"But at the age of 85? Forget it!": Internalized ageism, a barrier to technology use

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ABSTRACT

The COVID-19 pandemic has underscored how everyday information and communication technology (EICT), such as online banking, e-shopping, or e-mail, are essential for individuals of all ages to maintain activity engagement, health, and well-being. Yet, older adults are often stereotypically portrayed as incapable, technophobic, or unwilling to engage in EICT. This may further contribute to the digital divide, as age stereotypes have the power to act like self-fulfilling prophecies and impede older adults' engagement in complex everyday life tasks. This study aimed to shed light on internalized ageism as manifested in older non-users' narrations about EICT use. It further explored how age stereotypes in the context of EICT are constructed and perpetuated through disempowering and ageist environments. A qualitative approach was applied, performing semi-structured interviews in participants' homes ($N = 15$). Data were analyzed following the principles of qualitative content analysis, applying both deductive categorization and inductive coding. Internalized ageism appeared to be an omnipresent element in older adults' narrations about EICT non-use. This was reflected in the four subcategories "competence and learning", "relevance and use", "technology design", and "intergenerational contact". Ageism, as manifested in the social environment and the design of technology, seemingly contributed to the internalization of age stereotypes and low EICT engagement. This research calls for inclusive technology designs, ageism-free EICT learning settings, and awareness campaigns about lifelong learning to help close the digital divide and ensure optimal aging experiences for older people.

Background

Today's older adults have lived through the last century's immense transformation from analog and electronic to digital devices. They have participated in and contributed to the extraordinary development and conversion of everyday practices from overwhelmingly manual to nearly exclusively digital practices. Nevertheless, older age is often depicted as a problem by media, policy, and research discourses and perceived as a barrier when it comes to everyday technology use, especially modern everyday information communication technology (EICT) (Köttl, Tatzer, & Ayalon, 2021; Peine & Neven, 2020).

EICT are a subset of more complex and mostly internet-based everyday technologies, including digital services such as online banking, e-mail, e-shopping, gaming, or video-calling (Wallcook, Nygård, Kottorp, & Malinowsky, 2019). EICT encompasses mobile or smart phones, computers, tablets, or laptops, each capable of capturing, storing, and exchanging information (Gagnon et al., 2009). Even though the baby boomer generation is the fastest growing group of internet adopters (Vogels, 2019), later life EICT engagement is often accompanied by a wide range of age stereotypes, portraying older people as incapable, technophobic, stubborn, or not willing to keep up with changes (Neves & Amaro, 2012). While younger adults are commonly represented as "tech-savvy" or "digital natives", older individuals are often labeled as "digital immigrants" or "non-users" (Kania-Lundholm & Torres, 2015; Meisner, 2020; Prensky, 2001).

To a certain extent, this focus on chronological age in the context of EICT access and use may stem from research and policy debates on the digital divide, which often consider chronological age as one of the major factors that determines EICT access and usage (Fang et al., 2019). While this may be statistically accurate, life course scholars have demonstrated the importance of acknowledging factors like gender, education, socioeconomic background, household composition, and

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health-related barriers that contribute to the digital divide (Fang et al., 2019; Hunsaker & Hargittai, 2018). Furthermore, the vast heterogeneity of older persons, reflected in older adults' different life experiences, abilities, and interests, increasingly receives attention in current gerontological research on EICT use and related policy discourses. To date, factors such as perceived relevance of technology, experience, self-efficacy beliefs, skills, anxiety, concerns about privacy, or technology design are also known to add to the likelihood of using or not using EICT in later life (Gatto & Tak, 2008; Helsper & Reisdorf, 2013; Lee, Chen, & Hewitt, 2011; Peacock & Künemund, 2007).

In 2020, 32% of all adults in the European Union aged 65 to 74 reported never having used the internet (Eurostat, 2020). Based on the SHARE survey, Gallistl, Rohner, Seifert, and Wanka (2020) thoroughly examined the population of older non-users in the context of Austria. They identified that 46.1% of the individuals 65 and older had neither ever used a computer nor the Internet in the last seven days. Those with lower educational levels, the oldest-old, women, those with decreased subjective health, and those living in rural areas were most likely to be non-users. In conjunction with the factors above, survey data from Switzerland and Germany indicated that non-users were likely to hold more negative self-perceptions of aging (Köttl, Cohn-Schwartz, & Ayalon, 2020) and feel older (Seifert & Wahl, 2018) than active technology users.

Some scholars have accordingly argued to discontinue viewing chronological age as a barrier to EICT merely from an essentialist point of view, but rather to acknowledge and explore the various other possible definitions of age, including the life span concept, functional age, performance-based age, psychosocial age, or subjective age (Wagner, Hassanein, & Head, 2010). Subjective age perceptions, internalized ageist stereotypes and the characteristics of the environment (e.g., technology design, social environment, policy, media discourses) may facilitate or hamper EICT use and potentially expand the understanding of why some older people remain non-users. Research in the context of EICT usage has highlighted a need to examine the impact of ageist assumptions and stereotypes in hindering the uptake and use of EICT (Cutler, 2005; McDonough, 2016). In this paper, we therefore aim to shed further light on the role of internalized ageism in the context of EICT non-use.

Embodiment of age stereotypes

Ageism is understood as the stereotyping, prejudice, and discrimination against people based on their age (World Health Organization, 2018) and can be directed towards others or one-self (Levy, 2001). Implicit or explicit ageist notions related to older persons' EICT use are widespread in research, policy and media discourses (Fraser, Kenyon, Lagacé, Wittich, & Southall, 2016; Mannheim, Schwartz, Xi, Buttigieg, & Mcdonnell, 2019; McDonough, 2016; Meisner, 2020), but also in conversations and everyday life situations. According to the stereotype embodiment theory, age stereotypes and prejudices are deeply internalized over the life course and shape views towards one's own aging. Younger people assimilate and embody these age stereotypes from the surrounding environment when growing older (Levy, 2009). Embodied age stereotypes may then act as self-fulfilling prophecies, and prompt older adults to behave in ways that confirm the stereotype and potentially affect mental and physical functioning negatively or lead to withdrawal from certain activities (Lamont, Swift, & Abrams, 2015). Indeed, age stereotypes are known to impair performance on cognitive, social, and sensorimotor tasks, especially if controlled and automatic processing is required (Schmader, Johns, & Forbes, 2008). These are, in fact, necessary competences when engaging in more complex everyday life tasks like EICT (Reppermund et al., 2011).

