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On the Quantitative Assessment of Perceived Housing in Later Life

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Person-environment relationships become particularly important in later life. Our discussion of challenges in the assessment of experiential person-environment exchange processes is grounded on a four-domain model of perceived housing. We present empirical findings from an iterative process of instrument revision seeking optimization of both reliability and validity issues regarding control-related and meaning-oriented domains of perceived housing. Our initial reconstruction, however, was not confirmed to represent a consistent and reliable measure for the suggested dimensions of housing-related identity, privacy, and autonomy. Exploratory post-hoc analyses of the pilot pool of indicators suggests six holistic facets, such as “daily independence” “neighborhood belonging”, “mirror of self”, “continuity and remaining in place” and “being alone and at peace”. Plausible content-related interpretation and relations to major background characteristics encourage the continuous task of tailoring assessment instruments to meet the holistic character of housing experiences in later life.

KEYWORDS *person-environment exchange process, perceived housing, control beliefs, meaning of home, out-of-home environment*

INTRODUCTION

Environmental gerontology emphasizes the relationship between the person and the physical and social environment in old age (Lawton, 1977; Scheidt

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& Windley, 2006; Wahl, 2001; Wahl & Gitlin, 2007). Due to behavioral and experiential reasons, person–environment relationships become particularly important in later life. For instance, the ecological theory of aging (Lawton, 1982, 1998; Lawton & Nahemow, 1973; Scheidt & Norris-Baker, 2004) describes the interaction between levels of competence (e.g., functional limitations) and settings with different levels of environmental stress (e.g., barriers at home) that both lead to outcomes in zones of behavioral adaptation (or person–environment fit) and comfort versus maladaptation (or person–environment misfit) and negative affect. Thus, from a behavioral perspective, theoretical concepts and empirical data address the need for people of very old age to maintain daily independence despite an inevitable reduction of physical and cognitive competence. The environment may exert increasing levels of environmental pressure that forces the individual to adapt to ever-new barriers and obstacles. However, from an experiential perspective, cognitive and emotional representations of the environment may hold different layers of meaning for the individual, which may foster place attachment, reflecting facets of bonding and contributing to place identity in later life (Rowles, Oswald & Hunter, 2004; Rowles & Watkins, 2003; Rubinstein, 1989).

The aim of this article is to address methodological issues of environmental gerontology. The leading question is how to properly assess experiential person–environment exchange processes, emphasizing particular aspects of perceived housing. That is, we will not focus on the assessment of objective environmental conditions and barriers or on behavioral processes of environmental accessibility, use, or adaptation. Instead, we will focus on existing measurement options for person–environment experience in later life and report an illustrating four-domain model of perceived housing based on data from a European research project (Oswald et al., 2006). Finally, we want to exemplify one way to reconsider existing quantitative assessments and to introduce first steps ahead for two of the four domains of perceived housing—that is, housing-related control beliefs and meaning of home (based on pilot data not yet published). However, note that some of the presented data are based on prior work and publications generated together with other fellow researchers (Iwarsson et al., 2007; Nygren et al., 2007; Oswald et al., 2006; Oswald, Wahl, Schilling, Nygren, Fänge, Sixsmith et al., 2007; Wahl & Oswald, 2010; Wahl, Fänge, Oswald, Gitlin, & Iwarsson, 2009; Wahl, Iwarsson, & Oswald, 2012; Wahl, Oswald, Schilling, & Iwarsson, 2009).

THEORETICAL CONCEPTS OF PERSON–ENVIRONMENT EXCHANGE

Concepts of Person–Environment Exchange with a Focus on Environmental Behavior

Although we will emphasize perceived housing, it is necessary to also address environmental behavior to better understand person–environment

experience from an environmental gerontology perspective in general. The focus in these concepts is on functional person–environment exchange processes, observed behavior, and objectively measured environmental characteristics; however, one may nevertheless agree that environmental behavior is closely linked to some unobserved experiential processes, such as cognitions and evaluations, which precede adaptive or proactive behavior aimed to regulate person–environment dynamics as people age.

A prominent construct in this vein is psychological control theory (Lachman, 1986; Lachman & Burack, 1993), which has found further specification for the environmental domain of housing (Oswald, Wahl, Schilling, & Iwarsson, 2007; Oswald, Wahl, Martin, & Mollenkopf, 2003). Housing-related control beliefs trigger interpretations of housing as either contingent on one's own behavior (internal control) or on luck, chance, fate, or powerful others (external control). The argument is that control beliefs related to the regulation of person–environment exchange become increasingly important in old age. Longitudinal data show that external control beliefs are especially sensitive to age-related changes due to health and functional ability losses; thus, they are crucial in explaining age-related outcomes, such as autonomy or well-being (Baltes, Freund, & Horgas, 1999; Clark-Plaskie & Lachman, 1999).

