Farhana Ferdous
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(Re)designing the Continuum of Care for Older Adults

The Future of Long-Term Care Settings

Springer

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Foreword

The title of this timely volume highlights the pressing need for re-examining and revisioning the current long-term care system. Kane and Kane[1] (p. 4) defined long-term care as "a set of health, personal care and social services delivered over a sustained period of time to persons who have lost or never acquired some degree of functional capacity." Although this definition captures the core mandate of the long-term care provision, especially in North America over the decades, upon closer examination, it also suggests where we may have missed the mark. By and large, the ethic of care and caring for health and personal care has been predominantly shaped by clinical and health-related quality of life outcomes, largely foregoing the complex and integrated reality of older adults in their psychological, social, cultural, and spiritual inclinations. The relational nature of caring with the potential of independence and interdependence has been generally relegated to a unidimensional and undifferentiated framing of care. We have come far in the movement promoting person-centered care or person-oriented care in the last several decades, but not far or fast enough to have a transformational and systemic change of culture in long-term care.

Long-term care in the nursing home context is currently going through a critical phase after the pandemic's effect on outbreaks in the care facilities and resulting high number of deaths of residents and staff. The sobering reality of the pandemic has raised the curtain that has kept the systemic gaps and fault lines in our long-term care system out of our collective sight for decades. Important to note that the challenges faced by residents, care staff, and administration in this time of crisis do not represent failure or shortcoming of any particular group of organizations, providers, or individuals, rather they are indicative of the limitations at the macro levels of social values and resulting structural mechanisms and culture of care to provide long-term care. Regrettably, it has taken an outbreak of COVID-19 proportions to make those challenges come to sharp focus in our collective consciousness. In this

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[1] Kane, R. A., & Kane, R. L. (1987). *Long-term care: Principles, programs and policies.* New York, NY: Springer Publishing Company.

critical time to re-envision long-term care that may embrace a transformational change of the current system and culture, this edited volume is a timely contribution to shed light on the care innovations, challenges, and potentials in this care sector.

This volume offers an impressive collection of multidisciplinary contributions on diverse settings of long-term care, as well as on a myriad of topics spanning the continuum of long-term care, including gerotechnology, community-based care, diverse ethnicity of the residents, design for people with dementia, acute care, end-of-life care, adaptive reuse, impact of COVID-19, and continuing care retirement community (CCRC). It is worthwhile to note the overlap of the topics across setting types, such as the technology innovations and rehabilitation options in both care facilities and community. Several innovative projects and non-traditional options are part of this volume, such as the Rehabilitation and Architecture project (REARCH), Adult Family Care (AFC), adaptive reuse of closed malls, vertical CCRC, etc.

The readers of this volume will be challenged and rewarded with an in-depth understanding of distinct, yet complementary topics in long-term care that are relevant for contemporary times. Collectively, the chapters provide layers of insights on public policies, quality of care practices, and residents' quality of life, as impacted by the characteristics of the setting type, built environment, social contexts, and technological solutions. The diversity of topics covered in the volume is a testament to the complexity of what we know as long-term care; we can appreciate that making reforms in the current system is neither easy nor clear-cut. Nonetheless, the authors provide us a clear understanding of the challenges, highlight solutions, and shed light on pathways to move forward in a constructive way for improved care and support for older adults with disability who need support and care on an ongoing basis.

The continuum of long-term care that consists of community-based home care, institutional long-term care facilities, memory care, etc. is arguably here to stay for the foreseeable future. However, in the context of community-based care to foster aging-in-place, it is important to generate innovative solutions to unbundle the location-based care in more institutional settings and decentralize care and support in the community, e.g., community-based healthcare hubs. The community at large could also serve as a social ecosystem for interactions, activities, and support, which is a critical component in the older adults' functioning and quality of life. There is no one solution for the provision of long-term care, rather the settings and care levels need to recognize the diverse care and social needs of older adults in the community. Many older adults are "stuck in place" and would benefit in relocating to a congregate care setting, as many others with strong informal support networks, may thrive in their current communities with additional support.

Given the reality of the pandemic, it is important to share some reflections on the role of the physical environment of a care facility on infection prevention and control. Although it is too early to have substantial evidence on the built environmental impact on outbreak management or mitigation, based on emergent evidence, we can note the advantages of self-contained small homes (e.g., 12–16 bed households) with a clustered arrangement of rooms, activity, and dining areas—for more effective infection prevention and control, responsive management of residents with dementia, and care interactions. Smaller group size provides the option to

compartmentalize residents who might be at greater risk of infection, as well as isolate residents who are infected. Separating or grouping residents on floors with more than 60 residents and rooms with 2–4 residents is highly challenging. In conjunction with physical isolation, dedicated staffing would need to be established for affected residents to minimize transmission of the virus in the facility through staff. A majority of the residents in care homes live with cognitive decline and may have difficulty adhering to social distancing from other residents. They may have higher levels of anxiety at a time of isolation along with the reduced number of planned activities. A smaller group size facilitated by a household setting can provide the much-needed hands-on or close-proximity care and support from staff at a time of an outbreak. Beyond the possible benefit of outbreak prevention and control, there is evidence on the positive influence of small homes or household model on increasing residents' social engagement levels, decreasing anxiety and aggression, supporting mobility, and reducing use of psychotropic medications.

This is a time to galvanize our collective will and commitment to make meaningful and sustainable reform in long-term care on policy and practices by re-envisioning the current care model. There is no better time to embrace innovative care approaches, increase financial resources to support policies and practices that prioritize residents' safety and quality of life, staff safety and work culture, investments in physical infrastructure, higher staffing ratios, consistent staffing models, and increased wages for care aides. We are at a crossroads for long-term care homes. Let's have an honest discussion on the question—how can we create a community of care that is authentic and honors our elders and their care partners (healthcare workers and families) in providing a safe environment without compromising dignity, values, and comfort? How do we unbundle long-term care from care facilities and bring it to community homes more effectively and sustainably? A coordinated national effort is needed to focus on ramping up promising efforts and generating innovative solutions. If we don't act to meaningfully change the related policies and practices in the foreseeable future, tomorrow may become the same as yesterday's news as we flip back to the past "normal" in a default mode of operation. This is the charge and challenge in the coming days.