So far, few studies have addressed the potential association between older adults' EICT engagement and internalized ageism. For the purposes of this paper, internalized ageism is understood as a latent construct, involving self-stereotyping, negative self-perceptions of

aging, negative attitudes towards one's own aging, or perceiving oneself as (too) old (Ayalon & Tesch-römer, 2018; Bodner, 2009). A recent study drawing on representative survey data from Germany explored the bi-directional associations of EICT use and self-perceptions of aging by applying a cross-lagged model (Köttl et al., 2020). After controlling for potential confounders, such as gender, education, income, or region, low EICT use predicted more negative self-perceptions of aging in the domain of personal growth three years later. Moreover, a cross-sectional research study based on Swiss survey data highlighted a significant relationship between subjective age and Internet use. Older people who engaged in Internet activities felt younger than those in the same age group who did not use the Internet (Seifert & Wahl, 2018). Finally, a qualitative paper from Sweden raised awareness about the so-called "divide within", finding that older adults who actively used technology held negative age stereotypes against non-users from their own age group; that is, active technology users clearly differentiated themselves from the population of older non-users (Kania-Lundholm & Torres, 2015).

To date, few research initiatives have aimed to raise awareness and overcome self-or other-directed ageism in the context of technology. Intergenerational contact and learning appear to be effective measures to enhance older adults' digital technology adoption (e.g. Seguí, De San Pedro, Verges, Algado, & Cuyàs, 2019) and to combat ageism (Burnes et al., 2019). Moreover, the involvement of older people in digital technology design processes can enhance usability and acceptance of technological devices (Norman, 2017) as well as help to detect and counter stereotypes about older people (Frennert & Östlund, 2014; Peine & Neven, 2019).

The internalization and perpetuation of age-stereotypes through the physical–social environment

The social and physical environment have the power to both debunk and/or induce age stereotypes in the context of EICT use (Ayalon & Tesch-römer, 2018). While the social environment includes everyday social interactions, social networks, or relationships (Lang, 2001), the physical environment comprises the natural and built environment and material spaces (Lawton, 1985), including the design of technology. Indeed, earlier research has indicated the potential of environmental cues, such as technology design features, social interactions, or age-priming, to activate negative age stereotypes and impact EICT use (Caspi, Daniel, & Kavé, 2018; Fraser et al., 2016; Seguí et al., 2019).

There are various ways in which the environment may contribute to and perpetuate internalized ageism. For example, a mixed method-study including students (n = 120) revealed more features of patronizing talk in giving instructions on how to use a new technology towards an 82-year-old person than towards a 32-year-old (Thimm, Rademacher, & Kruse, 1998). A longitudinal study by Mariano et al. (2020) investigated the impact of stereotype threat (the performance-decline associated with the fear of confirming stereotypes) on computer use in a Portuguese sample of older persons. Their findings demonstrated that exposure to age stereotypes predicted lower levels of computer use a year and a half later. Moreover, Caspi et al. (2018) applied a pre-post manipulation design and assessed the impact of technology on subjective age, hypothesizing that technology itself can prompt age stereotypes and accordingly impair performance. They demonstrated that exposure to technology, especially unknown technology, negatively affected functioning and increased subjective age perceptions.

The present study

Engagement in EICT has become fundamental for individuals of all ages, ensuring social participation, access to goods, services, leisure activities, and lifelong learning. In fact, the often-negative representation of older individuals' EICT use has been refuted in various studies, demonstrating high relevance of technology and willingness to engage

in EICT (Czaja et al., 2006; Walsh et al., 2018). Nevertheless, age stereotypes in the context of EICT seem to persist and remain widespread among younger and older people alike.

This study explores one specific population group through a constructivist lens, namely older non-users. By acknowledging the various reasons for non-use (Fang et al., 2019; Hunsaker & Hargittai, 2018), the present study aims to better understand how this population negotiates age and aging in an increasingly technology-centered society, by specifically examining internalized ageist assumptions as well as the influence of the physical–social environment that may contribute to the construction of "the older non-user". As discussed earlier, technology design and the social environment (e.g., friends or family members) may be experienced as both empowering and/or disempowering by older non-users. An exploration of the complex interplay between aging persons and their physical–social environment (Wahl & Oswald, 2010) is expected to increase the understanding of why some older adults remain digitally excluded and how this group can be empowered. This is important to design targeted interventions and policies that combat age stereotypes in the context of technology, promote technology adoption in this group, and subsequently ensure engaged and connected aging. The present study, hence, focuses on two sets of questions: (1) How is internalized ageism manifested in older non-users' narrations about EICT? (2) How does the physical-social environment contribute to the internalization and perpetuation of EICT-related age stereotypes in older non-users?

Methods

Data

Secondary data were derived from a larger, ongoing research project by the ACCESS research group at University of Vienna. While the overall goal of this project was to explore older adults' access, barriers and later-life-learning in regard to new technologies, the qualitative data used for this current paper originally aimed to explore older adults' appropriation of new, digital technologies and the barriers that arise in this context.

From May to June 2019, fifteen semi-structured qualitative interviews were conducted across Austria. A purposive sampling strategy was employed by launching an open call, seeking older adults (65+) who have never used a computer and have not used the internet in the last 7 days. These two criteria were also employed by the Survey of Health, Ageing and Retirement in Europe (SHARE) to evaluate digital technology use and non-use in later life.

Participants were recruited through municipalities, community centers, older people unions, pensioners' clubs, nursing homes, and churches. Those who replied to the call identified themselves as having no experience with the internet or computers before the interview and were accordingly labeled as non-users by the researchers. As the study progressed, it turned out, however, that several interviewees have already engaged with some EICTs. For example, one participant worked with computers before retirement. Two interviewees used WhatsApp on their smartphones and another participant attempted to withdraw money from an ATM. Nevertheless, all participants self-identified as non-users of those EICTs. Earlier research has demonstrated that non-use in later life requires a broader conceptualization to adequately capture the continuum of non-use. The self-description of older persons as non-users is considered an appropriate approach for inclusion (Weaver, Zorn, & Richardson, 2010).

