

Conducting Research on Home Environments: Lessons Learned and New Directions

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The study of home environments is a research domain within the field of environmental gerontology that addresses issues related to aging in place. Despite the importance of aging at home, there are few recent studies in this area and most are descriptive and lack theoretical direction. This article examines the current state of research on home environments from which methodological challenges and new directions for future research are identified. Three broad research queries are posed: What should we measure and why in home environments? How do older people and their family members use the home environment in health, illness, and caregiving? What are the interrelationships between the home environment, psychological well-being, and daily functioning throughout the aging process? Suggestions for future research on home environments are discussed and the implications for advancing environmental gerontology highlighted. Specifically, the home environment offers a testing ground for generic environmental constructs and their measurement as well as a unique setting from which new understandings and constructs of person-environment fit can emerge.

The study of private housing arrangements or home environments is one domain of interest in environmental gerontology. Most individuals grow old in their primary, long-term, community-based residence (rented or owned); and “staying put” or aging in place at home is the consistently expressed desire of both older adults and family caregivers. An initial focus of

home environmental research, as described by Wahl and Weisman (2003), involved the study of variations in living arrangements, household compositions, housing standards, residential satisfaction, and the relationship of well-being to housing characteristics. This early work has been extensively reviewed elsewhere (Wahl, 2001) and is exemplified by the works by Kleemeier (1959), Carp (1966), and Lawton (Lawton & Simon, 1968). Recent research has shifted inward to a focus on the inner life processes associated with aging at home or the internal “sociophysical environment” of homes and support of everyday competencies in that setting. Although this represents a potentially important direction, there remains a lack of a critical mass of studies on home environments. Moreover, it is difficult to clearly delimit and define the boundaries of this domain of environmental gerontology and identify an associated body of contemporary scholarship.

Thus, the purpose of this article is to provide a broad overview of current research on home environments from which to propose key research directions in a somewhat neglected but vital area of inquiry. In accordance with the articles in this series, the intention here is to raise questions and challenges as an attempt to invigorate and sharpen a focus on this specific domain of environmental gerontology. A close examination of the key challenges that confront the study of private home environments serves in large measure to particularize, as in a case study approach, the broader concerns and future potential of environmental gerontology. That is, the micro-perspective presented here assumes and emphasizes the value of starting with a particular physical setting or “place” from which to understand underlying and basic environment and behavioral processes involved in the aging process. In this way, the particulars and characteristics of home life are viewed as a way to contextualize environment-behavior interactions, test the validity of generic structures of the parent field, and generate new constructs that may be specific to this intensely important setting in the life course of older adults. In this manner the article contributes to the advancement of environmental gerontology in general by specifying the parameters

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of one of its domains of concern. Therefore, for the purposes of this discussion, the term “home” is necessarily limited or bounded to the physical locality or dwelling (rented or owned). The focal point of the discussion here is on the concrete physical definition of a home as a house. This is in contrast to the equally significant notion of “home” as a phenomenon composed of essential meanings and experiences that may be unrelated to a particular physical setting. Given the broad scope of the material covered by the articles in this series both by Golant and by Wahl and Weiss, a narrowed focus on one physical setting, that of community-based dwellings or private housing arrangements, appears justified for this initial foray into the particular area of concern regarding the sociophysical environmental processes of daily home life. First, a brief justification for an inward focus on home environments is initially provided. Subsequently, the primary methodological challenges, and specifically, the recurrent problem of measurement, are examined as they relate to the home setting. Next, three new directions are proposed for research and illustrated by recent promising endeavors.

Why Conduct Research on Home Environments?

It is perhaps paradoxical that one must justify the importance of looking inward, or studying the internal processes of home environments as a key focal point of environmental gerontology, considering two unwavering and conventional gerontological facts: an aging demographic profile and home ownership rates. For example, in the United States the vast majority of older people (79%) live independently in single-family homes or apartments, compared with only 4% of persons of the same age who reside in nursing home facilities (National Center for Health Statistics, 1997; United States Census Bureau, 1997). Nevertheless, despite the dramatic increase in the numbers of older people and the fact that the home is the primary context for growing old, there is a dearth of research on the dynamical processes of daily home life and a continued preference for, and proliferation of, research on older people in institutional facilities. Therefore, providing a strong rationale beyond the demographic argument for centering attention on aging in the home environment is an essential departure point for a discussion of future research and reestablishing this area as central to environmental gerontology.

