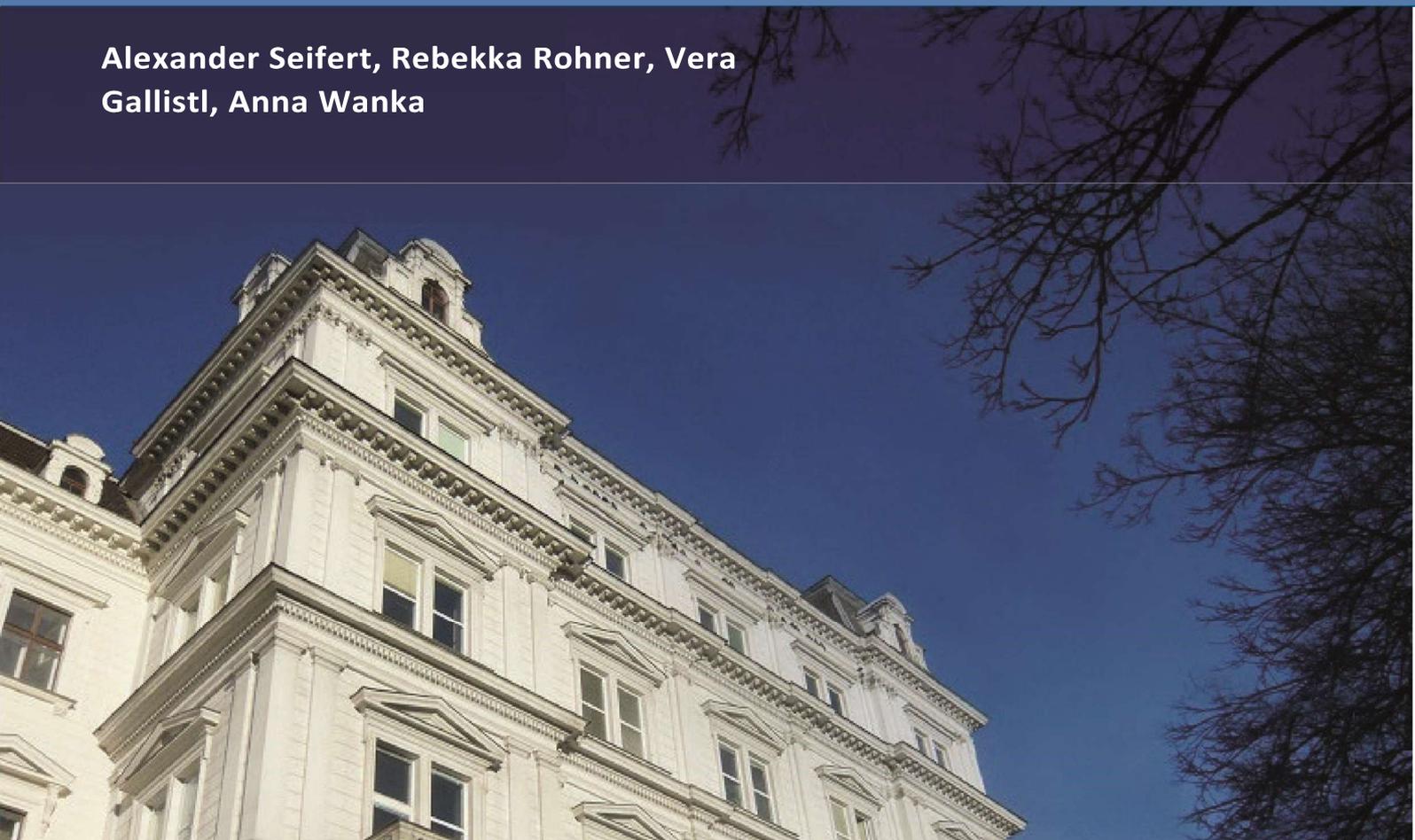




Aging in Digital Culture: How Older Smartphone Users Experience Aging

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Aging in Digital Culture: How Older Smartphone Users Experience Aging

