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Ageing and complexity: Reframing older adults' learning through interdisciplinary lenses

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Abstract

This paper presents a critical literature review on the systemic interconnections between ageing, learning, and care. Using the lenses of complexity and interdisciplinarity, we analysed a sample of 62 papers published between 2003 and 2022, examining their reference to micro, meso and/or macro levels, theoretical depth, and use of complexity as a sensitizing concept to understand implications for learning and transformation as structural features of an ageing society. Our analysis highlighted the role of different settings of care (formal, informal, and technology-mediated) in shaping, enhancing, or hindering meaning, well-being, and social justice for older learners and their caregivers, and the implications for society at large. Findings suggest a gap in the examined literature regarding the use of complexity theories to highlight self-organisation, interdependence, and co-evolution of individual and systemic learning. A theoretical interdisciplinary framework, we contend, would better mirror the multiple factors and levels entailed in the process of ageing.

Keywords: ageing, complexity theory, healthcare, caregivers, technology-mediated care

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Introduction

The transition towards a society where longevity is 'the new normal' requires a change of paradigm that entails, besides individual learning, the consideration of multiple transformations in relationships, professional practices and attitudes, services' organisation, and policies. From the individual perspective, learning to become an older person and adapt to new life conditions is a non-linear process emerging from daily interactions with oneself, others, and the environment, coping with new events, accidents, and dilemmas, taking and sharing decisions, and implementing new routines. Older adults' learning also entails letting go, finding new balances, and dealing with the Big Questions of life (Formenti & West, 2018). The establishment of new relational balances, identities, and good or bad outcomes in terms of health, well-being, and meaning, does not just depend on individual strategies of adaptation (microlevel), but on systemic and entangled factors at the meso and macrolevel.

Age-It is a national multidisciplinary research program devoted to mainstreaming ageing in Italian society, among the oldest in the world. It created a scientific hub for new ideas, practices, and policies, involving over 600 scholars from the biomedical, social, and technological sciences, to address ten challenges related to health, social justice, care, economy, work, ethics, technology, and education. Within this program, we formed an interdisciplinary group representing education, sociology, economy, technology, and gerontology to build a study devoted to understanding how ageing is constructed by different actors and answered to by the local communities. We will conduct interviews and cooperative inquiry sessions with older adults, informal and formal caregivers, and decision makers, to map emerging needs, problems, and resources, to signal challenges, and to suggest improvements. Fieldwork will connect qualitative and quantitative data within a participatory framework to highlight the experience, meaning, and agency of older people in co-evolution with their environment. We represent them as a diverse intersectional group, not only 'patients' or 'vulnerable' citizens, but lifelong learners, women and men whose backgrounds, social situations, biographies, interests, and relationships matter in the way they evolve. We use a comprehensive critical theory of learning in later life (Formosa, 2012; Withnall, 2009, 2011) to identify the effects of marginalisation and disempowerment on older adults, due to structural and discursive features within the system of care, and the informal learning processes involving family carers, professionals, decision makers, and other relevant actors in the system.

This literature review investigates the epistemic power of complexity as a sensitising theoretical concept that illuminates the interplay of many factors and levels, beyond the dominant focus on individuals, their health, and the measurement of isolated variables. We are dissatisfied with the hegemonic paradigm that neglects the heterogeneity of older adults' experiences and the role of intersectionality (gender, class, religion, education, place of living, etc.) in the transition to new life conditions. Linear practices and policies trivialise ageing and dispossess older adults from their rights to freedom, well-being, and meaning. A new paradigm is needed to (re)frame the meaning of learning in later life, that may be lost in transition with heavy effects on individuals, families, and communities.

By referring to complexity in adult education and learning (Formenti, 2018), we invoke a radical change of paradigm, based on co-evolution, circularity, self-organisation, and entanglement. Our review explores whether and how complexity theories are used by researchers to inspire new narratives, actions, and policies, and to cope with longevity as an opportunity.

Why complexity

In the last decades, interest in complexity has grown fast in organisational sciences (Axelrod & Cohen, 2000) and health policies (Braithwaite et al., 2017; Greenhalgh & Papoutsi, 2018). Its development in adult education research is slower and marginal (Alhadeff-Jones, 2009, Fenwick, 2003, 2016; Formenti, 2018), so we hope to fuel it by using the lens of complex systems theory (von Foerster, 1973/1984, 1982; Morin, 2008) to focus on learning, that is adaptation, interdependence, self-organization, and co-evolution, as cross-cutting features of individual lives, as well as relationships, groups, organisations, and networks. All systems, at all levels, 'learn' by interacting with a transforming social and material environment. This interaction is circular and produces unpredictability. The traditional approaches to ageing, however, seek predictability and enforce top-down strategies on individuals, groups, and communities to keep the situation under control and to solve emerging problems by linear answers. Research on policies has shown that the enforcement of increased regulations, guidelines, standard procedures, performance indicators in the healthcare system fails in guaranteeing to citizens quality of living, social justice, and even the consistent adoption of the prescribed behaviours (Braithwaite et al., 2017). Micro transitions and adaptations that work locally happen notwithstanding or beyond the given rules. Control fails.

Complex systems, in fact, are self-organised, layered, and entangled (Nowak & Hubbard, 2009). At the microlevel, individual identity evolves and (new) meaning is built whenever it is necessary to adapt and calibrate individual action to (new) emerging conditions. Brackets are here used to stress that learning is not always about the new: learning also is keeping a form, a habit, one's previous identity/ies, and this is especially important in later life. In complex systems theory, learning and living are different names for the same ongoing process. Hence, learning is biographically rooted: memories of the past combine with present interactions and the imagination of the future, to make and remake the individual (Formenti & West, 2018). Learners, at all ages, interpret events and information, interact with oneself, the others, and the environment (objects, spaces, procedures), coherently with their previous life and structure, constructing meaning and identity (Fenwick, 2003; Formenti, 2018).

At the meso-level, however, individuals are interdependent, especially within their proximal systems of relationships: family, workplace, friends, community/ies. Connectedness, circularity, repetition, and a constant flux of information are the main features of meso-systems, where every action is embedded in circuits of inter-actions. The meso-system enforces and reinforces expected behaviours, identities, and meanings through shared scripts, rituals, and narratives, objects and spaces, shaping lives and identities within organised activities (regularities, rules) and normative expectations. Complex organisations are dynamic and transform in relation to a changing environment. Structures and patterns *emerge* (Braithwaite et al., 2017) from a process of self-organisation where every part acts on the basis of tacit rules established in time by co-existence.

Complexity, then, brings our attention beyond individual paths, to comprise the context, which is not simply a backdrop or inactive container for human behaviour (Formenti, 2019), but the composition of 'many "moving parts" in complex interventions' (May et al., 2016, p. 3). When we look at education and learning, any action is connected to a context sustaining, reinforcing, or hindering it: their entanglement is another feature of complex systems (Hynes et al., 2020). 'Contexts are dynamic: contextual factors that might constitute barriers to implementation in one place may facilitate it in others' (May et al., 2016, p. 2).

These ideas pushed us to interrogate the literature on ageing, looking for clues of complexity, and the presence of different levels in interpreting the role of adaptive systems in the ageing society. By this, we intend to fuel a discussion on complexity in the field of older adult education.