The contributions in this volume do not make unrealistic claims or far-fetched promises, instead they offer useful insights into a host of salient topics in long-term care that need to be thoughtfully engaged with to advance our understanding of the challenges and potentials, and subsequently identify areas for impacting policy and practice. The need for providing long-term care to those of us who need that support is here to stay, regardless of the location of care. This is the time for a moral response on part of the policy-makers, care providers, healthcare professionals, and industry stakeholders to pay serious considerations to these ongoing and emergent issues and take necessary actions to create a more meaningful and effective generation of "long-term care" for our current and future older adults needing ongoing care.

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Preface

Continuum of Care Environments in the Post-COVID-19 Era

The global population of adults 65 years of age and older will increase dramatically over the next several decades, presenting economic and social challenges requiring sustainable solutions. These health and socioeconomic challenges will have implications for individuals older than 65 years and their families and communities, requiring integrated solutions that should be addressed simultaneously through the lens of realistic and evidence-based goals. The future design of aging programs, environments, and technologies may then support intergenerational solidarity and include specific targets to reduce inequalities between women and men, multiple generations, older populations, and among different subgroups, with particular attention being paid to vulnerable populations who are marginalized. While there is a growing body of research relating to these factors, there is less focus on the continuum of long-term care settings on residents' health, functioning, and quality of life along with associated design strategies on several unexamined issues in the continuum of care.

(Re)designing the Continuum of Care for Older Adults: The Future of Long-Term Care Settings presents a collection of essays focusing on the role of the built environment in the continuum of long-term care by representing recent advances in theoretical understanding, methodological innovations, and empirical evidence. This edited volume offers contributions from notable researchers and scholars in environmental gerontology and healthcare architecture on new and emergent research that can effectively inform and reshape the planning and design of long-term care environments. With diverse topics in theory, substantive issues, and methods, the volume covers a range of innovative programming, environments, and technologies which can impact the changing needs and support for older adults and their families across the continuum of care.

Recently, almost all healthcare settings have been particularly hard-hit by the novel coronavirus (COVID-19) pandemic, which can be lethal to older adults with or without any underlying health conditions. The double societal hit of our aging

community and infectious disease outbreaks like COVID-19 have raised great concerns for the future of care settings for older adults in need of long-term care. The Centers for Disease Control and Prevention (CDC) have reported that 8 out of 10 deaths in the USA have been in adults 65 years or older due to COVID-19 (CDC, 2020). The confined living arrangements in some care settings (i.e., sometimes 3 or 4 residents to a room), combined with understaffing and failure to comply with infection-control guidelines, have been associated with high infectious disease rates across the USA. In addition to the need for improved safety precautions for infection control, it is imperative that mental health and psychosocial support be concurrently delivered, calling attention to the urgent need for alternatives to traditional care settings.

The lessons we have learned through the COVID-19 health crisis about staffing shortages, turnover, and dangerously confining environments allow us to broaden the lens on new care environments that are designed to be inclusive, progressive, and convergent with the needs of an aging population. When considering the physical environment of care facilities, both the ambient environment and specific design features are considered as key elements that could influence the physiological and psychological health and well-being of its immediate users. This volume has four thematic sections which focus on (1) home and community-based care, (2) facility-based care, (3) memory and end-of-life care, and (4) evidence-based applied projects and next steps. This comprehensive view of the continuum of long-term care environments for older adults addresses the physical environment, design context, theoretical underpinnings, strengths and limitations of contemporary practice, and future care opportunities. Instead of taking one side of the above views, each subset of chapters will open up the grounds for critical discussions that are much needed in this design and research sector.

Part I: Home and Community-Based Care

Social separation is a significant public health issue and is linked to vulnerability in negative mental health outcomes. This book section addresses this confluence of issues relating to home care and family caregiving. The physical and mental challenges of aging can impact how an older adult takes care of activities of daily living at home such as bathing, eating, and toileting, calling to attention the adjustments in the home that can create a supportive, safe, and engaging environment. These adjustments are not only important for the individual in need of support, but for family members who provide care and who may have problems with balance and frailty, and/or struggling mobility themselves. Adjustments in the home environment may also include technologies to aid in reducing social isolation, as COVID-19 has pushed many lives at home into isolation while reducing the availability of medical services.

In *Bridging the Digital Divide: Smart Aging-in-Place and the Future of Gerontology*, Rotem Arieli, Manuela E. Faulhaber, and Alex J. Bishop explore the

impact of the emerging field of gerontechnology in aging-in-place for older adults who wish to remain in their home. They provide an overview of the literature related to older adults' use, access, barriers, and understanding of assistive smart technologies, emphasizing current gaps and future directions. In an aligned chapter entitled *How Environmentally Embedded In-Home Sensors Are Revolutionizing Independent Living and Family Caregiving: A Literature Review*, Dr. Kari Lane and Erin L. Robinson describe the influence that in-home sensors can play in enabling independence for care recipients and caregivers in the home. They argue embedded sensors can have an impact on the health of older adults and may assist older adults in living independently longer. They explore how older adults feel about accepting this technology in their homes and privacy issues are also discussed. This is followed by the chapter, *The Home as a Place for Rehabilitation After Stroke* by Marie Elf and Maya Kylén. Elf and Kylén use empirical research to describe the experiences of post-stroke individuals living at home. They address findings within the REARCH (Rehabilitation and Architecture) project, and the purpose was to explore environmental factors to fulfill person-centered rehabilitation. In the final chapter of Part I, Kelly Munly, Karen A. Roberto, and Katherine R. Allen explore the benefits of home-like settings for adult family care (AFC). They provide a brief history of AFC and present findings from a qualitative study that explored experiences of how they navigated their own personal circumstances.