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Zusammenfassung

Mit der Verbreitung von mobilen Geräten wie Smartphones, Smartwatches und Fitnesstrackern durchdringt die digitale Technologie zunehmend unser tägliches Leben. Sie sind auch zu "affektiven Technologien" geworden, die unsere alltäglichen Emotionen und Wahrnehmungen sowie unsere Erfahrungen des Alterns beeinflussen. Dieses Papier untersucht den Zusammenhang zwischen der Nutzung mobiler Geräte und der subjektiven Wahrnehmung des eigenen Alterns (SEA), mit der Hypothese, dass ältere Personen das Altern umso positiver erleben, je häufiger sie Smartphones benutzen. Ein hierarchisches lineares Regressionsmodell wurde auf der Grundlage einer Sekundäranalyse von Schweizer Umfragedaten (≥ 65 Jahre, $N = 1037$) berechnet. Gemäß den Umfragedaten benutzten 32,1% der Teilnehmer ein Smartphone. Univariate und multivariate Analysen, die für eine Reihe von relevanten Kontrollvariablen und die Nutzung verschiedener Geräte kontrolliert, bestätigten die positive Beziehung zwischen der Häufigkeit der Smartphone-Nutzung und der SEA. Die Ergebnisse legen nahe, dass mobile Geräte als unabhängige Variable in die Untersuchung der subjektiven Wahrnehmung des Alterns einbezogen werden sollten.

Abstract

With the spread of mobile devices such as smartphones, smartwatches, and fitness trackers, technology is increasingly permeating our daily lives. They have also become "affective technologies" that influence our everyday emotions and perceptions and our experiences of aging. This paper investigates the association between mobile device use and the subjective experience of aging (SEA), with the hypothesis that the more frequently older adults use smartphones, the more positively they experience aging. A multiple hierarchical linear regression model was calculated based on a secondary analysis of Swiss survey data for older (≥ 65 years, $N = 1037$) adults. According to the survey data, 32.1% of participants used a smartphone. Univariate and multivariate analyses, controlled for a number of relevant confounders and the use of different devices, confirmed the positive relationship between frequency of smartphone use and SEA. The results suggest that mobile devices should be included as an independent variable when investigating subjective experiences of aging.

Keywords

Smartphone, mobile Technologie, Wearables, Alterswahrnehmung, Altersbilder, Gerontechnologie

Keywords English

Smartphones, Mobile technologies, Wearables, Experience of aging, Socio-gerontechnology

Introduction

In digitalized societies, new information and communication technologies (ICT) are becoming more and more embedded in the daily lives of older adults. The acceptance of modern ICTs, such as smartphones, have become pervasive key societal themes across all domains of life. Consequently, gerontological research has put technology use among older adults on the research agenda (Schulz et al. 2015). More and more research show that technologies, such as the smartphone, and media uses, such as the Internet use, can be helpful for older adults by helping them maintain functioning and mental health, ensure independence, and engage with important life goals (Forsman and Nordmyr 2017; Hunsaker and Hargittai 2014; Hofer 2017; Schlomann et al. 2020; Sims, Reed, and Carr 2017).

The majority of gerontological research on the topic follows an interventionist logic (Peine and Neven 2019), asking how technology can improve quality of life, autonomy, and activity in later life, but a growing body of literature is shedding light on the more complex relationship between aging and technology, asking how technologies influence the meanings and experiences of aging itself (Joyce and Mamo 2006): We do not only use (or refrain from using) certain technologies because we are young or old; we also experience ourselves as younger or older because we use certain technologies. In a digital world, we experience our age based on the technologies we use (Wanka and Gallistl 2018). Furthermore, attitudes toward aging and technology use are highly interrelated (Chen and Chan 2011). Most studies of technologies and aging have found that digitalization and technological developments help older adults view themselves, not as old and frail, but as more fit and agile thanks to technology (Millar et al. 2019; Schulz et al. 2015; Zambianchi and Carelli 2018). Following Featherstone and Hepworth (1998), technological developments help older adults escape physical decline and the restraints of embodiment, creating an almost infinite range of possibilities for physically and culturally changing the experience of aging (Polivka 2000).

However, this relationship is likely not the same for all technologies. Mobile, handheld, and wearable technologies, such as smartphones and fitness or emergency bracelets, have unique effects on users' practices and perceptions (Kaerlein 2018). As technologies move closer to our bodies, they become affective technologies. This means that their

proximity to the body (e.g., a smartphone in the hand or a smartwatch on the wrist) leads to a stronger mediating relationship between users' emotions and the technology (Silva 2012). Affective technologies such as mobile, handheld, and wearable devices influence users' everyday emotions, perceptions, and experiences, including their experiences of aging. Marshall and Katz (2016) call this phenomenon the "quantification of aging" and found that wearables (such as fitness trackers and smartwatches) and digital apps or games (such as brain training apps) are particularly impactful. Ethnographic research suggests that older adults who use assistive wearables learn to experience themselves as frail through these technologies; this means that the technology enforces a specific identity in older users: an identity as someone who must depend on technological assistance to cope with daily life (Aceros, Pols, and Domènech 2015). Empirical research has also shown that more and more older adults are using mobile devices to track and quantify health-related information such as physical activity on a daily basis (Schlomann et al. 2020; Seifert et al. 2017).

