College of Design, Construction and Planning

UF DCP Research Agenda-Setting White Paper

Health in the Built Environment

Advancing Design and Planning for Well-being through Transdisciplinary Coordination

Executive Summary:

The Health in the Built Environment (HBE) Research Coordination Network (RCN) within the College of Design Construction and Planning (DCP) at the University of Florida (UF) addresses the critical relationship between built environments and human health, aiming to advance health parity and equilibrium through transdisciplinary collaboration. Recognizing that the environments where we live significantly impact physical and mental well-being, the HBE initiative integrates diverse perspectives to create holistic solutions for challenges like community well-being and escalating environmental hazards.

The RCN focuses on seven priority areas, including salutogenic design, healthy and resilient communities, and design for healthy aging, to develop environments that prevent illness and promote well-being. Through research projects and educational initiatives, the HBE seeks to guide infrastructure improvements by planning and designing to support human and ecological health resilience.

The initiative will engage non-academic stakeholders, create innovative networking strategies, and foster interdisciplinary approaches. Outcomes include 1) evidence driven planning strategies, 2) integrative frameworks for holistic design, 3) interactive online tools, and 4) web-based platforms for teaching and research. By reimagining built environments through the public health lens, the HBE RCN aims to assist individuals, communities, and policymakers in creating resilient, health-promoting, and sustainable spaces.

HBE Members:

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Lead	Lisa Sundahl Platt	University of Florida	Academia
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Description of the Problem

Given ongoing social and environmental changes, planning and constructing community infrastructure to support human health and well-being has never been more vital. The quality of the environments where we live, work, play, learn, and receive care are essential social determinants of health, particularly in vulnerable communities. Understanding the impact of built environments on individual and community health and well-being is critical for advancing health equity. Recognizing this, a collective of research and teaching faculty within DCP has emerged to champion HBE research and pedagogy as a critical response to the complex interplay between physical and mental well-being and the environments we inhabit. This transdisciplinary collaboration will transcend traditional academic silos, integrating knowledge and methods from diverse fields to address complex built environment challenges that impact human health. This approach will extend beyond academic disciplines, actively engaging non-academic stakeholders in the research process to foster mutual learning and co-production of knowledge.

Key Research Areas / Priorities

The proposed RCN will synthesize diverse perspectives to create holistic solutions for complex issues like community well-being, the impact of natural hazards on human health, and the necessity of community infrastructure development responsive to population and demographic changes. The group will engage in various research projects and educational initiatives that create environments that support well-being and enhance overall health. The outcomes of these efforts will be designed to assist individuals, community stakeholders, and policymakers in promoting salutogenic health by guiding infrastructure improvement efforts through planning and design that supports human and ecological health resilience. The unifying goal of all these efforts will be to reimagine our built environments through the lens of public health and well-being.

Primary Research Question

How can a transdisciplinary research coordination network focused on the topic of HBE translate research on salutogenic design, resilient communities, and healthy aging into actionable strategies and tools that promote potential for individuals and communities to attain their full health potential, regardless of their social position or other circumstances, and environmental sustainability within community infrastructure planning and development?

Solutions and Methodological Considerations

The HBE initiative encourages innovative ideas for implementing novel networking strategies, collaborative technologies, training and educational programs, broadening participation, and developing community standards for data and metadata. It intends to support HBE investigators and instructors in sharing information and ideas, coordinating ongoing or planned teaching and research activities, fostering synthesis and new collaborations, developing community standards, and advancing science and education through enhanced communication and idea exchange.

The HBE effort aims to achieve several objectives. These include pursuing research, developing pedagogy, advancing knowledge, and studying the impact of built environments on salutogenic health to guide future interventions for developing community infrastructure that proactively supports human well-being. Seed funding for developing the proposed RCN would catalyze the advancement of this initiative and facilitate the establishment of critical research and educational partnerships within and beyond the UF's academic community. This investment would facilitate funding workshops and symposia dedicated to exploring and promoting health-centric approaches in design, construction, and planning. Additionally, it would support the dissemination of research findings and assist in securing further funding opportunities in this crucial field. Creating this RCN will propel this unified initiative forward and identify specific opportunities for research and education that advance individual concept development. This network would serve as a platform for collaboration, fostering interdisciplinary approaches to address complex challenges at the intersection of health and the built environment. These collective efforts and the development of research would also position UF DCP as a premier thought leader and resource provider in the field of designing for health.

Developing a Health in the Built Environment Research Coordination Network

The Health in the Built Environment (HBE) research and teaching development collaborative within the College of Design, Construction, and Planning revolves around seven areas of concern. These concepts will serve as the primary drivers for study and pedagogy led by this group. This white paper will function as a Research Coordination Network (RCN) development primer, aiming to identify and codify opportunities for fostering new collaborations, including international partnerships where appropriate, and addressing interdisciplinary topics.

Specific aims centered around these concepts will be developed to align with viable future research opportunities, ensuring that the initiative remains at the forefront of HBE research and education. This approach will enable the group to adapt to emerging trends and challenges while focusing on its core principles.