Methodology: A critical literature review

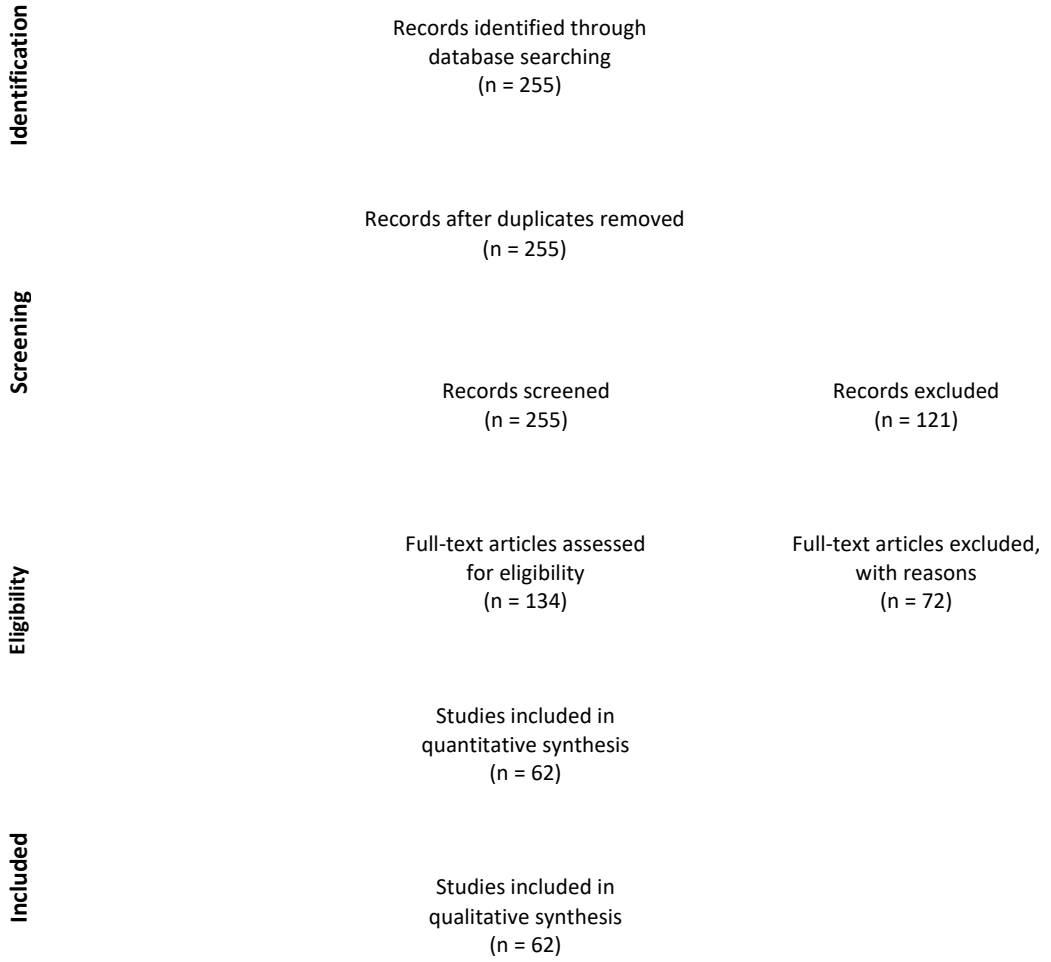
Inspired by Grant and Booth (2009) in their classification of literature review methodologies, we opted for a 'critical review', whose aim, compared to standard literature reviews, is to move beyond a solely descriptive account, to offer a reflexive and critical interpretation concerning key areas (better outlined in the paragraph below). Critical analysis is here used to sustain the construction of a conceptual model based on mapping the literature, enriching our theoretical framing of ageing and developing new ideas, hypotheses, and research questions around learning.

We operated our query on Scopus using the following keywords: ageing or aging, or elderly, or older adult, complexity, health or care, communication, critic* or narrative, system*, caregiver. These words define a semantic field that interconnects ageing, care, and complexity with other relevant concepts. Following several attempts, we decided not to include 'education' or 'learning' to keep a larger interdisciplinary focus. In this paper, education is not our main focus per se; we are interested in everyday life and informal learning (Golding et al. 2009), that is always present, even if tacit. We contend that older adults learn about ageing by experiencing systemic interactions with people, things, spaces, and organizations, that invite (or push) them to re-think their relationship with a changing body, to make choices in relation to work, family, mobility, household, social life, to understand relevant information about their health, to navigate new contexts, and to calibrate their actions in relation to these manifold experiences and challenges, not least by negotiating identity and social roles.

Figure 1 reports on the process following the PRISMA flow diagram (Moher et al., 2009). A total of 255 items were retrieved, then double checked to remove duplicates and papers that were not specifically addressing ageing. We further filtered our sample to consider papers concerning people who can decide for themselves (not institutionalised, no dementia). This led to a final sample of 62 records that were analysed guided by the following research question:

RQ: To what extent, if at all, does this corpus of publications contribute to conceptualising ageing as a complex learning phenomenon?

Figure 1. PRISMA Flow Diagram.



Data analysis

We analysed our data through content and thematic analysis (Vaismoradi et al., 2013). With respect to content analysis, we developed a codebook and adjusted it iteratively using dialogue and reflexivity to reach discursive intercoder agreement through the convergence of different perspectives (Cornish et al., 2013). Content analysis included the following variables:

- Methodology: qualitative, quantitative, mixed, case study, literature review, theoretical.
- Theoretical conceptualization of 'complexity': the term is used just as a synonym of 'difficult', or it represents multiplicity (i.e., a plurality of variables, factors, or agents), or it makes explicit reference to complexity theories.
- Theoretical depth of the paper: absence of theory, or mere enunciation of theoretical concepts, or a fully developed theoretical frame.

- Levels of systemic analysis: the paper focuses the micro, meso, and/or macro-level.
- Care system involved: informal, and/or formal, and/or technology-mediated.

These variables are informed by our critical stance, since they focus the frameworks of meaning, methodological approaches, and theoretical depth of the publications in relation to our research question, allowing us to categorise the understanding of ageing as a linear, multifaceted, or complex phenomenon.

With respect to the thematic analysis of the full texts of the papers, we built on the care system variable, identifying three systems of care: informal, formal, and technology-mediated. Each of us analysed one theme and drew a concept map to represent 'meanings embedded in a framework of propositions' (Novak & Gowin, 1984, p. 15, as cited in Daley, 2004). Iterative sharing and discussing of our maps led to identifying a range of sub-areas and gave a provisional answer to our research question.

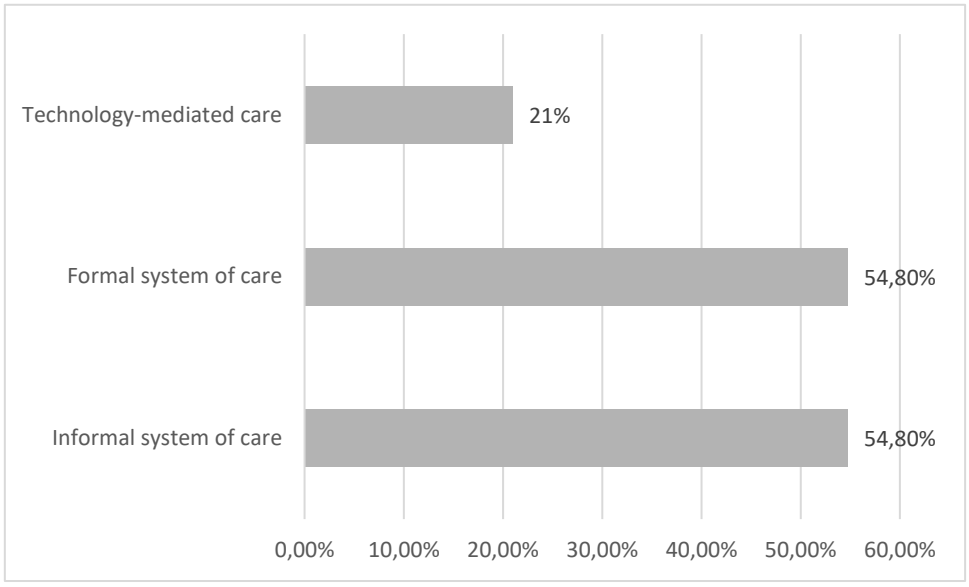
Mapping the territory: Findings from content analysis

By describing our sample, we want to reflect on the epistemic territory that we are exploring. We are interested in the epistemological turn entailed by using complexity to interpret ageing. Table 1 (in Appendix) shows our findings full length, with each record's full reference and the coded variables. With respect to the time of publication (2003 to 2022), Figure 2 shows a fluctuation reaching a peak in 2022. Hence, complexity seems an emerging and increasing concern in research on ageing, given that our sample is not representative.