Table 1 describes the characteristics of the fifteen older individuals who eventually met the inclusion criteria. Participants' age ranged between 69 and 88, with a mean age of 79 years. Two thirds of the participants were female, two thirds had achieved post-secondary nontertiary education (vocational training) or upper secondary education (vocational school), and one third lived in rural areas. Participants had no known health condition and they all gave written informed consent

Table 1
Participants' characteristics.

Interviewee	Age	Gender	Highest educational level[a]
Renate	79	Female	Upper secondary education
Judith	71	Female	Upper secondary education
Heinz	85	Male	Post-secondary non-tertiary education
Heidi	79	Female	Post-secondary non-tertiary education
Rosi	75	Female	Lower secondary education
Gundula	86	Female	Lower secondary education
Georg	80	Male	Post-secondary non-tertiary education
Karin	85	Female	Lower secondary education
Ernst	83	Male	Post-secondary non-tertiary education
Franz	88	Male	Post-secondary non-tertiary education
Anna	69	Female	Lower secondary education
Gertrude	79	Female	Post-secondary non-tertiary education
Josef	87	Male	Post-secondary non-tertiary education
Ines	70	Female	Doctoral or equivalent
Johanna	78	Female	Upper secondary education

[a] In accordance with the International Standard Classification of Education (ISCED).

to participate in the ACCESS research project. Their names were fully de-identified and replaced with pseudonyms in order to ensure anonymity (Table 1). The interviews were conducted using a semi-structured interview guide. Interviews were performed by three female researchers with a mean age of 24 years and an educational background in sociology. Before going into the field, they received training and conducted test interviews.

To empirically explore our research questions, we employed semi-structured interviews, capturing experiences, meanings, and attitudes related to EICT engagement and specifically addressing questions about later life (e.g., "To what extent do you have the impression that your handling of technical devices has changed in older age?"). Showcards portraying various EICT for visualization and a life graph method to biographically frame different life phases regarding EICT engagement (e.g., "Which technical devices do you associate with the individual phases of life?") were applied. Interviews lasted between 65 and 126 min and were audio recorded, transcribed verbatim (in German), and managed with MAXQDA (2018) data analysis software. Interview quotes were translated from German into English by the first author and verified by two other authors.

Data analysis

Data were analyzed following a seven-step-approach suggested by Kuckartz (2012) within the frameworks of qualitative content analysis. Kuckartz's approach integrates deductive categorization and inductive coding. In a first step, case summaries of each participant were created to emphasize differences and similarities of individual cases. Second, significant transcript passages reflecting implicit or explicit ascriptions of EICT (non-)use to age or aging were highlighted using memos. This included narrations about subjective age, age stereotypes (based on Fraser et al., 2016) or intergenerational comparisons. Drawing on stereotype embodiment theory (Levy, 2009), we also looked for negative experiences with EICT over the life course and elements of the physical–social environment that may have induced stereotype threat (e.g., technology user interfaces or social interactions). Thirdly, we developed main topic categories originating from the research questions and pre-existing data. In step four, the highlighted text passages were eventually coded and allocated into the following deductively formed categories: "age stereotypes related to EICT use in later life" and "environmental cues contributing to the activation and internalization of age stereotypes". Fifth, we inductively determined subcategories and in a sixth step recoded the data using the elaborated category system (Table 2). The final step involved the category-based analysis and presentation of the results. Transcripts were primarily analyzed by the first author; in order to enhance trustworthiness (Devers, 1999), categories and

Table 2
Description of categories and subcategories.

Category	Subcategory	Descriptions of subcategory
Age stereotypes related to EICT use in later life	Relevance and use	- No need or interest in EICT due to older age - Other priorities than EICT in later life - Non-use means social exclusion and disadvantage - EICT for safety and health
	Competence and learning	- Older adults are less capable of using EICT - Ability to learn deteriorates with age - EICT competences as a "marker" of not having dementia
Environmental cues contributing to the activation and internalization of age stereotypes	Design of technology	- Non-use affects age-perceptions - EICT design affects age-perceptions - Stigmatizing components of EICT
	Intergenerational contact	- The "young" introduce EICT - Lack of intergenerational support

Note: Everyday Information and Communication Technology = EICT

subcategories were discussed and refined through ongoing team meetings to engage in collective reflexivity and widen coding opportunities. Theoretical sensitivity was ensured by authors' diverse research backgrounds, as they brought perspectives from occupational therapy, gerontology, sociology, and psychology to the data analysis process (Charmaz, 2006).

Results

Positioning oneself as a "non-user" was to a certain extent ascribed to older age and aging by our participants. Two major categories, namely, "Age stereotypes related to EICT use in later life" and "Environmental cues contributing to the activation and internalization of age stereotypes" were derived from our analysis (Table 2). The first category captured narrations about subjective age, age stereotyping, and intergenerational comparisons, while the second category focused on perceived environmental influences from the physical-social environment, such as disempowering or ageist social interactions and built environments, including the design of technology. Within these categories, four thematic frameworks were identified: "Relevance and use", "Competence and learning", "Design of technology", and "Intergenerational contact", which will be outlined below.

Relevance and use

EICT was negotiated as a medium to stay connected and remain engaged with society. In contrast, low EICT engagement was by several participants associated with being disadvantaged, *an outsider* (Judith), *outside* (Heinz), or *on the margin* (Gertrude). Some participants explained how they stopped trying to keep up with the constantly changing and developing technological landscape while explicitly attributing non-use to older age (e.g., Renate, Anna, Ernst, Gertrude).

> I am not alone with it, at my age. When I meet friends at my age, or we talk with each other, all of them say 'I have no clue, I have no clue, I don't want that'. So, I am not alone with that. I always think, well, that's a whole generation at least a part of it, that doesn't want that anymore. (Gertrude).