A rationale for the study of home environments is founded chiefly in three societal trends. Primary among these trends is the subjective appraisal by elderly people themselves as to the importance of the home to life quality and the consensual preference and commitment of informal caregivers to helping aging family members stay at home. The aspiration to age in place has been consistently documented in the gerontological literature, dating back 30 years

and continuing to the present as represented by more recent national surveys (American Association of Retired Persons, 1990). It is no surprise, therefore, to find that homeowners and renters significantly outnumber residents of nursing home facilities. The importance of the home to older people is also underscored by past and current research on time use and activity engagement, which consistently shows that the vast majority of time spent by older people is inside the home (Evans, 1999; Horgas, Wilms, & Baltes, 1998; Moss & Lawton, 1982).

A second factor highlighting the significance of studying home environments is the empirical evidence of its reparative role. Wahl and Weisman (2003), using Lawton's three functions of the environment as maintenance, stimulation, and support, provide a comprehensive discussion of this evidence. Briefly, research has illuminated the ways in which living at home promotes a sense of personhood or normalcy in view of discontinuity and disjunction experienced as a consequence of multiple personal losses associated with age-related declines and chronic illness (Rubinstein, 1989). Further, the home environment may buttress daily functional abilities as well as buffer the threat of loss to personal autonomy and control, two important contributors to well-being.

A third societal trend is that the home of older people is increasingly becoming the context for long-term care. The rising dominance of homes for the delivery of sophisticated short- and long-term health and human services is a trend expected only to expand as the baby boomer generation ages (Wahl & Gitlin, 2003). Moreover, there has been dramatic growth in the volume of home care services covered by Medicare in the past 10 years such that the boundaries between hospital and home have become blended, particularly for frail elders (Binstock & Cluff, 2000; K. J. Mann, 1997).

A related point is that the home has also become the primary setting for short- and long-term unpaid informal caregiving provided chiefly by families and secondarily by friends or neighbors. Informal caregivers provide over 80% of home care to dependent older persons (Binstock & Cluff, 2000). Moreover, the role of the family as primary caregiver is projected to continue and expand with an aging society (Czaja, Eisdorfer, & Schulz, 2000). Understanding the role of home environments in providing daily care is thus important for developing appropriate and effective strategies for supporting families and reducing the risk factors associated with caregiving.

Superseding these societal directions, however, is a more fundamental rationale for the primacy of home environmental research that is provided by a life-span aging perspective. Simply stated, this model suggests that the basic developmental task in old age is the maintenance or restoration of loss through use of three adaptation processes, that is, selection, optimization, and compensation (Baltes, 1997). As such, staying in place, particularly in one's

life-long residence, may be an essential optimization strategy for successful adaptation. Thus, the socio-physical home environment as a centerpiece of the individuation of the aging process warrants our careful attention.

Challenges of Conducting Research of Home Environments

Given the recognized prominence of the home in the lives of older people, the relative absence of theory-driven research among contemporary studies in this area is rather surprising. This may be explained only in part by the lack of advances in theory and measurement in the parent field of environmental gerontology, as discussed fully by Wahl (2001) and others. Of equal dismay is that contemporary studies have not, for the most part, systematically drawn on well-defined environmental gerontological constructs, nor have recent investigations involving home environments always positioned the science and empirical findings within the larger context of this field. Contributing to this situation are the specific characteristics of home settings themselves. The home is an extremely complex behavioral unit. Unlike nursing home facilities that are regulated and have standard physical designs, standardized management, and care practices, and are thus predictable, private homes are characterized by their highly individualized, unregulated, fluid, and unpredictable qualities (Bradley, 1999). Micro sociocultural norms and personal preferences guide much of the internal arrangements of objects, tasks, and social participation within homes (Albert, 1990; Rubinstein, 1989, 1990). Further, extreme regional and local variations contribute to the highly individualized and distinctive structure and composition of homes, underscore the non-standardized quality of home life, and reinforce the individuation of the aging process in this context.