Part II: Facility-Based Care

This book section enumerates the unique issues and themes relating to physical and philosophical programmatic change in facility-based care occurring both in the USA and internationally. While the COVID-19 pandemic has been highlighted with images of older adults who are quarantined in closed long-term care settings, research prior to the pandemic highlights key frameworks relating to culture change and the small house model of care. These frameworks include shared goals, expectations, and consistency in leadership; frontline staff empowerment through the strength of teamwork; and the balance of choice, risk, and autonomy for residents in these settings. The physical environment has a direct impact on the social environment in these care settings, and while the actuality of "home" is a very personal distinction based on the history and past preferences of each individual, the shared themes in this section relate to the core elements of long-term care: the need for and the provision of care.

Leading off for Part II, Sheila L. Molony and Jude Rabig provide a background to theory of at-homeness in long-term care in *A Theory of Creating At-Homeness Across the Long-Term Care Continuum*. At-homeness is an experience of person-environment harmony that holds the potential for thriving in residential long-term care. The theory introduces the concept of *at-homeness* as a central construct to integrate theories of caring and thriving with key constructs related to deinstitutionalization, person-centered care, placemaking, and pattern language. In the following

chapter, Alex J. Bishop and colleagues explore the potential of robotic health assistants in facility-based care in a chapter entitled *The Evolution and Rise of Robotic Health Assistants: The New Human-Machine Frontier of Geriatric Home Care.* The chapter identifies and conceptualizes functional elements necessary for successful adoption of robotic technology within geriatric healthcare environments. Maja Kevdzija then addresses the need to reconsider the design of rehabilitation clinics for stroke recovery in *Rehabilitation Clinics That Enhance Stroke Recovery: Rethinking the Same-for-All Design Approach.* The chapter aims to explore the possibilities for designing rehabilitation clinics that support patients' activity and well-being during recovery. Maja introduces a new perspective on the design of rehabilitation clinics to creating specifically designed environments for different rehabilitation goals. In the final chapter of Part II, Shreemouna Gurung and Habib Chaudhury address the importance of the individuality of preferences through person-centered care in resident mealtimes in the chapter entitled *Exploring the Role of the Built Environment in Person-Centered Care During Mealtimes in an Ethno-Specific Long-Term Care Home*. This chapter offers insights on how the built environment influences mealtime care practices in an ethno-specific care home that promotes person-centered care (PCC).

Part III: Memory Care and End-of-Life Care

This book section addresses issues relating to memory care for individuals living with dementia. It is estimated that 5.4 million Americans have some form of dementia and these numbers are expected to rise in the coming decades, leading to an unprecedented demand for specialized programs, housing, and services. Historically a biomedical approach to dementia care has focused on symptoms, deficits, and emotionally charged metaphors about dementia that have influenced overall public perceptions. In response to these negative public perceptions, stakeholders in development, government agencies, and care administration have been moved to search for innovative options to create more autonomy and quality of life for individuals living with dementia in their care settings and communities. In addition, the values and norms of end-of-life care have been tested by COVID-19, yet environments to support choices for individuals at the end of life and their family members continue to advance. The final chapter in this section explores options for in-home services and facility-based settings at the end of life which are designed to provide comfort care as well as support for family members. Both nationally and internationally hospice and palliative care in hospital wards are being replaced by purpose-built care centers with multiple amenities such as family apartments, libraries, and centers for family gatherings.

Jeffrey Anderzhon starts off Part III with his broad chapter on the importance of design in memory care settings entitled *Designing for Dementia: An Approach That Works for Everyone.* This chapter discusses how dementia-specific environmental design has evolved, providing an appropriate stage for resident-centered care and

for integrated programming that celebrates the individual. Kate de Medieros then applies similar reasoning in the exploration of the significance of how designed space can impact individuals living with dementia in the chapter *Communication and Environmental Positioning in Dementia Care Units: Dialogues Through Space and Place.* By presenting the illustrative case study, this chapter considers how staff and residents use conversational positioning to construct power relationships and identities. In the chapter entitled *Adaptive Reuse of Closed Malls for Dementia Programs and Services: Community Focus Group Feedback*, Emily Roberts and Heather Carlile Carter share community feedback on conceptual design for adaptive reuse of commercial spaces for dementia housing, programs, and services. This article describes the qualitative work by a Midwestern University research team and highlighted five principle themes relating to the barriers and benefits of adaptive reuse. Gesine Marquardt and Kathrin Bueter discuss the need for addressing how acute care facilities impact individuals with dementia in the chapter entitled *Extending the Continuum of Care for People with Dementia: Building Resilience.* The chapter transfers the evidence-based research findings into hospital design and elucidates ways to implement design criteria in acute care settings. The authors argue that dementia-friendly design criteria can help to build a continuum of care in hospital environments. In the final chapter of Part III, Sharmin Kader addresses design for end-of-life care settings in the chapter entitled *Designing the Post-Pandemic Hospice Environment: "The Last Place."* This chapter discusses eleven therapeutic goals of hospice care environment for dying experiences. The author argued that the physical settings of hospice along with the carefully designed organizational environment can contribute to the realization of desired therapeutic goals and have a positive effect on individuals at the end of life.

Part IV: Evidence-Based Applied Projects and Next Steps

The evidence-based and applied projects section includes contributions presenting lessons learned to assist design professionals, educators, and policy-makers to develop care environments that are more effective in infection prevention, control, and social connectedness through evidence-based practices. This book section addresses the complex and multilayered impact of infectious disease outbreaks like COVID-19 on the trajectory of care for an aging population. By emphasizing different modes of applied design projects, the aim of this section is to bridge the gap between evidence-based research and practice-based design projects in the continuum of care settings. Significant discussion has come out of the COVID-19 pandemic throughout the healthcare industry and government agencies about necessary conversions of existing care settings, as well as the need for expanded quarantine and general patient care spaces in the time of a pandemic. Social isolation due to social distancing and quarantine is also impacting the mental and psychological well-being of older communities (Cudjoe & Kotwal, 2020). The design of spatial and physical environment of care facilities is an important aspect toward these steps,

and the evidence-based applied projects section addresses these challenges by using the examples from practice-based design projects within long-term care environments. The chapters of this section show a diverse range of built and unbuilt project examples along with theoretical construct aligned within the global context of care environments.

