction; Well-being; Working environment; Lifestyle; Health and functional capacity;					mechanism for labour market participation among older workers over 50 years. The survey explored the impact of new technologies in the workplace.	
Bláfoss et al. (2019)	7706	Quantitative	Sleep Problems Physical Activity at Work	N/A	Adults From the General Working Population	N/A		To investigate the association between sleep problems and the duration of low- and high-intensity leisure-time physical activity in sedentary and physical workers.	Workers, particularly sedentary older workers, having sleep problems report less high-intensity leisure-time physical activity.
Konstantoulas et al. (2020)	N/A	Quantitative	Pittsburgh Sleep Quality Index; Heart Rate; Physical activity; Medical records.	Over 50	Older officers	The SmartWork System	Digital	The study aims to answer whether working in more digitalized occupations is associated with lower subjective job quality. The study includes positive and negative aspects.	The study found that digitalization has predominantly positive effects, but employees in more digitalized occupations report higher stress levels due to negative environmental factors. Workers in the second half of their lives, are more vulnerable to becoming outdated due to technological advancements.
Borle et al. (2021)	3180	Quantitative	ICT exposure; Physical and mental health; Work ability; Education.	55 60	Older Worker	ICT	Digital	The study explored the negative impact of ICT use on older workers regarding their physical, mental health and workability.	Almost all the participants reported using ICT at work, and almost 20% reported high levels of digital work intensification. Although ICT use is not significantly and negatively associated with mental health or workability, digital work intensification is negatively associated with mental health and workability.
le Roux and Botha (2021)	192	Quantitative	Technostress; Productivity; Life satisfaction.	N/A	Managers within five ferrochrome smelting plants in South Africa	N/A		A descriptive and comparative study regarding technostress on productivity and overall life satisfaction for managers in South Africa. Gender	General findings indicate significant age group differences between younger and older workers for techno-complexity, techno-invasion, and techno-uncertainty. Older participants experience elevated levels compared to the younger group. There are no significant results regarding

								comparison and age group differences were tested.	techno-overload, techno-insecurity and technostress as a global score regarding age groups.
Kortmann et al. (2021)	1541	Quantitative	Job satisfaction; Occupational stress; Digitalisation; Job insecurity.	40–65	Workers subject to social insurance	ICT	Digital	Almost all the participants reported using ICT at work, and almost 20% reported high levels of digital work intensification. Although ICT use is not significantly and negatively associated with mental health or workability, digital work intensification is negatively associated with mental health and workability overall and across socio-economic positions.	The study found that digitalization has predominantly positive effects, but employees in more digitalized occupations report higher stress levels due to negative environmental factors. The study suggests that job quality is a multidimensional concept and that subjective measures of job quality are essential in determining an employee's well-being. The study adds to the existing literature on the relationship between digitalization and job quality by including workers in the second half of their lives, who are more vulnerable to becoming outdated due to technological advancements.
Prazeres and Passos (2021)	369	Quantitative	Ageism; Workplace discrimination; Quality of life.	Young group; Older group.	Health-related professionals	N/A		To characterize age discrimination at work in health-related professionals and to explore its association with demographic variables	Non-physicians with less professional experience and lower quality of life may experience age discrimination more frequently.
Yin et al. (2021)	49	Quantitative	Physical function; Cognitive function; Quality of life; Chronic pain; Mindfulness.	The mean age of the intervention group was 74.9

The mean age of the control group was 73.9 | Professionals involved in developing the de protocol and the program and 49 older Latino adults | FITxOlder mobile technology-assisted program | Digital | Test the viability of FITxOlder, a Community Health Worker (CHW)-led, mobile technology-assisted Chinese Qigong mind-body exercise program designed to promote healthy ageing among sedentary Latino adults residing in low-income communities. | The main findings report modest but significant results regarding older people's psychological and health outcomes after participating in the technology-assisted Chinese Qigong mind-body exercise program designed to promote healthy ageing. All additional findings report that participants are satisfied with the program and they have a good interaction with the program offered through technological tools (i.e., smart tablet). |