Another challenging characteristic of home environments relates to the research endeavor itself. The study of home life is necessarily time intensive, requiring face-to-face contact with single individuals. The researcher may be limited as to the amount of exposure to the environment and sampling of behaviors that may occur. In addition, the temporality of sociophysical setups is not well understood, and planned or spontaneous environmental changes within a home may occur over very brief time frames, confounding measurement and raising issues of stability and validity of observations. Unlike homes, in residential facilities it is possible to simultaneously sample multiple behavioral actions of many individuals who reside in one central location. It may be easier for researchers to gain access to a facility at different points in time and over repeated occasions more so than home environments. Thus, research of home environments may be

more costly than institutional environmental research and present unforeseen challenges.

Previous Research on Home Environments

There is a relatively wide array of contemporary studies that contribute to understandings of private home environments. Nevertheless, these studies are linked only implicitly by virtue of the physical setting or context in which the research occurs (e.g., an older adult's house or apartment, owned or rented), and by the tacit focus on variables or processes that have implications for aging in this place. Specifically, recent studies have centered on (a) describing living arrangements and identifying housing needs and preferences, (b) describing home modification and adaptive device use, (c) examining environmental risk factors for deleterious outcomes (e.g., falls), and behavioral and cognitive adaptational strategies that occur within the home, and (d) evaluating the effectiveness of home-based interventions designed to enhance aspects of well-being. Taken as a whole, there appears to be a logical research progression of inquiry from the generation of basic descriptive studies of physical dimensions (e.g., object use and attachment), to explanatory models of adaptive behaviors and home environmental setups, to predictive knowledge regarding outcomes of home-based interventions involving environmental processes. Nevertheless, with few exceptions (see Wahl, 2001), most of the contemporary works in this area tend to lack a unified and robust theoretical direction, and they inadequately address, or do not contend with, the persistent methodological dilemmas of what to measure, why, and in which way.

More specifically, recent research tends to remain principally at the descriptive level in which the environment is treated as an independent variable or "determinant of behavior" (Lawton, 1983). Within this framework the environment has been examined with regard to its relative contribution to positive- and negative-related outcomes such as attitudinal (satisfaction, well-being, and fear of falling) and physical (safety, functionality, and relocation) variables. Much of what is known descriptively about home environments of older people is based on self-report from three sources: databases derived from national probability samples such as the Annual Housing Survey that document trends in living arrangements, and home repair and home modification use and needs (Manton, Corder, & Stallard, 1993); community-based studies that examine specific dimensions of homes such as hazards, environmental barriers to functioning, assistive device needs and difficulties, and use rates (W. C. Mann, Hurren, Tomita, Bengali, & Steinfeld, 1994; Gitlin, 2001); and qualitative research on the meaning of objects and home life (Rubinstein, 1990).

Related to this focus has been an emphasis on examining the functional consequences of home

environmental conditions (Connell & Sanford, 1997), the number and type of home hazards (Carter, Campbell, Sanson-Fisher, Redman, & Gillespie, 1997; Clemson, Roland, & Cumming, 1997; Sattin, Rodriguez, DeVito, Wingo, & the Study to Assess Falls Among the Elderly [SAFE] Group, 1998), and substantiating the contributory role of home conditions to the risk of negative health events such as a fall, and increased dependence (Connell, 1996; Gitlin, Mann, Tomita, & Marcus, 2001). Although this research delineates a range of environmental problems and home hazards, findings are not consistent across studies, and, most importantly, it is difficult to draw generalizable conclusions. This is primarily due to the different approaches taken in defining core constructs such as a home hazard or environmental barrier.

At the explanatory level, recent interest has involved detailing the specific adaptive responses of older people, including not only physical manipulations but also task-based strategies, or how the person interacts with objects and persons within the home to accomplish daily routines and self-care activities. This research examines the behavioral actions of older people in an attempt to articulate the role of the environment not only as a predictor of behavior but also as an integral component of everyday coping processes (e.g., environment as mediator; Gignac, Cott, & Badley, 2000; Gitlin, Winter, et al., 2002; Wahl, Oswald, & Zimprich, 1999).

