Evaluation of environmental assessment tools for settings for individuals living with dementia

Margaret P. Calkins1 | Migette L. Kaup2 | Addie M. Abushousheh3

1IDEAS Institute, Cleveland Heights, Ohio, USA
2Kansas State University, Manhattan, Kansas, USA
3The Center for Health Design, Concord, California, USA

Correspondence
Dr. Margaret P. Calkins, 3345 N Park Blvd., Cleveland Heights, Ohio 44118, USA. E-mail: MCalkins@IDEASInstitute.org

Abstract

Introduction: The overarching goal of research on physical settings for individuals living with dementia is to identify associations between designed features within the built environment and outcomes of interest. Over the past three decades numerous environmental assessment tools have been developed in several countries, responding to a changing set of care industry values that increasingly prioritize a holistic, quality-of-life–driven person-centered care (PCC) model over a biomedical approach to long-term care (LTC) provision. This article reviews the diversity, constructs, strengths, and limitations of existing environmental assessment tools and identifies gaps for future tool development.

Methods: A systematic literature search was conducted using four databases (Medline, CINAHL, PsycInfo, and Avery Index) and terms related to health-care environments and assessment tools.

Results: A total of 13 environmental assessment tools for people living with dementia within shared residential settings were identified. Evaluation of the environmental assessment tools includes a synthesis of published data for each tool’s reliability, validity, ease of use, interpretability, strengths and weaknesses, as well as a comparison of various tool characteristics including date of development, country of origin, applicable care setting(s), number and variety of measures and underlying constructs, format, and descriptive versus evaluative content.

Discussion: While the shift to person-centered values encompasses all aspects of care and care settings, the majority of person-centered definitions exclude the important role of the designed, physical environment. However, this review of environmental assessment tools clearly demonstrates that newer tools are embracing the full array of PCC values. In the United States, this is shown in the shift from tools designed to assess segregated dementia care settings to tools that integrate the needs and preferences both of individuals living with and without dementia. Next-generation tools need to specifically address the household model of design.
KEYWORDS
activities of daily living, aging, Alzheimer’s and related dementias, art, assisted living and home health care, environmental design, environmental evaluation, health facilities, nursing homes, quality of life, scale and measures, self care, social psychology

Highlights
• The overarching goal of research on physical settings for individuals living with dementia is to identify associations between designed features within the built environment and outcomes of interest.
• A systematic literature search identified a total of 13 environmental assessment tools for people living with dementia within shared residential settings; these tools were then described and evaluated based on reliability, validity, ease of use, interpretability, strengths, and weaknesses.
• This review of environmental assessment tools clearly demonstrates that newer tools are embracing the full array of person-centered care values.

INTRODUCTION

With the rapidly increasing demographic statistics on Alzheimer’s disease (AD) and related dementias in the United States and worldwide, no available cure, and the efficacy of new treatments being limited in scope to specific, singular forms of dementia, the therapeutic potential of every available resource must be explored, including the built environment. The Alzheimer’s Association estimates that in the United States roughly 42% of assisted living (AL) residents and 61% of nursing home (NH) residents are living with moderate to severe cognitive impairment, though other sources place the rates as even higher. It is estimated that 75% of people living with dementia will spend time living in an AL community or NH (versus 4% of the general population). Because the need to provide care for persons living with dementia (PLWD) will continue to escalate within our long-term care (LTC) health system and the structure of care is changing, it is imperative to assess the outcomes associated with both settings and practices to optimize quality of care, living, and work. To understand the changes in the structure of care, a brief review of key benchmarks in the evolution of person-centered care (PCC) is warranted.

From the late 1970s into the early 1990s, the medical model for care provision in the United States was increasingly challenged as failing to promote high quality of living for individuals with chronic conditions, particularly those who didn’t need as much clinical care as what was referred to as custodial care. The passing of the Omnibus Budget Reconciliation Act of 1987 (OBRA ’87) validated this trend and called for the culture of care to further prioritize patients’ experience; organize care around patients’ goals and values; and make care recipients active participants in, if not the drivers of, treatment decisions. One decade after the publication of Kitwood’s PCC principles and the OBRA ’87 legislation, leaders and promoters of PCC convened a “Meeting of Pioneers in Nursing Home Culture Change” to formulate a collective vision for PCC, identify unique and successful strategies, and ascertain a measurement-based approach for evaluating and disseminating progress. Consensus for specific PCC almost 30 years later, in 1988, to distinguish a humanistic approach to dementia care. Kitwood emphasized that the progression of dementia was not solely a manifestation of brain pathology, but that cultural, organizational, and interactional dynamics provoke both positive and negative reactions. Thus, Kitwood is generally described as the founder of the concept of person-centered dementia care. Kitwood’s effort to describe PCC began with 10 principles that relate to the interaction between a care provider and an individual living with dementia without regard for the physical environment:

1. Recognition: Acknowledging the person through words or gestures.
2. Negotiation: Consulting persons with dementia about needs, desires, etc.
3. Collaboration: Working together or “doing with” the person with dementia.
4. Play: Having fun and being spontaneous and expressive.
5. “Timalation”: Fostering activities that involve the senses.
6. Celebration: Allowing for joy in the moment.
7. Relaxation: “Being with” the individual in a calming manner.
8. Validation: Acknowledging the individual’s reality and feelings.
9. Holding: Providing a safe psychological space.
10. Facilitation: Supporting/enabling a person by providing the “missing parts.”

As a conceptual approach to care, PCC became a generally agreed-to “best practice” for how care should be provided but lacked corresponding consensus and guidance for systems, processes, and outcomes. One decade after the publication of Kitwood’s PCC principles and the OBRA ’87 legislation, leaders and promoters of PCC convened a “Meeting of Pioneers in Nursing Home Culture Change” to formulate a collective vision for PCC, identify unique and successful strategies, and ascertain a measurement-based approach for evaluating and disseminating progress.
strategies remained elusive, but this group united in coining the term “culture change” (CC) to describe the purposeful departure from a medically driven approach to advance PCC efforts that had been occurring in LTC settings.16–18 Ten years later, a literature review was undertaken as an extension of a meeting of multidisciplinary PCC and CC experts convened by The Commonwealth Fund to develop a working definition for “culture changed” NHs that were successfully advancing PCC.17

The most notable codification of PCC in relation to the physical environment in the United States was achieved when the Centers for Medicare and Medicaid Services (CMS) endorsed the outcome of the literature review in CMS’s 8th Scope of Work.19,20 State quality improvement organizations were instructed to work collaboratively with NHs to improve their organizational culture based on implementation examples of 25 key practices associated with six CC constructs:20

1. Care and all resident-related activities are directed by the resident.
2. The living environment is designed to be a home rather than an institution.
3. Close relationships existing among residents, family members, staff, and community.
4. Management enables collaborative and decentralized decision making.
5. Work is organized to support and empower all staff to respond to residents’ needs and desires.
6. Systematic processes that are comprehensive and measurement based are used for continuous quality improvement.

While there continues to be general consensus for improving safety, quality, and coordination of care for older adults, there are no standardized parameters for delivering PCC.21 There are numerous—and sometimes competing—characterizations, definitions, descriptions, guiding principles, recommendations, and requirements by various groups and institutions in multiple countries to prioritize the subjective experiences and maximize the full potential of PLWD.6,7,9,10,12,15,22–26 The most recent prominent attempt to define PCC was undertaken by the American Geriatrics Society.21 An interdisciplinary PCC expert panel identified 15 PCC definitions and developed a composite definition for chronically ill older adults with functional limitations: “Person-centered care means that individuals’ values and preferences are elicited and once expressed, guide all aspects of their health care, supporting their realistic health and life goals. Person-centered care is achieved through a dynamic relationship among individuals, others who are important to them, and all relevant providers. This collaboration informs decision-making to the extent that the individual desires”21 (p. 16).

Regrettably, much of the guidance put forth for advancing PCC falls to address the physical environment as a therapeutic resource. Instead, the “environment” tends to be characterized as the “organizational culture that provides support and training in person-centered care practices for providers and identifies team members who are best suited for this type of care delivery”21 (p. 17).