Today, smartphones are the most common handheld technology for daily use, also by older adults (Anderson 2019). However, there is still little research on the influence of smartphone use (in contrast to that of other ICT devices) on the subjective experience of age and aging. For example, Seifert and Wahl (2018) found that internet use and subjective age are positively associated. Therefore, this study investigates the association between smartphone use and the subjective experience of aging (SEA) in older adults. SEA is a psychological reflection on one's own age and future (Steverink et al. 2001). We expect that older adults who use smartphones more frequently experience aging more positively (H1a) and that smartphone use predicts a positive SEA more than the use of other technologies (H1b).

Materials and Methods

A secondary analysis was conducted on data from the Digital Senior Study (Seifert and Schelling 2015), a representative Swiss survey on technology use among older adults. In 2014, 1,037 people aged ≥ 65 years in all language regions of Switzerland were interviewed (in German, French, or Italian, as appropriate). The survey used computer-assisted telephone interviews supplemented by paper-and-pencil surveys of households without

a telephone connection. A standardized questionnaire (see the appendix of the main publication, Seifert and Schelling 2015) was employed. A simple random sample of the permanent resident population of Switzerland aged ≥ 65 years was chosen from the AZ Direct database (response rate: 48.2%). There were no restrictions on upper age, current Internet use, nationality, or type of housing.

The dependent variable SEA was measured using a three-item scale (“I still feel fresh and full of courage to face life”; “I feel very old”; and “I already have all kinds of plans for the future”). These items were developed with reference to the scale measuring attitudes toward later life developed by Riegel and Riegel (1960). All three items were measured using a five-point Likert scale (ranging from 1, “does not apply at all,” to 5, “completely applies”), which was calculated with a mean index (range: 1–5, $M = 3.92$; $SD = 0.911$). Higher values indicated a more positive SEA, and the internal consistency had a Cronbach’s alpha of 0.590. All three items loaded on one factor and showed a good fit ($KMO = .641$; 56.6% explained variance), and all factor loadings were significant at the $< .001$ level and ranged from .723 to .767.

To explain differences in SEA based on smartphone use, we also included the predictor variable “frequency of smartphone use,” which was also measured using a five-point Likert scale (ranging from “never” to “daily”). Overall, 32.1% of participants used a smartphone; 68.2% of these used the device daily. The mean age of smartphone users was 71.2 years (non-users: 76.1 years); smartphone use thus differs between participants aged 65 to 79 years (38.4%) and those aged 80 years and older (11.4%). Control variables were also considered. We included individual characteristics and controlled for age (continuous years), gender (female), education (low, moderate, or high), household income (interval scales in Swiss Francs), and living alone. To control for subjective well-being, we included subjective health (“My health is still very good for my age”) and subjective joy (“In my life, I have more joy than worries”), which were measured using a five-point Likert scale (ranging from 1, “does not apply at all,” to 5, “completely applies”). To investigate whether mobile technologies have a stronger effect on the aging experience than non-mobile technologies, we included possession of a computer (yes/no) and newspaper, radio, TV, and landline use (measured using a five-point Likert scale ranging from “never” to “daily”) as control variables.

The statistical analysis was conducted using SPSS (version 25). In addition to a descriptive analysis, single regression models (gross model) were calculated to determine the binary effect of all independent variables on SEA. A multiple hierarchical linear regression model was also calculated to analyze the predictors of SEA. The first model included individual characteristics, the second model included subjective well-being, and the total model included media use. Missing data were excluded.

Results

Table 1 shows the descriptive statistics and bivariate relations between the predictors and the independent variable based on multiple gross regression models. In the single gross models, SEA was statistically significantly associated with frequency of smartphone use and with all covariates except newspaper, TV, and landline use. In the hierarchical linear regression models, we included only the statistically significant covariates (Table 1).

Table 1: Hierarchical linear regression analysis of the predictors of the subjective experience of aging (SEA).

