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Aging Well and the Environment: Toward an Integrative Model and Research Agenda for the Future

Hans-Werner Wahl, PhD,*[,1] Susanne Iwarsson, PhD,[2] and Frank Oswald, PhD[3]

[1]Department of Psychological Aging Research, Heidelberg University, Germany.
[2]Department of Health Sciences, Lund University, Sweden.
[3]Department of Interdisciplinary Ageing Research, Goethe University Frankfurt, Germany.

*Address correspondence to Hans-Werner Wahl, PhD, Department of Psychological Aging Research, Heidelberg University, Bergheimer Strasse 20, 69115 Heidelberg, Germany. E-mail: h.w.wahl@psychologie.uni-heidelberg.de

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Purpose of the Study: The effects of the physical–spatial–technical environment on aging well have been overlooked both conceptually and empirically. In the spirit of M. Powell Lawton's seminal work on aging and environment, this article attempts to rectify this situation by suggesting a new model of how older people interact with their environment. ***Design and Methods:*** Goals of the paper include (a) integration of the essential elements of the ecology and aging literature, particularly in regard to Lawton's research, (b) development of connections between traditional theories of ecology of aging and life span developmental models of aging well, (c) acknowledgment of the pronounced historical and cohort-related changes affecting the interactions of older people with their environment, and (d) discussion of the implications of this analysis for concepts and theories of aging well. ***Results:*** The model builds on a pair of concepts: environment as related to agency and belonging, founded in motivational psychology, and developmental science. ***Implications:*** After describing the model's key components, we discuss its heuristic potential in four propositions for future gerontological research and identify implications of the model for future empirical research.

Key Words: Ecology theory of aging, Physical–spatial–technical environment, Agency, Belonging, Person–environment resources

There is consensus within the gerontological literature that both personal and environmental resources contribute to aging well. Nevertheless, the contribution of key elements of the immediate environment, including the home, public, and community environments, as well as technology remains largely overlooked. In child and adolescent psychology, as in life span developmental science, coconstruction, the assumption that developing individuals are shaped by contexts and vice versa, is dominant (Valsiner, 1994; Youniss, 1987). In some contrast, although Lawton and Nahemow

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(1973) conceptualized aging well as involving a Person (P)–Environment (E) interchange dynamic, the role of the immediate physical, spatial, and technical environment has largely been neglected in gerontological research (e.g., Wahl & Weisman, 2003; Wahl & Oswald, 2010). This is all the more surprising because as Lawton and Nahemow (1973) argued almost four decades ago, it is the late phase of the human life span that is particularly sensitive to the nature and character of P–E interactions.

This article, written in the spirit of Lawton's seminal work on aging and environments (e.g., Lawton, 1977, 1982, 1989; Lawton & Nahemow, 1973; see also Scheidt & Norris-Baker, 2004), builds on his intention to better harmonize the person and environmental perspectives in aging research and practice. In the first edition of the *Handbook of the Psychology of Aging*, Lawton (1977) suggested a broad understanding of the environment, including housing, neighborhoods, out-of-home areas, and transport issues. Later, Lawton (1998) strongly supported the important role of technology in the "new" environment for aging well; thus, our broad understanding of the environment also includes interactions with technology. Building on work by Wahl and Oswald (2010), we develop a new framework for understanding the interchange between people and their environments. After describing the model's key components, we discuss its heuristic potential in terms of four propositions for future gerontological research.

Linking Environment with Models of Aging Well: Potential and Limits of Traditional Ecology of Aging Perspectives

The role of environment in aging is grounded in literature regarding the ecology of aging and environmental gerontology (we use these terms interchangeably) to which Lawton and other key gerontological researchers made classic contributions (e.g., Carp, 1987; Lawton, 1982, 1989; Lawton & Nahemow, 1973; Rowles, 1978, 1983; Rubinstein, 1987, 1989; see also Scheidt & Windley, 2006). The ecology of aging perspective posits old age as a critical phase in the life course that is profoundly influenced by the physical environment. According to Lawton (1982), the objective physical environment lies outside the skin, is inanimate, and is measurable. Although there is consensus that the physical environment has the potential to impose significant constraints in late life, it may also enhance opportunities for aging well, as new housing solutions and new technologies support declining competencies.