Environmental gerontologists and some others specializing in the health and well-being of older adults in relation to their contextual physical settings recognize that PCC is not achievable in a vacuum; the ability to advance PCC is supported or hindered by the quality, characteristics, and features inherent in the built environment. The Alzheimer’s Association has recognized this, and their Dementia Care Practice Recommendations, published roughly every decade from the early 1990s, have always included a section on the designed environment. The most recent version, published in 2018,24 uses PCC values as the basis for providing recommendations; the section on supportive and therapeutic environments calls for settings that reflect five dimensions that are consistent with the values and practices of PCC.25 They are:

1. Create a sense of community within the care environment.
2. Enhance comfort and dignity for everyone in the care community.
3. Support courtesy, concern, and safety within the care community.
4. Provide opportunities for choice for all persons in the care community.
5. Offer opportunities for meaningful engagement to members of the care community.

This article provides the outcome of a review undertaken to identify and evaluate environmental assessment tools for PLWD within shared

RESEARCH IN CONTEXT

1. Systematic Review: This article builds on a 2017 review of environmental assessment tools in health-care settings by Elf et al. We used the same search terms and databases to examine relevant resources published since 2017. We included nine tools reviewed by Elf et al., two additional tools published more recently, and two additional tools that the authors were familiar with that related to environments for people living with dementia, are commonly used, but did not appear in the literature search.

2. Interpretation: In the United States there is a clear evolution of tools from those primarily focusing on dementia-specific settings (special care units) to more recent tools, which take a broader, more inclusive and person-centered approach. Tools developed in other countries mostly continue to have a dementia-specific focus, although they incorporate person-centered values.

3. Future Directions: There are two primary recommendations for the next generation of tools. First, a more direct hypothesized link between specific environmental features or characteristics and outcomes of interest (active engagement in activities, positive well-being) is needed. Second, greater focus on identifying and measuring ways the environment can better support the staff is needed.

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residential settings. The evaluation of the environmental assessment tools includes a synthesis of published data for each tool’s evidence-based utility as well as a comparison of various tool characteristics. The environmental assessment tools’ measures, constructs, and sources for data reflect the medical to holistic shift that continues to occur within LTC.

2 | METHODS

To identify a comprehensive set of physical environmental assessment measures that are either dementia-focused or that are based on PCC values, a systematic review of the literature was completed. Elf et al.28 completed a systematic review of instruments for assessing the quality of the physical environment in health care in 2017, which was used as the initial basis for the identification of measures. The same search terms were used (tool, instrument, scale, assessment, measurement, evaluate, screening, physical health-care environment, health-care space, health-care setting, hospital, health-care architecture, health-care building, health-care design) and the same databases were searched (Medline, CINAHL, PsycInfo, and Avery Index) for the period from 2017 to 2021. Terms were searched in title or abstracts. Papers were included if they addressed assessing a shared residential environment either for older adults or PLWD and were published in English. The search returned 31,495 references (duplicates removed), which was followed by a review of titles by two authors (M.C. and M.K.). This reduced the number of potential articles to 667, which had abstracts reviewed for potential inclusion. From this, 19 articles were selected for full article review, and two tools developed since 2017 were identified.

Of the 23 assessment tools identified by Elf et al., 16 were for environments for older people, of which 7 were specifically for settings for PLWD.28 Elf et al. counted different versions and subscales of the same tool as separate. For example, the Therapeutic Environment Screening Survey Nursing Home version (TESS-NH), TESS-NH/RC (residential care), and Special Care Unit Environment Quality Score (SCUEQS) account for three separate scales, and the Environmental Audit Tool (EAT) and EAT-HC (health care) are counted as two separate scales. In this review, the version of the tool where the greatest psychometric data were available is described, and related tools or versions that are sufficiently similar (e.g., separate NH and AL versions) are listed as part of the original tool. Elf et al.28 also included the Multiphasic Environmental Assessment Protocol (MEAP) and two subscales, which are not included in this paper as they relate to independent senior housing, not supportive residential care settings (ALs or NHs) and have no focus on dementia. Thus, a total of nine tools reviewed in the Elf et al. article are included in this paper, and two new tools developed since 2017 are also included. Finally, this search strategy was supplemented by the authors’ extensive knowledge of the field; an additional two assessment tools were included (experience of home and artifacts of culture change) as reflecting PCC values and assessing the physical environment (see Table 1).

This literature review process targeted tools or scales that measured or assessed specific design criteria of the built environment that contribute to a comprehensive understanding of the role of designed features on the inhabitants of shared residential settings. The review

| Environmental assessment tool | Acronym | Related version | Developer | Year | Country of origin |
|-------------------------------|---------|----------------|-----------|------|------------------|
| 1a. Therapeutic Environment Screening Scale | TESS | SCUEQS | Sloane et al. | 2001a | USA |
| 1b. Special Care Unit Environmental Quality Score (subscale) | | | Sloane et al. | 2002 | |
| 2. Environment–behavior model | E–B Model | SCUEQS | Zeisel et al. | 1994 | USA |
| 3. Nursing Unit Rating Scale | NURS | | Grant | 1996 | USA |
| 4. Professional Environmental Assessment Protocol | PEAP | | Lawton et al. | 2000 | USA |
| 5a. Sheffield Care Environment Assessment Matrix | SCEAM | | Parker et al. | 2004 | UK |
| 5b. Swedish-Sheffield Care Environment Assessment Matrix (translation) | S-SCEAM | | Nordin et al. | 2015 | Sweden |
| 6. Environment Quality Assessment for Living | EQuAL | | Cutler et al. | 2006 | USA |
| 7a. Artifacts of Culture Change 1.0 | ACC | V 1 | Bowman & Schoeneman | 2006 | USA |
| 7b. Artifacts of Culture Change 2.0 | | V 2 | | 2020 | |
| 8. Experience of Home | EOH | | Malony | 2007 | USA |
| 9. Evaluation of Older People’s Living Environments | EVOLVE | | Lewis et al. | 2010 | UK |
| 10. Environmental Audit Tool | EAT | | Fleming & Bennett | 2011 | Australia |
| 11. Dementia Design Audit Tool | DDAT | | Kelly et al. | 2011 | UK |
| 12. Dining Environment Audit Protocol | DEAP | | Chaudhury et al. | 2017 | USA |
| 13. Enhancing Healing Environment | EHE | | Waller | 2017 | UK |

aDeveloped in 1990; revised in 2001.
did not attempt to include all research studies that evaluated specific or targeted features (e.g., a lighting study) or tools that measured aspects of the social and/or care environments (e.g., VIPS framework, Dementia Care Mapping, CARES Observation Tool).

Because of the evolution in PCC values and practices described above, the review of assessment tools is organized chronologically (see Table 1).

2.1 Characteristics of each assessment tool

The environmental assessment tools vary in a number of different ways. Their development spanned several decades and countries and apply to different types of settings (housing/independent living, residential care/AL, NHs) which might be specifically for individuals living with dementia (dementia specific) or might be for individuals with and without dementia (dementia inclusive). Initially, environmental assessment tools were designed specifically for segregated dementia care settings, referred to as Special Care Units or SCUs in the United States. The evolution of the tools reflects a growing awareness of the collective needs and desires shared by people living with and without dementia—an important and inclusive component of PCC (see Table 2).

Most of the assessment tools use observation of the physical environment as the primary source of information, with several having a few clarifying questions for staff. One tool is primarily based on information collected by interviews, and one is completely interview-based. There is also considerable variance in total number of items, ranging from 16 to 2494. Table 2 provides a summary of the characteristics of each tool.