Concepts of Person–Environment Exchange with a Focus on Environmental Experience

In addition to the behavioral notion of person–environment exchange, person–environment exchange processes have been addressed on the experiential level in terms of residential satisfaction, place attachment, or meaning of place and are related to identity and well-being in later life (Rowles et al., 2004; Rowles & Watkins, 2003; Rubinstein, 1989). Among these concepts, residential satisfaction addresses a subjective global evaluation of the congruence between the individual and his or her living environment (Pinquart & Burmedi, 2004), often assessed by single-item self-evaluations (Oswald, Wahl, Mollenkopf, & Schilling, 2003). Concepts of place attachment and identity (Altman & Low, 1992; Lalli, 1992; Neisser, 1988; Proshansky, 1978; Stedman, 2002) emphasize experiential processes of person–environment exchange in a more differentiated way. Place attachment is not only related to attitudes, but also to a gamut of processes operating when people form affective, cognitive, behavioral, and social bonds to the environment (Brown & Perkins, 1992), thereby transforming space into place (Altman & Low, 1992; Rowles & Watkins, 2003). In this regard, the concept of the meaning of place or, more specifically, the meaning of home, deals with the most frequent manifestation of bonding (Oswald & Wahl, 2005). For instance, because older adults have often lived a long time in the same residence, cognitive and emotional aspects of the meaning of home are often strongly

linked to biography. Such social, cognitive, and emotional links may manifest through processes of reflecting on the past, symbolically represented in certain places and cherished objects within the home. Thus, the experience of place covers non-goal-oriented cognitive and emotional aspects of bonding. Moreover, it covers behavioral and physical bonding because familiarity and routines have been developed over time.

Aspects of bonding and meaning have been assessed by global evaluations (e.g., on indoor vs. outdoor place attachment) (Oswald, Hieber, Wahl, & Mollenkopf, 2005), as well as from a more qualitative empirical in-depth approach (Haak, Fänge, Iwarsson, & Ivanoff, 2007; Peace, 2005). Often, data were drawn from case studies or qualitative in-depth interviews in the fields of geography, ethnography, sociology, or psychology. They dealt with small numbers of participants, transcribed verbal data sets, and heuristic or explorative analyses with only limited possibilities to be interpreted in relation to objective assessments of environmental characteristics or of extensive assessments of person-environment fit or accessibility (Rowles, 1983; Rubinstein, 1989; Sixsmith & Sixsmith, 1991), but promising efforts have also been made of quantifying meaning-of-home aspects (Oswald et al., 2006).

THE MULTIDIMENSIONALITY OF PERCEIVED HOUSING

The label of perceived housing is used to cover issues of person-environment experience with relation to the socio-physical home environment. We refer to a four-domain model of perceived housing, introduced as a comprehensive set of assessments based on four conceptual domains: housing satisfaction, usability in the home, meaning of home, and housing-related control beliefs (Oswald et al., 2006). The model was tested with a subset of the European ENABLE-AGE Project (Iwarsson et al., 2007), i.e., 1,223 community-dwelling very old individuals (80-89 years old) who lived alone in Sweden, the United Kingdom, and Germany. Four instruments on perceived housing were administered in individual face-to-face sessions at home visits, after several rounds of translation and pilot testing.

Housing Satisfaction

To address this basic evaluation, a single-item measure (five-point rating scale) from the Housing Options for Older People questionnaire (Heywood, Oldman, & Means, 2002) was used, which specifically targeted satisfaction with the condition of the house ("Are you happy with the condition of your home?").

Usability in the Home

Usability addresses the degree to which the physical home environment supports the performance of activities at home, based on individual ratings, assessed with the Usability in My Home Questionnaire (Fänge & Iwarsson, 1999, 2003) (five-point rating scale). Although this instrument was originally introduced with three subdomains—addressing activity aspects, personal and social aspects, and physical environmental aspects of usability—only two subscales were used in the four-domain model due to psychometric analyses: activity aspects (4 items; Cronbach's $\alpha = .67$, e.g., “In terms of how you normally manage your cooking/heating of food or preparation of snacks, to what extent is the home environment suitably designed in relation to this?”) and physical-environmental aspects (6 items; Cronbach's $\alpha = .75$, e.g., “How usable do you feel the entrance to your home is?”).

Meaning of Home

The development of the Meaning of Home Questionnaire (Oswald, Mollenkopf, & Wahl, 1999) was derived from open-ended examinations of a broad scope of contents for four areas of theoretical importance (physical, behavioral, cognitive/emotional, and social), representing the heterogeneity of perceived housing (Oswald & Wahl, 2005). To assess subjective meaning, participants were instructed to judge to what extent they agreed or disagreed with statements on an 11-point scale (range, 0-10). Psychometric analyses indicated acceptable internal consistency (Cronbach's $\alpha > .50$) in three of four subscales: physical aspects (6 items, Cronbach's $\alpha = .60$, e.g., “Being at home means for me living in a place which is well-designed and geared to my needs”), behavioral aspects (6 items, Cronbach's $\alpha = .67$, e.g., “Being at home means for me being able to change or rearrange things as I please”), and cognitive/emotional aspects (10 items, Cronbach's $\alpha = .62$, e.g., “Being at home means for me feeling comfortable and cosy/homey”). The subscale on social aspects (5 items, Cronbach's $\alpha = .44$) was discarded due to its low reliability.