Based on Lewin's ecological equation, Lawton suggested an interaction term to account for the influence of person–environment interactions, that is, $B = f(P, E, P \times E)$. This interaction term suggests that because person-related competencies and needs manifest differently in different environments, they may lead to dissimilar outcomes. The ecology theory of aging (ETA) of Lawton and Nahemow (1973) provides a broad overarching framework that includes different types and levels of personal competence (e.g., sensory loss, physical mobility loss, and cognitive decline) and characteristics of the objective environment (housing standards, neighborhood conditions, and public transport). A fundamental assumption of the ETA is that unique combinations of personal competence and environmental characteristics determine an individual's optimal level of functioning.

Complementing Lawton's ETA, person–environment exchange is a function of subjective experiences in affective and cognitive terms, personal meanings, and attachment. The classic approach to the cognitive–affective dimension of the physical environment is to address satisfaction with housing (Pinquart & Burmedi, 2004). Other examples include Rowles' (1983) "insideness," the rich collection of memories that support an individual's sense of place identity, and Rubinstein's (1989) meaning of home, focused on active management of the environment.

There are numerous implications of traditional ecology of aging principles for models of aging well. For example, because housing figures prominently in the major day-to-day context of aging, research into the potential and constraints of the home environment addresses important issues related to preserving health and quality of life in later life. There has been and continues to be a strong desire of old and very old people to "age in place," remaining in their familiar home environment or an environment of their choice for as long as possible. This desire may ultimately reflect an optimization strategy critical to late life; it affords continuity and control over important aspects of daily life, including routines, self-care and other potentially meaningful and self-defining activities (Rowles, Oswald, & Hunter, 2004). In sum, ecology of aging principles may be particularly critical to understanding the "good life" in old age (Lawton, 1983).

The important messages of environmental gerontology for models of aging well suggested by

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early conceptual and empirical work have fallen by the wayside, however. It is noteworthy that no material specifically addressing the ecology of aging can be found in the most recent *Handbook of Theories of Aging* (Bengtson, Gans, Putney, & Silverstein, 2009) or its earlier edition (Bengtson & Schaie, 1999). Furthermore, classic models of aging well (Baltes & Baltes, 1990; Rowe & Kahn, 1998; Ryff, 1989) have not clearly defined the role that environment plays.

The lack of attention to environment on the part of these models of aging well may be explained by a pronounced focus on the social environment, with less emphasis on the physical environment (Wahl & Lang, 2006). In addition, there has been a failure to clearly specify the objective and subjective characteristics of the environment that may influence gains and losses associated with the aging process. Furthermore, although consideration of environment has the potential to add to our understanding of cohort and historical influences on aging well, it has not been well defined. A prime example of how environment could influence the aging process is the emergence of "new" technology from which future (but not previous) cohorts of people may benefit (Lawton, 1998).

Toward an Integrative Framework of Aging Well As Person–Environment Interchange

To expand important perspectives in the field of the ecology of aging and link them more closely with developmental models of aging well, we suggest the framework depicted in Figure 1 (Wahl & Oswald, 2010). At the core of this framework is the assumption that two processes, experience-driven belonging and behavior-driven agency, help to better understand and integrate existing P–E interchanges as people age. These themes have been central to all major theories concerning fundamental human needs since Maslow's (1954) landmark work. Belonging reflects a sense of positive connection with other people and the environment (e.g., Bakan, 1966; Baumeister & Leary, 1995; Wiggins, 1991), whereas agency refers to the process of becoming a change agent in one's own life by means of intentional and proactive behaviors (e.g., Bandura, 2006; Wiggins, 1991).