3 STRUCTURE OF TOOL ANALYSIS

Each of the environmental assessment tools is described in detail and reviewed using several different strategies. The first is an appraisal of the psychometric properties, ease of use, and interpretation, as well as a description of general strengths and weaknesses of each tool (see Table 3). The second is a more in-depth analysis of the measures associated with each assessment tool (see Table 4). The third reviews how the different tools address the core concepts of PCC (see Table 5). Finally, this is distilled down to how they relate to the five dimensions of supportive and therapeutic environments included in the Alzheimer’s Association’s Dementia Care Practice Recommendations (see Table 6).  

3.1 Tool description and psychometric properties

3.1.1 Therapeutic environment screening scale: TESS (and subsequent versions) and SCUEQS

The original TESS was developed in the late 1980s and contained 12 items that were able to discriminate between SCUs and “traditional” care settings. In the 1990s, a workgroup of the National Institute on Aging (NIA) Cooperative Agreement Studies that focused on environmental assessment made significant revisions to the TESS (referred to as TESS-2+), which is primarily a collection of descriptive items. This was used in the NIA-SCU collaborative of research projects, and the validated version, known as the TESS-NH version, includes 84 discrete items and one global rating that cover 13 domains. The tool was subsequently updated and now has separate versions for NH and for AL. No psychometric data were available for these versions, and thus all reporting here is for the TESS-NH version.

All items in the TESS-NH are coded so that higher scores reflect more favorable attributes of the physical environment. Responses are categorical, except the global rating, which is in a Likert format. Interrater reliability scores ranged from 41.7% to 100%, with an average of 86.7%. Test–retest agreement was high (above 0.80) for fixed items of the environment, and understandably lower for environment-in-use items such as lighting and noise.

The SCUEQS is a summary scale consisting of 18 TESS-NH items. Item scores are added to create a single score that ranges from 0 to 41. Interrater reliability of the TESS-SCUEQS is 0.93. Kappas for the TESS-SCUEQS are between 0.75 and 1.0 for the majority of items (all but two). Test–retest scores were 0.88 for the TESS-SCUEQS.

3.1.2 Environment-Behavior model

Zeisel et al. created an environment–behavior (E–B) model that “describes and organizes the influences that the physical environment of Special Care Units has on residents and caregivers” (p. 4). Using a repeated Delphi approach with both experienced researchers and administrators of dementia care programs, their model has eight primary model concepts and 16 secondary environmental dimensions that are designed to specifically differentiate well-planned SCUs from more traditional care settings that do not focus on the needs to individuals living with dementia and their care partners. Also, each concept (primary characteristic) specifically links a design feature to performance criteria. In this sense, this tool is evaluative in nature, not just descriptive.

For each category (e.g., common space structure) the two subdimensions are defined in terms of a high and a low value (e.g., many or few social spaces, and distinctive vs. similar in design). These two ratings, which are fundamentally descriptive, are then combined into a scoring matrix so that living areas with a high number of distinctive spaces are rated as more effective than one with fewer spaces that are similar in character. Overall, this process combines both discrete and global aspects of environmental assessment, though the final scoring is more global than discrete. There are no published reports of the psychometric properties of this tool.

3.1.3 Nursing Unit Rating Scale (NURS)

The Nursing Unit Rating Scale (NURS) was developed to compare SCUs for people living with dementia to non-SCU/traditional care units across six environmental dimensions (see Table 3).
### TABLE 2  Characteristics of environmental assessment tools

| Assessment tool | Related version | Dementia exclusive/inclusive | Type of setting(s) | Measures/items | Level of measurement | Data collection method(s) | Descriptive/evaluative |
|-----------------|-----------------|-------------------------------|--------------------|----------------|----------------------|--------------------------|------------------------|
| TESS            | E               | NH & AL                       | 13 constructs, 84 items | Discrete items with 3 global measures | Observation             | D                        |
| SCUEQS          | E               | NH & AL                       | 7 constructs, 18 items | Discrete items | Observation           | D                        |
| E-B Model       | E               | NH & AL                       | 16 constructs      | Discrete and global | Observation, interview | E                        |
| NURS            | E               | NH                            | 6 constructs, 158 items | Discrete items | Interview            | D                        |
| PEAP            | E               | NH & AL                       | 9 constructs       | Global ratings within each construct | Observation, interview | E                        |
| SCEAM           | I               | NH                            | 11 constructs, 318 items | Discrete items | Observation           | D                        |
| S-SCEAM         | I               | NH                            | 10 constructs, 215 items | Discrete items | Observation           | D                        |
| EQuAL           | I               | NH                            | 10 constructs, 386 items | Discrete items | Observation, instrumentation | D                      |
| ACC V 1         | I               | NH & AL                       | 6 constructs, 79 items | Discrete items | Self-assessment       | D & E                    |
| ACC V 2         | I               | NH & AL                       | 5 constructs, 132-134 items | Discrete items | Self-assessment       | D & E                    |
| EOH             | I               | NH & AL                       | 0 constructs, 25 items | Global questions | Interview             | E                        |
| EVOLVE I        | I               | Independent housing for seniors/IL | 13 constructs, 2494 items | Discrete items | Observation, instrumentation | E                      |
| EAT             | E               | NH & AL                       | 10 constructs, 72 items | Discrete items | Observation           | E                        |
| DDAT            | E               | LTC                           | 11 constructs, 345 items | Discrete items | Observation, instrumentation | D & E                |
| DEAP            | I               | NH & AL dining rooms          | 4 constructs, 24 items  | Discrete items | Observation, instrumentation | D                      |
| EHE             | E               | LTC                           | 7 constructs, 64 items | Discrete items | Observations with discussion | E                      |

*E, dementia exclusive (specific); I, dementia inclusive.
*AL, assisted living; IL, independent living; LTC, UK level not specified; NH, nursing home.
* D, descriptive; E, evaluative.
Items were developed from a search of the literature and a content analysis of descriptive data collected in 75 SCUs and 1122 non-SCUs. It differs from the other tools described here, in that it focuses more directly on policy and program features and indirectly on the physical environment. Because these features are typically not easily visible, it relies more heavily on interviews with staff than observation. The NURS was used in a large study of 400 nursing units in 124 care communities. All measures had moderate to high internal consistency with Cronbach’s alpha ranging from 0.70 to 0.95. No inter-rater reliability was reported.

### 3.1.4 | Professional Environmental Assessment Procedure (PEAP)

The Professional Environmental Assessment Procedure (PEAP) was created to both validate and augment the TESS (described above). Like the E–B model of Zeisel et al., the PEAP is specifically based on a set of therapeutic goals derived from the literature and is focused on evaluating SCUs. The PEAP consists of a 5-point rating of nine dimensions of place experience thought to be particularly relevant to PLWD.

Each dimension is defined, with an expanded conceptual discussion of its meaning, followed by a rater’s guide for what to observe and inquire about at the time of the walk-through. Each dimension is then rated on a 5-point scale, with 5 reflecting a better setting. Each point of the scale is described in such a way as to highlight the differences among the five points.

All PEAP dimensions demonstrated good or very good inter-rater agreement. Percentage agreement between raters ranged from 91.7% to 58.3% (average 72.2%). Despite some lower percentage agreements, the ratings never differed by greater than 1 point on the scale (reflected in higher Spearman rho correlation coefficients and the weighted kappas). Spearman’s rho ranged from a high of 0.88 for the dimension of continuity of self to a low of 0.69 for provision of privacy, the only dimensions that did not reach or exceed 0.75. When kappas were calculated, the results ranged from 0.69 to 0.85. These are lower than in some other tools likely because it is a more global assessment format, which requires more subjective interpretation.

### 3.1.5 | Sheffield Care Environment Assessment Matrix (SCEAM) and Swedish version S-SCEAM

The Sheffield Care Environment Assessment Matrix (SCEAM) was developed as part of a larger study to investigate relationships between the physical environment and quality of life for older people in a variety LTC settings in England. The SCEAM provides a set of numeric scores that may be used to make structured comparisons between buildings, to examine individual buildings in relation to specific criteria, or to examine statistically the relationship between characteristics of buildings and measurements such as quality of life scores. It is person-centered, covers the full range of frailties for which the care environment should compensate (i.e., is dementia-inclusive), and has identifiable subsets associated with both physical and cognitive frailties. It is comprised of 210 items, which are noted as present/absent by a rater in a walk-through tour. The items within each domain are then summed and a total score for each domain results. While data are reported for how the SCEAM scored 38 care homes, no psychometric properties were reported.