Housing-Related Control Beliefs

The assessment of domain-specific control beliefs is based on the conceptual distinction between internal control, which means that housing-related events are highly contingent upon a person's own behavior (where personal responsibility implies that one is responsible for what happens) versus external control, which means either some other person is responsible or things happen by mere luck, chance, or fate. The Housing-related Control Beliefs Questionnaire was developed as a 24-item questionnaire based on

the psychological dimensions of internal control, external control: powerful others, and external control: chance to be judged on a five-point rating scale (Oswald, Wahl, Schilling, & Iwarsson, 2007; Oswald, Wahl, Martin, & Mollenkopf, 2003). However, psychometric analyses indicated poor levels of internal consistency in the internal control subscale and only medium internal consistency in both external control subscales. To improve the psychometric qualities of this instrument and in accordance with the conceptual argument that housing-related external control is of particular interest in perceived housing in very old age (Baltes et al., 1999), the internal control subscale was removed. Both external subscales were combined, resulting in sufficient reliability (Cronbach's $\alpha = .67$, e.g., "Where and how I live has happened more by chance than anything else," "Other people have told me how to arrange the furnishings in my home").

What was found in ENABLE-AGE was a confirmation of the hypothetically proposed four factor model by means of multi-group analysis (multi-sample Structural Equation Model). Without going into detail, perceived housing was best displayed by the selected four constructs, reflecting four different domains, each uniquely contributing to the understanding of perceived housing in old age. In addition, cultural differences or similarities in terms of structural relationships between the four domains were revealed in the multi-group analysis for the three subsamples (i.e., Germany, Sweden, and the United Kingdom), showing little variability. Although personal and environmental background variables and objective living conditions could vary within and between the samples in the three countries, findings revealed comparable patterns of relationships, indicating a certain level of universality of perceived housing patterns in very old age across research sites.

FIRST STEPS TOWARD A MORE HOLISTIC MEASURE OF PERCEIVED HOUSING

In this section, we want first to briefly revisit some issues that may keep the current measurements of perceived housing from unfolding their full potential for representing person-environment experience. Second, we will present first results from the piloting of an approach to the measurement of perceived housing in later life that aims at addressing aspects of meaning of home and housing-related control beliefs in a holistic way. Note that we exclude the concepts of housing satisfaction and usability in this article. The reason is that the concept of housing usability is about to be further developed in close relation to objective housing accessibility from an occupational therapy perspective. As housing satisfaction is concerned, the concept draws its importance from its inclusiveness and generality but appears to be less

promising to further deepen our understanding of person–environment experience processes in later life.

Shortcomings of Measures on Housing-Related Control Beliefs and Meaning of Home

Apart from the general supporting evidence for a conceptually multidimensional model with both considerable overlap and substantial uniqueness of the four concepts of perceived housing reported so far, previous analyses indicated some challenges to most existing measures. These measures should be addressed from both a substantive and a methodological perspective to further enrich the discussion on proper assessments of perceived housing in later life.

CEILING EFFECTS

Our previous studies revealed a substantial amount of ceiling apparent in many items that ask for perceived housing aspects. With respect to the concept of housing-related control beliefs, most individuals acknowledge their own responsibility for their living situation (i.e., internal control focus), with, on average, more than three of four respondents choosing the highest category. Likewise, the living environment is considered to hold a high amount of meaning with respect to the individuals' social, physical, or cognitive and emotional demands. Therefore, current instruments do not discriminate well among the majority of people that do not experience substantial problems with their living conditions.

HETEROGENEITY OF HOUSING-RELATED ISSUES

The rationale for many of the proposed scale developments was to deliberately include many different connotations of perceived housing into scale construction to address the heterogeneity of living conditions and lifestyles apparent in old age. Similarly, introducing domain-specific content may result in a loss of generalizability in attitudinal response. For instance, in the assessment of domain-specific control beliefs, a danger is that the concrete domain-specific content is taking the lead, so the control beliefs cannot be “put to work” in answering the questions to a sufficient degree. However, because some aspects are only represented by a restricted set of items, psychometric requirements are hard to meet for many of the proposed instruments. As a consequence, subscales with low scale consistency have been discarded from subsequent analyses, and conceptually distinct aspects of perceived housing have been merged into a single indicator.