Synthesis of Findings

Category	Content subcategory	Author(s)
Health	Web-based health program for older workers improve health conditions.	Cook et al, 2015
	Sedentary older workers, having sleep problems report less high-intensity leisure-time physical activity.	Bláfoss et al. 2019
	Living with a chronic health condition can further affect older workers perceptions of their ability to continue in the work force and their quality of life	Koreshi & Alpass, 2022
	A strong correlation between the monthly automatically calculated scores and self-reported sleep quality	Konstantoulas et al., 2020
	Digital work intensification displayed negative associations with mental health and work ability.	Borle et al., 2021
	Technology-assisted mind-body exercise program impact on psychological and health outcomes of older people.	Yin et al, 2021
	Digital work intensification is negatively associated with mental health and work ability.	Borle et al., 2021
Techno stress	Age discrimination is more often experienced by noon-physicians with less experience and a lower quality of life.	Prazeres & Passos, 2021
	Older respondents are experiencing slight levels of techno-invasion, which are adding to perceived levels of technostress.	le Roux & Botha (2021)
	Technostress is a significant issue among older adults	Nimrod, 2018
	Employees in more digitalized occupations report higher levels of stress due to negative environmental factors	Kortmann et al., 2021

Discussion of Findings

- *Regarding the impact over health*, studies have focused on various health outcomes like sleeping quality (i.e., Blafos et al., 2019; Konstantoulas et al., 2020), mental health and work ability (i.e., Borle et al., 2021), arthritis as chronic condition (i.e., Koreshi & Alpass, 2022), physical and quality of life in older community-dwelling low-income adults (i.e., Yin et al., 2021), diet, physical activity, stress and tobacco use (i.e., Cook et al., 2015), stress and job quality (Kortmann et al., 2021).

- Overall, results of studies indicate that technological tools assessing health outcomes are reliable and can provide insight to trigger mechanism for behavioural and lifestyle interventions to adopt healthier sleep habits (i.e., Konstantoulas et al., 2020).

- Borle and colleagues (2021) found mixed effects, ICT use does not negatively impact mental health or work ability, but digital work intensification is negatively associated with mental health and work ability for older workers.

- Studies that tested web-based programs for improving health outcomes reported modest but significant improvements for mind and body (i.e., FitxOlder mobile technology-assisted Chinese Qigong mind-body exercise program, Yin et al., 2021) and that they are effective for behavioral change, self-efficacy, planning healthy eatind and mild exercise (i.e., HealthyPast50 web-based health program for older workers (Cook et al., 2015).

Discussion of Findings

- Kortmann and colleagues (2021) generally report positive effects of digitalization, but also that more digitalized occupation face elevated levels of stress in specific negative environmental factor.

- *Studies regarding technostress* that we identified show mixed effects of significant and non-significant effects. Results generally indicate higher levels of technological stress in some important aspects specific to the working life.

  - For example, le Roux and Botha (2021) found that older workers experience higher levels of techno-complexity, techno-invasion and techno-uncertainty, but not for techno-overload, techno-insecurity or the overall score for technostress, when compared with younger groups.

  - Nimrod (2018) also found that technostress is significant for older workers over 60 and all its components are significant aspects for them and with possible negative impact over well-being.

  - Gonzales & Morer (2015) identified in their studies that lack of consistency in tool adjustments affect the ergonomics of a workstation for older workers and in general.

  - Finally, Andersen and Sundstrup (2019) anticipate both negative and positive effects of technology and propose for their long-term project (i.e., SeniorWorkingLife project) to assess both aspects.

Discussion of Findings

- Although the other studies were focused on health outcomes, researchers have often assessed also the technological impact and satisfaction that the use of technological tools have for older workers. For example, Borle and colleagues (2021) report that 92% of participants reported ICT use at work. Almost 20% reported high levels of digital work intensification, while a similar proportion did not experience digital work intensification. Similarly, Yin and colleagues report the impact of technological tools, participants reporting that they are familiar with technological tool (i.e., a tablet), and that although the protocol of the intervention was disrupted, the recruitment, retention and fidelity of participants was high.

- Our results are in line with this debate and show that there are different results depending on type of outcome, technological tools and context and age group. Generally, we have identified two thematic categories that are most impacted for older workers: an impact over health and technological stress.