Researchers in Sweden translated, adapted, and further developed a Swedish version of the SCEAM (S-SCEAM) to provide a contextually appropriate instrument to residential care facilities in their country. As part of this process, content validity and reliability of the S-SCEAM were tested. The results of the content validity analysis showed that more than one third of the items had item content validity index (I-CVI) values less than the critical value of 0.78, with scores ranging from 0.13 to 0.77. As a result, slightly >100 of the original items in the SCEAM were removed due to cultural and/or translational differences between the residential care systems in the two different countries. The test-retest reliability for the S-SCEAM showed strong results; 96% for rater 1 and 95% for rater 2. Inter-rater reliability indicated 95% agreement on the first assessment between the two raters (kappas = 0.851 [95% confidence interval (CI) [0.79, 0.91]]), and 94% agreement on the second assessment (kappas = 0.832 [95% CI (0.76, 0.90)]).

### 3.1.6 | Environmental Quality Assessment for Living (EQuAL)

The Environmental Quality Assessment for Living (EQuAL) tool is a comprehensive descriptive tool developed to assess nested levels of the environment: resident room, nursing unit, and the entire care community. The items were generated from a literature review with a particular focus on items conceptually related to quality of life.

Inter-rater reliability was assessed only for the bedroom scale and was calculated separately for private versus shared rooms. Of the 112 checklist items tested by 24 pairs of raters in private rooms, 97 items (96%) yielded a significant kappa statistic. Of the significant kappas, only 1 item was in the poor range (κ = 0.4), 10 items (15%) were in the fair range (κ = 0.4–0.6), 29 items (30%) were in the good range (κ = 0.6–0.8), and 16 items (16%) were in the excellent range, and 100% agreement for all pairs of raters was achieved for 41 items (42%). Inter-rater reliability for shared rooms, where the assessor needed to separate the environment of the focal resident from any roommates, was slightly lower. Of the 110 shared-room items tested with 36 pairs of raters, 96 items (87%) yielded significant kappas. Of the significant kappas, 4 items (4%) were in the poor range, 19 (20%) were in the fair range, 27 items (28%) were in the good range, and 15 (16%) were in the excellent range, and there was 100% agreement on 31 (32%) items. Face validity of the items was assessed with four environmental experts assigning one or more quality of life domains to each item. Data was...
collected on 1988 residents, living in 131 distinct nursing units in 40 care communities in five states.

### 3.1.7 | Artifacts of Culture Change (ACC)

The Artifacts of Culture Change (ACC) tool “fills the purpose of collecting the major concrete changes homes have made to care and workplace practices, policies, and schedules, increased resident autonomy, and improved environment. It results from study of what providers and researchers have deemed significant things that are changed and are different in culture changing homes compared to other homes” (p. 5). It is an observational tool that describes discrete aspects of NHs that reflect PCC values.

There are now two versions of the ACC, version 1 published in 2006 through CMS, and version 2 published in 2020 through Pioneer Network. In ACC-1 the environment section was the largest section, both in terms of numbers of items and points possible (60% of the total score is from the Environment section). Four questions were heavily weighted: the percentage of residents living in a household, percentage of residents in a private room, percentage in an enhanced shared room, and the absence of a traditional nurses’ station, which together accounted for up to 200 points (accounting for 37% of the total score). Throughout the ACC-1 tool, items were assigned different numbers of points based on how important they were thought to be by the developers. In contrast, in version 2, all items are answered as being fully implemented, partially implemented, or not a current practice, and the totals from each column are then divided by the number of elements to derive Artifact Percentages of Fully Implemented, Partially Implemented, or Not-Current Practices. There are two versions of ACC-2, one for NHs (134 items) and one for AL communities (132 items). Neither ACC 1.0 nor ACC 2.0 have undergone any psychometric testing or validation, nor are they published in any peer-reviewed journal. They are included here because they have been used by many care communities.

### 3.1.8 | Experience of Home (EOH)

The Experience of Home (EOH) Scale is designed to measure the strength of how residents experience (or do not experience) a LTC setting as being similar to home. The EOH focuses on the transactional nature of place experience as opposed to just features of the environment. The instrument is administered to older adults, has 25 items, and uses a visual analog scale for responses. The mean of the sum of individual scores is the final score, with higher numbers reflecting stronger experience of home. The instrument was administered to 200 older adults in diverse dwelling types. Principal component analysis provided support for construct validity, eliciting a three-factor solution (home, not home, and boundary) accounting for 63.18% of variance in scores. Internal consistency and reliability were supported with Cronbach’s alpha of 0.96 for the entire scale. Test–retest reliability was also evaluated, and results were stable ($r = 0.86$).

### 3.1.9 | Evaluation of Older People’s Living Environments (EVOLVE)

Another tool developed by researchers from the University of Sheffield is the Evaluation of Older People’s Living Environments (EVOLVE) tool. This project was completed in collaboration with the Personal Social Services Research Unit, University of Kent, and supported by the Housing Learning and Improvement Network and the Elderly Accommodation Counsel. Unlike the SCEAM (developed by the same team), this tool’s focus is on the design of housing communities (similar to independent living in the United States) and individual dwellings, and it is dementia inclusive. Developed, tested, and revised over a 3-year period (circa 2006–2009), the EVOLVE is comprised of a series of checklists covering 13 domains.

There is no publicly reported data on the psychometric properties of the EVOLVE, though face validity and inter-rater reliability between two researchers were generally noted as strong. Comprised of 474 items for single dwellings and 2020 for a housing community, this tool is specifically designed for architects, housing providers, commissioners, individuals, and researchers for both planning housing design as well as assessment of existing settings.

### 3.1.10 | Environmental Audit Tool

The EAT is comprised of 72 items selected to exemplify a set of design principles first used in the development of the units for the “Confused and Disturbed Elderly” built by the New South Wales (Australia) Department of Health in the late 1980s and early 1990s (the Australian equivalent of SCUs in the United States). These design principles are similar to, but not completely consistent with, the elements of household design that are emerging in US NH and AL communities.

The majority of the 72 items are answered yes/no, with a few items having additional options or points. The EAT was specifically designed to address some of the “limitations” of the TESS, in that it covers a wider variety of items, but it does not form any type of cohesive scale. It is a cross between the TESS and the PEAP in that it forms scales on specific dimensions, but each scale is based on a number of discrete elements. The EAT was validated in a sample of 22 dementia-specific settings and eight units accommodating people with a variety of diagnoses (dementia-inclusive settings). The average percentage of absolute agreement between two raters using the EAT was 86.8% (range 46.6%–100%). Interclass correlations (ICCs) ranged from -0.05 to 1; 13.8% of items had ICCs of less than 0.4; and 54.2% of the ICCs were greater than 0.70. The inter-rater reliability of the total score was 0.97 (Pearson’s r, significant at 0.000). It was also validated against the TESS and the PEAP.

### 3.1.11 | Dementia Design Audit Tool (DDAT)

This tool, developed by the Dementia Services Development Centre (DSDC) at the University of Stirling, UK, addresses both interior and exterior environments for people living with dementia. It is divided
into 11 sections (10 spatial areas plus “general principles”) with 345 individual items (many repeated for different spaces). In addition to general common areas and outside spaces, a proportion (generally 20%) of bedrooms and bathrooms must be surveyed individually. Each item is scored as “standard met” (score 1), or “standard not met” (score 0). For some items, this requires judgment based on the knowledge of the rater. The tool is primarily used by the DSDC for consulting purposes but a license for a self-conducted single-site audit is available for purchase through their website. For non-DSDC personnel to use the tool requires extensive training using resources not available with the tool but available through DSDC. The underlying constructs that form the basis for item inclusion are not clearly delineated. Limited information about psychometric data is available for the DDAT. Quirke et al. cites inter-rater reliability of individual questions was 79.4% and of overall score of 95% for the DDAT (though these scores could not be verified through the cited reference).