Valerie Greer and Keith Diaz Moore lead off Part IV with the chapter entitled *Autonomy, Identity and Design in the COVID-19 Era*, describing the lessons learned across the continuum of care during the COVID-19 pandemic. They specifically examine independent housing and skilled care with a focus on how physical settings and technological systems can empower autonomy and identity in response to vulnerabilities exposed by the COVID-19 pandemic. In the chapter *Creating a Tailored Approach: The Transformation of Jewish Senior Life*, Emily Chmielewski and Melissa DeStout of Perkins Eastman architecture firm explore real-world outcomes of culture change in long-term care in a case study. They outline the design goals of both renovation and new construction and explain the process of redesigning the physical environment using research-based evidence to make more informed decisions. Upali Nanda and Grant Warner of HKS Architects share their research framework of enriched environments and illustrate the principles through a robust case study "The Vista at CC YOUNG" in the chapter entitled *Flexible and Enriched Environments for Senior Living and Aging-in-Place in Dense Urban Environments*. Similarly, Hui Cai, Caroline Coleman, and Dani Kolker share their case study in changing paradigms in *Envisioning Innovative Post-COVID Approaches Toward LTCF Design in Dense Urban Areas: Exploring an Evidence-Based Design Prototype*. They provide an extensive review and synthesis of the lessons learned from long-term care settings during and after the pandemic. Closing out this section, six colleagues of Gensler architecture firm address the next steps in approaching the care needs of an aging in the chapter entitled *Realizing the Future of Intergenerational Environments for Aging Through Design Research*. The Boomtown framework is an intergenerational community model that outlines recommendations and targeted interventions for physical and social architecture to promote longevity and make connection among its residents. In this chapter, Boomtown framework presents a conceptual model of intergenerational communities in which all people, regardless of generation or culture, can actively age in place.

(Re)designing the Continuum of Care for Older Adults: The Future of Long-Term Care Settings offers a framework of scholarship to provide a better understanding of advanced research and design of the built environment in specialized healthcare settings through a critical discussion of theoretical, methodological, and empirical evidence. More specifically, this volume presents a variety of the built environments in continuum of care through theoretical constructs and design features, as well as up-to-date empirical research findings in guiding new research and design. The key idea is to emphasize emergent, evidence-based design research and practice that can effectively inform and reshape the planning and design of long-term care environments in the future. By simultaneously focusing on theory and scholarship through in-depth essays and case studies, this book looks fundamentally toward the future. The volume can be used as a resource for all care administrators, healthcare design

professionals, and researchers in addressing design challenges and rethinking current/ contemporary issues in redesigning future care facilities.

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About the Editors and Contributors

Editors

Farhana Ferdous, PhD, is an assistant professor in the Department of Architecture at Howard University. She is an educator, designer, and scholar whose teaching and research career span the continents of South Asia, Australia, and North America. She continues to make symbiotic interconnections between design, practice, and research, especially one which is focused on health, design, and marginalized African American or aging population. Her inclusive teaching style and evidence-based pedagogical philosophy integrate diversity and communities of color by making symbiotic interconnections between two facets of architecture: environment and design. As an environmental gerontologist, Dr. Ferdous has published widely on urban and environmental design and environmental psychology for the elderly. Her co-edited volume *All-Inclusive Engagement in Architecture: Towards the Future of Social Change* published by Routledge (2021) is a groundbreaking critical discourse focusing on the impact of social engagement in architecture. Her scholarship has been supported by several research grants including from the American Association of University Women (AAUW) Fellowship (2013), Grantmakers in Aging (GIA) Fellowship (2013), Academy of Architecture for Health Foundation (2017), Toyota Individual Research Grant (2018), Graham Foundation Grant (2021), Alzheimer's Association Research Grant (2021), Innovations in Pedagogy/Teaching Fellowship (2021), and National Endowment for Humanities Fellowship (2022).

Emily Roberts, PhD, is an associate professor of Interior Design at Oklahoma State University and has a research focus in Environmental Gerontology, the study of the person-environment fit between older adults and the physical environment. She holds a PhD in Architectural Studies and a Master's degree in Gerontology from the University of Missouri-Columbia. She previously attained a Masters of Architecture from the University of New Mexico. As an Environmental Gerontologist, Dr. Roberts has studied the factors involved in aging in place, as well as evolving models of long-term care, particularly for older adults with dementia and their families. Dr. Roberts has conducted research in the United States, Europe, and Canada, focusing on government-funded community-based long-term care programs. She serves on the Editorial Board of the *Journal of Aging and Environment* and *Inquiry: The Journal of Health Care Organization, Provision and Financing*

and serves as the Environmental Gerontology network chair for the Environmental Design Research Association.

Contributors

Katherine R. Allen is Professor Emerita of Human Development and Family Science, Virginia Tech. She received the Ernest Burgess Award and the Alexis Walker Award, both given for lifetime achievement in scholarly contributions to family science from the National Council on Family Relations. She studies marginalization, vulnerability, reflexivity, and innovation over the family life course using feminist, intersectional, and qualitative approaches. Her recent work includes intergenerational family tensions around technology, lesbian mothers' experiences with relational dissolution and child loss, older women's family relationships when surviving gynecological cancer, and the interconnection among scholarship, pedagogy, and praxis using autoethnographic and critical approaches.

Jeffrey Anderzhon, FIFA, is an architect specializing in environments for the elderly and is Principal at Crepidoma Consulting, LLC. He holds a Bachelor of Architecture degree from Illinois Institute of Technology, is a past member of the Alumni Board of Directors, and received the 2008 Alumni Professional Achievement Award. He is a member of the College of Fellows, American Institute of Architects and co-author of the books *Design for Aging Post Occupancy Evaluations: Lessons Learned from Senior Living Environments* and *Design for Aging, International Case Studies of Building and Program* and has written numerous articles on environments for the elderly. He served as the 2006 Chair for the AIA Design for Aging Knowledge Community; 2007 and 2011 Jury Chair; 2009 juror for the International Association of Homes and Services for the Ageing Design Symposium; and juror for the Design for Future Aging, Student Competition, Yonsei University, Seoul, Korea, in 2006 and 2007.