Predictors	M (SD)	Range	Gross Models <i>Beta</i>	Total Model 1 <i>Beta</i>	Total Model 2 <i>Beta</i>	Total Model 3 <i>Beta</i>
Age	74.48 (6.95)	65–100	-.408***	-.369***	-.271***	-.252***
Female	52.7%		-.121*	-.007	-.009	-.001
Education (ref. Low)						
Moderate	57.3%		.196***	.102*	.031	.029
High	24.5%		.254***	.102*	.029	.028
Income	7.31 (2.17)	1–11	.252***	.195***	.179***	.169***
Living alone	36.1%		-.081*	.061	.041	.031
Subjective health	4.13 (1.05)	1–5	.514***		.404***	.397***
Subjective joy	3.99 (1.11)	1–5	.317***		.118***	.108***
Computer ownership	42.9%		.131***			-.027
Newspaper use	4.56 (1.06)	1–5	-.003			

Radio use	4.50 (1.11)	1–5	.144***	.017	
TV use	4.76 (.82)	1–5	-.013		
Landline use	4.44 (.91)	1–5	.012		
Smartphone use	2.13 (1.71)	1–5	.298***	.079**	
Model Fit			<i>F</i> (6, 737) = 31.880, <i>p</i> < .000; <i>R</i> ² = .206	<i>F</i> (8, 735) = 60.900, <i>p</i> < .000; <i>R</i> ² = .399	<i>F</i> (11, 732) = 45.133, <i>p</i> < .000; <i>R</i> ² = .404

N = 1037; *** *p* < .001 ***p* < .01 **p* < .05; M =mean; SD=standard deviation, B=standardized beta coefficient

In the total model, age, income, subjective health, subjective joy, and smartphone use were statistically significant predictors of SEA; gender, education, living alone, computer ownership, and radio use were not statistically significant predictors in the multivariate analysis. Younger individuals, individuals with higher income levels, individuals with high levels of health and joy, and individuals who used smartphones often were more likely to have a positive SEA. Smartphone use had the lowest effect; nevertheless, this effect was statistically significant and contributed to the overall variance in SEA; showing that smartphone use predicts SEA under the control of the covariates.

Discussion and Conclusion

This study explored the relationship between smartphone use and SEA. As we expected, the association between smartphone use and SEA was positive and statistically significant for a Swiss sample of adults aged 65 years and older. Therefore, the hypothesis (H1a) was supported. Older adults who used a smartphone more frequently experienced aging more positively than similar individuals who used a smartphone less frequently or not at all. Thus, the results confirm the relationship between positive images of aging and the use of technology in later life, particularly the use of mobile devices.

Drawing on literature on within Socio-gerontechnology, this result suggests that positive images of aging might be not only a precondition for using technology but also an outcome of technology use in later life. In digital cultures, we perceive and experience the

aging process with and through technological devices, so technology use might influence our subjective aging experience. Affective technologies that we carry and use in close proximity to our bodies are a particularly interesting case to study the relationship between technology use and its impact on the subjective experiences of ageing, as the results of this paper suggest in line with existing socio-gerontechnological literature (cf. Marshall and Katz 2016, Silva 2012). Therefore, the results of this study support literature indicating that aging in a digital world calls not only for new empirical material but also for more complex theoretical understandings of the relationship between technology and aging; these understandings must go beyond an interventionist logic (Peine and Neven 2019; Wanka and Gallistl 2018).

The results also suggest that the relationship of the aging experience with the use of mobile devices is stronger than the relationship between SEA and the use of other technologies such as TVs or radios (H1b). After controlling for background variables, the use of smartphones was the only usage variable that was positively associated with images of aging. Therefore, as technological development brings technological devices closer to our bodies through fitness trackers and other mobile devices, these devices might also more seamlessly integrate into our identities and SEAs. Future research, therefore, should consider wearables (e.g., fitness trackers), smartwatches, and smartphones in more detail as a gerontological field of study, especially as rates of smartphone use among older adults are increasing (Taylor and Silver 2019).

The present study has some limitations. First, the study used cross-sectional data, and the sample had a narrow regional focus, i.e., Switzerland. International longitudinal research is required to examine the causal inferences and possible changes in the relationship between smartphone use and SEA over time. Second, the data came from a 2014 survey; a higher rate of smartphone use among similar participants may be expected today. Additional research with new datasets is needed to confirm the study's findings. Third, data on other factors that could affect SEA, such as objective health, ability to cope with daily activities, personality, and psychological factors, were not available. Fourth, we examined the reported frequency of smartphone use but not how or why smartphones are used, and nor did we look at attitudes toward smartphone use. Furthermore, we do not quantify

the smartphone use by automatically tracking people's diverse and individual use. Therefore, further studies should consider automatic tracking and additional aspects of smartphone use beyond reported frequency.