Others, on the other hand, emphasized their general willingness to continue to participate and stay engaged with societal changes (e.g., Judith, Georg). Rosie, for instance, described her smartphone as "a friend", a vehicle to stay informed about politics and day-to-day events. Yet, despite her regular smartphone use, she relativized this statement by comparing herself with the younger interviewer in terms of active societal participation through technology: "I don't know, you are young, you for sure participate more". This statement may be based on an assumption that active participation in society is predominantly expected from the young and enabled through new technology. While younger people "need to continue researching and studying new technology to not fall back" (Gertrude), some study participants perceived it as "normal" for an older person to be less actively engaged, lonelier, and disconnected (Judith, Karin, Gertrude, Ines). On the other hand, Judith identified digital exclusion of older people as one reason for decreased societal participation in later life: "It affects me very much. Not the digitalization per se but rather that everything is done via the internet. It makes me wonder why nobody is considerate of older people". She continues to explain how this impacts her autonomy in everyday life as she needs to ask for help in situations that she would have usually managed on her own.

Perceived relevance of EICT, addressed as interest, benefits, and priorities, played an essential role in negotiating (non-)use of EICT. Lack of interest due to ones' age was widely communicated as an explanation for being disconnected from new EICT. In contrast, some interviewees emphasized that if there was an interest or a need to use EICT, older people would be willing to start using them despite their older age. Several participants, however, clearly distinguished themselves from these "other older people" by stressing how they themselves were not interested in using EICT (e.g., Anna, Renate).

Moreover, some of the study participants associated non-use with being "old and stubborn" (Ernst) and a "technology-refusing old person" (Heidi). Refusal or non-use of EICT were repeatedly ascribed to the need to prioritize in later life. Older age was appreciated as a period of life where priorities were expected to change. While EICT use for leisure, work, and social contact was associated with youth, aspects of health, security, and maintaining independence were appraised as more prominent and important in older age. Other explanations for non-use of EICT in this sample of non-users were, for instance, lack of time, complex technology interfaces, expensive or hard-to-reach courses, and lack of experience, motivation, or social support (e.g., Gertrude, Josef, Judith, Georg).

Competence and learning

Level of interest, competence, and ability to learn in later life were often negotiated simultaneously. Several participants put performance problems into perspective by attributing them to their low interest in EICT. In contrast, others strongly emphasized their interest and willingness to use new technology but justified non-use through age-related challenges with learning (e.g., Heinz, Heidi, Karin). Incompetent use was often understood as a product of losses due to age, such as physical or cognitive decline:

> I am interested and curious, but sometimes I just cannot catch up. Why? Because I never did it, I am a bit one-sided, I admit. Maybe I would do it, but it doesn't really work anymore. That's clear, that's normal, I don't have a problem, with that, that's normal, no? A young person processes information faster and when you are old or 87, it is obvious. (Heidi).

Several comparable statements indicated a belief that older adults are prone to experiencing a decline in their ability to learn in later life. As Heinz explained, "you [interviewer] have to look for an interviewee around 65, you know, somebody that is not yet such an idiot, somebody that still knows something. And, at a certain age one isn't interested

anymore". Having difficulties in recalling information due to age, such as remembering steps to operate a new EICT, was widely considered as "normal". In some cases, perceived performance problems were described as age-related mental overload and associated with lower cognitive capabilities: "Ah, I think one considers oneself as stupid, because of not understanding it" (Ines). This underlying fear of cognitive decline was reflected in several comments and in one case even associated with dementia: "I don't remember; I am not demented or something. I just don't remember" (Georg). He continues by clearly distinguishing himself from those older adults experiencing cognitive decline. Furthermore, perceived fear and insecurity related to EICT use were explicitly expressed, while fear of destroying something or making a mistake were most frequently communicated:

> There is the insecurity of doing wrong. I think that's very formative in older age; having this insecurity of doing something wrong, crashing all of it. (Judith).

Design of technology

Experiences of failure when engaging in a new EICT were often associated with the design of the technology. Participants described haptic and vision problems with activities such as typing on the smartphone or taking pictures with tablets. Mostly, study participants ascribed these performance challenges to their older age. Several narrations revealed that EICT appeared to even have the power to induce negative stereotypical assumptions about the older user, mirroring limitations and age-related changes:

> It holds nicely in my hand, looks pleasant, well proportioned, but I obviously also believe, it is, because, I don't see well and hence, somehow, it immediately reminds me of my bad eyesight, right? Like when I walk and realize, it is tiring, then the walk isn't pleasant anymore either. It is like that. (Ines).

Moreover, Heidi expressed how negative user-experiences with EICTs affected her subjective age perception:

> The writing [on the smartphone] is too inconvenient. Because of the small keys, it is not so comfortable. Indeed, I always think that I am still 20 on the inside and nothing has changed, I am still the same, right?

Despite the fact that she usually feels young, the technology design itself made her feel older. Only a few participants explicitly described the design or complexity of the technology as impeding their use. Furthermore, a common understanding among interviewees was that technology specifically designed for older people "lies comfortably in the hand, is not slippery" (Ines) and "bigger" (Judith) due to vision decline and loss of grip strength in older age. At the same time, the stigmatizing power of "gerontechnology" (technology specifically designed for older people) versus mainstream technology was discussed:

> But these women, (…) they already have the normal, the so-called pensioners' phones, like my husband also. Very few with smartphones can be spotted". (Karin).

Various study participants agreed with the notion that older adults do not need to have the latest model of technology as it would not "pay off" (e.g., Karin, Heidi).

Intergenerational contact

Commonly, younger family members, like grandchildren or children, introduced participants to new EICT and shaped their perceptions of success and failure. In these intergenerational learning situations, the belief that teaching an older person a new technology requires patience was widespread: "Mh, yes, the grandson, he lacks patience.

'Grandmother, if you were at least able to write'. Yes, I am not even capable of that, but please, I get along pretty well" (Gertrude). Similarly, Georg described how the thought of learning to use a computer had always been in the back of his mind. Yet, he negotiated his non-use by saying: "And then everyone, acquaintances, friends, family members try to talk me out of it. They know I have no patience for this". Rosie further argued:

> I think I could better explain [a new technology] than the young when they explain it to an old [person]. Because I feel like they never have patience or expect more than what an older person can grasp.

One other participant mentioned her grandson's furious reactions in situations where she requested help: "'Did you press again the wrong button?'" Me replying, 'well, I wouldn't call you if I hadn't pressed a wrong one.'" *(Anna).* Several other study participants experienced insults or devaluations as a consequence of performance problems.