### 3.1.12 Dining Environment Audit Protocol (DEAP)

The Dining Environment Audit Protocol (DEAP) focuses on the dining environment in shared residential environments based on PCC values. Dining is often one of the early care practices and environmental areas that are modified as a care community seeks to adopt more person-centered values and practices, hence it is included in this review. The DEAP is organized into four sections and includes 24 descriptive items, seven evaluative items, and two scale questions that rate the overall home-likeness and functionality of the dining room, with a scoring range from 0 to 8. The higher number represents a higher quality of the observed dining environment.

The DEAP tool was validated in a sample of 10 dining rooms in three care communities that were part of the same parent organization. Seven of the ten dining rooms assessed were dementia-specific and three were “general population.” Average inter-rater reliability was 0.7 (range 0.2–1.0). Overall “home-likeness” is based on key physical environmental features including size of the space, institutional/homelike furniture, quality of lighting, absence/presence of homelike artifacts, etc. Overall “functionality” was related to entry/exist conditions, contrast between table and plates, posted menu, server, lighting intensity, glare, etc. The construct validity of DEAP is supported with several correlation measures and theoretical relations with home-likeness and functionality of the dining rooms in a study based on data from 82 dining rooms in 32 care homes. The home-likeness scale was positively associated with a view of the garden/green space, presence of a clock, and a posted menu, while functionality scale was positively associated with number of chairs and lighting (P < .05).

### 3.1.13 Enhancing the Healing Environment (EHE) assessments tools

The Enhancing the Healing Environment (EHE) program was initiated in England as part of a national dementia strategy. This program created a series of tools that could be used by a wide group of users to assess different environments for individuals living with dementia. The initial version (titled “Is your ward dementia friendly?”) focused on acute care settings and is adapted from the EHE program and developed by The King’s Fund, an independent charity working to improve health and health care in England. This tool focuses on specific aspects of the physical setting in a hospital ward that have been demonstrated to impact the interactions that persons with dementia have in health-care settings. This tool is organized into seven criteria.

This tool is simplistic in its design and application, intended to be used easily by both experts as well as individuals unfamiliar with the care setting (e.g., patients or family members). It was launched in 2012 and made available free of charge. Two subsequent tools, using similar criterion, were developed in 2013 to assess outpatient areas of hospital and, of relevance here, LTC settings. No psychometric data could be located in any published peer-reviewed literature: evaluation of the tools was apparently conducted by asking those who had downloaded it to complete an online questionnaire of their experiences using the tool. In addition, a summative report on the evaluation of the tools notes challenges with inter-rater interpretation of the indicators, but, again, no metrics are provided to understand the scope of these differences.

Table 3 lists each environmental assessment tool and summarizes it in terms of reliability, validity, ease of use, each of interpretability, and general strengths and weaknesses. No tool scored 2 (best score) in all four numeric columns, neither did any tool score 0 across the board. Many tools that are easy to use lack strength in interpretability and utility, resulting in limited ability to recommend changes or take actions to improve the environment once results are known.

### 3.2 Relationship to core PCC values

The continual evolution of tools since the early 1990s demonstrates how our understanding of the built environment and its impact on the quality of the experience of planned care settings for persons with dementia has evolved. Most, but not all, of the tools were developed around some set of guiding principles or domains (which are broader than individual constructs). This evolution can be seen in the different constructs of the individual measures (see Table 4) and underlying domains (see Table 5) within each of the tools. The list of constructs from each tool (listed in Table 4) was reviewed and condensed into a smaller number of domains so that similar constructs were grouped together (e.g., Choice and Control was grouped with Autonomy) allowing for easier comparison across tools (Table 5). Some domains are included in a majority of tools, spanning all periods of development, but there are also domains that are present only in a few tools. Tools with subscales or different versions that address different constructs are listed separately (note DDAT is not included as no information on constructs was publicly available).

The domain of Safety and Security was the most common, appearing in 11 of the 15 tools. This is perhaps not unexpected as the judgment of people living with dementia can become impaired over the
| Assessment tool | Reliability<sup>a</sup> | Validity<sup>b</sup> | Ease of use<sup>c</sup> | Interpretability<sup>d</sup> | Strengths<sup>e</sup> | Weaknesses<sup>f</sup> |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| TESS            | 2               | 2               | 2               | 1               | Useful for cross-site comparisons | Descriptive nature reduced actionability |
| E–B Model       | NA              | NA              | 2               | 2               | Based on therapeutic goals | Limited number of generalized variables included |
| NURS            | 0               | 1               | 1               | 2               | Addresses policy and program features | Can be hard to differentiate policy vs. practice |
| PEAP            | 1               | 1               | 1               | 2               | Based on therapeutic goals, easy to rank and compare different settings | Requires relatively deep knowledge of gold standard of dementia care, language is outdated |
| SCEAM           | 2               | 1               | 0               | 1               | Can be scored in different ways to compare living area, identify features for specific criteria or correlate with behavioral outcomes | Lengthy |
| EQuAL           | 1               | 1               | 0               | 1               | Assesses at multiple scales: bedroom, living area, whole community | Lengthy |
| ACC             | NA              | NA              | 2               | 2               | Designed to be administered by community staff; self-evaluation tool | Objectivity of responses can be questionable |
| EOH             | 2               | 2               | 1               | 2               | Transactional approach of how individuals experience the environment | Uses interview format, which can be challenging with lower functioning residents |
| EVOLVE          | NA              | NA              | 1               | 2               | Simple checklist, easy to score | Time consuming to complete full building evaluation |
| EAT             | 2               | 1               | 1               | 2               | Based on generally accepted guiding principles | Response categories limiting |
| DDAT<sup>f</sup> | 1               | 2               | 0               | 0               | Linked to formal accreditation program in UK. Can be used with existing buildings and during design | Requires significant training, underlying constructs unclear, missing some common areas |
| DEAP            | 1               | 0               | 2               | 2               | Focused on the dining room, easy to administer | Validation sample quite small; inter-rater reliability quite variable |
| EHE             | NA              | NA              | 2               | 2               | Completed by people deeply familiar with the setting | Somewhat more subjective in nature than other tools |

<sup>a</sup> Reliability (test–retest, inter-rater, internal consistency): 2 (good) if reliability coefficients generally ≥ 0.80; 1 (fair) if reliability coefficients 0.60–0.79; 0 (poor) if reliability coefficients < 0.60 or no information.

<sup>b</sup> Criterion validity (convergent, discriminant, predictive, concurrent): 2 (good) if reliability coefficients ≥ 0.60; 1 (fair) if reliability coefficients 0.40–0.59; 0 (poor) if reliability coefficients < 0.40 or no information.

<sup>c</sup> Ease of use: 2 (good) if not time intensive to train/administer and scoring is simple; 1 (fair) if not time intensive to train/administer or scoring is simple; 0 (poor) if time intensive to train/administer and scoring is not simple.

<sup>d</sup> Interpretability/utility: 2 (good) if range of scale is used and reflects actionable items; 1 (fair) if range of scale is used or reflects actionable items; 0 (poor) if range of scale is not used and does not reflect actionable items.

<sup>e</sup> Strengths and weaknesses include conceptual model of well-being in dementia; breadth of measurement/focus; focus on deficits/strengths; appropriateness of respondents; person-centeredness; levels of inquiry; consideration of time; use of measure; other.