A growing interest is at the predictive, intervention level, that is, testing home-based interventions that involve environmental and behavioral adjustments to support family caregiving or physical and cognitive functioning of frail older people (Gitlin, Winter, et al., 2002; W. C. Mann, Ottenbacher, Fraas, Tomita, & Granger, 1999; Tinetti, Baker, Gallo, Nanda, Charpentier, & O'Leary, 2002; for a comprehensive review of home-based interventions to prevent functional decline, see Stuck, Egger, Hammer, Minder, & Beck, 2002).

Collectively, these studies suggest a number of important characteristics of home environments. First, environmental hazards are common in homes of older people who do or do not have impairments. However, the role of the environment as a risk factor for falls within the home is still unclear. Although some studies implicate certain physical features of home environments as contributing to almost one half of all falls among the elderly population (Rubenstein & Josephson, 1996), not all studies support this finding (Gill, Williams, & Tinetti, 2000). Nevertheless, a consistent finding is that older people, who are functionally compromised, confront numerous difficulties navigating at home and have various environmental problems including home modification and repair needs (Clemson et al., 1997; Gitlin, Mann, et al., 2001).

Second, research clearly shows that the home and its objects are imbued with symbolic meanings that

contribute to perceived well-being and quality of life. Finally, it is also evident that older people actively reconstruct their living space and modify their behavioral interactions with environmental features in the home to cope with physical and cognitive difficulties. Active interventions involving environmental manipulations demonstrate significant outcomes, including reduced upset in caregivers (Gitlin, Corcoran, Winter, Boyce, & Hauck, 2001) and functional decline among frail elders (W. C. Mann et al., 1999; Tinetti et al., 2002).

Nevertheless, there are several critical limitations to this loosely connected body of research. One limitation is that there are just too few studies on home environments. Consequently, a limited range of home environments has been sampled and persons from a wide range of socioeconomic and racial and ethnic backgrounds are poorly represented. In addition, the extant research does not include older people who represent the full range of functioning. Most studies are of persons with a specific cognitive or physical impairment, thus providing a truncated understanding of the salience of home environments throughout the aging process and life span. Moreover, studies to date are primarily cross-sectional, and thereby are not designed to disentangle the seemingly complex relationships between physical and psychological function and environmental adequacy and modification as they unfold over time (e.g., the natural trajectory of person-environment home life). The relationships between predictors of environmental problems and the role of home environments in postponing or contributing to disability remain largely unanswered. Finally, with the exception of early research by environmental gerontologists such as Lawton, Carp, and, more recently, Wahl and colleagues (1999), current studies are not based in a theoretical framework founded in environmental gerontology or designed to test specific theory-driven hypotheses. Thus, incremental knowledge building and testing of theory-generated hypotheses have not uniformly and systematically occurred. Also, the lack of a common metric remains problematic such that it is difficult to derive cross-study comparisons and solid conclusions even about seemingly straightforward aspects of home environments, such as the type and number of hazards that may be present.

New Directions for Research

Accordingly, many research questions remain unanswered. These can be categorized as broad queries that address one of three primary, interrelated areas. These questions are as follows: (a) What should we measure and why? (b) How do older people and their family members use the home environment in health, illness, and caregiving? (c) What are the interrelationships between the home environment, psychological well-being, and daily

functioning throughout the aging process? To address these questions, three interconnected directions for future research are recommended. These include the need to direct focused attention to theory development to fully explicate core constructs and environmental-behavioral interactions in the home; the careful delineation and measurement of different dimensions and attributes of home environments; and the examination of person-environment transactions.