For some of the participants, non-use was due to younger peoples' assumptions and expectations of deficiency. For example, in the context of downloading applications on a smartphone, Rosie feared her younger family members' "not always polite" reactions: "And then they say, what kind of nonsense did you do? They are not always polite, yes, but what can you do? They don't mean to insult". She seems to accept their comments as justified and replies to them with non-use ("No, I rather not do it"). Intergenerational support was discussed by various participants as needed but not sufficiently available. Rosie referred to a situation where her younger family members offered help, though this help was never actually provided: "And he didn't do it again! How often did I ask him? Show me how! He still hasn't shown it to me yet. It doesn't matter". This example indicates a potential for unequal power relations and in a state of dependency. It reinforces the notion of the tech-savvy young adult while placing the older person in a waiting and dependent position.

Contrary to these negative narrations about intergenerational contact, younger family members were, in some cases, also described as supportive and empowering resources to engage in EICT. For instance, one participant shared her overall positive experience with receiving support from a grandchild: "Laura, my granddaughter (….) has a lot of patience with me; she showed me a lot and organized the device. This is definitely a relief." (Gertrude).

Discussion

This study aimed to explore the role of internalized ageism in the context of later life EICT engagement. It also examined the physical-social environment's potential to activate and perpetuate age stereotypes, perhaps leading to lower technology adoption. This paper reports on findings from an interview study with older non-users of everyday information and communication technology (EICT).

The findings suggest that the self-identification of older individuals as non-users was to some extent built on age-based stereotypes. Among other known factors that hinder EICT use (Fang et al., 2019), internalized ageism appeared to constitute an invisible barrier to older adults' EICT engagement. This was reflected in devaluations of the self and decreased self-efficacy, greater perceived performance problems, and disengagement from meaningful EICTs. Being lonelier, less actively engaged, technology-refusing, less able to learn in older age, and experiencing cognitive decline in later life were widespread beliefs and explanations for non-use expressed by older non-users.

The presumption that older age is a time of social, physical, and cognitive decline (Bryant et al., 2012) accompanied older non-users' reflections about EICT use. EICTs were perceived as complex in use, requiring high levels of cognitive capacities, while non-use was by some participants explained by the "normal" decline in cognition due to advanced age. Indeed, the normal aging process is associated with declines in grey and white matter volume and neurotransmitter levels to an

extent that may contribute to observed cognitive changes with older age, potentially affecting processing speed and certain memory, visuospatial, and executive functions relevant for EICT use. However, these changes are small and should not impact older adults' global functioning (Harada, Natelson Love, & Triebel, 2013). Nonetheless, successful EICT engagement was understood as an indicator or "marker" of good cognitive health and described by one participant even as a sign for "not yet having dementia". Experiences of failure when using EICT appeared to have activated underlying negative expectations of being old and cognitively impaired. Various examples showed how younger people reinforced these experiences by sending disempowering verbal or non-verbal messages. The fear of failing may be seen as embedded in a fear of confirming age stereotypes; for instance, the stereotype that older people are less capable and slower with new things (McDonough, 2016). Confirming stereotypes by making mistakes may lead to self-fulfilling processes that culminate in lower self-efficacy, increased levels of stress, and actual performance problems (Yagil, Cohen, & Beer, 2016).

It may also be argued, though, that actual cognitive impairment, even mild or subjective cognitive impairment, can in fact detrimentally influence performance and use of EICT (Hedman, Kottorp, & Nygård, 2017; Malinowsky et al., 2017; Nygård, Pantzar, Uppgard, & Kottorp, 2012). We did not assess cognition in this population of non-users, but it may be that some participants have indeed experienced cognitive challenges, particularly when using EICT. One way of coping or excusing non-use may then be to blame one's older age instead of admitting cognitive decline in front of a stranger, acknowledging the well-documented stigmatizing power of dementia or other cognitive impairments (Sajatovic & Sajatovic, 2018).

Several study participants rated the necessity as well as their ability to learn new things in later life, especially new EICTs, as low. They suggest that older persons "require more time to acquire knowledge, make more mistakes, and need greater support" (González, Ramírez, & Viadel, 2015, p.1) when learning to use new technology. Indeed, some of the participants described later-life learning as impaired due to their aging minds. Counteracting this age stereotype, Leanos et al. (2019) demonstrated how learning new skills in older adulthood (including digital tablet and photography use) in an empowering environment results in cognitive growth, comparable to cognitive growth seen in children.

The social environment essentially influenced the adoption of new EICT in our data. Learning new EICTs was strongly associated with intergenerational support and contact, which is in line with findings from intergenerational learning interventions to enhance EICT skills (e. g., Brown & Strommen, 2018; Seguí et al., 2019). These studies show largely positive results, leading to greater empowerment in both younger and older adults, as well as decreasing age stereotypes. Despite the highly encouraged intergenerational contact as a measure to enhance EICT use and decrease ageism in society (Burnes et al., 2019), intergenerational learning settings in the context of EICT are not universally positive. In our study, narrations about intergenerational contact repeatedly revealed disempowering or even ageist practices. The assumptions that older adults are not capable to learn a new EICT, that much patience is needed when teaching an older person to use an EICT, and the expectation that older adults do not need the latest technology, were widespread in participants' younger family members as well as in older interviewees. Lack of support, verbal aggression, devaluation, and the perception of being left alone with the technology seemed to have contributed in some cases to low EICT use. To a certain extent, the younger population was depicted as at the center of competence, partly unwilling to share knowledge and experience with their older family members. Being placed in a waiting and dependent position highlighted a potential for unequal power relations between young and old. To overcome these, technology-alienated older persons may benefit from peer-learning opportunities (Woodward et al., 2013). One should, however, keep in mind "the divide within", described as the divide created by older persons themselves as some of them hold negative age

stereotypes towards other older non-users (Kania-Lundholm & Torres, 2015). Research has shown that the ideal candidates to support peers in learning a new EICT tend to be older adults who are only a little advanced in one or another area (Ma, Chan, & Teh, 2020). Fostering a life-long-learning approach, further research across generations is required to explore the role of age stereotypes in the learning of EICT. Future survey data on younger peoples' age stereotypes regarding later-life EICT use may help to better understand the internalization of age stereotypes over the life course.