Figure 2. Evolution in time - years of publication.

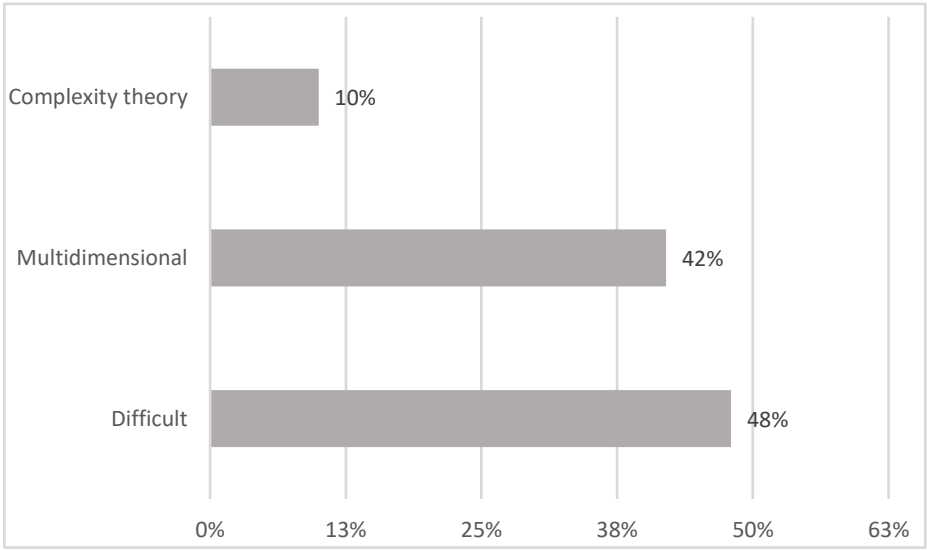
As for the care system focused by the papers, 54.8% of them concern the informal system, 54.8% the formal system, 21% technology-mediated care (Figure 3). These areas are the object of the following paragraph.

Figure 3. Care systems addressed in the papers.



As for 'complexity' (Figure 4), only 10% of the papers explicitly use complexity theories, while most papers (48%) use the word as a mere synonym of 'difficult', followed by those that interpret complexity just in terms of multidimensionality or multifactoriality (42%). These findings show, with respect to our sample, a gap in the literature that invites further research using complexity theory as a lens to studying ageing, as we will argue in our conclusions.

Figure 4. Meaning of 'complexity'.



As for theoretical depth (Figure 5), 46.8% developed or implemented a theoretical frame. A third of the papers (30.6%) are merely focused on empirical data, with no theoretical framework. The remaining 22.6% just enunciate one or more theoretical concepts, but no theoretical improvement or discussion based on the research results.

Figure 5. Degree of theoretical depth.

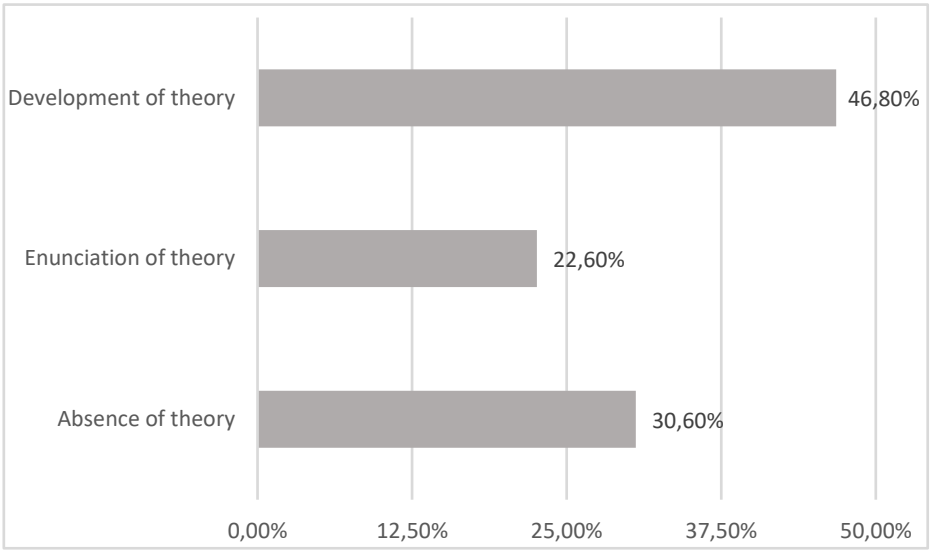
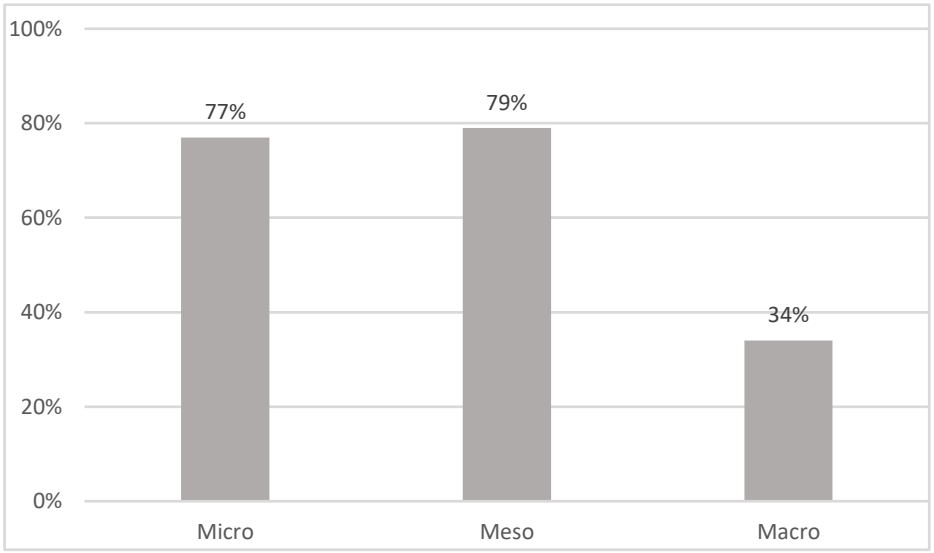


Figure 6 shows that most papers concern the micro (77%) and/or meso-level of analysis (79%), while 34% address the macro-level. A composite index shows a mean of 2 levels (*M*= 1.89, *SD*= .749) in each paper, mostly presenting the micro and meso together (40.3%). Totally, 21% of the papers consider them all (details in the Appendix).

Figure 6. Systemic levels of analysis.



So, while the macro level receives less attention, several researchers try to compose the layers. At the micro-level, these studies (e.g., Pereira et al., 2022; Majón-Valpuesta et al., 2022) focus on individual experience and strategies to construct ageing and oneself as an ageing person. At the meso-level (e.g., Hagedoorn et al., 2021; Schusselé Filliettaz et al., 2021), human groups, organisations, and contexts are seen as shaping this construction, creating both constraints and possibilities by structuring the everyday experiences of their members and users. At the macro-level (e.g., Griffore, 2019; Keating, 2022), the focus is on dominant and marginal discourses, local and national policies, cultural transformations, and environmental general conditions.

These findings show that only a part of the retrieved papers is coherent with our expectations: while there might be a growing interest for complexity related to ageing, only a few publications consider it as a specific theoretical frame for research. The balance between formal and informal care and the connections of micro and meso systems are coherent with a systemic perspective that tries to illuminate the links between subjective experience (individual learning) and transformations in the proximal systems (family, organisation), while a lesser interest for the macrosystem could indicate that social justice and social transformations are not a main concern. These arguments will be clearer after the thematic analysis.