Rotem Arieli is a PhD candidate in Human Development and Family Studies at Iowa State University. She has a Master of Science degree in Human Development and Family Studies from Iowa State University and a Bachelor of Science degree in Family Studies and Human Development from Kansas State University. Rotem has presented her research at state, national, and international conferences, receiving the 2021 Young Research Investigator Award at the International Centenarian Consortium. She recently co-authored a book chapter focused on environmental supports for centenarians (people aged 100+), and her current research focuses on the well-being and social health of older adults, with active interests in gerontechnology, social support, and exceptional longevity.

Alex J. Bishop, PhD, FGSA, is a professor in the Human Development and Family Science Department and the Bryan Close Professor of Adulthood and Aging in the

College of Education and Human Sciences at Oklahoma State University, Stillwater, Oklahoma. He is also a fellow member of the Gerontological Society of America. Dr. Bishop maintains an interest in examining well-being among old and very old adults who age in place. Of particular interest is understanding how socially assistive robotic technology can be used to passively and actively monitor the health and well-being of homebound older adults receiving home healthcare services. Dr. Bishop's work is focused on integrating technology-based applications, innovations, and education to further modernize the home healthcare industry and enhance the future of work in geriatric care.

Kathrin Bueter is a post-doctoral research associate at the Chair of Social and Health Care Buildings and Design in the Faculty of Architecture at Technische Universität Dresden, Germany. Her work focuses on designing architecture for persons living with dementia. Recent publications include a Construction and Design Manual on Dementia-friendly Hospital Buildings. In 2017, she completed a doctoral thesis at TU Dresden with a dissertation on "Dementia-friendly Acute Care Hospitals." She graduated from the University of Applied Sciences and Arts Hannover with a Master's degree in Interior Design in 2011, with a final thesis on designing dementia-friendly holiday accommodation.

Hui Cai, PhD, is Associate Professor and Chair at the Department of Architecture, and Associate Director of the Institute of Health and Wellness Design at the University of Kansas. Cai received her PhD degree from the Georgia Institute of Technology. Dr. Cai's research focuses on using evidence-based design approach to analyze the relationship between culture, human behavior, and the physical environment in healthcare settings and healthy communities. Cai disseminates her work extensively through numerous publications in academic journals. She has received several awards, including the International Academy Award for Best Research project, AIA-AAH/AAH Foundation Burgun Fellowship, 2021 HCD 10 Healthcare Design Educator, 2021 Foundation for Health Environments Research Grant, and the inaugural Wilbur H (Tib) Tusler, Jr. Health Design Research Prize. She serves on the Board of Directors for Environment Design and Research Association.

Barbara W. Carlson, RN, PhD, FGSA, is the Ziegler Endowed Chair in Nursing Science and Associate Dean for Research, Scholarship, and PhD Studies at the Fran and Earl Ziegler College of Nursing. Her research focuses on cerebral blood flow during sleep and cognitive decline in older adults. A national expert in biobehavioral science, her work involves the design and application of minimally invasive physiological sensors and wearable devices, signal processing and analysis, behavioral observation methods, neurocognitive testing, inflammatory/immune markers, epigenetics, and the integration of physiologic and behavioral measures. Her current randomized clinical trial examines impact of vaccines to boost innate immunity in nursing home residents.

Heather Carlile Carter completed her PhD in Human Environmental Sciences with an emphasis in Architectural Studies at the University of Missouri, Columbia. She has an active research program. Her interests include the impact of material culture on place meanings, older person residential care environments, sustainable environments, and interior design pedagogy. One of Dr. Carter's areas of focus is people's behavior within and attachment to their interior environments, particularly how older people transition out of the houses they live in for many years and what possessions they choose to keep to make place in their new environments. She is a professional member of the Interior Design Educators Council (IDEC), the American Society of Interior Design (ASID), and the International Interior Design Association (IIDA). She has National Interior Design Qualifications (NCIDQ) certification and is a [US Green Building Council](#)'s Leadership in Energy and Environmental Design Accredited Professional (LEED AP).

Habib Chaudhury, PhD, is Professor in the Department of Gerontology, Simon Fraser University, Canada. He has extensive research experience in the field of environmental gerontology. He conducts research and consulting work in the following areas: physical environment for people with dementia in long-term care facilities, memories of home and personhood in dementia, community planning and urban design for active aging, and dementia-friendly communities. Projects have been funded by the Public Health Agency of Canada (PHAC), Canadian Institute of Health Research (CIHR), Social Science and Humanities Research Council (SSHRC), Canada Mortgage and Housing Corporation (CMHC), CapitalCare Foundation, and the Centre for Health Design. Published books include *Environments in an Aging Society: Autobiographical Perspectives in Environmental Gerontology* (*Annual Review of Gerontology and Geriatrics*, Vol 38, 2018; co-edited with F. Oswald), *Remembering Home: Rediscovering the Self in Dementia* (Johns Hopkins University Press, 2008), and *Home and Identity in Later Life: International Perspectives* (Springer Publishing Company, 2005; co-edited with G. Rowles). Dr. Chaudhury conducts research consulting with various national and international organizations in the areas of planning and design of senior housing and long-term care facilities. He is also affiliated with the Centre for Research on Personhood in Dementia at the University of British Columbia, Vancouver, and Alzheimer Catalonia, Barcelona, Spain. He serves as the Editor-in-Chief of the *Journal of Aging and Environment*

Emily Chmielewski, EDAC, is a founding member, senior associate, and director of Perkins Eastman's Design Research Department, an industry forerunner of practice-based environment-behavior research. She is an advocate for research in practice and helps create better-built environments by pushing the boundaries of professional knowledge and improving environmental design through design research. Emily's research primarily focuses on senior living and K-12 educational environments. Her studies have ranged from concise environmental audits that gather major lessons learned to more in-depth research that evaluates multiple

aspects of a facility's physical environment and building occupants' satisfaction and use patterns.