Theory Development

Placing the study of the home environment within a theoretical framework is perhaps the principal challenge of future research (see Golant, 2003). There are potentially three strategies that can be pursued. One approach is to apply existing environmental theories to the study of homes; a second strategy is to integrate an environmental perspective into existing theoretical frameworks of quality of life and health; a third strategy is to develop new theories from the ground up. The first approach may be limited given that the field as a whole remains hampered by the lack of theory advancement and the development of a framework for evaluating transactions (Wahl & Weisman, 2003; also see Lawton, 1999; Parmelee & Lawton, 1990). Nevertheless, the primary approach, that of Lawton and Nahemow's (1973) ecology of aging framework, adopts an interaction perspective that provides a compelling adaptational framework that has both clinical and research applications. This model has made significant contributions to generating testable hypotheses and deriving intervention principles (Nahemow, 2000).

Although the competence-environmental press framework continues to remain a pivotal model in person-environmental research, it has, as Lawton himself observed, a few disadvantages. Foremost is that the predictive ability of the model is diminished by fractionating the measure of behavioral competence from environmental forces. Empirically linking a person's competencies to environmental conditions remains a fundamental challenge within this model. That is, the Lawton-Nahemow model does not offer a precise theoretical or measurement strategy to pursue person and environment linkages. Moreover, the framework reflects the environmental docility hypothesis but does not explicitly exemplify proactivity, a hypothesis Lawton proposed subsequent to the full development of this model (Lawton, 1989). Thus, this framework suggests that the environment controls or determines behavior. In this way, it does not fully account for how older people manipulate environmental conditions to diminish its demands, nor, as Lawton stated, does it provide a way of understanding the environment as a resource for older people with high levels of competency (Lawton, 1999). Finally, as Lawton himself lamented, the framework has not significantly contributed to the

advancement of an environmental taxonomy and associated measures for use in different settings. Clearly, Lawton himself saw the need to refine and expand this model.

One example of building on this model is the environmental taxonomy proposed by Barris, Keilhofner, Levine, and Neville (1985), which views an environment as consisting of four interrelated, hierarchical dimensions (objects, tasks, social groups or organizations, and culture) and specific attributes (e.g., an object's temporality, symbolic meaning, or degree of availability). This taxonomy has been widely used in occupational therapy and has more recently been applied to structuring home environmental intervention research.

Another strategy to theory development is to integrate an environmental perspective within existing models that are designed to explain broad phenomena such as health, quality of life, or well-being. Contemporary integrative attempts have been promising. Recently, the World Health Assembly of the World Health Organization (WHO) approved major revisions to the international system of classifying disability and adapted a new disease classification system referred to as the International Classification of Functioning, Disability, and Health (ICF; World Health Organization, 2000). This model posits four interconnected structures that affect health and human functioning: the body (e.g., body systems and structures), activities (range of activities from simple to complex), participation (areas of life a person is involved in, has access to, or for which there are societal barriers or opportunities), and the environment. Within this scheme, environmental factors compose the physical, social, and attitudinal context in which people live and carry out their lives. These factors are defined as external to persons that can have either a positive or negative influence on performance. Future research is necessary to characterize the way in which environmental factors interact with body structures, activities, and participation in health, illness, and disability. This model is in contrast to previous disablement models that propose a linear relationship among pathology, impairment, function, disability, and social adaptation such that the physical and social environments are not fully explicated (Verbrugge & Jette, 1994).

Another example of integrating an environmental perspective with an existing model is the caregiver stress process model refined by the National Institutes of Health multisite initiative, Resources for Enhancing Alzheimer's Caregiver Health (REACH; Schulz, Gallagher-Thompson, Haley, & Czaja, 1999). REACH investigators extended a basic health stress process model to include environmental stressors (e.g., behavior of care recipient, safety of home, and involvement of others), and they linked these to health outcomes in caregivers. The model suggests that caregivers evaluate whether environmental external demands pose a potential threat

and, if so, whether they have sufficient coping mechanisms to diminish the stress imposed. If caregivers perceive the environmental demands as threatening and their coping resources as inadequate, the model posits that caregivers will experience stress. The appraisal of stress is assumed to contribute to negative behavioral responses that place the individual at risk for physical and psychiatric disease. Thus, the expansion of a basic stress process model to include the physical and social environment highlights the potential significance of the home as a contributor to the mechanisms of caregiver distress. The framework provides a basis for developing and testing clinical applications involving environmental redesign to determine if they have an impact on the stress-process cycle.