However, understanding of these processes in classic motivational and social psychology has been limited to individual and person–social environment interactions. The life span developmental dynamics of belonging and agency have largely been ignored,

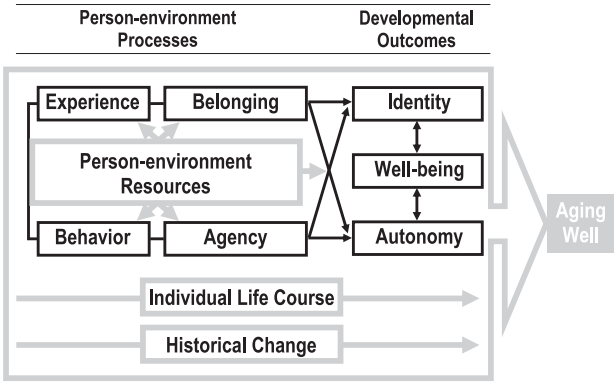

Figure 1. Conceptual framework: Interplay of belonging and agency, aging well, and the environment.

especially in old age (Wahl & Lang, 2006). We argue that adapting these constructs to the person–environment sphere is worthwhile, as they are particularly useful for understanding the role of environment for aging well. Moreover, these constructs are very useful for integrating the major theoretical approaches in the field of the ecology of aging, which have heretofore developed largely in parallel fashion (Wahl & Oswald, 2010).

Environment-Related Processes of Belonging and Agency

Processes associated with belonging account for the full range of environment-related experiences; they explain subjective evaluations and interpretations of place and guide cognitive and emotional representations made regarding place (Oswald & Wahl, 2005; Rowles & Watkins, 2003). Processes of belonging bring together key concepts in the ecology of aging and theories regarding residential satisfaction by explaining variation in subjective global evaluations of home or geographic location (Pinquart & Burmedi, 2004). Similarly, theories about place attachment and identity (Neisser, 1988) emphasize the transformation of "space" into "place" (Rowles & Watkins, 2003), describing how people form affective, cognitive, behavioral, and social bonds to the environment (Peace, 2005; Smith, 2009). Similarly, concepts such as the meaning of home are directly related to place attachment (Oswald & Wahl, 2005). In the process of reflecting on the past, social, cognitive, and emotional links become manifest, symbolically represented by certain places and cherished objects within the home (e.g., Rubinstein, 1987). Thus, belonging incorporates nongoal-oriented cognitive and emotional aspects as well as the behavioral and physical

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aspects of bonding because familiarity and routines develop over time (e.g., Rowles et al., 2004).

In contrast, processes of agency include the full range of goal-directed behaviors related to environment, such as environment-related cognition and perceived control over the physical environment. They include reactive and proactive aspects of using, compensating, adapting, retrofitting, creating, and sustaining places, especially important in old age because of decreasing functional and cognitive capacity. Processes of agency are evident in theories of the ecology of aging such as the environmental docility hypothesis and the ETA (Lawton, 1982; Lawton & Nahemow, 1973; Scheidt & Norris-Baker, 2004); because of their increasing vulnerability, older people constantly need to react to forces of environmental press in order to remain independent. Extending this model, the environmental proactivity hypothesis suggests that older adults are not simply pawns of their environment but can proactively change environments in order to meet their own needs and to maintain independence (Golant, 2011; Lawton, 1989; Oswald & Rowles, 2006). In addition, processes of P–E agency cover cognitions and evaluations, which precede adaptive behavior aimed to regulate P–E dynamics as people age. A prominent construct in this vein is psychological control (Lachman & Burack, 1993), which has been extended to the housing domain in our previous work (Oswald, Wahl, Schilling, & Iwarsson, 2007).