STRUCTURAL VALIDITY

In a related vein, the plethora of different meanings of housing, the complex structure of responsibilities and potentials for continuity and change in living conditions, and the diverse activities supported or restricted by the living environment have been segmented and ordered using global categories drawn from the respective disciplinary dictionaries (e.g., physical, behavioral, cognitive, emotional, social). However, it is unclear how these analytic categories relate to the experience of housing and the living environment. Salient perceptions of housing in old age may incorporate emotional, cognitive, and behavioral reactions to physical and social aspects of the living environment, representing a more holistic experience of living circumstance than the sum of its parts may indicate. Elaborating on valid themes of perceived housing, variation in question content could tap emotional, cognitive, and behavioral aspects, thereby transposing the existing structure but retaining much of the analytical framework used so far.

ECOLOGICAL VALIDITY

Even with a higher percentage of time spent indoors in old age, the perception of housing may nevertheless be strongly influenced by subjective appraisals of the immediate outdoor environment, the neighborhood, or even larger spatial expenses; this would be due to their enabling, supporting, or self-referencing characteristics. Therefore, the current focus on the indoor housing environment may be unduly narrow and miss both important aspects of housing as a fundamentally social human experience and targets for housing interventions on a neighborhood or community level.

Reconsidering Concepts of Housing-Related Control Beliefs and Meaning of Home

To address some of these challenges, we revisited our conceptual framework of housing-related control beliefs and meaning of home by seeking empirical evidence for an alternative—possibly even more holistic—underlying structure of perceived housing indicators. In other words, driven by the assumption that the current partitioning of the housing experience, both within and across proposed instruments, may blur more holistic pictures of main themes in housing-related person–environment exchange, explorative factor analysis was used to identify possible consistent content areas or themes of perceived housing in the German ENABLE-AGE dataset. Results from these analyses indicated the meaning questionnaire and the control beliefs questionnaire to address common themes.

In this article, we present findings of a research-oriented seminar at the Goethe University Frankfurt, where a group of students followed-up these themes of perceived housing in later life by generating an extended list of items that capture both indoor (respectively home) and out-of-home (respectively neighborhood) housing-related experiences. The extended pool of 47 items was intended to represent three meta-categories supposed to be at the core of perceived housing in old age: identity-related aspects of perceived housing, issues of privacy and familiarity at home, and autonomy-related aspects of perceived housing. Although behavioral and experiential aspects of person–environment exchange are reflected in all three domains, identity-related aspects of perceived housing, as well as privacy and familiarity, more explicitly cover components of thinking and feeling. Conversely, autonomy-related aspects of perceived housing cover more behavior-related items and issues of housing-related control beliefs. To assure content validity of these versatile and broadly defined target concepts, three to four subdomains have been proposed for each category, and multiple indicators (items) were sought for each of these subscales. In addition, half of the items were designed to explicitly refer to the indoor environment, whereas the other half aimed at addressing meaning held by individuals' immediate out-of-home environment. This initial pool of items has been piloted with a total of 232 participants in a mixed paper-pencil self-report, a face-to-face interview, and an online survey (Table 1).

RESULTS

Sample Description

Basic characteristics of the convenience sample for the pilot study are given in Table 2. Mean age for the total sample was approximately 65 years, with a range of 50 to 96 years. Somewhat less than two-thirds of the participants were women. Self-reported health status used the full range of answering options. The average self-rated health was expectedly good. Because most of the participants had been recruited from an adult education mailing list, a high share of respondents (more than 50%) had an academic educational background. In line with this finding, approximately 40% of respondents reported their monthly income as ranging above 2,500 Euros. A 30% minority of respondents lived in single-person households. Two-thirds of participants indicated that they live in their own houses or apartments (or on a rent-free basis). Respondents' spread over urban, suburban, and rural regions was surprisingly balanced, with a somewhat higher proportion of respondents living in suburban areas. As could be expected for this age segment, on average participants had a history of living in the same place both with respect to the current city or town (36.5 years) and with respect to the

TABLE 1 Item Pool for Three Conceptual Meta-Categories of Perceived Housing (Examples)

Sub-domains	Example items
	Domain "Identity-related aspects of perceived housing"
Design	- The furnishing of my home tells a lot about me.
	- The composition of my neighborhood matters a lot to me.
Continuity	- Many things in my home have their specific places.
	- I am a regular customer in many shops in my neighborhood.
Social	- I am a part of the social community in this building.
	- I can just be myself in my neighborhood.
Physical	- I would lose a lot of myself if I were to move away from here.
	- This building's style and shape means a lot to me.
	Domain "Issues of privacy and familiarity"
Familiarity	- I know my home like the back of my hand.
	- I am well-acquainted to streets and walkways in my neighborhood.
Comfort	- My home is a place to relax.
	- I feel safe and secure in my neighborhood.
Retreat	- I have the opportunity to be by myself at home.
	- I know places in my neighborhood where I can be by myself if I want to.
Intimacy	- What I do at home is nobody's business but my own.
	- There are places in my neighborhood that hold private memories.
	Domain "Autonomy-related aspects of perceived housing"
Independence	- I can handle my daily housekeeping routines myself.
	- I do not need anybody's help to get from A to B in my neighborhood.
Freedom of choice	- I myself decide how to structure my day.
	- I myself decide which options in the neighborhood I will use.
Self-responsibility	- Whether I can stay at home or not depends on luck and circumstance (recoded).
	- I can contribute my share to the neighborhood life.

current house or apartment (21.6 years). Not surprisingly, overall satisfaction with the current housing situation was high for most of the participants.