Other emerging theories are also attentive to the role of the environment as represented by recent advances of personal control theory and its application to physical disability. Control theory contends that individuals tend to be motivated to maintain control over difficult life situations and is based on the premise that “control” is a human imperative (Schulz, Heckhausen, & O’Brien, 1994). To maintain control, individuals may adopt various strategies referred to as primary and secondary mechanisms. Primary mechanisms refer to attempts people make to change their immediate environment (people or objects) or actively manipulate external forces to retain control. Secondary mechanisms refer to attempts to modify internal cognition or emotions, which also support or enable the use of primary or active behavioral strategies.

Critical to the concept of personal control is the emphasis on the individual’s engagement with his or her immediate environment to afford positive affect and buffer threats or actual losses to personal abilities to control important life outcomes. Although the immediate environment is not explicitly defined, within this framework, using the home environment can be conceptualized as a primary adaptive strategy that enables older people to actively control important outcomes that, in turn, may enhance self-efficacy. One prediction based on this framework is that to the extent that an environmental strategy is successful in helping older people sustain control and feel efficacious, then negative affective responses to disability such as anxiety or depression will be minimized.

The integration of an environmental perspective within a metatheory does not necessarily solve the core question of the relationship between persons and environments within the home context. However, it does contextualize an environmental perspective in that it places person–environment transactions within a larger universe of meaning and set of explanations. Lawton sought to accomplish this by positing his four-quadrant quality of life model. In this model, Lawton defined one of the four sectors as the objective environment (other sectors included perceived quality of life, psychological well-being, and behavior), and

person–environment transactions were viewed as underscoring or forming the backdrop or foundation of all four sectors. It remains the only model of quality of life that integrates objective and subjective aspects of environments. Other more ground-up and qualitative approaches to theory development may also help to advance a link between subjective and objective perspectives of home environments and relationships to health and life quality outcomes.

Measurement Development

Another critical direction for future research is the development of measures of the home environment. The lack of psychometrically sound environmental measures in general continues to hinder the study of the relationship of environment and behavior in the home context (for more extensive reviews of this issue see Carp, 1994; Lawton, Weisman, Sloane, & Calkins, 1997). The extreme variation in private living arrangements, variations in meaning attributions, object placements, and the tendency of individuals to underreport detrimental physical conditions highlights the need for a standard metric for use in homes to allow for cross-comparisons. The approach to conceptualizing and subsequently operationalizing the environment remains a daunting task (see Wahl & Weisman, 2003).

Although a primary emphasis in environmental gerontology is the development of generic environmental taxonomies that transcend settings and users, the testing ground for such work has tended to be setting specific. For example, measures of environmental dimensions have been developed with adequate psychometric properties to evaluate special dementia units and nursing home environments (Norris-Baker, Weisman, Lawton, Sloane, & Kaup, 1999). These measures evaluate a range of environmental attributes that are relevant to home life such as safety, orientation or way-finding, and support of functionality, comfort, security, and personhood. However, although these environmental taxonomies may not be place specific, application of their operational definitions to homes may lead to refinements or differentiation. That is, core environmental constructs may simultaneously assume distinct or culturally specific manifestations in homes and thereby elude direct observation by using operational definitions and measurement approaches that have been developed chiefly in and for institutional settings.

Only a few assessments have been developed specifically for use in the home environment. These assessment tools can be categorized according to the taxonomy posited by Barris and colleagues (1985), which includes objects, tasks, social groups, and culture. The few tools that do exist specifically for home environments primarily target physically frail elders, concern mostly the object layer, and have safety as the principal attribute measured (Letts

et al., 1994; Oliver, Blathwayt, Brackley, & Tamaki, 1993; Tideiksaar, 1986). Results from studies evaluating home safety measures show that consistency in raters tends to vary by the type of hazardous condition observed (Clemson et al., 1997; Sattin et al., 1998). A major limitation of these existing assessments is that items do not distinguish between levels of hazards. Most measures assume that home environmental conditions pose the same level of risk to older people and do not account for the extent of exposure or user interface. Nevertheless, any one environmental condition may be more hazardous than another condition for older people, and level of risk may vary depending on the degree of exposure, health status, or other user characteristics. Various approaches to collecting information about the physical attributes of homes are through self-report, evaluative observations of the presence or absence of specified conditions, or mapping of functional competencies to observations of specific environmental conditions.