- Finally, there are three studies that lack involvement of technological tools (i.e., Bláfoss et al. 2019; Koreshi & Alpass, 2022; Prazeres & Passos, 2021). Although they lack to test the impact of technological tools, they bring important insights into the quality of the working life of older adults, especially for health outcomes and age discrimination patterns.

General Directions of Action of the European Union regarding Digital Skills and Employment

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General Directions of Action of the European Union regarding Digital Skills and Employment

Abstract. The issue of digital skills in the context of employment seems to be gaining more importance in recent years at the European policy-making and legislative levels. Several such policies and pieces of legislation also tackle the issue of inequality related to the age and digital skills of EU citizens, more and more important in what concerns the labour force and employment. In this context, the paper aims at providing an overview of the most relevant general European Union directions of action, policies and legislation related to digital skills in the context of employment, to identify the most important provisions that may be further instrumentalized into policies supporting digital skills for older workers, as well as to verify the enforceability and the effects, institutional or otherwise, of the most relevant EU documents on the matter. Of particular importance are the European Pillar of Social Rights (2017) and the subsequent Action Plan, the Digital Education Action Plan (2021-2027), 2030 Digital Compass: the European Way for the Digital Decade and the European Declaration on Digital Rights and Principles, as well as the 18 April 2023 Council Recommendations on the key enabling factors for successful digital education and training and on improving the provision of digital skills in education and training.

Goals

- To provide an overview of the most relevant European Union legislation, policies, general directions of action related to digital skills in the context of employment

- To identify the most important provisions that may be further instrumentalized into policies supporting digital skills for older workers

- To verify the institutional effects and the enforceability of the most relevant EU documents on the matter

The European Pillar of Social Rights: Building a fairer and more inclusive European Union (2017) and the subsequent Action Plan

- The European Pillar of Social Rights has been proclaimed by the European Parliament, the Council and the Commission in 2017 at the Gothenburg Summit

- The Pillar of Social Rights is about better delivering on rights for citizens by building on 20 key principles and rights essential for fair and well-functioning labour markets and social protection systems. Among these:

Chapter I: Equal opportunities and access to the labour market

1. **Education, training and life-long learning**: Everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market

2. **Gender equality:** Equality of treatment and opportunities between women and men must be ensured and fostered in all areas, including regarding participation in the labour market, terms and conditions of employment and career progression.

3. **Equal opportunities**: Regardless of gender, racial or ethnic origin, religion or belief, disability, age or sexual orientation, everyone has the right to equal treatment and opportunities regarding employment, social protection, education, and access to goods and services available to the public. Equal opportunities of under-represented groups shall be fostered.

Chapter I: Equal opportunities and access to the labour market
4. Active support to employment: Everyone has the right to timely and tailor-made assistance to improve employment or self-employment prospects. This includes the right to receive support for job search, training and re-qualification (...). People unemployed have the right to personalised, continuous and consistent support (...).

Chapter II: Fair working conditions
5. Secure and adaptable employment: Regardless of the type and duration of the employment relationship, workers have the right to fair and equal treatment regarding working conditions, access to social protection and training (...).

- **The European Pillar of Social Rights Action Plan** has been presented by the Commision on 4 March 2021, and had been endorsed during the Porto Social Summit, 7-8 May 2021
- It turns the Principles into concrete actions to benefit citizens. It also proposes headline targets for the EU to reach by 2030:

➢ **78% Employment**: at least 78% of the population aged 20 to 64 should be in employment by 2030
➢ **60% Training**: at least 60% of all adults should be participating in training every year by 2030
➢ **15 million Reducing poverty**: a reduction of at least 15 million in the number of people at risk of poverty or social exclusion
o Delivering the Pillar of Social Rights is a shared responsibility for the EU institutions, national, regional and local authorities, social partners and civil society

The Digital Education Action Plan (2021-2027): Resetting education and training for the digital age

- Adopted on 30 September 2020
- A renewed European Union (EU) policy initiative which targets an inclusive and accessible digital education in Europe and aims to support the adaptation of the education and training systems of Member States to the digital age

- It has two priorities:

- ✓ **Priority 1: Fostering the development of a high-performing digital education ecosystem**
- ✓ **Priority 2: Enhancing digital skills and competences for the digital transformation**

- Actions: Structured Dialogue with Member States on digital education and skills, proposals for Council Recommendations, common guidelines for teachers and educators to foster digital literacy and tackle disinformation through education and training etc.