While participants sometimes addressed physical environmental barriers, such as the complexity or the haptic of the design of technology, they usually placed responsibility for non-use onto themselves and their chronological age. Despite the fact that most participants experienced challenges with the design of the technology, they rationalized non-use by older age and age-related losses. As demonstrated in the findings, the technology design appeared to have the power to activate age stereotypes and induce stereotype threat.

In line with findings from an experimental study by Caspi et al. (2018), the user experience and design of some EICT impacted interviewees' subjective age perceptions, making them feel older. Stigmatizing elements in the design of technology uncovered in study participants' descriptions, such as the "pensioner phone" (Karin) seemed to have activated internalized age stereotypes and impeded EICT engagement. Critical gerontologists have argued that for older adults, specifically-designed technologies are often deficit- or compensatory-oriented and mirror designers' internalized age stereotypes (Peine & Neven, 2019). One way to overcome these is to fully involve end-users in the design process. In fact, participatory and co-design approaches can not only effectively counter age stereotypes in the design of technology, but also improve the quality, acceptability and usability of a technology (Fischer, Peine, & Östlund, 2019; Peine & Neven, 2019). Intergenerational technology training interventions may target both older and younger people. This may increase older persons' confidence to use technology but also enhance gerontological literacy among younger people so as to tackle age stereotypes; for instance, through promoting experiential learning, positive exposure, and facts on aging (Brown & Strommen, 2018; Levy, 2016).

To better understand the internalization of age stereotypes over the life course and the impact of the physical and social environment on older persons' EICT use, future studies may also employ negative and positive priming methods (Meisner, 2012) as well as the potential of positive self-perceptions of aging and a "young" subjective age as an empowering recourse to take up EICT use. Moreover, observational studies based on self-descriptions may add a new perspective to the plethora of survey-based research.

Limitations

The limitations of this study point to important future research directions. First, the selected group of EICT non-users does not allow exploration of internalized ageism and older adults' EICT engagement in general (i.e., including users). Future projects may target a more representative sample embracing the wide spectrum of use and non-use (Selwyn, 2004). Rigid distinctions between "user" and "non-user" may be avoided in future research and policies due to their stigmatizing connotation. It became clear in our data that even those older adults who perceived themselves as not actively engaged in EICTs did indeed use a variety of meaningful everyday technologies.

Second, the comparatively young age of the interviewers may have affected older adults' openness to report on their EICT use. Acknowledging that many participants elaborated on challenging intergenerational EICT situations, future studies may involve a more age-diverse research team to collect interview data. Third, this study using secondary interview data focused primarily on internalized ageism, while other sociodemographic characteristics such as gender, educational level, or socioeconomic status undoubtedly intersect and contribute to

both EICT non-use as well as the internalization of age stereotypes. Future quantitative research should control for these factors when exploring the association between internalized ageism and EICT use in later life. Another limitation is that coding was primarily performed by the first author, while the other authors contributed by discussing and refining categories and subcategories. Inter-rater reliability was hence not calculated. At last, this qualitative study focused on the specific case of Austria only. Future cross-cultural qualitative inquiries may augment our findings.

Conclusions and implications

Internalized ageism is a prominent element in older adults' narrations about EICT engagement. By shedding light on physical-social environments that contribute to the activation, perpetuation, and internalization of age stereotypes, we broadened the scope from the individual that has embodied negative assumptions about old age (Levy, 2009) and contextualized the interrelation between the person and disempowering environments. Future research may explore in greater detail how everyday practices embedded in ageist environments impact the perpetuation and internalization of age stereotypes and low EICT use; for instance, by also addressing the impact of the media, research, and political discourses. Raising awareness about ageism among technology designers, but also enhancing inclusive and participatory technology design initiatives, may decrease the likelihood of induced stereotype threat through EICT designs, ensuring greater EICT engagement across the whole population (Peine & Neven, 2019). Moreover, target-group tailored intergenerational and peer learning programs can increase access to important EICT and tackle internalized ageism. Aside from enhancing intergenerational solidarity and contributing to a more age-inclusive society, these measures foster a more positive and socially connected experience of aging itself.

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Compliance with ethical standards

All procedures performed involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the Declaration of Helsinki or comparable ethical standards.

Declaration of Competing Interest

We have no conflict of interest to declare.

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References

Ayalon, L., & Tesch-römer, C. (2018). *Contemporary perspectives on ageism.* https://doi.org/10.1007/978-3-319-73820-8

Bodner, E. (2009). On the origins of ageism among older and younger adults. *International Psychogeriatrics, 21*(6), 1003–1014.

Brown, L. E., & Strommen, J. (2018). Training younger volunteers to promote technology use among older adults. *Family and Consumer Sciences Research Journal, 46*(3), 297–313.

Bryant, C., Bei, B., Gilson, K., Komiti, A., Jackson, H., & Judd, F. (2012). The relationship between attitudes to aging and physical and mental health in older adults. *International Psychogeriatrics, 24*(10), 1674–1683. https://doi.org/10.1017/s1041610212000774

Burnes, D., Sheppard, C., Henderson, C. R., Wassel, M., Cope, R., Barber, C., & Pillemer, K. (2019). Interventions to reduce ageism against older adults: A systematic review and meta-analysis. *American Journal of Public Health, 109*(8), e1–e9. Retrieved from 10.0.8.57/AJPH.2019.305123.

Caspi, A., Daniel, M., & Kavé, G. (2018). Technology makes older adults feel older. *Aging & Mental Health*, 1–6. https://doi.org/10.1080/13607863.2018.1479834

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis.* London: SAGE.

Cutler, S. J. (2005). Ageism and technology. *Generations, 29*, 67–72.

Czaja, S. J., Charness, N., Fisk, A. D., Hertzog, C., Nair, S. N., Rogers, W. A., & Sharit, J. (2006). Factors predicting the use of technology: Findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychology and Aging, 21*(2), 333–352. https://doi.org/10.1037/0882-7974.21.2.333

Devers, K. J. (1999). How will we know "good" qualitative research when we see it? Beginning the dialogue in health services research. *Health Services Research, 34*(5), 1153–1188.