Person–Environment Resources

Our model assumes that P–E resources are essential to both belonging and agency. Although the concept of P–E resources draws on Lawton's (1989) use of the terms "person resources" and "environmental resources" (see also Scheidt & Norris-Baker, 2004), we suggest using the concept only as a relational one. That is, in our model, the concept of P–E resources represents the most immediate interface between the person and his/her environment, which is difficult to disentangle. It assumes that all personal resources, including functional abilities, cognitive and affective functioning, and personality traits, may gain or lose importance in specific environmental configurations. Similarly, environmental resources, including barrier-free housing or innovative housing solutions, are utilized differently across persons. Specifically characteristic of old and very old age, perfect P–E fit constellations may rather quickly become risky lack-of-fit situations (e.g., when cognitive or functional ability decline). As such, all person resources (and risks) must always be seen in relation to environmental resources (and risks) and vice versa.

P–E resources are central to agency and belonging. In terms of agency, physical home environments may or may not fit an older individual's decreasing functional capacity; thus, it may be crucial to adapt the home environment in order to maintain autonomy. In addition, personal resources may foster or hinder the full use of such environmental adaptation. As we have argued earlier, housing-related control beliefs—that is, control expectations in the domain of housing—may become particularly relevant here (Oswald, Wahl, Schilling, & Iwarsson, 2007; Wahl, Oswald, Schilling, & Iwarsson, 2009). Similarly, processes of belonging may be nurtured differentially through the experience of place-related meaning in terms of the type of chronic impairment. For example, older adults with vision and mobility impairment, prone to losing control over the physical environment, and may be overly reliant on the familiarity of the home environment.

Interchange With Environments in a Life Course Perspective

Our model posits that the interaction of belonging and agency unfolds within a life-course perspective, with the processes of belonging increasing in importance as people enter old and particularly advanced old age, whereas the relevance of processes of agency decreases. This is consistent with models of human development and aging (Erikson, 1950; Tornstam, 2005). It explains why old, and particularly very old, adults are hesitant to undertake repeated relocations, show high stability and regularity in their out-of-home–related activities (e.g., preferred places and travel patterns), and value their familiar home and neighborhood environment, even if they present inherent risks (Oswald & Rowles, 2006; Scharf, Phillipson, & Smith, 2005; Wahl & Oswald, 2010).

Although we regard the interplay of belonging and agency as largely complementary across the adult life span, antagonistic and ambivalent configurations may increase as people move from middle to old and very old age. An interesting case is environment-oriented curiosity and explorative behavior as described in Berlyne's (1960)work. According to the conceptual and empirical work by Carstensen (2006), curiosity and explorative behavior decreases as people age. On the other hand,

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environments may stimulate the aging cognitive and emotional systems and become increasingly important in later life. This may occur as major roles related to being in the workforce or caring for one's children are completed and new experiences and opportunities for enhancing belonging are embraced. Indeed, the ongoing orchestration of curiosity-oriented agency and familiarity-oriented belonging may lie at the heart of fundamental challenges in old and very old age. Prime examples would include ambivalence related to a planned relocation to a new home environment (such as a retirement community) or the possible use of a new technology, such as the Internet or sophisticated mobile telephones.

Environment and the Cohort Dynamics of Life Span Development and Aging

Environment influences aging well within a historical, cohort-related, and cultural context. Historical changes relevant to aging well can be traced to changes in aging individuals' relations with the environment. The impact of interaction with the environment on aging well has increased as new housing solutions for older adults, such as assisted living, retirement communities, or intergenerational arrangements, and new housing options for persons with dementia have replaced traditional built environments. Such developments enhance the fit between living preferences and needs and what the environment has to offer, augmenting the well-being of both current and future generations of older people (Wahl & Gitlin, 2003). It is likely that future built-environment solutions for older adults may not only better support agency-related processes (e.g., enhancing daily autonomy even among older adults with disabilities) but also nurture or even "provoke" new forms of belonging, including new relationships with the younger generation or friendships with persons with dementia. Similarly, new P–E interchange patterns are evident in out-of-home mobility and, at the more macro level, in the migration patterns of current and future cohorts of older people. Never in history has there been an aging cohort with so much "world experience" and openness to new travel modes as is true today. In the future, this lifestyle trend may become more commonplace or take new directions, perhaps via new mobility modes (such as car-sharing, E-Bikes) or increasing "use" of virtual environmental realities. Migration or extensive traveling may become a major expression of older adults' agency-related behaviors, while also modifying the traditional view of "aging in place" and possibly leading to "place detachment" and new variations of belonging in the future. This may also be seen as another variant of the ambivalence between curiosity-oriented agency and familiarity-related belonging as people move from middle to old and very old age, a conflict that may become even more pronounced in the future.