<sup>f</sup> Psychometrics reported in Quirke et al. but could not be verified through cited reference.
| Assessment tool | TESS | SCUEQS | E-B Model | NURS | PEAP | SCEAM | S-SCEAM |
|-----------------|------|--------|-----------|------|------|-------|---------|
| Related version |      |        |           |      |      |       |         |
| Constructs      |      |        |           |      |      |       |         |
| 1. Exit control |      |        | 1. Exit control |      |      |       |         |
| 2. Maintenance  |      |        | a. Immediacy of control |      |      |       |         |
| 3. Cleanliness  |      |        | b. Unobtrusiveness |      |      |       |         |
| 4. Safety       |      |        | 2. Wandering paths |      |      |       |         |
| 5. Orientation/ |      |        | a. Continuous |      |      |       |         |
| cueing          |      |        | b. Wayfinding |      |      |       |         |
| Privacy         |      |        | 3. Individual away places |      |      |       |         |
| Unit            |      |        | a. Privacy |      |      |       |         |
| autonomy        |      |        | b. Personalization |      |      |       |         |
| 7. Noise        |      |        | 4. Common space structure |      |      |       |         |
| 8. Outdoor      |      |        | a. Quantity |      |      |       |         |
| access          |      |        | b. Variability |      |      |       |         |
| 9. Lighting     |      |        | 5. Outdoor freedom |      |      |       |         |
| 10. Noise       |      |        | a. Availability |      |      |       |         |
| 11. Visual/Tactile stimulation | | | b. Supportiveness | | | | |
| 12. Space/seating | | | | | | | |
| 13. Familiarity/homelikeness | | | | | | | |
| Primary         |      |        | 6. Residential scale |      |      |       |         |
| environmental   |      |        | a. Size |      |      |       |         |
| characteristics  |      |        | b. Familiarity |      |      |       |         |
| Secondary       |      |        | 7. Autonomy |      |      |       |         |
| environmental   |      |        | a. Safe |      |      |       |         |
| characteristics  |      |        | b. Prosthetic |      |      |       |         |
| 8. Sensory      |      |        | 8. Sensory comprehension |      |      |       |         |
| comprehension   |      |        | a. Noise management |      |      |       |         |
|                 |      |        | b. Meaningfulness to residents | | | | |
| Comprehensive   |      |        | 9. Sensory comprehension |      |      |       |         |
| performance     |      |        | 1. Maximizing awareness & orientation | | | | |
| criteria        |      |        | 2. Separation | | | | |
|                 |      |        | Stability | | | | |
|                 |      |        | 3. Stimulation | | | | |
|                 |      |        | 4. Complexity | | | | |
|                 |      |        | 5. Control/tolerance | | | | |
|                 |      |        | 6. Continuity | | | | |
|                 |      |        | 7. Stimulation & coherence (quality) | | | | |
|                 |      |        | 8. Provision of opportunities for personal control | | | | |
|                 |      |        | 9. Continuity of the self | | | | |
|                 |      |        | 10. Facilitation of social contact | | | | |
| NURS            |      |        | 1. Separation | | | | |
| PEAP            |      |        | Stability | | | | |
| SCEAM           |      |        | 2. Stimulation | | | | |
|                 |      |        | 3. Complexity | | | | |
|                 |      |        | 4. Control/tolerance | | | | |
|                 |      |        | 5. Continuity | | | | |
|                 |      |        | 6. Support of functional abilities | | | | |
|                 |      |        | 7. Provision of opportunities for personal control | | | | |
|                 |      |        | 8. Continuity of the self | | | | |
|                 |      |        | 9. Facilitation of social contact | | | | |
| 1. Privacy      |      |        | 1. Privacy | | | | |
| 2. Personalization |     | | | | | | |
| 3. Choice & control | | | | | | | |
| 4. Community    |      |        | 3. Choice & control | | | | |
| 5. Safety & health |   | | | | | | |
| 6. Supports for physical frailty | | | | | | | |
| 7. Comfort      |      |        | 4. Comfort | | | | |
| 8. Support for cognitive frailty | | | | | | | |
| 9. Awareness of the outside world | | | | | | | |
| 10. Normalness & authenticity | | | | | | | |
| 11. Provision for staff | | | | | | | |
| S-SCEAM         |      |        | 1. Privacy | | | | |
|                 |      |        | 2. Personalization | | | | |
|                 |      |        | 3. Choice & control | | | | |
|                 |      |        | 4. Community | | | | |
|                 |      |        | 5. Safety & health | | | | |
|                 |      |        | 6. Supports for physical frailty | | | | |
|                 |      |        | 7. Comfort | | | | |
|                 |      |        | 8. Support for cognitive frailty | | | | |
|                 |      |        | 9. Awareness of the outside world | | | | |
|                 |      |        | 10. Normalness & authenticity | | | | |
|                 |      |        | 11. Provision for staff | | | | |
| Assessment tool | EQuAL | ACC | EOH | EVOLVE | EAT | DDAT | DEAP | EHE |
|-----------------|-------|-----|-----|--------|-----|------|------|-----|
| Related version | V 1   | V 2 |     |        |     |      |      |     |
| Constructs      |       |     |     |        |     |      |      |     |
| 1. Autonomy     | 1. Care practice | 1. Resident directed life | 1. Personal realization and choice | 1. Be safe and secure | 1. Compensate for disability | 1. Meaningful interactions between patients, their families, and staff |
| 2. Dignity      | 2. Environment  | 2. Home environment & accommodation of needs and preferences | 2. Dignity and privacy | 2. Be small | 2. Maximize independence, | 2. Well-being |
| 3. Privacy      | 3. Family and community | 3. Family and community | 3. Comfort and control | 3. Be simple with good visual access | 3. Reinforce personal identity, | 3. Eating and drinking |
| 4. Meaningful activity | 4. Leadership | 4. Leadership and engagement | 4. Personal care | 4. Have unnecessary stimulation reduced | 4. Enhance self-esteem/ confidence | 4. Mobility |
| 5. Enjoyment    | 5. Workplace practice | 5. Being well known | 5. Social support inside building | 5. Have helpful stimuli highlighted | 5. Demonstrate care for staff | 5. Contiinece and personal hygiene |
| 6. Relationships | 6. Outcomes    |     | 6. Social contact outside | 6. Provide for planned wandering | 6. Be orienting and understandable | 6. Orientation |
| 7. Comfort      | 7. Accessibility |     | 7. Be familiar | 7. Be familiar | 7. Welcome relatives and the local community | 7. Calm, safety, and security |
| 8. Security     | 8. Physical support |     | 8. Provide opportunities for a range of social interactions from private to communal | 8. Provide opportunities for a range of social interactions from private to communal | 8. Control and balance stimuli |   |
| 9. Functional competence (defined as being as independent as possible and desired) | 9. Sensory support | | 9. Sensory support | 9. Encourage links with the community |   |   |
| 10. Spiritual well-being | 10. Dementia support | | 10. Dementia support |   |   |   |
|                 | 11. Health and safety | | 11. Health and safety |   |   |   |
|                 | 12. Security | | 12. Security |   |   |   |
|                 | 13. Working care | | 13. Working care |   |   |   |

*TABLE 4 (Continued)*
| Assessment tool | Related version | TESS | E-B Model | NURS | PEAP | SCEAM | S-SCEAM | EQUAL | ACC | EOH | EVOLVE | EAT | DDAT | DEAP | EHE |
|-----------------|-----------------|------|-----------|------|------|-------|---------|-------|-----|-----|--------|-----|------|------|-----|
| Safety & Security | XX | X | X | - | X | X | X | X | X | - | - | - | XX | X | X | X | X |
| Familiarity/homelike/ | - | X | XX | X | X | XX | XX | - | - | X | - | - | XX | - | XX | - | - |
| personalization | | | | | | | | | | | | | | | | | |
| Autonomy | - | - | X | X | X | X | X | X | - | X | - | XX | - | - | - | |
| Quality/regulation of stimulation | XXX | X | XX | X | XX | - | - | - | - | - | - | XX | X | X | - | - |
| Privacy | X | - | X | - | X | X | X | X | - | - | - | XX | - | - | - | - |
| Comfort | - | - | - | X | X | - | - | X | - | - | - | XX | - | X | X | XXX |
| Support functional abilities | - | - | - | X | X | - | - | X | - | - | - | XX | - | X | X | XXX |
| Community connections | - | - | - | - | - | X | X | - | X | X | - | XX | X | - | - | - |
| Orientation | X | X | - | - | X | - | - | - | - | - | - | XX | X | - | X | |
| Social engagement | - | - | - | - | X | - | - | XX | - | - | - | XX | X | X | - | - |
| Access to nature | X | - | X | - | - | X | X | - | - | - | - | - | X | - | - | |
| Staffing | - | - | - | - | X | - | - | XX | X | - | XX | - | X | - | - | - |
| Support for Cognition | - | - | - | - | - | X | X | - | - | - | - | - | XX | X | - | - |
| Accessibility | - | - | - | - | - | X | X | - | - | - | - | - | XX | - | - | - |
| Cleanliness/maintenance | XX | XX | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Dignity | - | - | - | - | - | - | - | X | - | - | - | XX | - | - | - | - |
| Segregation vs integration | X | - | - | X | - | - | - | - | - | - | - | - | - | - | - | - |
| Well-being | - | - | - | - | - | - | - | XX | - | - | - | - | - | - | - | X |
| Other | X | X | - | - | - | - | - | XXX | X | X | - | XXX | - | - | - | - |