Eurostat. (2020). Digital inclusion - individuals. Retrieved March 9, 2021, from https://ec.europa.eu/eurostat/databrowser/view/ISOC_BDEK_DI_custom_658794/default/table?lang=en.

Fang, M. L., Canham, S. L., Battersby, L., Sixsmith, J., Wada, M., & Sixsmith, A. (2019). Exploring privilege in the digital divide: Implications for theory, policy, and practice. *The Gerontologist, 59*(1), e1–e15. https://doi.org/10.1093/geront/gny037

Fischer, B., Peine, A., & Östlund, B. (2019). The importance of user involvement: A systematic review of involving older users in technology design. *The Gerontologist, 60*(7), e513–e523.

Fraser, S. A., Kenyon, V., Lagacé, M., Wittich, W., & Southall, K. E. (2016). Stereotypes associated with age-related conditions and assistive device use in Canadian media. *The Gerontologist, 56*(6), 1023–1032. https://doi.org/10.1093/geront/gnv094

Frennert, S., & Östlund, B. (2014). Review: Seven matters of concern of social robots and older people. *International Journal of Social Robotics, 6*(2), 299–310. https://doi.org/10.1007/s12369-013-0225-8

Gagnon, M. P., Legare, F., Labrecque, M., Fremont, P., Pluye, P., Gagnon, J., … Gravel, K. (2009). Interventions for promoting information and communication technologies adoption in healthcare professionals. *Cochrane Database of Systematic Reviews, 1*.

Gallistl, V., Rohner, R., Seifert, A., & Wanka, A. (2020). Configuring the older non-user: Between research, policy and practice of digital exclusion. *Social Inclusion, 8*(2), 233–243.

Gatto, S. L., & Tak, S. H. (2008). Computer, internet, and E-mail use among older adults: Benefits and barriers. *Educational Gerontology, 34*(9), 800–811. https://doi.org/10.1080/03601270802243697

González, A., Ramírez, M. P., & Viadel, V. (2015). ICT learning by older adults and their attitudes toward computer use. *Current Gerontology and Geriatrics Research, 2015*(2015), 1.

Harada, C. N., Natelson Love, M. C., & Triebel, K. L. (2013). Normal cognitive aging. *Clinics in Geriatric Medicine, 29*(4), 737–752. https://doi.org/10.1016/j.cger.2013.07.002

Hedman, A., Kottorp, A., & Nygård, L. (2017). Patterns of everyday technology use and activity involvement in mild cognitive impairment: A five-year follow-up study. *Aging & Mental Health*, 1–8.

Helsper, E. J., & Reisdorf, B. C. (2013). A quantitative examination of explanations for reasons for internet nonuse. *CyberPsychology, Behavior & Social Networking, 16*(2), 94–99. Retrieved from 10.0.4.65/cyber.2012.0257.

Hunsaker, A., & Hargittai, E. (2018). A review of internet use among older adults. *New Media & Society, 20*, 3937–3954. https://doi.org/10.1177/1461444818787348

Kania-Lundholm, M., & Torres, S. (2015). The divide within: Older active ICT users position themselves against different 'Others'. *Journal of Aging Studies, 35*, 26–36. https://doi.org/10.1016/j.jaging.2015.07.008

Köttl, H., Cohn-Schwartz, E., & Ayalon, L. (2020). Self-perceptions of aging and everyday ICT engagement: A test of reciprocal associations. *The Journals of Gerontology: Series B*. https://doi.org/10.1093/geronb/gbaa168

Köttl, H., Tatzer, V., & Ayalon, L. (2021). COVID-19 and everyday ICT use: The discursive construction of old age in German media. *The Gerontologist.* https://doi.org/10.1093/geront/gnab126

Kuckartz, U. (2012). In Weinheim (Ed.), *Qualitative Inhaltsanalyse. Methoden, praxis, Computerunterstützung [Qualitative Content Analysis. Methods, Practice, Computer Support].* Beltz Juventa.

Lamont, R. A., Swift, H. J., & Abrams, D. (2015). A review and meta-analysis of age-based stereotype threat: Negative stereotypes, not facts, do the damage. *Psychology & Aging, 30*(1), 180–193. https://doi.org/10.1037/a0038586

Lang, F. R. (2001). Regulation of social relationships in later adulthood. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences, 56*(6), P321–P326. https://doi.org/10.1093/geronb/56.6.P321

Lawton, M. P. (1985). The elderly in context: Perspectives from environmental psychology and gerontology. *Environment and Behavior, 17*(4), 501–519. https://doi.org/10.1177/0013916585174005

Leanos, S., Kürüm, E., Strickland-Hughes, C. M., Ditta, A. S., Nguyen, G., Felix, M., … Wu, R. (2019). The impact of learning multiple real-world skills on cognitive abilities and functional independence in healthy older adults. *The Journals of Gerontology: Series B, 75*(6), 1155–1169. https://doi.org/10.1093/geronb/gbz084

Lee, B., Chen, Y., & Hewitt, L. (2011). Age differences in constraints encountered by seniors in their use of computers and the internet. *Computers in Human Behavior, 27*(3), 1231–1237.

Levy, B. R. (2001). Eradication of ageism requires addressing the enemy within. *The Gerontologist, 41*(5), 578–579.

Levy, B. R. (2009). Stereotype embodiment: A psychosocial approach to aging. *Current Directions in Psychological Science, 18*(6), 332–336. https://doi.org/10.1111/j.1467-8721.2009.01662.x

Levy, S. R. (2016). Toward reducing ageism: PEACE (positive education about aging and contact experiences) model. *The Gerontologist, 58*(2). gnw116–232.

Ma, Q., Chan, A. H. S., & Teh, P.-L. (2020). Bridging the digital divide for older adults via observational training: Effects of model identity from a generational perspective. *Sustainability (Basel, Switzerland), 12*(11), 4555.