Technology developments that were not available to the cohorts investigated empirically in Lawton's early work now serve as another resource in old age. For example, the Internet, the "automation" of everyday technology (e.g., teller machines, ticket machines, computer voice menus, and car technology), and sensor- or GPS-based assistance have changed the way younger as well as older people interact with the environment (Czaja, Sharit, Charness, Fisk, & Rogers, 2001; Fozard, 2005). Indeed, a new and rapidly growing "silver market" has emerged, as technologically innovative products designed for older adults, particularly those with compromised physical, cognitive, or social functioning, abound (Charness & Boot, 2009; Rogers & Fisk, 2010). Robots accompany frail older adults while they stroll around the house or use the bathroom; personal computers provide cognitive or physical training programs; smart home environments support people with sensory, mobility, or cognitive decline; and robotic animals play a significant role in the social and emotional life of older people with dementia. Future cohorts of older adults will benefit from a full range of technology products designed to support them as they "stay connected" and age well despite accumulated loss experiences. It is possible that in the future, older people will not only use robot care to support and compensate for lost competencies (agency) but may also feel emotionally attached to their robotic animal or enjoy virtual reality, new means of experiencing environmental richness in the context of pronounced disability (belonging).

Implications for Models of Aging Well

The complex dynamics between belonging and agency demand a multidimensional understanding of aging well. Consistent with the model proposed by Ryff (1989) and others (Haak, Fänge, Iwarsson, & Ivanoff, 2007; Rowles, 1983), we define aging well as maintaining the highest autonomy, well-being, and preservation of one's self and identity as possible, even in the face of severe competence loss. We conceptualize these outcomes as important to

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Table 1. Emerging Propositions of Model of Belonging and Agency, Aging Well, and the Environment

Proposition	Central tenets of proposition (from the perspective of Lawton's ecology of aging principles)
Proposition 1 It is useful to consider environment-related processes of belonging and agency in combination in order to better understand aging well.	Motivations toward belonging and agency apply to the full range of interactions with environment, including home environments, out-of-home action spaces, and technology environments. Processes of belonging and agency both correlate substantially with key outcomes of aging well across countries. There is a need to combine Lawton's competence–press approach with meaning and place attachment-related views of exchange with environments.
Proposition 2 Processes of environment-related belonging gain in importance in the face of major age-associated functional impairment, whereas agency becomes less important.	The fundamental tenets of Lawton's environmental docility hypothesis continue to hold. Equally important is a changed dynamic in terms of belonging-related processes as aging people experience major functional impairment. Such a holistic view of interaction with environment in the face of pronounced functional inability adds to the understanding of aging well in challenging life phases, such as age-related autonomy loss and care needs.
Proposition 3 The interplay of belonging and agency can augment existing life span development models of aging well.	Lawton's distinction between environmental press and proactivity continues to be important. Nevertheless, more consideration of belonging processes in research on old and very old individuals may counteract the tendency of a too "agentic" view of late life span development.
Proposition 4 The interplay of belonging and agency can augment the analysis of cultural frames and cohort dynamics regarding aging well.	The implications of Lawton's emphasis on the role of exchange with the environment for understanding cultural and cohort dynamics are underrated and should be expanded to the macro level of aging well. The current cultural trend toward an agency-oriented understanding of aging well may ignore strong belonging-related motivations in increasing numbers of very old adults.

consider simultaneously, as major endpoints of interaction with the environment. This perspective moves beyond traditional perspectives espoused by scholars in the field of the ecology of aging who have sought to explain well-being (e.g., Lawton & Nahemow, 1973), well-being and autonomy (e.g., Carp, 1987), or identity (e.g., Rubinstein, 1989) in isolation.