Informal, formal, and technology-mediated systems of care: Findings from thematic analysis

The informal system of care: interdependence, coevolution, and communication

In our mapping of 34 papers addressing the informal system of care, seven topics appeared relevant to our research question.

1. The crucial role of the family system. Many papers (12, 13, 14, 20, 22, 25, 31, 41 43, 46, 54) focus on the role of partners, companions, children and grandchildren as informal caregivers, introducing concepts as intergenerational care (20, 54), relational complexities (11), normative expectations about patterns and roles in care, e.g. gender stereotypes (20, 22, 54), the workload (11) as well as the positive of caregiving (22), the effects of family dynamics and history (20, 22, 25, 51, 59), the cultural construction of family values (35) such as solidarity (54), trust (25), abnegation (44), but also dependency and patriarchal practices (11), power (48), and the processes of co-evolution and shared coping between caregiver and care-receiver (13, 14, 59).
2. A focus on ageing as an ongoing non-linear process (transition) in search of a (new) balance, characterised by in-betweenness, unsettlement (25), transitional care (46), practices of handover and changes in health (25, 31, 46), continuity and discontinuity (25), cultural values as hindrances to the use of services (35), misrecognition (11), and adjustment processes (46). For instance, 'During the transition between hospital and home, older adults live an "in-between existence" at three levels: contextual, bodily and existential' (Roux et al., 2019, p. 6).
3. The daily impact of materiality, e.g. living arrangements (20), objects, time, space (25), medication practices (25, 31), on the quality of life, meaning, and possibility of ageing-in-place or self-determination (25). 'Several studies have demonstrated that, for home-dwelling older adults, the body space and home space are interconnected and co-vulnerable across the various dimensions of their homes as sites of long-term care' (Roux et al., 2019, p. 2).
4. The emergence of polarities, dilemmas, tensions, and boundaries, that can be seen as hindrances or, we suggest, occasions for reflection, learning and transformation, in a logic of composition: lifelong stressors/strengths (22), formal/informal care, private/public space, control/empowerment (25), visible/invisible care (58), facilitators/barriers (12).
5. The need for information (13, 14, 25, 31), communication (31), knowledge (13, 14, 35, 58), health literacy (13, 14) and mediation (48, 51) to sustain shared

decision making (11, 13, 22, 51), renegotiate boundaries (25), change representations (35, 39, 50), values (35), and balance power (25, 48).
6. Multiple social factors and 'intersectional complexities' (22) shape informal care: social determinants, gender and gendered caregiving (11, 12, 20, 22), cultural factors (11, 14, 35, 39, 43), income (22, 39), race, social class, employers' support (22, 39), corporate caring (52), religion and church community (22), migration (43), lifelong inequality (22), policies (48, 52), facilitators and spaces for social participation (12), marginalization (35), and cohort-specific effects (e.g. baby boomers, 12).
7. Complexity (13, 22) is a cross-cutting feature of relationships (11, 41), practices (25), informal care (58), meaning (50), rural ageing (35), intersectionality (21), and the overall healthcare ecosystem (13).

These topics show the interdependence of individual, relational, and societal factors. The dominant narrative of ageing as an individual process is challenged if we recognize the need for transformation at all levels. A systemic perspective, recognizing that learning is collective, lifelong, and diffused in the more-than-human system, would sustain policies and practices that pay attention to the wellbeing of the informal system, constituted by relationships among family members, companions, friends, as well as with objects, spaces (home), artefacts, and landscapes, and not separable from the formal system, but constantly interacting with it.

For example, Roux et al. (2019) study the management of medications after hospitalisation within the physical and symbolic space of home and daily routines. The transition entails a renegotiation of boundaries and identities, private space is transformed and small changes in everyday health-related practices (e.g., the management of a pillbox) can change older adults' life in subtle but significant ways. This awareness could inspire more respectful ways to accompany transitions.

Interdependence is evident in many papers. For example, using a developmental-contextual model, Berg and Upchurch (2007) show the co-evolution of couples dealing with chronic illness and suggest abandoning the separated study of care-receiver and care-giver, since these roles are frequently reciprocal in a couple, where partners share stressors, perceiving them as 'ours' rather than 'mine'. They also usually pool resources and make joint efforts at coping. The occurrence of health problems may disrupt previous balance and trigger action to restore homeostasis not only for the ill person, but in the relationship, and in relation to others too.

When some disruptive event (here, chronic illness) announces a transition to a new phase of life, the partners are called to complex learning: adaptation, self-development, emotional regulation, and changes in their relationship. We add that transformative learning is also possible (Mezirow, 1991), when the emerging dilemmas push individuals to reflect on their mindsets, habits, or worldviews, and change them. Learning and adaptation involve all the members of a social system. Berg and Upchurch (2007) present different strategies of dyadic coping: uninvolvement, support, collaboration, control, protective buffering, or overprotection. They are negotiated through communication and everyday action, and influenced by culture, gender, quality of relationship, and the impact of specific illnesses in terms of care burden, timeline, consequences, and controllability. Besides, dyadic coping changes across the lifespan, during specific phases of life and stages of illness (or other stressors). A couple can be unable to find (learn) a new balance, while another one will reinforce the relationship. None of this is predictable.

Such a co-evolutionary framework could be used to highlight changes in the whole system of informal care, also considering its relationships with the formal system. A

dyadic model, in fact, risks isolating the couple from other caregivers, increasing the burden and loneliness of the primary caregiver (usually a woman, due to gender normative expectations). When looking at the larger unit – family, proximal system, local community – co-evolution appears more complex, and the action of socio-cultural aspects more evident. Coping is a relational process depending on culture, gender roles, and other sociological variables.

In a similar vein, Bower et al. (2020) have used ethnography to study low-income mother-daughters dyads and explore

> how the women transitioned into the role of caregiver and care recipient, their relationship history, daily routines, living arrangements, health status, the intersection of work and family life, the impact of being low-income on their perceived well-being, and their broader family and support networks within the context of their family culture. (Bower et al., 2020, p. 136)

Here, caregiving is seen as the search of balance in a changing situation, weaving individual (health status and religion); family (dyadic relationship history, family involvement and expectations); and social factors (low-income, work environment, and community support). To balance their stress, mothers and daughters referred to other family members for emotional and instrumental support. The normative patterns of gender-based distribution of care in the family cumulate with inequity embedded in the larger society. Caregiving ultimately is a social practice: framing it as a private or family issue is problematic.

Formal systems: Professionals and organisations facing complexity

In mapping 34 papers addressing complexity in formal care, we identified 4 topics related to our research question:

1. Transitional care (e.g. discharge after hospitalization, referral from one service to another) is an emerging area of practice and research (3, 9, 10, 16, 30, 33, 41, 56) that considers and composes the different needs of patients, family members, and professionals, for example in medication management at home (33), or boundary negotiation in coordinated care (26). Communication and collaboration between different professionals, with patients and informal caregivers, are used to connect staff and family (57), nurses and physicians (32), to overcome gaps (37), and bring attention to speech (61) and voice (26). Patients' voices and values may be silenced by an overly strict application of professional guidelines, so narrative approaches can enable patients to make choices (10, 26). Effective communication, empathy, and collaboration fuel positive relationships with families and within interprofessional teams (19).
2. Health literacy and co-production of health as a value are critical for shared decision-making related to health. Partnership-based care recognizes the expertise of patients and informal caregivers about their priorities and needs (19). Health literacy, of both patient and companion, sustains more effective professional work; a companion with higher health literacy can play an active and informed role in decision-making, contributing to a collaborative patient-centred care approach (14).
3. Complexity-informed professional development and training can be pivotal in transforming formal caregivers' representations of ageing that are culturally based (4, 29), sometimes infused with ageism and preconceptions (38). New

needs for training emerge from the interactions with families to promote a collaborative and empathetic approach to family engagement (49). Training should go beyond skills development, to deal with 'the entire care situation and work organisation' (49, p. 70). The capacity to manage communication, divergent expectations and breakdowns would sustain collaboration by addressing in more effective ways the complexity of needs and different perspectives of professionals and users (19). Current medical education and clinical guidelines are not aligned with the multifaceted needs of older adults; health policies and procedures can constrain the quality of care (38). A huge integrative literature review (40) clarified how knowledge of the multiple components of professional work in the hospital could sustain better strategies, staff training, and resources. Older adults' human, social and financial capital also has to be considered in training professionals (24). A research in Norway (5) showed the positive impact of a program that promotes health in the community. Burnt-out workers are a growing problem in overly mechanistic, bureaucratic, and disconnected care systems, so the enhancement of personal connections with users and other professionals can increase the quality of professional experience and workers' empowerment.