Malinowsky, C., Kottorp, A., Wallin, A., Nordlund, A., Björklund, E., Melin, I., … Nygård, L. (2017). Differences in the use of everyday technology among persons with MCI, SCI and older adults without known cognitive impairment. *International Psychogeriatrics, 29*(7), 1193–1200. https://doi.org/10.1017/S1041610217000643

Mannheim, I., Schwartz, E., Xi, W., Buttigieg, S. C., & Mcdonnell, M. (2019). *Inclusion of Older Adults in Research and Design of Digital Technology, 16*(9), 3718. https://doi.org/10.3390/ijerph16193718

Mariano, J., Mariano, J., Marques, S., Ramos, M. R., Ramos, M. R., Gerardo, F., … de Vries, H. (2020). Too old for computers? The longitudinal relationship between stereotype threat and computer use by older adults. *Frontiers in Psychology, 11*, 568972.

McDonough, C. C. (2016). The effect of ageism on the digital divide among older adults. *Gerontology and Geriatric Medicine, 2*, 1–7. https://doi.org/10.24966/ggm-8662/100008

Meisner, B. A. (2012). A meta-analysis of positive and negative age stereotype priming effects on behavior among older adults. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences, 67*(1), 13–17. https://doi.org/10.1093/geronb/gbr062

Meisner, B. A. (2020). Are you OK, boomer? Intensification of ageism and intergenerational tensions on social media amid COVID-19. *Leisure Sciences*, 1–6.

Neves, B., & Amaro, F. (2012). Too old for technology? How the elderly of Lisbon use and perceive ICT. *The Journal of Community Informatics, 8*, 1 SE-articles.

Norman, K. L. (2017). Cyberpsychology: An introduction to human–computer interaction. In *Cyberpsychology.* Cambridge University Press.

Nygård, L., Pantzar, M., Uppgard, B., & Kottorp, A. (2012). Detection of activity limitations in older adults with MCI or Alzheimer's disease through evaluation of perceived difficulty in use of everyday technology: A replication study. *Aging & Mental Health, 16*(3), 361–371. https://doi.org/10.1080/13607863.2011.605055

Peacock, S. E., & Künemund, H. (2007). Senior citizens and Internet technology: Reasons and correlates of access versus non-access in a European comparative perspective.

European Journal of Ageing, 4(4), 191–200. https://doi.org/10.1007/s10433-007-0067-z

Peine, A., & Neven, L. (2019). From intervention to co-constitution: new directions in theorizing about aging and technology. *Gerontologist, 59*(1), 15–21. Retrieved from 10.0.4.69/geront/gny050.

Peine, A., & Neven, L. (2020). The co-constitution of ageing and technology – A model and agenda. *Ageing and Society*, 1–22. https://doi.org/10.1017/S0144686X20000641

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), 1–6.

Reppermund, S., Sachdev, P. S., Crawford, J., Kochan, N.a., Slavin, M. J., Kang, K., … Brodaty, H. (2011). The relationship of neuropsychological function to instrumental activities of daily living in mild cognitive impairment. *International Journal of Geriatric Psychiatry, 26*(8), 843–852. https://doi.org/10.1002/gps.2612

Sajatovic, M., & Sajatovic, M. (2018). Dementia-related stigma research: can we move the stigma dial? *Innovation in Aging, 2*(suppl_1), 865–866.

Schmader, T., Johns, M., & Forbes, C. (2008). An integrated process model of stereotype threat effects on performance. *Psychological Review, 115*(2), 336–356. https://doi.org/10.1037/0033-295x.115.2.336

Seguí, F. L., De San Pedro, M., Verges, E. A., Algado, S. S., & Cuyàs, F. G. (2019). An intergenerational information and communications technology learning project to improve digital skills: User satisfaction evaluation. *Journal of Medical Internet Research, 21*(8), 1–9. https://doi.org/10.2196/13939

Seifert, A., & Wahl, H.-W. (2018). Young at heart and online? Subjective age and internet use in two Swiss survey studies. *Educational Gerontology, 44*(2–3), 139–147.

Selwyn, N. (2004). The information aged: A qualitative study of older adults' use of information and communications technology. *Journal of Aging Studies, 18*, 369–384. https://doi.org/10.1016/j.jaging.2004.06.008

Thimm, C., Rademacher, U., & Kruse, L. (1998). Age stereotypes and patronizing messages: Features of age-adapted speech in technical instructions to the elderly. *Journal of Applied Communication Research: Applied Research in Language and Intergenerational Communication, 26*(1), 66–82.

Vogels, E. (2019). *Millennials stand out for their technology use, but older generations also embrace digital life.* Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2019/09/09/us-generations-technology-use/.

Wagner, N., Hassanein, K., & Head, M. (2010). Computers in human behavior computer use by older adults: A multi-disciplinary review. *Computers in Human Behavior, 26*(5), 870–882. https://doi.org/10.1016/j.chb.2010.03.029

Wahl, H., & Oswald, F. (2010). Environmental perspectives on aging. In D. Dannefer, & C. Phillipson (Eds.), *The Sage Handbook of Social Gerontology* (pp. 111–124). London: Sage Publications Ltd.

Wallcook, S., Nygård, L., Kottorp, A., & Malinowsky, C. (2019). The use of everyday information communication technologies in the lives of older adults living with and without dementia in Sweden. *Assistive Technology*, 1–8. https://doi.org/10.1080/10400435.2019.1644685

Walsh, R., Drasga, R., Lee, J., Leggett, C., Shapnick, H., & Kottorp, A. (2018). Activity engagement and everyday technology use among older adults in an urban area. *The American Journal of Occupational Therapy, 72*(4). https://doi.org/10.5014/ajot.2018.031443, 7204195040p1-7204195040p7.

Weaver, C. K., Zorn, T., & Richardson, M. (2010). Goods not wanted: Older people's narratives of computer use rejection. *Information, Communication & Society, 13*(5), 696–721. https://doi.org/10.1080/13691180903410535

Woodward, A., Freddolino, P., Wishart, D., Bakk, L., Kobayashi, R., Tupper, C., … Blaschke-Thompson, C. (2013). Outcomes from a peer tutor model for teaching technology to older adults. *Ageing & Society, 33*(8), 1315–1338. Retrieved from http://search.proquest.com/docview/1504423869/.

World Health Organization. (2018). Ageing and life-course. Geneva. Available from: http://www.who.int/ageing/ageism/en/.

Yagil, D., Cohen, M., & Beer, J. D. (2016). Older adults' coping with the stress involved in the use of everyday technologies. *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society, 35*(2), 131–149.