Using an evaluative direct observational approach, the Home Environmental Assessment Protocol (HEAP) is a relatively new measure designed to assess the physical home features that support or hinder the physical function of persons with dementia. The HEAP consists of 192 items representing the number of hazards, physical adaptations, and level of clutter and comfort in eight areas of the home that are used by a person with dementia. Adequate interrater agreement was obtained for hazards, whereas excellent interrater agreement was found for ratings of presence of home adaptations and level of clutter and comfort. In addition, measured attributes were associated with cognitive and functional status in the expected direction such that more adaptations were observed in homes with persons with higher levels of dependency and lower levels of cognitive status, suggesting preliminary construct validation (Gitlin, Schinfeld, et al., 2002). This tool operationalizes several important characteristics of homes in which dementia caregiving occurs, but it has two potential limitations. First, it assumes an evaluative approach such that environmental features are judged independent of the characteristics of its users. Evaluation is based on observation and does not incorporate personal appraisals or considerations of subjective meanings or actual frequency of object use. Second, it evaluates a select set of physical attributes for one illness characteristic, moderate stage dementia.

One approach to understanding environment as process in the home is the examination of what Barris and colleagues refer to as the task layer of the environment, or the way in which persons interact with everyday objects to carry out daily activities in the home. Tasks reflect the interactions of persons with objects in their environment and as such represent, in part, the transactions of persons and environments (see Golant, 2003). Specifically, a task

consists of a sequence of actions within an environment to satisfy an external social requirement or an internal motive to be competent (Levine & Brayley, 1991). Thus, different strategies may be used to carry out a task in the home environment. For example, the Task Management Strategy Index (TMSI) evaluates the specific ways in which caregivers interact with the environment to manage complex dementia-related behaviors. Items on the TMSI (e.g., place items in the order in which they need to be used) assess caregiver appraisals of their daily actions related to changing the external environment of the home to assist in caregiving tasks (Gitlin, Schinfeld, et al., 2002). One potential limitation is that it relies on a responder's cognizance of his or her own discrete daily actions.

Another recently developed approach to capture dynamical processes at the task layer of the environment is a measurement system developed by occupational therapists in Sweden, the "Enabler." This tool, based on Steinfeld's postoccupancy work (Steinfeld et al., 1979), rates dimensions of the physical environment of the home in relation to the specific functional capacity of an individual. The Enabler yields important information as to the extent to which an individual can perform daily activities within the home context. By matching particular environmental and person characteristics, a measure of person-environment fit is derived from which to identify clinical intervention. Preliminary research shows that the Enabler is a useful clinical and research tool with adequate interrater reliability, although knowledge and use of this tool is not widespread (Iwarsson & Isacson, 1996; Iwarsson & Slaug, 2001).

Notably absent from the literature are measures that capture Barris's social (e.g., availability and participation of others, social roles) and cultural layers (e.g., beliefs and values that guide interactions within an environment), as well as what Lawton referred to as higher order environmental attributes (e.g., engagement, stimulation, satisfaction, novelty, comfort, personal control, and personal continuity). Nor are there comprehensive measures of these different dimensions such as those found for evaluating institutional settings. Furthermore, with the exception of the Enabler, dynamical processes continue to elude present-day measurement strategies.

In summary, a few interesting measures have recently been developed to evaluate selected environmental aspects that appear to be important to specific aspects of home life such as safety or support of physical function. However, measuring attributes that contribute to higher levels of everyday competencies remains relatively unexplored. Most importantly, there are few reliable and valid measures that specify the interrelatedness of person and environmental characteristics, with only the Enabler showing promise in this complicated area. Thus, several methodological issues persist in measuring home environments: the identification of and conceptual and

operational definitions of environmental dimensions that are relevant to sample in the home; the level of exposure necessary for adequate sampling to occur; the construct validity of selected dimensions; and the best strategy for measurement (e.g., direct observation or self-report; Evans, 1999). A related issue is whether generic environmental taxonomies transcend settings and person characteristics or are place and user specific. If the latter is true, then, for example, attributes derived from institutional-based research require further elaboration and careful application to homes.