4. Technologies are increasingly used in the care system to sustain collaboration and to integrate interventions. In a pilot study in Switzerland (19), homecare actors provided proactive and targeted information to the healthcare system; the project combined health innovation, interprofessional and interinstitutional collaboration, and partnership among patients, relatives, and professionals. Technology can sustain treatment management at home by offering personalised medication management plans, educational materials, and regular follow-up by healthcare professionals; for example, using the HOME tool improved medication adherence, perceived experience of older adults, and overall health outcomes (32).

These data suggest that a complexity framework can be used to empower professionals in positioning themselves more actively in the system of care, collaborating with other professionals, users, and families, and considering individual behaviour in the light of the relationships around the person. Enhanced communication, collaboration, targeted training, and personal-relational development may improve the quality of care and work experience.

Complexity in coordinated care (26) and organisations (57) is especially interesting. For example, Utley-Smith et al. (2009) refer to previous work on complexity (Cillers, 1998; Stacy, 1996) and to Bronfenbrenner's (1977) social ecological model to perform a comprehensive micro, meso, and macro-analysis of a nursing home. They show how an organisation can be understood and managed as a complex system featuring many elements and relationships, and built on constant information exchange and diversity among its members. They highlight nonlinear processes and feedback loops, relationships with the environment, and the cumulative cascade effects on the whole system triggered by small interactions at a local level. This knowledge can enhance the organisation's capacity for self-regulation and more effective strategies and behaviours.

For a formal caregiver, job satisfaction depends on the quality of the workplace atmosphere, the effective communication with users and families, and the possibility to know and transform one's own presuppositions and limits. Well-being is an eco-systemic process, not only individual. Research shows that coordinated or integrated care, a

longstanding policy concern (World Health Organization, 2002), is still a big challenge for professionals (Bishop & Waring, 2019).

Technology-mediated care as an educational process

A body of 13 papers concerned technology-mediated care, namely the caring processes that incorporate technology as a tool and/or an environment. We identified three topics:

1. Top-down versus bottom-up approaches: the former concern other-directed care, i.e. using technology for compensatory (7, 8) or activating (15, 18, 28) actions; the latter entails self-directed care and personal agency (17, 55). Compensatory strategies may adopt technology to guarantee proper medication administration and communication between informal and formal caregivers (32), or cognitive stimuli through robots (21), immersive virtual reality, and videoconferencing (8). Bottom-up approaches, far less represented in this literature, involved the study of how older people use technology in self-directed ways, for example acting as 'digital caregivers' when using social media to take care of others and themselves (17), or to cope with life transitions maintaining relationships, interests, and managing daily tasks (55).
2. Affordances, users, and systems are crucial aspects in designing and testing technological infrastructures and digital tools. Affordances and design characteristics can promote or hinder certain actions (Evans et al., 2017). Older adults can be involved in co-design to promote more meaningful experiences with technology. Several actors, such as designers, family caregivers, IT providers, health-care professionals, are called to offer insights to make technology-mediated care more significant and effective, and to educate older people using such technology (7, 15, 18, 21, 34, 42).
3. Discourses of technology-mediated care: although only two papers (21, 53) made specific reference to the macro system, the examined literature reflects specific discourses of a neoliberal cultural milieu. Hsu et al. (2020) explain how the development of aged-care robots in Japan, imbued with a tendency to frame ageing as an urgent crisis and promoting stereotypes on older adults as physically and mentally frail, justifies investment in robotic solutions based on paternalism and a technocentric epistemology. Similarly, Ganyo et al. (2011) raise ethical issues on using fall detectors that reinforces a broader culture of surveillance; it may hinder the autonomy and privacy of older people for the purpose of reducing public expenditures.

These topics illuminate a range of issues related to learning. Firstly, the diversity of experiences and uses of technology by older adults (Waycott et al., 2022). Then, the support to active ageing through online physical activity and the promotion of health and digital literacy (Ottoboni et al., 2019). Technologies can be interpreted as useful tools to guarantee therapeutic alignment and foster collaborative care, but also as learning environments. Berry et al. (2021) explored how different interactive tools can support shared reflexivity between patients and healthcare providers about health issues and personal values. For example, My List, a questionnaire filled by the patient in preparation for an upcoming visit, connects self-care duties, health indicators, and personal values. Older adults testing this prototype defined it as thought provoking. Another app, Time Machine, invites patients to evaluate past and future changes in their system of beliefs concerning health. Interestingly, when reflecting on the future, the participants expressed

positive views and transformative reflections on prospective changes in their frameworks of meaning and courses of action concerning their healthcare.

Bottom-up approaches, as said, are not much explored in our corpus of literature. Using a feminist framework, Brewer et al. (2021) show that older adults act as online caregivers, challenging the dominant idea that portraits them as passive users of social media and recipients of care. 'Digital caregivers' use social media to care for others and for themselves. Technology can help to cope with life transitions, maintain relationships and manage daily tasks, showing that older adults prefer those technologies that promote social interactions (Salovaara et al., 2010). So, when people appropriate technology for their own satisfaction, caring and learning are self-directed, going beyond the mere healthcare purpose.

Online Patient Education can be effective (Win et al., 2016) when offering individualised contents, interactive features, user-friendly texts and graphics, and navigational instructions. In evaluating mobile health apps for women considering prevention or treatment for osteoporosis, Kirkscey (2021) underscores the complex relationship between different stakeholders: users, caregivers, physicians, and IT coordinators. However, considering all the several actors in the development of technology for aged care is not always a given, as pointed out by Hsu et al. (2020), whose interviews with technology developers reveal that design is *for* and not *with* older people, seen as passive users and recipients of care. On a different note, Goumopoulos et al. (2017) show interdependence in their evaluation of the Senior App Suite, a mobile app for older people including services such as social networks, emergency detection, and wellbeing promotion; here, encouragement from family members and caregivers is deemed essential by older adults to scaffold their own use of technology.

Technology-mediated care is destined to grow, but it needs to be reconceptualised to acknowledge that 'technology is more than a tool of health care. […] is inseparable from care and humanity and is a significant driver that will shape our understanding of these concepts' (Archibald & Barnard, 2018, p. 2474). The pervasiveness of technology requires an approach to care as a more-than-human matter, a set of 'embodied and interembodied practices that bring together people and other living organisms with spaces and things in ways that seek to contribute to their flourishing. […] a dynamic sociomaterial assemblage of humans and nonhumans' (Hjorth & Lupton, p. 585). Also, matters concerning the digital divide, access, and inequalities among older technology users need to be further addressed to better ground technology-mediated care to situated lived experiences.

As a matter of fact, technology-mediated care is a cross-cutting, relational, and complex topic. These papers show concern for the informal and formal systems (7, 8, 15, 17, 18, 32, 42), but only two of them address the macro-level (21, 53). Complexity theory is only referred to in one paper (18), multifactoriality in another one (15), so the majority use complexity as a synonym for 'difficult'. A comprehensive critical framework could bring to a deeper understanding of the lights and shadows of technology-mediated care in ageing.