Heuristic Potential of Model: Emerging Propositions

We derive four propositions from our conceptual framework that have heuristic value for a future research agenda related to aging well in the environment (Table 1). Although there are empirical linkages to existing data, the overall empirical platform for these predictions still has a number of limitations, including a paucity of longitudinal data. Also, the propositions may lead to conceptual refinement of existing models of aging well, which may lead in turn to new empirical data and results in the future.

Proposition 1: Usefulness of Considering Agency and Belonging in Combination in P–E Research

Our model predicts that the simultaneous consideration of environment, agency, and belonging will enhance the understanding of aging well. Our model provides the conceptual groundwork for a holistic and flexible account of a wide range of environments, counteracting the traditional separate discourse on various environments, such as the home, out-of-home, and technology environments.

The dynamic interplay among environmental barriers, personal competencies, and outcomes of aging well is complex and likely to benefit from our belonging- and agency-oriented view. This was demonstrated in the European ENABLE-AGE Project, with a sample of 1,918 individuals aged 75–89 years, living alone in private homes in urban areas of Sweden, Germany, the United Kingdom, Hungary, and Latvia (see Iwarsson et al., 2007). We found that the processes of housing-related agency and belonging were both related to autonomy

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and well-being (Oswald, Wahl, Schilling, Nygren, et al., 2007). Specifically, participants living in more accessible housing, who perceived their home as useful and valuable (belonging) and who thought that they themselves were responsible for their housing situation (agency), were more independent in daily activities (autonomy), had a better sense of well-being (environmental mastery), and suffered fewer depressive symptoms. Supplementary analyses (Wahl, Oswald, et al., 2009) unraveled a significant interaction, as the predictive role of accessibility on depressive symptoms was higher for those with high levels of housing-related external control beliefs and lower for those with low levels of housing-related external control beliefs.

Regarding the technology environment, empirical findings support the view that technology use can make a large positive difference in the lives of older adults, including people with problems in everyday functioning and cognitive impairments (e.g., Rogers & Fisk, 2010; Topo, 2009). As seen through the lens of our model, technology such as the Internet has become a new resource for exerting agency, for purposes including health information seeking, learning and education, and cognitive and physical training (Charness & Boot, 2009). Moreover, belonging-related processes, including new forms of attachment and emotional interaction with grandchildren, are also linked with new forms of communication media (Quadrello et al., 2005). In addition, there is preliminary evidence that interacting with animal, entertainment, and therapeutic robots enhances the emotions of older adults with dementia (Libin & Cohen-Mansfield, 2004; Shibata & Wada, 2010; Tamura et al., 2004).

Proposition 2: Processes of Belonging Gain in Importance Among Older Adults With Major Functional Impairment

Extending Lawton's environmental docility and proactivity hypotheses (Lawton, 1983; Lawton & Nahemow, 1973), our model predicts that processes of belonging gain in importance among older adults with major functional impairment.

Empirical research suggests that home environment characteristics are significantly linked to everyday competence; accessibility problems resulting from the interaction of functional limitations and environmental barriers are significantly related to dependence in daily activities (Wahl, Fänge, Oswald, Gitlin, & Iwarsson, 2009). Severe vision loss is significantly influenced by P–E mismatching, suggesting an important role for agency (Wahl, Oswald, & Zimprich, 1999). Recently, Heyl and Wahl (2011) found that people with severe vision loss relied on their cognitive resources to counteract their reduced everyday functioning due to P–E mismatches more often than did older adults without visual impairments.

However, vision and mobility loss also seem to shape the place-related meaning of the physical environment, that is, the belonging component. Oswald and Wahl (2005) compared blind adults, adults with severe mobility impairments, and older adults without functional impairment. They found that blind adults experienced their home environment less as a function of its physical features and as a behavioral action space (agency) than did those with mobility impairments and those who were unimpaired. In contrast, older adults with vision loss and those with mobility impairment experienced the meaning of familiarity of the home environment (belonging) much more than did the group without functional impairment.