Caroline Coleman, Assoc. AIA, EDAC, is a Project Coordinator in the Healthcare design group at The Beck Group in Dallas, Texas office. Coleman received her undergraduate degree in Architectural Studies and Master of Architecture degree at the University of Kansas. During her graduate education in Kansas, Coleman was selected to study at the Institute of Health and Wellness Design where she completed research exploring the impact of health on community resilience. In collaboration with Dani Kolker, Coleman developed a prototype continuous care retirement community as her final capstone project. Her project received honorable mention for the student work, Healthcare Environment Award.

Tama Duffy Day, FACHE, FASID, FIIDA, LEED AP, is a Principal, the Global Leader of the Senior Living Practice, and an advisor to the Health Sector at Gensler. A leader in the health industry for over four decades, she challenges conventional thinking and develops solutions to reimagine longevity in an age-inclusive world. Actively leading projects across the world, she is a frequent speaker at events and conferences such as Milken Institute's "Future of Health" Summit, the Agile Ageing Alliance "Societies Leaders Forum," Environments for Aging, and the Mayo Clinic "Transform." Her work has been published in *Forbes*, *Interior Design* magazine, *Fast Company,* and *The McMorrow Reports*. She is an active member of Women in Healthcare and is on the Washington, DC Mayor's Age-Friendly Task Force. She serves on the boards of the Capitol Hill Village and The CARITAS Project and on Advisory Boards for the Healthcare Facilities Symposium, Marymount University, and Medical Construction and *Design* Magazine. A frequent author and blogger, she has hosted and been a guest on numerous podcasts featured on the Gensler Design Exchange platform on topics ranging from Equity by Design and Psycho-Oncology, to Sound Health and Rethinking Patient-Centered Design. She is one of the few design professionals inducted as a fellow into the American College of Healthcare Executives.

Kate de Medeiros, PhD, is the O'Toole Professor of Gerontology in the Department of Sociology and Gerontology, a research fellow at the Scripps Gerontology Center, and an affiliate faculty member in the Women, Gender, and Sexuality Studies program at Miami University, Oxford, Ohio. Her dementia-related research includes work on living alone with dementia, risk and value in nursing homes, the meaning of place and friendships in long-term care, self and personhood, and the role of the participatory arts in improving quality of life. She co-developed (with C. Lyketsos) the Neuropsychiatric Inventory Clinician Rated assessment, a revised tool to measure behavioral changes in people with dementia. Her other age-related research has focused on narratives in later life, the meaning of suffering in old age, and agist language and practice. Her research has been funded by the National Institutes of Health and the Alzheimer's Association. She has authored or co-authored four books on aging, over 45 journal articles, and numerous

book chapters. She is currently the editor of *Narrative Works*, a journal which includes narrative scholarship from a variety of disciplines.

Melissa DeStout, AIA, LEED AP BD+C, CPHD, is a senior associate and architect at Perkins Eastman, specializing in designing environments with senior living providers across the United States. Her work ranges from complex renovations to new construction across all levels of care. She frequently works with clients from early strategic and master planning efforts through to the completion of the work in a project management role. Melissa's passion for the well-being of the residents and staff occupying her designs as well as her love of nature have led her to focus her work in senior living on sustainable concepts, particularly biophilic design.

Stella Donovan is a Research Communications Strategist for the Gensler Research Institute. She translates research from teams around the world into engaging and actionable deliverables. She has received numerous editorial awards and prizes, including a recent Hermes Award for Gensler's Research Catalogue, Volume 3. Prior to Gensler, Stella worked as a book editor for social science publications.

Marie Elf is a Professor of Nursing at Dalarna University in the Department of Nursing. I have a position as program director for the nursing program. I am originally qualified as a nurse, have a PhD in architecture, and have since worked across several academic environments in nursing, architecture, and health services with a focus on architecture and its impact on the patient's health and well-being. Ever since I graduated in healthcare architecture, I have devoted myself to research to provide evidence on the built environment and its impact on the health and well-being of older people and patients with stroke. Today I combine my knowledge of nursing and architecture in my research. I lead several projects with a focus on care and rehabilitation at home for people with frail health. My research includes person-centered care, participation, and support for self-care – always with a question about how the environment looks like and is experienced: Is it promoting or hindering?

Manuela E. Faulhaber is a PhD student in Human-Computer Interaction at Iowa State University. She holds a Master of Science degree in Human-Computer Interaction as well as a Bachelor's degree in Psychology and Sociology, both from Iowa State University. Ella has presented research at over a dozen national and international conferences and co-authored a book chapter on Internet Gaming Disorder. She is a recipient of the Vera Whinery Memorial Scholarship, International Merit Scholarship, and Mary Zetta Lind Scholarship Award. Her research interests include user research, technology, and social media.

Valerie Greer, AIA, LEED AP, is an assistant professor in the School of Architecture and a faculty affiliate with the Center on Aging at the University of Utah. A licensed architect with experience working from design through construction on complex building types, Valerie teaches studios and seminars that investigate themes of social, environmental, and health impact. Her research focuses on

design and health environments, resilient places for aging, and adaption to climate change. Valerie is currently a principal investigator on a research project that utilizes photovoice methods to investigate healthy aging in place during the COVID-19 pandemic.

Shreemouna Gurung is PhD candidate in the Department of Gerontology at Simon Fraser University, Vancouver, Canada. Her research is focused on person-centered care for ethnically diverse older adults in long-term care homes.

Nadia Firdausya Jones, PhD, is a senior data analyst at Oklahoma Department of Mental Health and Substance Abuse Services in Oklahoma City, Oklahoma. She received a doctoral degree in Human Development and Family Science from Oklahoma State University, Stillwater, Oklahoma. Dr. Firdausya Jones has contributed to various projects involving the development of socially assistive robotic devices and technology tools for geriatric and mental health care. Her research and professional interests focus on the interconnection between mental and physical health relative to the use of clinical interventions designed to passively and actively monitor physiological stress and cognitive functioning for improved mental health functioning wellness.