Note: Each x refers to an environmental assessment tool construct; multiple x’s in a cell indicates that the tool has multiple constructs that related to single person-centered care categories. “Other” refers to constructs that were only included in a single instrument or spanned multiple constructs.
### Table 6: Environmental assessment tool measures sorted by person-centered domain

| Assessment tool | Related version | Sense of community | Comfort and dignity | Courtesy, concern & safety | Opportunities for choice | Meaningful engagement |
|-----------------|-----------------|--------------------|--------------------|--------------------------|------------------------|----------------------|
| TESS            |                 | x                  |                    | x                        | x                      | -                    |
| SCUEQS          |                 |                    | x                  | x                        |                        | -                    |
| E-B Model       |                 |                    |                    |                          |                        |                      |
| NURS            |                 |                    | x                  | -                        | x                      | -                    |
| PEAP            |                 |                    | x                  |                         |                        |                      |
| SCEAM           |                 |                    | x                  |                          | x                      | -                    |
| S-SCEAM         |                 |                    |                    |                          | x                      | -                    |
| EQuAl           | x               |                    |                   |                          |                        |                      |
| ACC V1          |                 |                    |                   |                          | x                      | -                    |
| EVOLVE          |                 |                    |                   |                          |                        |                      |
| EOH             |                 |                    |                   |                          | x                      | x                    |
| EAT             |                 |                    |                   |                          | x                      | x                    |
| DDAT            |                 |                    |                   |                          | x                      | x                    |
| DEAP            |                 |                    |                   |                          | x                      | -                    |
| EHE             |                 |                    |                   |                          | x                      | x                    |

3.3.1 | Create a sense of community within the care environment

This practice recommendation emphasizes fostering engagement at several levels. To do so the environmental factors that can empower (and not disable) an individual living with dementia must be understood. There is currently some debate about the morality of segregating people who are living with dementia behind a secured door, which may contribute to the stigmatization of PLWD and can be considered a form of restraint. Care communities that deeply adopt PCC values and practices create ways for PLWD to engage with individuals who do not currently show signs of cognitive decline. Complete segregation of PWLD is often not practical (given that up to 60% of residents in a community might be living with dementia) and may inhibit a sense of community as individuals’ needs change over time. The exception to this is communities that are exclusively PLWD. In larger care communities, having readily available shared social and activity spaces between living areas (what used to be called units) can help support a sense of community. Finally, designing spaces and programs that intentionally bring the outside neighbors into the community is another way of achieving a sense of community.

Older tools that focus on segregation of individuals living with dementia (e.g., the NURS) or emphasize exit and wandering control (e.g., TESS, E-B Model, PEAP) may not provide a translatable assessment to this concept in a PCC framework. Newer tools such as the EAT, SCEAM/S-SCEAM, EQuAL, ACC, EVOLVE, and EHE better address the range of community spaces and activities that reflect this construct.
3.3.2 | Enhance comfort and dignity for everyone in the care community

Fostering "authentic comfort" and supporting dignity requires creating familiarity and opportunity for an individual to be respected. In the context of design, comfort derives in part of feeling “at home”; so a setting that reflects a household in scale (number of people and size of spaces), décor (not only reflective the type of décor people might have had in a home, but having their actual possessions out in the shared areas of the household), and familiar routines (e.g., having access to a kitchen to be able to eat what, when, and where one chooses) will better support a sense of comfort than larger, less familiar traditional care settings will. Being able to have control over one’s own space (something that is impossible to do in a shared bedroom) is also an important component of comfort. Living areas designed so that it is easy to find important destinations reduces the anxiety associated with feeling lost. Dignity is about how people are treated: are they known and respected for who they are and how they respond in different situations. The environment can be designed to be able to respond to individuals’ particular preferences and reflect who they view themselves to be.

Many of these environmental tools are well suited to evaluating physical features that can support the subelements of this dimension. Instruments such as TESS, the E–B Model, PEAP, EAT and SCEAM/S-SCEAM, ACC-2 specifically draw out attributes that contribute to the home-like character of the setting and other qualities that contribute to familiarity with one’s previous lifestyles (e.g., continuity of self). The limitation of these instruments is that they often isolate discrete elements and don’t address the collective combination of variables, which taken together, create more cohesive meanings for people. The EOH focuses directly on this construct, but from a more experiential perspective.

3.3.3 | Support courtesy, concern, and safety within the care community

This construct supports people in the care community to live and work in a state of physical ease and having freedom from pain or restraint. In practice, staff consider the needs and preferences of each individual who receives care assistance, and people are equal partners in the planning of care; their opinions are important and are respected. While this may seem to be largely interpersonal, there are associated environmental correlates.

The most overt environmental responses to this relate to issues of safety, and in most cases is interpreted as taking away/denying access to spaces or items that care partners consider unsafe (which was and continues to be a common practice). This includes, often, places outside the secured living area and often even includes denying access to an enclosed courtyard, because it often argued that it is harder for staff to keep an eye on residents (than say, in their bedrooms). As PCC values have advanced, there is greater recognition that people don’t give up their rights simply because they moved into a memory care shared residential setting, and that these restrictions do not reflect a person-centered value.

The second area where the environment intersects with this construct is in design features that support functional independence, by offering prosthetic elements that compensate for either physical or cognitive changes. Examples include assistive wardrobes, easy access to food and beverages, and support for wayfinding.

Staff needs should also be considered. For example, having access to pleasant respite areas (both inside and outside) reflects the care community’s commitment to their comfort and well-being, and having easily accessible storage for personal protective equipment so that both staff and residents can be protected from contagions demonstrates organizations concern for safety. Overall, few of the tools directly address staff or visitor needs (beyond a place to engage with a resident). Three of more recently developed tools do specifically address environmental needs of staff (SCEAM, ACC, and EVOLVE).

Most of the tools described above address safety and security directly (all except NURS and ACC-1). Most also emphasize the importance of outside spaces, though not always the ability to go outside freely. Only the SCEAM/S-SCEAM and the ACC-1 and ACC-2 specifically address opportunities for residents to leave their living area when they choose, and under what conditions. Beyond safety, support for abilities (physical and cognitive) is also common to many of the tools. Tools such as the PEAP provide a range of dimensions that contribute to these outcomes (i.e., support functional abilities, provisions for personal control, continuity of self); as does the SCEAM (i.e., supports physical frailty, supports cognitive frailty), and the EAT (reduce unnecessary stimulation and highlight helpful stimulation, provide for positive wandering). The actual autonomy that an individual may experience/perceive will be based largely on other dimensions not measured in most existing environmental tools: knowing each resident and what is important to her/him and focusing on residual abilities, which are addressed in the EAT and ACC-2.