Proposition 3: The Interplay of Agency and Belonging Can Augment Existing Life Span Developmental Models of Aging Well

Third, there is heuristic value in our model's ability to inform and add to life span developmental models of aging well. In particular, agency decreases and belonging increases in importance for aging well as people move from young old to very old age. Therefore, our model may be seen as a life span developmental extension built on principles of the ecology of aging.

With respect to theories of aging well, our model further develops the selective optimization with compensation (SOC) model described by Baltes and Baltes (1990) as P–E agency processes become better understood. For example, home modification, concentration of out-of-home mobility to familiar areas, and using a care robot reflect important selection and compensatory strategies, beyond those included in the SOC model. On the other hand, processes of P–E belonging seem to be underrepresented in currently dominant models of aging well. Existing models tend to be agency oriented, overlooking more experientially driven processes. Yet experientially driven belonging processes may lie at the heart of managing old and particularly very old age, as part of the ongoing search for balancing agency and belonging, corresponding to individual competencies and needs. Some of the

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key models of aging well acknowledge agency and belonging dynamics, although they do not consider the context of environment. For example, the key prediction of the life span theory of control of Heckhausen, Wrosch, and Schulz (2010) is that an increase in secondary control strategies is a powerful development tool supporting the need for primary control. This can be interpreted as an indirect indication of transition from agency- to belonging-oriented processes, as people move from middle adulthood to old and very old age. Similarly, Carstensen's (2006) extensive empirical work driven by the socioemotional selectivity theory (SST) has demonstrated a transition from information-seeking to intimacy-oriented social motivations as people age. A similar transition may indeed characterize the relationship between older people and their environment (Wahl & Lang, 2006). Support for this assumption comes from a recent study comparing "young-old" (65–79 years old) and "old-old" (80–94 years old) community-dwelling older adults in a small town neighborhood; place attachment processes were found to become stronger in very old age (Oswald, Jopp, Rott, & Wahl, 2011). This is consistent with the meta-analytic finding by Pinquart and Burmedi (2004) that residential satisfaction increases over the life span into very old age. Thus, old and particularly very old adults tend not to undertake repeated relocations, show high regularity in their out-of-home-related activities (e.g., preferred places and travel patterns), and generally value their home and neighborhood environment highly, even if these are "bad" in objective terms (Oswald & Rowles, 2006; Wahl & Oswald, 2010).

Proposition 4: The Interplay of Agency and Belonging Can Augment the Analysis of Cultural Frames and Cohort Dynamics Regarding Aging Well

There is heuristic value in our model's ability to add to the understanding of cultural frames for aging well and the role of cohort effects. In a sense, therefore, our model is a cohort-, history-, and culture-related extension of the principles of the ecology of aging, and in particular, the ETA of Lawton and Nahemow (1973).

Our model predicts that value conflicts and cultural tensions will exist in the future. More specifically, we posit an increase in tensions between agency and belonging, as cultural values change. In Western cultures, individuals are viewed as being the "producers of their own development" (Lerner & Busch-Rossnagel, 1981). Although this is a promising individual perspective in cultural terms, the limited biological potential of very old age challenges such a view. In the future—particularly in advanced older age—a new conflict may develop between investing in the belonging component and feeling strong societal and cultural pressure to exert agency. Indeed, finding the "right" balance between belonging and agency in P–E transactions may become a new "development task" in old age in the future. The potential of technology, new housing, and out-of-home mobility solutions will have to be balanced with the desire to maintain and enjoy existing P–E configurations, even if risks persist and possible "new" ways to experience aging are neglected.