In this line, it is worth stressing the different learning experiences and representations of older adults promoted by technology. As recipients of care, users can express differential degrees of agency in deciding whether and how to use technology. The top-down approach forces them to interact with technology in a way that confirms the construction of ageing as a problem to be controlled. However, recognizing users as active agents of (self)care, who should know what is relevant for them and use technology to achieve their goals, may be more effective, in the long term, to sustain wellbeing, cope with life transitions, and build meaningful transformations.

Older adults are at risk of normative and paternalistic design and use of technological solutions. Their voices need to be taken into consideration in every aspect of technology-mediated care: design, evaluation, implementation, and use. Research shows that many significant people have a role to play in this process, and technology can work as a mediator and collective learning environment where older adults and other subjects can express themselves, learn, and explore possibilities. This would be a step beyond the deficit narrative that fuels the dominant portrayal of the ageing person as an impaired patient, and the individualistic epistemology isolating them from their systems.

Conclusions: Multiplying and connecting learning dimensions

> When someone says, 'It's complex. It's very complex!,' the word *complex d*oes not constitute an explanation, but rather indicates the difficulty in explaining. The word serves to designate something we really can't explain, but that we shall call 'complex'. For this reason, if there really is a complex form of thinking, it won't be capable of opening all doors (like those keys that open safes and cars). It will, on the contrary, be a thinking wherein difficulty is forever present. (Morin, 2008, p. 84)

Our critical literature review helped us to name relevant actors, contexts, and issues focused by interdisciplinary research on ageing that is concerned with complexity. Morin invites us to embrace complexity and go beyond a mere declaration of difficulty to gain a holistic understanding of the issues at hand. Interdisciplinarity, interprofessional dialogue, and interactions among many actors and organisations, and with the material environment, are structural factors in the process of learning about ageing, and the complexity framework is helpful in connecting different theories, disciplines, and perspectives, offering a way to overcome rigid boundaries between sectors.

Learning is a necessity for people who are ageing (all of us, indeed) as well as for their partners, families, formal and informal caregivers, communities, media, and the larger systems in a more-than-human world (Ferrante, 2017; Ferrante & Palmieri, 2015). The co-evolution of all these networks and relationships brings about transformations, not least transformative learning (Mezirow, 1991). A critical perspective alerts us on the risks of oversimplification and social injustice that increase when some variables, voices, or stories are neglected.

Post-capitalist economies are facing rapid and disruptive changes due to longevity, but not much attention is paid to investigate what kind of learning and education are required to cope with it. We contend that learning is a systemic process: we learn from each other, the systems where we belong teach – directly and indirectly - how we are expected to perform and narrate (our) later life, social roles, constraints and possibilities. Learning and transformation are not always positive, in this regard. The dominant discourse on ageing in the welfare system – or what remains of it - is based on cost assessment and solutions to simplified problems. We suggest that the theory of complexity can be used to develop new ideas and actions to enhance eco-systemic well-being and social justice for the most vulnerable individuals, groups, and communities. Complexity interconnects, as we have seen, health, lifestyle, socio-relational dynamics, care provision, economic, social and cultural capital, biographies, education, and media usage. It challenges causal linear thinking (Trompette et al., 2020). In times of uncertainty and unpredictability, respecting the systems' capacity for self-organisation works better than rigid regulations and protocols. Guidance and standards should not hinder, but enhance the situated capacity of adaptation and calibration at the local level.

Our literature review is focused on care, since health and a relative loss of autonomy can become fundamental aspects of identity in later life. It may be a bias, that narrows

down the complex identity of an older adult to medical problems. The number of healthy, active, and autonomous people over 65 is increasing, and care may not be perceived as an issue. However, many older adults tend to avoid the feelings of vulnerability related to ageing, and accept the need of others. Here, we tried to show that ageing people behave in relation to their belief systems as members of collectives, participating in the co-construction of social representations, and building scripts, coping strategies, and decision-making in relation to the context. New ongoing identities are shaped by meaningful relationships with significant others, media, and cultures, that may nurture emancipating or oppressive effects. Hence, our point is to invite researchers in older adults' learning to take a distance from dominant individualism to investigate these environmental complex dimensions.

Several aspects are worth of further inquiry: the (de)construction of representations and beliefs about ageing and the risks of ageism; the capacity of families and communities to cope with emerging needs and the burden of care; the resources to support learning about ageing, for older as well as younger learners; a better understanding of favourable trajectories and transitions, seen as circular and oscillating processes instead of linear or cumulative paths.

Complexity theory offers a comprehensive and effective representation of the learning context of ageing that embraces self-organisation and interdependence at a micro, meso, and macro-level. The 'dynamic elements of context play a powerful role in shaping participants' capacity and potential to respond' (May et al., 2016, p. 3). We have argued that conventional thinking oversimplifies complex issues by isolating variables and individuals. Intervention, education, and research driven by causal linearity and binary thinking separate health and meaning (another version of the body-mind dualism), intervention and context, programs and beneficiaries, national policies and local communities. In the following step of our study, we intend to implement and test these ideas in meeting older people, informal and formal caregivers, decision-makers, and communities, to build a thick representation of later life as a co-evolutionary process entrenched within the context, landscapes, and lifescapes of people (Formenti et al., 2014).

Declaration of conflicting interests

The authors declare no potential conflicts of interest with respect to the research, authorship or publication of this article.