Sharmin Kader, PhD, Assoc. AIA, is an architectural designer, researcher, and educator with over a decade of experience. Her project areas focus on healthcare facilities, student living-learning environments, and senior living. She worked as a lead design researcher in architectural and engineering firms. Currently, she is working as a postdoctoral research scholar at Kent State University. She has developed expertise in the post-occupancy evaluation (POE) process, and she has developed the first-ever POE tool for hospice care environment, *Hospice Environmental Assessment Protocol* (HEAP). She has been the recipient of several awards and honors throughout her academic and professional career. Three of her practice-based research projects received the Certificate of Research Excellence. She served as a Chair of the Board of the Environment Design Research Association (EDRA) for two consecutive years. In 2019, she presented a webinar on the "end-of-life care environment" organized by the Academy of Architecture for Health of the American Institute of Architects (AIA AAH). She has presented her work at national and international venues and has served as a reviewer of many conferences, AIA Convention, HERD journal, and others.

Maja Kevdzija, PhD, EDAC, is an assistant professor in Healthcare Design at the Faculty of Architecture and Planning at TU Wien, Austria. She obtained her PhD in 2020 at the Faculty of Architecture at Technische Universität Dresden, Germany. Her research study on mobility-supporting rehabilitation clinics for stroke patients was awarded the Healthcare Environment Award 2020 in the Post-Graduate Student category, the 2021 European Healthcare Design Award in the Design Research category, and the 2021 EDRA Certificate of Research Excellence (CORE) with Merit

Status. In her research, she is exploring at how the built environment may support and enhance the recovery of stroke patients in rehabilitation settings.

Dani Kolker, Assoc. AIA, EDAC, LEED AP BD+C, is a Tradewell Fellow/ Medical Planner at EYP Architecture and Engineering. Kolker received her Master of Architecture degree from the University of Kansas. During her graduate studies at the University of Kansas Institute of Health and Wellness Design, Kolker focused her research on pediatric behavioral health design post-COVID-19. Kolker has received several recognitions including a St. Louis AIA scholarship and Healthcare Environment Award honorable mention in the student design work category in collaboration with Caroline Coleman.

Maya Kylén, PhD, in gerontology, is a researcher and teacher at Lund University. She belongs to the Applied Gerontology Research Group at the Institution of Health Sciences and has focused her research on the relationship between place, health, and well-being along the process of aging, as well as exploring attitudes to user involvement in research on aging and health. She is the principal investigator of a large project exploring the relationship between health and economic factors that incentivize or disincentivize relocation in older age. Since 2018, she is also working as a researcher at Dalarna University, School of Education, Health, and Social Studies. Together with Professor Marie Elf, they explore how factors in the built and social environment can support a person-centered rehabilitation process at home among people with stroke.

Kari Lane, PhD, RN, is an associate teaching professor at the University of Missouri's Sinclair School of Nursing. Dr. Lane completed her doctorate in Nursing and Aging at the University of Iowa. She was a 2008 NICGNE Archbold Scholar and a 2013 NHCGNE Claire M Fagin Fellow. Dr. Lane's expertise lies in gerontology, long-term care, and health sensors to monitor for chronic health changes. Dr. Lane also has a strong interest in hearing impairment in older adults and interventions to assist in communication. She teaches geriatrics and pathophysiology at the school of nursing.

Laura Latham is the design director at the Gensler Research Institute and is dedicated to visualizing and communicating research to inform the design of all aspects of life—how we live, work, play, and care. Laura has led Gensler's research focused on longevity and intergenerational community models. In Laura's previous role as a design director in Gensler's brand design practice, her work spanned many industries including hospitality, finance, travel, corporate and residential real estate, designing places, spaces, print, and digital communications that create rich user experiences.

Gesine Marquardt is an architect and has been a professor of Social and Health Care Buildings and Design in the Faculty of Architecture at Technische Universität Dresden, Germany, since 2015. In her academic and design work, she develops

architectural concepts for the healthcare sector in a society impacted by demographic change. Her publications focus on the dissemination of knowledge about dementia-friendly architecture. From 2012 to 2017, she headed an Independent Junior Research Group funded by the German Research Association after her postdoctoral work at the Johns Hopkins Medical Institutions in the USA. Her 2007 dissertation on dementia-friendly architecture earned her several academic awards.

Sheila L. Molony, PhD, APRN, GNP-BC, FGSA, FAAN, is a professor of Nursing at Quinnipiac University. She is a fellow of the American Academy of Nursing and the Gerontological Society of America. Dr. Molony is currently engaged in an R21 study to develop new positive psychosocial outcome measures that are meaningful and useful for people living with dementia (individuals with a diagnosis and care partners). Dr. Molony's doctoral and postdoctoral work focused on the development and testing of a measure to quantify the experience of at-homeness and person-environment integration.

Keith Diaz Moore, PhD, AIA, is Dean of the College of Architecture and Planning at the University of Utah and has served as both interim Chief Sustainability Officer and interim Senior Vice President for Academic Affairs (iSVPAA). Dr. Diaz Moore is an international expert in the connection between culture, health, and place, particularly regarding design for people experiencing dementia with several books, over 40 refereed publications, and more than 100 presentations on the topic. Whether in his academic, professional, or community roles, he is an ardent proponent for the power of good design to promote health and social well-being.

Kelly Munly is an assistant professor in the Penn State Altoona Department of Human Development and Family Studies, with a research and teaching focus on adult development and aging; her doctoral degree in human development, as well as gerontology and future professoriate certificates, is from Virginia Tech. In academia, government contract settings, nonprofits, and direct care settings, she has studied and worked with a range of topics, including community-based long-term care and caregiving relationships, intersectionality, critical race theory, autoethnography, intergenerational programming, community-based public health intervention, and substance use disorder prevention and treatment across the lifespan.

Upali Nanda, PhD, is Principal and Global Director of Research for HKS, an international architectural firm where she spearheads and leads research projects globally. She also teaches as Associate Professor of Practice at the Taubman School of Architecture and Urban Planning at the University of Michigan and serves as the Executive Director for the nonprofit Center for Advanced Design Research and Education. Her award-winning research around health and well-being, neuroscience and architecture, sensthetics, point of decision design, enriched environments, and outcome-driven design has been widely published. She has won various research and innovation awards, including the 2015 HCD 10 Researcher Award and the 2018 Women in Architecture Innovator Award.