Funded by the European Union

2030 Digital Compass: the European Way for the Digital Decade

- A comprehensive framework that will guide all actions related to the digital field. The aim of the Digital Decade is to ensure all aspects of technology and innovation work for people.

- Announced in 2021

- It includes targets (basic digital skills for a minimum of 80% of population by 2030); objectives that will guide the actions of Member States; a policy programme, with a mechanism to monitor progress; multi-country projects; rights and principles that reflect EU values, which have to be respected in the digital world.

Funded by
the European Union

The European Declaration on Digital Rights and Principles for the Digital Decade

- Proposed in January 2022, signed in December 2022
- Covers key rights and principles for the digital transformation

- Chapter II

- ✓ **2. Solidarity and Inclusion**: The digital transformation should contribute to a fair and inclusive society and economy in the EU. We commit to: (...) a digital transformation that leaves nobody behind. It should benefit everyone, achieve gender balance, and include notably elderly people, people living in rural areas, persons with disabilities, or marginalised, vulnerable or disenfranchised people and those who act on their behalf (...).
- ✓ **4. Digital education, training and skills:** Everyone has the right to education, training and lifelong learning and should be able to acquire all basic and advanced digital skills. We commit to: (...) giving everyone the possibility to adjust to changes brought by the digitalisation of work through up-skilling and re-skilling (...).

- two proposals aimed at supporting the development of digital skills among European citizens:

- **Council Recommendation on the key enabling factors for successful digital education and training** - calls on Member States to ensure universal access to high-quality digital education and training, and to address the digital divide that has become even more evident in light of the COVID-19 pandemic
- **Council Recommendation on improving the provision of digital skills in education and training** - addresses the varying levels of digital skills within different segments of the population and the ability of national education and training systems to address these differences; it calls on Member States to provide digital skills coherently through all levels of education and training and to establish incremental objectives and targeted interventions for specific priority or hard-to-reach groups

Platforms

- **Digital Skills and Jobs Platform** – among others, it lists the existing programs and actions on the matter; for instance, ICTSkills4All, which aims at improving digital literacy among seniors

- **European Digital Education Hub** – an open online collaborative community for digital education stakeholders in Europe and beyond; among others, it seeks to enhance knowledge sharing and knowledge building between European digital educators.

Conclusions

- These directions of action are rather new initiatives, that reflect a more intense focus on issues related to digitalization and employment, having been more visible or adopted in the past 2-3 years

- They do, however, tackle the issue of inequality related to age and digital skills regarding EU citizens

- They don't generally create clear and enforceable obligations for the Member States. Rather, they formulate general directions of action at EU level, calls for action, general recommendations, propose the adoption of recommendations...

- It would be worth monitoring how the Member States are/will be implementing these standards

Policies on digitalization in Albania and the impact on older workers

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Policies on digitalization in Albania and the impact on older workers

Abstract. Digitization is reshaping Albania's workforce, offering opportunities and challenges, especially for older workers. The country's integration into the European Union has improved infrastructure, creating potential for older individuals. However, only 24% of Albania's population possesses basic digital skills, and structural barriers like networking costs and digital infrastructure gaps persist. Older workers often lag in digital skills due to a lack of trust in technology and limited exposure. The COVID-19 pandemic highlighted their digital isolation in employment, raising concerns about their marginalization in automation and computerization initiatives. To unlock their potential, older workers need flexibility and support in adapting to the evolving job market. While Albania has made strides in digital transformation, it lacks specific strategies for the digital inclusion of older workers. Prioritizing their digital upskilling and allocating funds for their proficiency in future labor market strategies is crucial. Ageism and retirement assumptions often leave older workers overlooked, making it essential to ensure access to digital tools and skills, promoting local capacity, and involving community input and local businesses in policymaking. By investing in the digital inclusion

Policies on digitalization in Albania

The future of work depends on several factors, including long-term competition, demographic developments, etc. However, digitisation is one of the main drivers of technological change in the foreseeable future.