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Appendix

	Full reference	Method	Geography	Theme	Systemic level	Complexity	Theoretical Depth
1	Johansson, C., Lindberg, D., Morell, I. A., & Gustafsson, L. K. (2022). Swedish experts' understanding of active aging from a culturally sensitive perspective–a Delphi study of organizational implementation thresholds and ways of development. *Frontiers in Sociology*, *7*, 1-15.	Mixed	Sweden	4	Micro, Meso, Macro	2	3
2	Bowley, J. J., Faulkner, K., Finch, J., Gavaghan, B., & Foster, M. (2022). Understanding the Experiences of Rural-and Remote-Living Patients Accessing Sub-Acute Care in Queensland: A Qualitative Descriptive Analysis. *Journal of Multidisciplinary Healthcare*, *15*, 2945-2955.	Qual	Australia	1	Micro, Meso	1	1
3	Pereira, F., Bieri, M., del Rio Carral, M., Martins, M. M., & Verloo, H. (2022). Collaborative medication management for older adults after hospital discharge: a qualitative descriptive study. *BMC nursing*, *21*(1), 1-16.	Qual	Switzerland	1, 2	Micro	2	1
4	Bonus, C. G., Northall, T., Hatcher, D., & Montayre, J. (2022). Experiences of perioperative care among ethnically diverse older adult patients: An integrative review. *Collegian*, *29*(6), 911-923.	Lit rev	Australia	2	Micro, Meso, Macro	1	1
5	André, B., Jacobsen, F. F., & Haugan, G. (2022). How is leadership experienced in joy-of-life-nursing-homes compared to ordinary nursing homes: a qualitative study. *BMC Nursing*, *21*(1), 1-9.	Qual	Norway	2	Micro, Meso	2	3
6	Keating, N. (2022). A research framework for the United Nations Decade of Healthy Ageing (2021–2030). *European Journal of Ageing*, *19*(3), 775-787.	Theor	United Kingdom	1, 2, 4	Micro, Meso, Macro	2	3
7	Beeber, A. S., Hoben, M., Leeman, J., Palmertree, S., Kistler, C. E., Ottosen, T., ... & Anderson, R. A. (2022). Developing a toolkit to improve resident and family engagement in the safety of assisted living: Engage—A stakeholder-engaged research protocol. *Research in Nursing & Health*, *45*(4), 413-423.	Qual	United States	1, 2, 3	Micro, Meso	1	2
8	Waycott, J., Zhao, W., Kelly, R. M., & Robertson, E. (2022). Technology-mediated enrichment in aged care: survey and interview study. *JMIR Aging*, *5*(2), 1-16.	Mixed	Australia	2, 3	Micro, Meso	1	1
9	Kokorelias, K. M., Singh, H., Posa, S., & Hitzig, S. L. (2023). Understanding the goals of older adults with complex care needs, their family caregivers and their care providers enrolled in a patient navigation program. *Journal of Applied Gerontology*, *42*(5), 862-870.	Qual	Canada	1, 2	Micro, Meso	2	1
10	Fudge, N., & Swinglehurst, D. (2022). Keeping in balance on the multimorbidity tightrope: A narrative analysis of older patients' experiences of living with and managing multimorbidity. *Social Science & Medicine*, *292*, 1-9.	Qual	United Kingdom	2	Micro	2	3
11	Hamiduzzaman, M., Torres, S., Fletcher, A., Islam, M. R., Siddiquee, N. A., & Greenhill, J. (2022). Aging, care and dependency in multimorbidity: how do relationships affect older Bangladeshi women's use of homecare and health services? *Journal of Women & Aging*, *34*(6), 731-744.	Qual	Bangladesh	1, 2	Micro, Meso, Macro	2	3
12	Majón-Valpuesta, D., Pérez-Salanova, M., Ramos, P., & Haye, A. (2022). "It's impossible for them to understand me 'cause I haven't said a word": how women baby boomers shape social participation spaces in old age. *Journal of Women & Aging*, *34*(3), 277-293.	Qual	Spain	4	Micro, Meso, Macro	2	3
13	Suarez Vazquez, A., Suárez Álvarez, L., & Del Rio Lanza, A. B. (2022). Communicating with companions. The impact of companion empowerment and companion literacy on the well-being of elderly patients. *Health Communication*, *37*(5), 648-655.	Quan	Spain	1	Micro, Meso, Macro	2	3
14	Río-Lanza, A. B. D., Suárez-Álvarez, L., & Suárez-Vázquez, A. (2021). Accompanying patients aged 65 or over: how companions' health literacy affects value co-creation during medical encounters. *Journal of Aging and Health*, *33*(10), 953-964.	Quan	Spain	1, 2	Meso	2	1
15	Berry, A. B., Lim, C. Y., Liang, C. A., Hartzler, A. L., Hirsch, T., Ferguson, D. M., Bermet, Z.A. & Ralston, J. D. (2021). Supporting collaborative reflection on personal values and health. *Proceedings of the ACM on human-computer interaction*, *5*(CSCW2), 1-39.	Qual	United States	2, 3	Micro, Meso	2	3
16	Hagedoorn, E. I., Paans, W., van der Schans, C. P., Jaarsma, T., Luttik, M. L. A., & Keers, J. C. (2021). Family caregivers' perceived level of collaboration with hospital nurses: A cross-sectional study. Journal of nursing management, 29(5), 1064-1072.	Quan	Netherlands	1, 2	Meso	1	1
17	Brewer, R. N., Schoenebeck, S., Lee, K., & Suryadevara, H. (2021). Challenging passive social media use: Older adults as caregivers online. *Proceedings of the ACM on Human-Computer Interaction*, *5*(CSCW1), 1-20.	Mixed	United States	1, 3	Micro, Meso	1	1
18	Kirkscey, R. (2021). mHealth apps for older adults: a method for development and user experience design evaluation. *Journal of Technical Writing and Communication*, *51*(2), 199-217.	Qual	United States	3	Micro, Meso	3	2

19	Schusselé Filliettaz, S., Moiroux, S., Marchand, G., Gilles, I., & Peytremann-Bridevaux, I. (2021). Realist evaluation of a pilot intervention implementing interprofessional and interinstitutional processes for transitional care. *Home Health Care Services Quarterly*, *40*(4), 302-323.	Qual	Switzerland	2	Micro, Meso	3	3
20	Kridahl, L., & Duvander, A. Z. (2021). Are mothers and daughters most important? How gender, childhood family dissolution and parents' current living arrangements affect the personal care of parents. *Social Sciences*, *10*(5), 1-20.	Quan	Sweden	1	Meso, Macro	2	3
21	Hsu, E. L., Elliott, A., Ishii, Y., Sawai, A., & Katagiri, M. (2020). The development of aged care robots in Japan as a varied process. *Technology in Society*, *63*, 1-9.	Qual	Japan	3	Micro, Macro	1	2
22	Bower, K. L., Kemp, C. L., Burgess, E. O., & Atkinson, J. L. (2020). Complexity of care: Stressors and strengths among low-income mother-daughter dyads. *Journal of Women & Aging*, *32*(2), 131-148.	Qual	United States	1	Micro, Meso, Macro	2	3
23	Altomonte, G. (2020). Exploiting ambiguity: A moral polysemy approach to variation in economic practices. *American Sociological Review*, *85*(1), 76-105.	Qual	United States	2, 4	Micro, Meso, Macro	2	3
24	Griffore, R. J. (2019). Capital and value in late adulthood. *Family and Consumer Sciences Research Journal*, *48*(2), 138-148.	Theor	United States	1, 2, 4	Micro, Meso, Macro	3	3
25	Roux, P., Verloo, H., Santiago-Delefosse, M., & Pereira, F. (2019). The spatial dimensions of medication management by home-dwelling older adults after hospital discharge. *Health & Place*, *60*, 1-9.	Qual	Switzerland	1, 2	Micro, Meso	1	3
26	Bishop, S., & Waring, J. (2019). From boundary object to boundary subject; the role of the patient in coordination across complex systems of care during hospital discharge. *Social Science & Medicine*, *235*, 1-9.	Qual	United Kingdom	1, 2	Micro, Meso	3	3
27	Keating, N., Eales, J., Funk, L., Fast, J., & Min, J. (2019). Life course trajectories of family care. *International Journal of Care and Caring*, *3*(2), 147-163.	Theor	Canada, South Africa, South Korea	1, 4	Micro, Meso, Macro	1	3
28	Ottoboni, G., Gallelli, T., Mariani, E., Rebecca Soluri, V., Nunziata, S., Tessari, A., Savary, J.P. & Chattat, R. (2019). Remote home physical training for seniors: Guidelines from the AAL-supported MOTION project. *European Journal of Ageing*, *16*, 25-37.	Qual	Italy	3	Micro, Meso	1	2
29	Lane, P., & Smith, D. (2018). Culture, ageing and the construction of pain. *Geriatrics*, *3*(3), 1-13.	Lit review	United Kingdom	4	Macro	2	3
30	Mickelson, R. S., & Holden, R. J. (2018). Medication adherence: staying within the boundaries of safety. *Ergonomics*, *61*(1), 82-103.	Mixed	United States	1, 2	Micro	1	1
31	Bristol, A. A., Crist, J. D., Phillips, L. R., Shea, K. D., & Lacasse, C. (2018). Family caregivers' experiences of Within-Hospital handoffs for older adults in acute care. Journal of nursing care quality, *33*(4), 368-374.	Qual	United States	1, 2	Micro, Meso	1	1
32	Sheehan, O. C., Kharrazi, H., Carl, K. J., Leff, B., Wolff, J. L., Roth, D. L., ... & Boyd, C. M. (2018). Helping older adults improve their medication experience (HOME) by addressing medication regimen complexity in home healthcare. *Home Healthcare Now*, *36*(1), 1-14.	Quan	United States	1, 2, 3	Micro, Meso	1	1
33	Werner, N. E., Malkana, S., Gurses, A. P., Leff, B., & Arbaje, A. I. (2017). Toward a process-level view of distributed healthcare tasks: medication management as a case study. *Applied Ergonomics*, *65*, 255-268.	Qual	Netherlands	1, 2	Micro, Meso	2	2
34	Goumopoulos, C., Papa, I., & Stavrianos, A. (2017). Development and evaluation of a mobile application suite for enhancing the social inclusion and well-being of seniors. *Informatics*, *4*(3), 1-27.	Mixed	Greece	3	Micro	1	1
35	Bacsu, J., Abonyi, S., Viger, M., Morgan, D., Johnson, S., & Jeffery, B. (2017). Examining rural older adults' perceptions of cognitive health. *Canadian Journal on Aging/La Revue canadienne du vieillissement*, *36*(3), 318-327.	Qual	Canada	4	Micro, Meso	2	3
36	Hagedoorn, E. I., Paans, W., Jaarsma, T., Keers, J. C., van der Schans, C., & Luttik, M. L. (2017). Aspects of family caregiving as addressed in planned discussions between nurses, patients with chronic diseases and family caregivers: a qualitative content analysis. *BMC Nursing*, *16*(1), 1-10.	Qual	Netherlands	1, 2	Micro	1	1
37	Gustavson, A. M., Jones, J., Morrow, K. J., & Stevens-Lapsley, J. E. (2017). Preparing for the future of post–acute care: A metasynthesis of qualitative studies. *Home Health Care Management & Practice*, *29*(2), 70-80.	Lit review	United States	4	Meso, Macro	2	3
38	Ben-Harush, A., Shiovitz-Ezra, S., Doron, I., Alon, S., Leibovitz, A., Golander, H., ... & Ayalon, L. (2017). Ageism among physicians, nurses, and social workers: Findings from a qualitative study. *European Journal Of Ageing*, *14*, 39-48.	Qual	Israel	2, 4	Micro	2	2
39	Roos, V., Silvestre, S., & De Jager, T. (2017). Intergenerational care perceptions of older women and middle adolescents in a resource-constrained community in South Africa. *Journal of Gerontological Social Work*, *60*(2), 104-119.	Qual	South Africa	4	Micro, Meso, Macro	1	2
40	Morrow, E. M., & Nicholson, C. (2016). Carer engagement in the hospital care of older people: an integrative literature review. *International Journal of Older People Nursing*, *11*(4), 298-314.	Lit review	United Kingdom	1, 2	Macro	1	3