Tim Pittman is a Research Strategy and Communications Director for the Gensler Research Institute. He holds a Bachelor's degree in Visual and Environmental Studies from Harvard University and a Master's degree in City Design and Social Science from the London School of Economics. His core areas of expertise include survey design, data visualization, and the translation of research findings into actionable insights. His work has been featured in publications including the *Harvard Business Review*, *Corporate Real Estate Journal*, and *Fast Company*; and received numerous both design and editorial awards, including a recent Hermes Award for Gensler's Research Catalogue, Volume 3.

Jude Rabig is a nurse gerontologist whose practice, research, and writing focus on the small house model of residential long-term care. She served as the founding Executive Director of the Robert Wood Johnson National Green House® Project and led the initiative for five years. She then established Rabig Consulting to assist organizations in the USA and Canada to implement small house projects. She has served on task forces, including the University of Minnesota's National Advisory Group Study of State Nursing Home Regulations, the Specialty Subgroup for review of Residential Health Care Facilities Guidelines for Design and Construction of Health Care Facilities, and the Pioneer Network National Fire Protection Code Revision Task Force. She has been an Atlantic Philanthropies Hartford Foundation Practice Change Fellow and a Center for Medicare and Medicaid Innovation Advisor. She holds a PhD in gerontology from Union Institute and studied Social Entrepreneurship at the Stanford School of Business.

Karen A. Roberto is University Distinguished Professor; Executive Director of the Institute for Society, Culture, and Environment; and Senior Fellow at the Center for Gerontology at Virginia Tech. Her research includes studies of rural older women, dementia family caregiving, and elder abuse. Much of Dr. Roberto's research relies on community-based samples, combines quantitative and qualitative methodologies, and includes interviews with older adults, family members, and formal service providers. She is the recipient of the Gerontological Society of America Behavioral and Social Sciences Distinguished Mentorship Award and the Gary Andrews Visiting Fellow Award from the Australian Association for Gerontology.

Erin L. Robinson is an assistant professor at the University of Missouri School of Social Work and has expertise in public health social work and gerontology. Dr. Robinson's primary research focus is on older adult health, health communication, eldertechnology, and social support networks. She collaborates with an interdisciplinary research team from engineering, nursing, occupational therapy, and medicine to develop a state-of-the-art monitoring technology for older adults, which uses in-home sensors to detect early signs of illness and functional decline. A large part of Dr. Robinson's work is around developing a sensor-enhanced care coordination model for older adults.

Weihua Sheng, PhD, is a professor at the School of Electrical and Computer Engineering, Oklahoma State University (OSU), USA. He is the Director of the Laboratory for Advanced Sensing, Computation, and Control (ASCC Lab, http://ascc.okstate.edu) at OSU. Dr. Sheng received his PhD degree in Electrical and Computer Engineering from Michigan State University in May 2002. He obtained his MS and BS degrees in Electrical Engineering from Zhejiang University, China, in 1997 and 1994, respectively. Eight of his publications have won the best paper or best student paper awards in major international conferences. His current research interests include social robots, wearable computing, human-robot interaction, and intelligent transportation systems. His research has been supported by US National Science Foundation (NSF), Department of Defense (DoD), Oklahoma Transportation Center (OTC), etc. Dr. Sheng is a senior member of IEEE and is an Associate Editor for *IEEE Robotics and Automation Magazine*.

Sofia Song leads cities research at the Research Institute, where she leads a cross-disciplinary team that includes architects, planners, economists, and technologists, to generate new insights and knowledge that extend beyond a single building to communities, neighborhoods, and cities. She positions Gensler as a cities thought leader to influence change at the city scale. Prior to Gensler, she was a founder and head of research at a start-up that created a transparent marketplace for senior living in the USA. She was also the former head of research at proptech companies such as StreetEasy.com and Compass. Sofia has a background in economics and urban planning.

Grant Warner, AIA, LEED AP, is a principal at HKS. Grant is passionate about designing senior living environments where residents and their care-partners can thrive. He leads the early planning and design stages of projects, learning from clients and care partners to program and design the best environment for their unique needs. Grant values empathy, creativity, and innovation and infuses these values into the firm's projects. A board member of SAGE, an enthusiastic participant in The Sleepover Project, and speaker at numerous national conventions on aging, Grant is a devoted advocate for our elders, enjoys teaching others, and loves collaborating with each community to find ways design can help improve quality of life.

Nicholas Watkins, PhD, is Gensler's Health Sector Research Lead. His professional work focuses on the interactions between humans and their built environments that reflect excellence in design and contribute to well-being and productivity. His research findings on healthcare, workplace, arts + culture, and education settings can be found in several refereed publications and venues. He has served as an EDRA board member and chair, and his design research of workplace settings has impacted organizations' national and international guideline development. He was recognized as one of the top ten leaders in healthcare design with an HCD 10 honor during the award's inaugural year.

Part I
Home and Community-Based Care

Bridging the Digital Divide: Smart Aging in Place and the Future of Gerontechnology

Rotem Arieli, Manuela E. Faulhaber, and Alex J. Bishop

1 Introduction

Research has established that there are barriers specific to older adults, known to possibly contribute to the *digital divide* of understanding and engaging with technologies (Neves & Vetere, 2019; Schlomann et al., 2020). As the number of older adults continues to climb (Greenwald et al., 2018; Mendel & Toch, 2019), effective technology integration remains important to address. Studies have linked the importance of information and communication technologies with improved satisfaction and well-being in later life (Bong et al., 2019; Schlomann et al., 2020). Improving information and communication technologies may help older adults to live independently for longer while positively influencing health and social connection (Czaja et al., 2018; Schulz et al., 2015; Schlomann et al., 2020).

Older adults may experience significant physical, cognitive, and environmental changes as they age which may create opportunities for interventions focused on mitigating losses and maintaining quality of life (Van Patten & Maye, 2020). This topic is important and relevant as older adults may not want to move from their

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