The majority of participants ($n = 179$, 84.4%) rated the statements on their housing experiences in an online questionnaire, whereas a total of 33 (15.6%) participants rated the items either on their own or as a part of a face-to-face interview. The participants who were recruited and participated in the study in person were substantially older and rated their health as significantly lower than the participants who completed the online questionnaire (differences and tests not reported in Table 2). Moreover, participants in the online questionnaire were well-educated and reported a high level of financial resources. With regard to housing, the personally addressed participants lived more often in rural areas, had on average significantly more years (approximately 9.5 years) of residency in the current city or town, and reported significantly lower overall housing satisfaction. As was planned, the

TABLE 2 Characteristics of Pilot Study Sample

Background variables	Total Sample (<i>N</i> = 212)		
	No.	Mean \pm SD or %	(Range)
Age, years	212	64.8 \pm 8.5	(50–96)
Female sex	135	63.7%	
Self-rated health (1–5) ^a	208	3.3 \pm 1.0	(1–5)
Education (selected categories)			
Elementary school	20	9.8%	
University	103	50.5%	
Net income (combined categories)			
Less than 2,500 € per month	93	44.7%	
Refused to answer	29	13.9%	
Housing tenure			
Owner (own house or no rent)	135	65.9%	
Household composition			
Living alone	62	29.4%	
Area of residency			
Urban	68	32.7%	
Suburban	78	37.5%	
Rural	62	29.8%	
Living duration			
Years of residency (city/town)	210	36.5 \pm 19.5	(0–89)
Years in current house/apt.	210	21.6 \pm 12.9	(0–76)
Housing satisfaction (1–5) ^a	209	4.4 \pm 0.7	(2–5)

^aLower scores indicate better perceived health or lower housing satisfaction.

multi-method sampling approach yielded a more diverse sample of individuals aged 50 years or older for the pilot than any single approach would have captured. Although we did not aim for generalizability of our convenience sample for this pilot study, we would nevertheless like to see this added heterogeneity as an advantage toward our goal of developing an instrument for perceived housing that may correspond with a variety of lifestyles apparent in current and future cohorts of older individuals.

SCALE ANALYSIS

Major indices for the psychometric properties of the proposed instrument that have been investigated for the full study sample are given in Table 3. Although we carefully sought items that may help to discriminate also in the upper range of the respective domains, a considerable share of respondents still lingered in the highest category. However, ceiling effects appeared to be limited to the familiarity and comfort subdomains of the privacy component and the independence in daily routines subdomain of autonomy. The latter finding may not come as a surprise with this relatively young, healthy, and

TABLE 3 Psychometric Properties of Perceived Housing Pilot Instrument

Domains and Sub-domains	Number of items	Percent in highest category	Cronbach's Coefficient alpha		
			Overall	Indoor	Outdoor
"Identity-related aspects of perceived housing"	17	40.2	.79	.65	.71
Design	5	45.8	.60		
Continuity	4	50.6	.51		
Social Environment	4	35.6	.65		
Environment	4	28.8	.39		
"Issues of privacy and familiarity"	16	61.5	.82	.79	.72
Familiarity	4	76.9	.67		
Comfort	4	70.3	.70		
Retreat	4	53.4	.64		
Intimacy	4	45.4	.40		
"Autonomy-related aspects of perceived housing"	14	65.5	.88	.73	.85
Independence	5	86.1	.88		
Freedom of choice	5	64.3	.75		
Self-responsibility	4	46.2	.44		

proactive sample. However, some items do not elicit a more balanced spread of responses (e.g., "I know my home like the back of my hand").

On the level of the primary domains of perceived housing, scale consistency—with estimates between .79 and .88—seems sufficient throughout. Because the relatively large number of items per dimension is foremost a result of our attempt to cover a broad content field, one might consider these scales as efficient. However, on the subscale level, reliability cannot be regarded as satisfactory for several subscales, but note that each subscale only comprises a maximum of 5 items that are designed to capture both indoor- and outdoor-related aspects of perceived housing that may not be congruent in each respect.