3.3.4 | Provide opportunities for choice for all persons in the care community

In its most recent Requirements for Participation, CMS makes it clear that resident preferences and choices are to be honored. Choice implies there are options. Much of the emphasis in the Requirements for Participation are on choice about how care services are delivered, or about daily schedule (when to rise/retire or bathe). But there are environmental correlates of choice as well. Designing spaces and places that accommodate different levels of activity and types of stimulation that are meaningfully varied in terms of size, scale, and décor, which includes both indoor and outdoor areas, gives people choices about where and how they want to spend their time. Spaces need to be designed to support a continuum from being alone, to being private with one or two companions, to smaller groups and larger groups of individuals. Similarly, when outside, opportunities to be a passive watcher or to be actively engaged in an activity, of being able to sit in the sun or in the shade, of being able to be outside but under cover
when it is raining, are all examples of how design supports meaningful choices. Another aspect of choice is control—or being recognized as having the right to make choices. A creatively designed outdoor space provides little choice if residents are only allowed outside with staff for structured activities or when accompanied by a family member.

Thus, choice and control are distinct but overlapping concepts, and are addressed to a greater or lesser extent in every assessment tool described. It is only modestly addressed in the TESS, E–B Model, NURS, DEAP, and EHE. In the EAT, SCEAM, EQuAL, ACC, EOHand EVOLVE, either choice or autonomy is a core dimension that is addressed in more significant detail.

3.3.5 Offer opportunities for meaningful engagement to members of the care community

Lives are dynamic and while people develop routines to their day, they also need variety and some spontaneous options to keep their interest. Further, relationships, especially meaningful relationships, develop while doing things based on shared interests. The facilitation of meaningful social engagement is fostered by environmental supports, props, and cues that can support both planned and spontaneous interactions. For example, at a micro level, effective conversation is facilitated when chairs are placed at right angles to each other. On a larger spatial scale, a few studies have found that having elements of a residential kitchen supports not only independence in eating and hydration, it also supports social interactions as residents and staff work together to prepare meals. This dimension also specifically encourages engagement with the larger community, not just the other people who live or work in a given living area. Having a variety of destinations, such a library, café, pub, putting green, aviary, green house, etc., all provide opportunities for people to do things together, building and maintaining meaningful relationships.

The concept of meaningful engagement is relatively recent, and therefore not addressed in many of the earlier assessment tools to any meaningful degree. For instance, one of the PEAP’s core domains is “Facilitation of Social Contact,” which addresses how the environment brings people together but includes nothing about the quality and types of the interactions that might lead to meaningful engagement and relationships. Similarly, the EAT addresses “opportunities for a range of social interactions from private to communal” but primarily focuses on different size of spaces and whether they can be private. The EQuAL, EVOLVE, and EHE tools are the three tools that most directly assess how the environment supports opportunities for engagement in meaningful activities and relationships.

4 Discussion

Interest in evaluating the impact of the designed environment on PLWD began almost 50 years ago with the work of M. Powell Lawton et al. with the development and evaluation of the Weiss pavilion at the Philadelphia Geriatric Center. At that time, there was little in the way of evidence-based design specific to dementia and there were no validated environmental assessment tools available. As Lawton et al. noted, “the independent variable itself was distressingly gross in that the change in treatment locale subsumed an immense variety of components whose effects are unquestionably related to one another in very complex ways” (p. 755). They went on to suggest that research studies on single-item environmental characteristic-to-outcome studies were needed, because there would be greater control over and ability to measure both independent and dependent variables.

While this might have been an important and foundational first step in the early 1980s, this paper clearly demonstrates that there now exists a broad array of environmental assessment tools that can provide quite detailed description, measurement, and comparison metrics of the designed environment.

The analysis in this paper demonstrates that many of the older tools do not adequately address all of the core PCC values and practices, but newer tools better reflect the contemporary values of PCC, such as meaningful engagement and community connections. The EAT, SCEAM/S-SCEAM, EVOLVE, EOHand ACC-2 are more directly drawn from the PCC literature and were developed since 2004. Of these, only the ACC-2 and the EOHand ACC-2 were developed in the United States and reflect the unique culture of LTC in this country. Care communities that choose to deeply adopt PCC values often also choose to adopt some version of a household model, with a small scale (generally 9 to 16 residents) and residential style kitchen and living room and dining room spaces. As PCC and the Green House™/small house/household movement grows in popularity, research increasingly shows that communities that adopt PCC practices and values have outcomes—clinical, quality of life, organizational, engagement, etc.—that are at least as good or much better than settings that follow traditional care models and design. The EAT is the only tool reviewed that addressed some of the unique aspects of a household model in terms of scale, functional kitchens assessable to residents, and presence of residents’ own furniture. However, there are many aspects of household design that are not adequately addressed in the EAT. Therefore, new tools should seek to specifically address the household model of design. It is worth noting that a new assessment tool, the Environmental Audit Scoring Evaluation (EASE), is currently undergoing psychometric evaluation, and it is specifically designed to focus on the household model as a deep expression of PCC values. The EASE also incorporates the needs of staff more directly.

Another void that needs to be filled is in identifying the markers of evidence for PCC. For environmental assessments, this may lie more in the patterns of use within the setting, rather than simply the presence or absence of specific features. Engaging a broader cross-section of users in assessments could strengthen an evidence-based approach. A core characteristic of PCC is a sense of deep knowing of the person by care providers. Future evaluative measures should tap into this knowledge base by involving more residents and staff in the descriptions of both effective and ineffective environmental experiences.

PCC also fundamentally shifts the focus from the “absence of a negative response” (e.g., less agitation) to a focus on the positive experiences of life (e.g., expressions of joy). This construct should be applied
to the evaluation of settings that support individuals with dementia as well. For example, instead of seeking information about a feature that reduces agitation, measures could look for features that positively impact pleasure. Additionally, being able to link specific environmental features to behavioral/emotional/well-being outcomes would also serve to advance the field.

The tools described here were designed for assessing existing environments. Only the DDAT indicates it is meant to be used during the design process. But there are differences in evaluating a design during its development versus a complete, built setting, and the field would benefit from more tools specifically designed to be used during design. To this end, the EASE, described above, and a new version of the EAT called the EAT-PLAN are specifically geared to be used during the design process.

All these tools have an embedded, implicit cultural context that drove their development. As the work on translating the SCEAM for a Swedish setting demonstrated, a reasonably significant portion of the items were not directly transferrable from England to Sweden. Users of these tools need to understand the importance of these contextual influences, and not expect that a tool developed in one context will work equally well in another one.

5 | CONCLUSION

Virtually all of the comprehensive literature reviews on physical environments for individuals living with dementia include a comment that a major limitation in much of the research is the lack of detailed description about the independent variable—the environmental factors or changes that are hypothesized to have an impact on the outcomes of interest. With the number and breadth of measures identified in this review, there is no justification at this point in time for evaluating dementia care settings not to include a detailed, systematic, valid, reliable, and comprehensive assessment of the designed environment, regardless of whether the study is a quasi-experimental study of a single environmental factor or a post-occupancy evaluation of a whole new building. Using an existing, validated tool is essential if the knowledge base is to continue to grow. Similarly, no building should be designed that does not actively use the evidence-based knowledge that has been generated over the past several decades.

Finally, in addition to the cultural context mentioned above, it is worth stating that assessment tools that seek to pull out a single aspect of PCC are inherently going to be limited. Just as a core value of PCC is “know the person”—meaning the whole person—trying to evaluate a single component of a person-centered setting (the physical environment) is like saying, “if you know the skeleton of the person, you know the whole person.” Settings are dynamic, multi-component systems comprised of people, places, policies, and social norms that interact at multiple levels. From the micro-environment of tactile nuances of grab bars and interior details to meso environmental building codes that specify how many exit doors must be in place and regulations administered by CMS, to the macro environment of our current cultural norms that segregate frail older people away from the general community, the layers of decisions and daily interactions are confounding and complex. Ultimately, the tools that will most effectively increase our knowledge will be those that can take a systemic approach, and evaluate the policies and procedures, staff development, leadership styles, clinical care, daily routines, and social life, as well as the designed environment.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. Author disclosures are available in the supporting information.

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SUPPORTING INFORMATION
Additional supporting information can be found online in the Supporting Information section at the end of this article.

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