Safety may be a case in point. Although it is an environmental attribute that transcends user and place, the full range of items representing this domain may differ depending on person capabilities, contextual characteristics, and personal attributions and meanings. On a final note, underlying a discussion of methodology is the “why” question; that is, why measure certain attributes versus others, and for what purposes. Here the big question concerns what the objectives of home environmental research are and whether endeavors should be focused on understanding the essential dialectic of autonomy and security proposed by Parmelee and Lawton (1990) in order to help older people remain independent and at home.

Understanding and Intervening in Person–Environment Transactions

Another important direction for future research is in understanding linkages between persons and home environmental features. Recent research has documented the mediating role of living environments in supporting everyday competence, particularly in older people with sensory deficits and physical disability (Gignac et al., 2000; Wahl et al., 1999). These studies emphasize home environment as process and articulate its changing role with disability.

Another challenging area for future research is testing strategies that help older people regulate or modify their relation to their home environment, as an optimizing and compensatory mechanism for aging in place. Although little research has occurred in this area, one recent study with family caregivers shows that modifying person–environmental interactions can reduce caregiver upset, enhance efficacy in managing complex behavioral problems, and slow the rate of functional decline in persons with dementia (Gitlin, Corcoran, et al., 2001). A study of physically frail elders similarly shows that a home modification intervention can slow the rate of functional decline (W. C. Mann et al., 1999). Still more research is necessary to determine the best practices or combination of strategies, the range of benefits evinced by older people, and who benefits, in what ways, and why from adjusting different attributes of home environments.

New approaches to examining the environment

from a process perspective have included a range of methodologies. Case studies using frame-by-frame videotape analysis has been helpful in specifying interactions between discrete functional actions (e.g., toileting) and particular environmental features (e.g., height of toilet or presence of grab bars; Connell & Sanford, 1997). New applications of technologies to home research hold great promise for delineating person–environment relationships. For example, microchip technology to detect and record the physical motions of daily self-care is now being tested. This approach represents an innovative, nonobtrusive approach to monitoring and researching home life (Glascok & Kutzik, 2000).

Conclusion

For the vast majority of older people and their family caregivers, the home is the preferred residence in which to grow old. Given the centrality of private living arrangements in abetting life quality and sustaining functionality, the relative omission of a clear theoretical direction as well as the lack of attention to measurement in home environmental research is disappointing. Although research on home environments to date has been founded in a broad ecology of aging framework, it remains hampered by the lack of sufficient attention to theoretical developments and theoretically derived measurement approaches. Refined and/or new theoretical frameworks that emphasize and account for the complexities of this setting should guide future research efforts. In a complementary fashion, an environmental perspective should be integrated in current theories of adaptation and quality of life.

Potential research directions include the development of measures and methodologies that evaluate everyday adaptive responses and the specific person and environmental characteristics that contribute to living at home as well as developing and testing specific environmental strategies to maximize quality of life at home. Again, the need to respect the complexity of this setting is paramount. There may not be a single best methodological approach or measure.

Moreover, research in this area should be broadened to include diverse racial and ethnic groups, housing conditions, and socioeconomic levels, as well as older people with different levels of competencies and types of impairments and functional difficulties. Finally, research on home environments has the promise of contributing to the development of meaningful clinical applications and closing the theory–research–application gap (Wahl & Weisman, 2003). That is, understanding home environments as a potential optimization strategy and therapeutic modality may yield knowledge about the types of strategies and environmental setups that are most helpful to older people to effectively sustain continuance. Yet another contribution of home environ-

mental research is its potential role as a laboratory for developing and testing core constructs that may extend environmental gerontology as a whole. In this way, home environmental research can help particularize and refine existing constructs in environmental gerontology as well as articulate new visions of person–environment transactions.

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