Responses to the autonomy-related items appeared to be substantially more homogeneous when considering aspects of the out-of-home environment compared with an indoor focus of appraisal. Apparently, elders' daily indoor home routines and expectations to age in place are affected by various potential influences in a much more heterogeneous way than they are with respect to the out-of-home environment.

CONFIRMATORY MODEL TEST

Confirmatory factor analysis has been used for a more rigid testing of the assumed structure of the item pool. However, results for the three-domain model indicated substantial misfit to the empirical data, regardless of whether single indicators or aggregated sub-domain scores were considered. More

specifically, outbound parameter estimates for the relationship between the identity- and privacy-related components indicate that these factors could not be separated. Introducing method factors for indoor and outdoor indicators did not result in a more appropriate representation of the empirical data.

These findings preclude us from suggesting the proposed instrument as a consistent and reliable estimate for the three conceptually holistic dimensions of perceived housing in later life. The results indicate that people may not perceive issues of privacy and identity as separate experiential entities of person–environment exchange. Moreover, the multi-dimensional space of perceived indoor housing appears to be only partly congruent with the perception of the neighborhood home environment.

POST-HOC EXPLORATORY ANALYSIS

In an attempt to inform further conceptual reasoning and scale development, we present results from post hoc analyses of the pilot pool of perceived housing indicators.

Exploration of Item Interrelationships

In concordance with the aforementioned results of both conventional scale analysis and confirmatory factor analysis, principal component analysis suggests the need to consider more than three (overarching) but less than 11 subcomponents to account for the observed variance in perceived housing. According to the Kaiser criterion, up to 12 components could be extracted. However, visual inspection of the eigenvalues indicates a comparably good representation by 6 major components (Table 4).

Interpretation of the pattern of item loadings yields a clear daily independence factor (factor 1, 15 items) that, apart from the vast majority of both indoor and out-of-home autonomy indicators, also includes the privacy aspect familiarity with the out-of-home environment. The second and third components are characterized by indicators from both the identity and privacy domain. Because the second component is dominated by references to the out-of-home environment with respect to 6 of the 8 proposed identity- and privacy-related meanings of housing, this experiential component may be interpreted as neighborhood belonging (factor 2, 10 items). On the contrary, although it also shows a considerable spread over the presupposed subdimensions, the third factor is characterized by references that express the perceived home environment as a mirror of self (factor 3, 9 items), using a term borrowed from Markus (1995). Indicators that may define the fourth component share a connotation of continuity and remaining in place (factor 4, 7 items) and incorporates some of the indicators from the initially proposed autonomy domains, especially those that explicitly refer to chances

TABLE 4 Exploratory Factor Structure of Item Pool

	Factor	Factor					
		One: Daily independence	Two: Neighborhood belonging	Three: Mirror of self	Four: Continuity and remaining in place	Five: Being alone and at peace	Six (...)
Factor loading (only >.30 displayed)							
35 ¹	I can handle daily routines of my personal hygiene alone at home.	0.83					
42	How to move around in my neighborhood is up to my decision.	0.82					
21	I know all the places I need to run errands.	0.81					
37	If I need medical help, I can go to the doctor alone.	0.81					
34	I can handle my daily housekeeping routines myself.	0.79					
38	I don't need anybody's help to get from A to B in my neighborhood.	0.75					
36	I need help from others for my daily shopping.	-0.75					
43	I myself decide which opportunities in the neighborhood I will use.	0.67					
20	I am well-acquainted to streets and walkways in my neighborhood.	0.64					
39	I myself decide how to structure my day.	0.62					0.38
44	I have a lock on my daily routines.	0.61					0.52
46	I can contribute my share to neighborhood life.	0.58					0.41
41	I myself decide what I do in my neighborhood.	0.46					0.36
5	I would take part in initiatives to design my neighborhood.	0.45					
8	I am a regular customer in many shops in the neighborhood.	0.37	0.69				
12	I feel myself attached to the people in my neighborhood.		0.68				
33	There are places in my neighborhood that have shaped me.		0.66				
32	There are places in my neighborhood that hold private memories.						
7	I would like to stay in this neighborhood in the future.		0.65	0.33			
11	Familiar faces in the neighborhood make me feel a part of it.		0.63				
17	Changes in the neighborhood do affect me.		0.57				
24	I feel good in my neighborhood.		0.57	0.35			
16	The neighborhood has nothing to do with me.		-0.51				
4	The condition of my neighborhood matters a lot to me.		0.48				
15	I would lose a lot of myself if I were to move away from here.	0.37	0.46	0.31	0.31		
19	I feel attached to my home.			0.77	0.30		
22	I feel at home in my apartment.			0.69			
30	At home I can just be what I am.			0.68			

(Continued on next page)

TABLE 4 (Continued)