Implications for Future Gerontological Theorizing and Empirical Research

A major implication of our model for future research is the importance of explicitly considering aging in the environment in longitudinal studies of aging rather than decontextualizing the aging individual, as most longitudinal studies tend to do. In order to avoid such decontextualization, specific measures targeting P–E interactions should be included. However, it is also true that we are still far from establishing a methodology for measuring environment-related agency and belonging processes. Developing a psychometrically sound interdisciplinary minimum data set built on existing research (e.g., Iwarsson & Slaug, 2010; Oswald et al., 2006) is a critical task for the future.

There is also a strong need for more bridge-building between research related to models of aging well and a more explicit consideration of P–E interactions. For example, systematically specifying how the complexity of residential decisions, the various uses of out-of-home spaces, and the wide array of technology solutions may speak to SOC or SST is work mostly yet to be done in conceptual and empirical terms (Lindenberger, Lövdén, Schellenbach, Li, & Krüger, 2008; Wahl & Lang, 2006). In addition, the current trend toward measurement burst designs, taking into account short-term interindividual variability in areas such as cognitive and emotional functioning, and daily stress experiences (e.g., Ram & Gerstorf, 2009) would benefit from a stronger P–E transactional perspective. For example, as Moss and Lawton (1982) have already shown, the later morning and early afternoon hours of a typical day in old age are more

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agency- (and curiosity-) driven, in terms of using out-of-home action spaces and possibly experiencing novel events, compared with evening hours that are strongly dominated by belonging-oriented processes. Making connections between such natural ecology dynamics and cognitive and emotional regulation processes may be a promising approach. Indeed, the ecology of aging view always involved a strong consideration of concrete day-to-day behaviors in natural environments (Lawton & Nahemow, 1973; Wahl, 2001).

The intersection of the aging and environment perspective and the biogerontology and neuroscience perspective also demands more research attention. This would enable better understanding of possible interactions between environmental input and cognitive and affective functioning at various levels, including brain processes. Although research on the relationship between cognitive functioning and enriched environments indicates the importance of environments for normal aging and Alzheimer's Disease (e.g., Arendash et al., 2004; Lores-Arnaiz et al., 2006), scant research regarding P–E interactions exists (see also Hertzog, Kramer, Wilson, & Lindenberger, 2008). We are not aware of any rigorous research that brings together environment and its impact on the course and outcome of various "new" systemic housing solutions (e.g., e-health, e-care, ambient assisted living) or that systematically manipulates housing and neighborhood features in order to test for their possible effects on cognitive aging.

Our model challenges the cohort dependency of major theories of aging well and demands a more flexible and dynamic understanding of theory construction. Surprisingly, the dominant models of aging well (except for Lindenberger et al., 2008) give little attention to key facets of quality of life, such as the manifold use of out-of-home environments (Webber, Porter, & Menec, 2010), new forms of housing design, and the increasing use of technology, including smart home devices, Internet-based intervention and care strategies, and robotic aids. The same lack of attention applies to established models in geriatric medicine, such as the disablement process model (Verbrugge & Jette, 1994) and the International Classification of Functioning (World Health Organization, 2001). One may indeed argue that new developments in our culture of aging as well as the rapidly growing "silver market" (Kohlbacher & Hang, 2011) are not taken seriously enough by key theorists in the field of aging. More generally framed, there is a need to constantly monitor theories of aging well in terms of their capability to accurately and comprehensively reflect ongoing cultural change critical for aging. The explicit consideration of environment may help to promote such reflection as continuously important work in the field of gerontology.

In closing, new challenges arise as we recommend the stronger consideration of environment. In particular, the issue of environment underscores the urgent need to learn (and educate ourselves) about new competencies, such as highly skilled residential decision making or sophisticated technology use that will be increasingly necessary for aging well in the future (see also Zarit, 2009). It is nevertheless deeply satisfying for aging researchers that many older adults continue to play the "keyboard," conducting a "good life" (Lawton, 1983) with great virtuosity, even in very old age. We expect that in the future, this virtuosity will increasingly involve environment-related competencies, and we have no doubt that we will all continue to benefit from the legacy of M. Powell Lawton.

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