In conclusion, this is the first study to find that smartphone use plays an important role in SEA. Future studies in this field should increasingly consider affective technologies, i.e. mobile devices that are carried and used close to the body such as smartphones, smartwatches, or fitness trackers, when investigating individuals' experiences of aging. Furthermore, future research should include more qualitative data about participants' smartphone use and the affects evoked by different use practices to investigate the manifold influences of daily smartphone use on SEA, and comparative studies on different types of (affective and non-affective) devices are needed to better understand what kind of technologies can make us feel old or young, respectively. On a practical level, these results suggest that interventions that support technology use in later life should allow for specific device use among older adults. The results also highlight the role of technology designers in shaping SEA. Therefore, technology should be designed to be easy for older adults to use (Czaja et al. 2019), and designers should consider the impact technology can have on older adults' experience of their own age(ing). Older adults who wish to use ICT might be helped by offers of support and training to increase their self-efficacy and digital literacy skills (Cotten et al. 2016). Finally, more research on how technological devices convey specific images of aging and how to encourage age-aware designs is needed.

References

- Aceros, Juan C., Jeannette Pols, and Miquel Domènech. 2015. "Where Is Grandma? Home Telecare, Good Aging and the Domestication of Later Life." *Technological Forecasting and Social Change* 93 (April): 102–11. <https://doi.org/10.1016/j.techfore.2014.01.016>.
- Anderson, Monica. 2019. "Mobile Technology and Home Broadband 2019." *Pew Research Center*. https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2019/06/PI_2019.06.13_Mobile-Technology-and-Home-Broadband_FINAL2.pdf.
- Chen, Ke, and Alan H.S. Chan. 2011. "A Review of Technology Acceptance by Older Adults." *Gerontechnology* 10 (1): 1–12. <https://doi.org/10.4017/gt.2011.10.01.006.00>.

- Cotten, Shelia R., Elizabeth A. Yost, Ronald W. Berkowsky, Vicki Winstead, and William A. Anderson. 2016. *Designing Technology Training for Older Adults in Continuing Care Retirement Communities*. Boca Raton, FL: CRC Press
- Czaja, Sara J., Walter Richard Boot, Neil Charness, and Wendy A. Rogers. 2019. *Designing for Older Adults: Principles and Creative Human Factors Approaches*. Boca Raton: CRC Press.
- Featherstone, M., and M. Hepworth. 1998. "Aging, the Lifecourse and the Sociology of Embodiment." In *Community, Medicine and Health*, edited by G. Scamble and P. Higgs, 147–75. New York: Routledge.
- Forsman, Anna K., and Johanna Nordmyr. 2017. "Psychosocial Links Between Internet Use and Mental Health in Later Life: A Systematic Review of Quantitative and Qualitative Evidence." *Journal of Applied Gerontology* 36 (12): 1471–1518. <https://doi.org/10.1177/0733464815595509>.
- Hofer, Matthias. 2017. "Older Adults' Media Use and Well-Being: Media as a Resource in the Process of Successful Aging." In *The Routledge Handbook of Media Use and Well-Being*, edited by Leonard Reinecke and Oliver Mary Beth, 384–95. New York: Routledge.
- Hunsaker, Amanda, and Eszter Hargittai. 2018. "A Review of Internet Use among Older Adults." *New Media & Society* 20 (10): 3937–54. <https://doi.org/10.1177/1461444818787348>.
- Joyce, K., and L. Mamo. 2006. "Graying the Cyborg: New Directions in Feminist Analyses of Aging, Science, and Technology." In *Age Matters: Realigning Feminist Thinking*, edited by T. Calasanti and K. Slevin, 99–123. New York, NY: Routledge.
- Kaerlein, Timo. 2018. Smartphones als digitale Nahkörpertechnologien: zur Kybernetisierung des Alltags [Smartphones as Digital Near-Body Technologies: For the Cybernetization of Everyday Life]. *Digitale Gesellschaft*, Band 21. Bielefeld: transcript.
- Marshall, Barbara L., and Stephen Katz. 2016. "How Old Am I? Digital Culture and Quantified Ageing." *Digital Culture & Society* 2 (1): 145–52. <https://doi.org/10.25969/mediarep/893>.
- Millar, Roberto J., Shalini Sahoo, Takashi Yamashita, and Phyllis Cummins. 2019. "Problem Solving in Technology-Rich Environments and Self-Rated Health Among Adults in the U.S.: An Analysis of the Program for the International Assessment of Adult Competencies." *Journal of Applied Gerontology*. <https://doi.org/10.1177/0733464819829663>.
- Peine, Alexander, and Louis Neven. 2019. "From Intervention to Co-Constitution: New Directions in Theorizing about Aging and Technology." *The Gerontologist* 59 (1): 15–21. <https://doi.org/10.1093/geront/gny050>.
- Polivka, Larry. 2000. "Postmodern Aging and the Loss of Meaning." *Journal of Aging and Identity* 5 (4): 225–35. <https://doi.org/10.1023/A:1026449621184>.
- Riegel, Klaus F., and Ruth M. Riegel. 1960. "A Study on Changes of Attitudes and Interests During Later Years of Life." *Human Development* 3 (4): 177–206. <https://doi.org/10.1159/000269403>.