Factor loading (only >.30 displayed)	Factor					
	One: Daily independence	Two: Neighborhood belonging	Three: Mirror of self	Four: Continuity and remaining in place	Five: Being alone and at peace	Six (..)
9 Since I live here, my home has become an important point of reference to me.			0.61			
23 My home is a place to relax.			0.53		0.38	
25 I feel secure in my neighborhood.			0.42			
2 I do care much about personal objects in my home.			0.42	0.40		
1 The furnishing of my home tells a lot about me.			0.39	0.34	0.34	
10 I can be myself in my neighborhood.	0.39		0.37			
6 Many things in my home have their specific places.			0.61			
31 What I do in my home is nobody's business but my own.			0.61			
27 I have the opportunity to be myself at home.			0.59			
40 Everything in my home will stay the way it is, no one is going to tell me what to do.			0.50			
45 Whether I can stay in my home or not depends on luck and circumstance.			0.41			
18 I know my home like the back of my hand.				0.39		0.37
47 Whether or not I will be able to stay in my home will probably depend on other people.	-0.39		-0.31	0.39		
28 I know places in my neighborhood where I can be alone and at peace with the self if I want to.					0.68	
29 There are places in my neighborhood where I can be undisturbed although being among people.					0.68	
26 At home I have the opportunity to be undisturbed.					0.52	
3 I do not follow the advice of others when it comes to the layout of my home.			0.40		0.36	-0.33
13 I am a part of the social community in this building.		0.32				0.57
14 This building's style and shape means a lot to me.						-0.36

Note. Items are sorted according to factor loading. Highest factor loadings for indicators with substantial cross-loadings are underlined. The translation of the German word "Quartier" may cover neighborhood, quarter, or even district; we emphasized the word "neighborhood," although it is characterized by social and physical entities.

¹Numbers indicate the order of appearance in the questionnaire.

and risks of remaining in place. Factor 5 is best represented by indicators that express experiences of undisturbed and autonomous housing with respect to both the immediate indoor and adjoining out-of-home environment. Different from the functionally coined daily independence component, this domain appears to be more strongly related to a notion of being alone and at peace (factor 5, 4 items). As a consequence of the implied method, any additional component extracted will be more specific to connotations represented by only a small set of indicators. Thus, the last factor (not separately labeled) represents covariation in two items that address social ties to the neighborhood and that participants don't care much about the style of the building one lives in.

Descriptives for Hypothetical Components of Perceived Housing

Given the post hoc character of the identified empirical meanings of housing in later life, we will present differentiations of these components for various individual background characteristics in a purely descriptive way and refrain from any statistical testing. The hints to the potential validity of different connotations of perceived housing in different subgroups of the pilot sample may inform a more tailored generation of additional indicators to use in future scale development. Table 5 gives correlations and mean differences with respect to the individual factor scores on all six hypothetical aspects of perceived housing.

Substantial relationships between chronological age and perceived housing aspects are suggested by a moderate negative correlation for factor 1 only. The plausibility of this relationship, and hence the validity of the interpretation of this hypothetical factor, is further supported by the relatively large positive correlation with respondents' self-rated health. With respect to other sociodemographic background variables, those participants from urban and suburban residential areas hold higher values of factor 1 than those living in more remote areas. Moreover, because financial and educational resources are vital ingredients to independence in later life, we were not surprised to find more of these resources to come with higher reported levels on this factor. Factor 2 shows the highest correlation with living duration with respect to both house/apartment and neighborhood (i.e., town, city). However, relationships to chronological age are small in magnitude. High attachment to the neighborhood context of housing is positively associated with higher overall housing satisfaction. Nevertheless, motivations or options to relate to the surrounding housing area appear to be smaller in urban areas compared with rural settings, as well as for those participants who do not own the house or flat they live in. Apart from these differences, financial resources do not appear to play a major role for attachment to the neighborhood. Because higher educational backgrounds are often related to flexibility

TABLE 5 Individual Factor Scores by Sociodemographic Background Variables

N, <i>r</i> (Pearson) or Mean value within category	No.	Factor					
		One: Daily independence	Two: Neighborhood belonging	Three: Mirror of self	Four: Continuity and remaining in place	Five: Being alone and at peace	Six (..)
Age, years	157	-.52	.15	.08	.14	<.01	.20
Sex							
Male	58	0.04	0.09	-0.12	-0.14	-0.14	0.10
Female	99	-0.02	-0.05	0.07	0.09	0.08	-0.06
Self-rated health (1-5)	155	.41	-.11	.18	-.14	.10	.10
Household composition							
Living alone	62	-0.01	-0.16	0.05	0.10	0.19	-0.35
Living together with others	149	-0.01	0.06	-0.03	-0.05	-0.08	0.13
Home ownership							
Tenant	57	0.06	-0.17	-0.13	0.03	0.06	-0.12
Own house/no rent	97	-0.05	0.01	0.06	<-0.01	-0.03	0.07
Area of residency							
Rural	48	-0.40	0.33	0.09	-0.09	-0.10	0.19
Suburban	55	0.09	-0.15	-0.08	0.22	0.05	0.12
Urban	52	0.25	-0.11	-0.02	-0.11	0.09	-0.30
Net income (comb. cat.)							
Less than 2,500 € per month	70	-0.28	0.01	-0.09	0.18	-0.06	-0.09
2,500 € or more per month	64	0.20	0.02	0.07	-0.17	0.09	0.03
Refused to answer	21	0.27	-0.07	0.02	-0.06	-0.05	0.26
Education (selected cat.)							
No university	75	-0.21	0.18	0.06	0.04	<0.01	0.09
University	77	0.18	-0.15	-0.04	-0.03	<-0.01	-0.08
Living duration (in city/town)	156	-.07	.27	.14	-.02	-.15	.11
Living duration (house/app.)	156	-.05	.30	.13	.10	-.18	.16
Housing satisfaction (1-5)	156	.13	.31	.47	-.02	.14	.04