Digital transformation has emerged as a crucial factor in the labour market in Albania, bringing significant changes to the employment landscape.

While these changes have brought many opportunities, they have also created new challenges for the workforce, particularly older workers, including the risk of increased inequality and social exclusion.

The question is how are public policies responding to the impact of digitalization on older workers, to support older workers in the digital labour market and ensure that they can benefit from the opportunities brought about by digital transformation?

Policies on digitalization in Albania

Embarking on the path towards integration with the European Union has set the direction for driving the economic and digital growth of the country (European Commission, 2022). As a result, numerous policies and initiatives were implemented during the EU accession period, which led to significant enhancements in terms of accessibility, infrastructure, and cost-effectiveness.

This updated plan holds great potential for older workers, who often face difficulties due to limited access to broadband services and a lack of technology in their homes, hindering their ability to learn and practice digital skills.

"Digital Agenda of Albania, 2022-2026" Strategy serves as the foundation for the new Government program that lays out the next phase of the country's digital transformation started with Inter-sectorial Strategy on "Digital Agenda of Albania, 2015-2020"

The impact of digitalization on older workers

Albania has the lowest percentage of people aged 16 to 74 with basic digital skills in Europe, with only 24% of the population possessing these skills (Eurostat, 2022.) This poses a significant challenge for older workers, particularly older women, who are an important part of the workforce and can contribute significantly to the economy.

It is essential to recognise that there are structural barriers that prevent these groups from gaining access and digital skills, including the price of networking and physical gaps in digital networking infrastructure (Tomer and Fishbane, 2020).

Because many older workers simply did not grow up using and adapting to newer technologies, a lack of trust in technology is an often-cited reason why older workers tend to have lower digital skills (Hunsaker et al., 2019).

The COVID-19 pandemic forced many older Albanian workers to use technology to interact with family and engage in other social events.

However, when it comes to employment (current or future), it is likely that older individuals may face isolation as a result of their inadequate knowledge of IT, lack of access to IT, and connectivity issues, particularly in remote and underprivileged regions.

Furthermore, if the automation and computerisation initiatives do not consider the needs of older employees with or without disabilities, they may become even more marginalised.

To unlock their potential, older workers, both men and women, require greater flexibility and support to adapt their professional profiles to meet the demands of the evolving market.

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Policies responding to potential risks of social exclusion for older workers

With a strong and stable policy framework, coupled with essential digital enablers, Albania has successfully upheld its regional leadership in service delivery and digital transformation (Sigma Monitoring Report, 2021.)

However, the digital inclusion of older workers is often overlooked, with a lack of specific strategies focused on their needs.

By providing affordable internet access, devices, and digital literacy programs tailored for older workers, might enable their participation in the digital world, maintain their independence, engage in social activities, and embrace new opportunities in the dynamic labour market.

The digitalization wave accelerated by the pandemic has highlighted the need for digital inclusion for older workers.

However, there is a lack of specific digital strategies targeting older workers in Albania. To ensure the inclusion of older workers in Albania's digital transformation, it is crucial for the government to prioritize their digital upskilling.

The next strategy on labour market that will follow the National Employment and Skills Strategy 2019-2022 might prioritize funding initiatives to support older persons in becoming proficient digital citizens, enabling them to use the internet effectively, engage in society, and remain productive.

Policy Recommendations

The majority of government programs, strategies, and instruments prioritize assisting young individuals in enhancing their digital skills, fostering innovation

There is a lack of specific digital strategies targeting older workers in Albania

Ageism and assumptions about retirement often result in these workers being overlooked in programs and resources

Ensuring access to digital tools and skills is crucial. More funds should be allocated to provide devices, education and training to older workers

Policies must consider local capacity and incorporate input from the community and local businesses
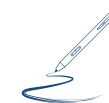
By investing in the digital inclusion of older workers, Albania can unlock their potential and enable them to actively participate and benefit from the digital era.