41	O'Connor, M., Moriarty, H., Madden-Baer, R., & Bowles, K. H. (2016). Identifying critical factors in determining discharge readiness from skilled home health: An interprofessional perspective. *Research in Gerontological Nursing, 9*(6), 269-277	Qual	United States	1, 2	Micro, Meso	1	2
42	Win, K. T., Hassan, N. M., Oinas-Kukkonen, H., & Probst, Y. (2016). Online patient education for chronic disease management: consumer perspectives. *Journal of Medical Systems, 40*, 1-13.	Quan	Australia	1, 3	Micro, Meso	1	1
43	Domínguez-Guedea, M. T., & Garcia, A. O. (2015). Sociocultural and familial influences on the well-being of mexican older adults' family caregivers. *Research in Gerontological Nursing, 8*(4), 188-196.	Quan	Mexico	1	Micro, Meso, Macro	2	2
44	Smith-Carrier, T., & Neysmith, S. (2014). Analyzing the interprofessional working of a home-based primary care team. *Canadian Journal on Aging/La Revue canadienne du vieillissement, 33*(3), 271-284.	Case study	Canada	2	Micro, Meso	2	3
45	Riva, G., Gaggioli, A., Villani, D., Cipresso, P., Repetto, C., Serino, S., Triberti, S., Brivio, E., Galimberti, C., & Graffigna, G. (2014). Positive Technology for Healthy Living and Active Ageing. *Studies in Health Technology and Informatics, 203*, 44-56.	Theor	Italy	3	Micro, Meso	1	3
46	Storm, M., Siemsen, I. M. D., Laugaland, K., Dyrstad, D. N., & Aase, K. (2014). Quality in transitional care of the elderly: Key challenges and relevant improvement measures. *International Journal Of Integrated Care, 14*, 1-15.	Case study	Norway	1, 2	Meso	1	2
47	Walsh, K., & Shutes, I. (2013). Care relationships, quality of care and migrant workers caring for older people. *Ageing & Society, 33*(3), 393-420.	Mixed	Ireland, United Kingdom	2	Micro, Meso, Macro	2	3
48	Hobbs, A., & Alonzi, A. (2013). Mediation and family group conferences in adult safeguarding. *The Journal of Adult Protection, 15*(2), 69-84.	Lit review	United Kingdom	4	Meso	2	2
49	Viau-Guay, A., Bellemare, M., Feillou, I., Trudel, L., Desrosiers, J., & Robitaille, M. J. (2013). Person-centered care training in long-term care settings: usefulness and facility of transfer into practice. *Canadian Journal on Aging/La Revue canadienne du vieillissement, 32*(1), 57-72.	Qual	United Kingdom	1, 2	Micro, Meso	2	3
50	Bisogni, C. A., Jastran, M., Seligson, M., & Thompson, A. (2012). How people interpret healthy eating: contributions of qualitative research. *Journal of Nutrition Education and Behavior, 44*(4), 282-301.	Lit review	United States	4	Micro, Meso	2	3
51	Wall, J. C., & Spira, M. K. (2012). A conceptual framework for differential use of mediation and family therapy interventions with older adults and their families. *Journal of Gerontological Social Work, 55*(3), 282-297.	Qual	United States	1	Meso	1	2
52	Schroeder, B., MacDonald, J., & Shamian, J. (2012). Older workers with caregiving responsibilities: A Canadian perspective on corporate caring. *Ageing International, 37*, 39-56.	Theo	Canada	1, 4	Macro	1	1
53	Ganyo, M., Dunn, M., & Hope, T. (2011). Ethical issues in the use of fall detectors. *Ageing & Society, 31*(8), 1350-1367.	Theo	United States	3, 4	Meso, Macro	1	2
54	Even-Zohar, A. (2011). Intergenerational solidarity between adult grandchildren and their grandparents with different levels of functional ability. Journal of Intergenerational Relationships, *9*(2), 128-145.	Quan	Israel	1	//	1	1
55	Salovaara, A., Lehmuskallio, A., Hedman, L., Valkonen, P., & Näsänen, J. (2010). Information technologies and transitions in the lives of 55–65-year-olds: The case of colliding life interests. *International Journal of Human-Computer Studies, 68*(11), 803-821.	Qual	Finland, Sweden	3	Micro	1	3
56	Connolly, M., Grimshaw, J., Dodd, M., Cawthorne, J., Hulme, T., Everitt, S., ... & Deaton, C. (2009). Systems and people under pressure: the discharge process in an acute hospital. *Journal of Clinical Nursing, 18*(4), 549-558.	Qual	United Kingdom	1, 2	Micro, Meso	2	1
57	Utley-Smith, Q., Colón-Emeric, C. S., Lekan-Rutledge, D., Ammarell, N., Bailey, D., Corazzini, K., Piven, M.L. & Anderson, R. A. (2009). Staff perceptions of staff-family interactions in nursing homes. *Journal of Aging Studies, 23*(3), 168-177.	Mixed	United States	1, 2	Micro, Meso	3	3
58	Clark, A. M., Reid, M. E., Morrison, C. E., Capewell, S., Murdoch, D. L., & McMurray, J. J. (2008). The complex nature of informal care in home-based heart failure management. *Journal of Advanced Nursing, 61*(4), 373-383.	Qual	Scotland	1	Micro, Meso	1	1
59	Berg, C. A., & Upchurch, R. (2007). A developmental-contextual model of couples coping with chronic illness across the adult life span. *Psychological Bulletin, 133*(6), 920.	Lit review	United States	1	Micro, Meso, Macro	3	3
60	Tuckett, A. G. (2007). The meaning of nursing-home:'Waiting to go up to St. Peter, OK! Waiting house, sad but true'—An Australian perspective. *Journal of Aging Studies, 21*(2), 119-133.	Qual	Australia	2	Micro, Meso	1	3
61	Williams, K. N. (2006). Improving outcomes of nursing home interactions. *Research in Nursing & Health, 29*(2), 121-133.	Qual	United States	2	Micro, Meso	1	2
62	Wodarski, J. S., & Williams-Hayes, M. M. (2003). Utilizing case management to maintain the elderly in the community. *Journal of Gerontological Social Work, 39*(4), 19-38.	Theor	United States	4	Meso	1	1