Note. Numbers in bold indicate correlations between factors and approx. continuous background characteristics.

with respect to housing, participants with academic background hold lower positions on this perceived housing component. A less diverse picture can be found with respect to potential individual characteristics' effect on factor 3. Somewhat higher mean factor scores for women compared with men and owners compared with tenants support the validity of our interpretation. Moreover, slightly higher positions for participants who live in rural settings, possess more financial resources, or are less educated may be regarded as further support for this perceived housing aspect. Finally, substantial positive relationships with overall housing satisfaction can be found for this factor. Being a woman, living in a suburban place, and having to get along with compromised health or a limited amount of financial resources seem to be background characteristics that may affect factor 4. This housing-related experience may also capture some of the more problematic feelings related to housing in old age. Also for factor 5, only small tendencies can be found with respect to different background characteristics. Being a man, living in rural areas, and having less money and a longer history of living in a place appears to be inversely related to the experience of positive withdrawal and autonomy. Finally, the hypothesized more social component of perceived housing is also found to be positively related to chronological age and the duration of living in the current home. The most prominent experiential differences can be found with respect to living area and household composition: participants from single households and urban residential areas perceive their housing much less as a matter of social issues. Even when taking into account their low scientific virtue, we would argue that these findings can make a point for considering more holistic components of experiences to better address the heterogeneity of perceived housing in old age.

DISCUSSION

In this article, we tried to emphasize content-related and methodological aspects of the assessment of experiential person–environment exchange processes (in particular, aspects of perceived housing). Starting from a four-domain model of perceived housing developed in the project ENABLE-AGE, we identified challenges in the existing measures and presented preliminary data to continue the discussion on valid assessment of perceived housing. In this regard, we were able to at least address some of the challenges with existing perceived housing measures. In particular, the new indicators were less susceptible to show ceiling effects and captured the out-of-home environment as an important area of perceived housing, strengthening claims for structural and ecological validity. Moreover, identity-related aspects of perceived housing, issues of privacy and familiarity at home, and autonomy-related aspects of perceived housing have been assessed in a methodological mix of face-to-face assessment and an online survey that may allow for a

better coverage of the diversity of housing arrangements in old age. Finally, instead of relying on the acceptable Cronbach's alpha scores for the three overarching scales and concepts, we used a rigid testing of our conceptual model by using confirmatory factor analysis that revealed substantial misfit to the empirical data on the subscale level. However, from a substantive point of view, investigation of areas not fitting well with the conceptual model turned out to be informative in its own right. This is particularly true for the disparity of indoor and outdoor perceptions of housing aspects. To proceed from this step of analysis, we finally presented results from exploratory post-hoc analyses of the pilot pool of perceived housing indicators, further underlining a more holistic perspective on perceived housing that may incorporate behavioral, cognitive, and emotional aspects. Descriptive findings for six extracted facets of perceived housing showed plausible relationships to major background characteristics of this pilot sample that encourage us to continue with further steps of method development.

However, this first step ahead toward further method development has several limitations. Concerning the data assessment, there was only little control over sample composition and validity of information given (especially within the online survey). Although some of the mentioned methodological shortcomings of the former instruments have been addressed, psychometric problems, such as the heterogeneity of subscales—as well as ceiling effects—are partially still there. In terms of the assumption to balance out the home and the out-of-home environment, at least in German, the term “home” appears to be easier to define than the term “Quartier,” which refers to both the neighborhood and the district. Finally, and most importantly, this study considered only parts of the former four-domain model and did not include any cross-cultural replication.

In conclusion, asking how to address the overarching question “Environmental Gerontology: What Now?,” we would argue that with this article we tried to shed some light on the ongoing struggle for empirically sound quantitative assessment of perceived person–environment processes in the field of housing. Moreover, presenting first findings may show that measurement development in environmental gerontology includes work in progress to further strengthen this perspective also for future cohorts of older adults.

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