- Schlomann, Anna, Alexander Seifert, Susanne Zank, Christiane Woopen, and Christian Rietz. 2020. "Use of Information and Communication Technology (ICT) Devices Among the Oldest-Old: Loneliness, Anomie, and Autonomy." *Innovation in Aging* 4 (2): igz050. <https://doi.org/10.1093/geroni/igz050>.
- Schulz, Richard, Hans-Werner Wahl, Judith T. Matthews, Annette De Vito Dabbs, Scott R. Beach, and Sara J. Czaja. 2015. "Advancing the Aging and Technology Agenda in Gerontology." *The Gerontologist* 55 (5): 724–34. <https://doi.org/10.1093/geront/gnu071>.
- Seifert, Alexander, and Hans Rudolf Schelling. 2015. *Digitale Senioren. Nutzung von Informations- und Kommunikationstechnologien (IKT) durch Menschen ab 65 Jahren in der Schweiz im Jahr 2015* [Digital Seniors. Use of Information and Communication Technologies (ICT) by People Aged 65 and Over in Switzerland in 2015]. Zurich: Pro Senectute.
- Seifert, Alexander, Anna Schlomann, Christian Rietz, and Hans Rudolf Schelling. 2017. "The Use of Mobile Devices for Physical Activity Tracking in Older Adults' Everyday Life." *Digital Health* 3 (1): 1–12. <https://doi.org/10.1177/2055207617740088>.
- Seifert, Alexander, and Hans-Werner Wahl. 2018. "Young at Heart and Online? Subjective Age and Internet Use in Two Swiss Survey Studies." *Educational Gerontology* 44 (2–3): 139–47. <https://doi.org/10.1080/03601277.2018.1427495>
- Silva, Sandra Rubia. 2012. "On Emotion and Memories: The Consumption of Mobile Phones as 'Affective Technology.'" *International Review of Social Research* 2 (1): 157–72. <https://doi.org/10.1515/irsr-2012-0011>.
- Sims, Tamara, Andrew E. Reed, and Dawn C. Carr. 2017. "Information and Communication Technology Use Is Related to Higher Well-Being Among the Oldest-Old." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 72 (5): 761–70. <https://doi.org/10.1093/geronb/gbw130>
- Steverink, N., G. J. Westerhof, C. Bode, and F. Dittmann-Kohli. 2001. "The Personal Experience of Aging, Individual Resources, and Subjective Well-Being." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 56 (6): 364–373. <https://doi.org/10.1093/geronb/56.6.P364>.
- Taylor, Kyle, and Laura Silver. 2019. "Smartphone Ownership Is Growing Rapidly Around the World, but Not Always Equally." *Pew Research Center*. <https://www.pewresearch.org/global/2019/02/05/smartphone-ownership-is-growing-rapidly-around-the-world-but-not-always-equally/>.
- Wanka, Anna, and Vera Gallistl. 2018. "Doing Age in a Digitized World—A Material Praxeology of Aging with Technology." *Frontiers in Sociology* 3 (April): 6. <https://doi.org/10.3389/fsoc.2018.00006>.
- Zambianchi, Manuela, and Maria Grazia Carelli. 2018. "Positive Attitudes towards Technologies and Facets of Well-Being in Older Adults." *Journal of Applied Gerontology* 37 (3): 371–88. <https://doi.org/10.1177/0733464816647825>.