The Seven Areas of Critical Concern of the Health in the Built Environment Initiative

The HBE Seven Areas of Critical Concern, which are defined as "areas of research and pedagogy where we have specialized knowledge and expertise", are as follows:

1. Salutogenic Health
   Salutogenesis shifts the focus from the origins of disease (pathogenesis) to the origins of health and well-being (salutogenesis). When applied to sustainable design, construction, and planning, this concept guides the creation of built environments that optimally support human health. The model is based on two key concepts: Sense of Coherence (SOC) and Generalized Resistance Resources (GRRs). This approach integrates with evidence-based and sustainable design principles in built environments, such as biophilic elements and flexible spaces, to enhance comprehensibility, manageability, and meaningfulness. By operationalizing salutogenesis through valid design strategies, we can improve occupants' physical and mental health via enhanced environmental quality. This transformative approach to evaluating the built environment's influence on human well-being cultivates more resilient, health-promoting, and sustainable spaces. It aligns seamlessly with the objectives of regenerative sustainable design models, enhancing the healing potential and overall health impact of our constructed surroundings. By integrating these principles, we create more livable spaces and contribute to a holistic ecosystem that supports long-term human and environmental health.

2. Healthy & Resilient Communities
   A Resilience Repertoire concept is a cornerstone of healthy environment design, encompassing a range of components and strategies that enable individuals and communities to respond to unexpected challenges adaptively, ensuring long term sustainability and growth. This approach views resilience in complex-built environments as more than just a collection of individual components; it

recognizes the need for ongoing trade-offs to maintain optimal performance. The Resilience Repertoire facilitates systemic thinking across design, construction, and planning practices by identifying successful interactions between system elements within a socio-technical context. This framework connects abstract theory to concrete observations in built environments, ensuring that appropriate resources, system characteristics, and functional structures sustainably support individual and community priorities. The concept emphasizes robustness against potential disturbances and the ability to recognize opportunities for recombining structures and processes, facilitating operational transformation and changes in outcome trajectories. By focusing on these aspects of health in the built environment, researchers and educators can develop more comprehensive and practical approaches to building resilience and enhancing preparedness and adaptability in the face of diverse challenges and opportunities. Identifying resilient repertoires for design, construction, and planning will emphasize the creation of buildings and spaces that can withstand and adapt to various challenges, fostering robust and adaptable communities. This framework also advocates a holistic approach to designing the built environment that integrates indoor and outdoor environments to create cohesive, supportive settings that promote overall well-being.

3. Health and Housing
   A core principle of the HBE initiative is investigating the intricate relationship between housing and health. This concept delves into how our living environments influence physical and mental well-being. On average, Americans spend about 90% of their time indoors, which translates to roughly 21 hours per day. This proportion tends to increase as individuals age. This area of concern encompasses crucial factors such as safety, indoor air quality, thermal comfort, noise mitigation, integration of biophilic elements, and access to natural light. Furthermore, the concept extends beyond individual dwellings to consider broader issues, including overall housing quality, accessibility, affordability, inclusivity, and thoughtful neighborhood design. By addressing these interconnected aspects, the HBE initiative aims to create living spaces that actively promote health and enhance the quality of life for residents.

4. Design and Planning for Healthy Aging
   Creating environments for healthy aging has become increasingly vital as global populations age. Current health statistics highlight the prevalence of falls among older adults in their homes, often due to environmental factors like poor lighting

and unsuitable flooring. These incidents frequently lead to severe injuries, hospitalizations, and transitions to long-term care facilities. Addressing this challenge will include creating spaces that promote independence, social engagement, and physical activity for older adults. This concept encompasses accessible housing designs for aging in place, walkable neighborhoods with green spaces that promote active aging, community centers fostering intergenerational interactions, and health infrastructure supporting healthy aging, wherever older adults are spending their time, all aimed at enhancing the quality of life and safety for older adults.

5. Health Systems Infrastructure Design
   This concept addresses the physical and organizational structures supporting healthcare delivery, encompassing the design of facilities ranging from hospitals to community clinics and broader health system infrastructure. The American National Standards Institute (ANSI) and American Society of Safety Professionals (ASSP) advocate for "state-of-the-art systems engineering and management" in planning safety-critical systems. A frequently underutilized yet potentially transformative element in healthcare evidence-based design and planning is the strategic integration of existing environmental data repositories. This approach informs the development of robust prevention-through-design infrastructure. By embedding preventive support features and dynamic informational feedback loops into building design and operational processes, this method cultivates ongoing enhancement throughout the lifecycle of care systems. This proactive strategy not only optimizes facility performance but also significantly contributes to improved health outcomes and operational efficiency. Ultimately, the focus is creating environments that facilitate efficient and effective care and promote healing and well-being for patients and healthcare providers.

6. Environmental Hazards, Natural Disasters, and Health
   Environmental hazards and natural disasters' profound impact on human health necessitates the integration of climate resilience into environmental design. This concept encompasses strategies to improve human well-being, mitigate climate-induced health issues, and address environmental justice by mitigating urban heat islands, improving indoor and outdoor air quality, enhancing building flood resilience, and promoting sustainable energy and transportation systems to reduce carbon emissions using nature-based solutions. Adverse health effects, such as those influenced by increased high heat days and flooding due to natural hazards,

can pose significant health risks to community members. These climate-related health issues can disproportionately impact vulnerable populations like older adults, children, and low-income communities, exacerbating health disparities. Given the complexity of predicting the effects of this emergent phenomenon, it is crucial to develop and employ novel analysis methods to inform better policies that promote regional and social resilience in the face of ongoing climatic changes and shifting economic factors.

7. Computational Approaches to Designing for Health and Well-being
   Computational Design harnesses computerization to classify, predict, and optimize planning outcomes, interpreting data through coded abstractions that encapsulate design components and actions. Its subset, Algorithmic Design (AD), employs rule-based logic to manage design complexity within planning workflows. Building on this foundation, methods such as applied AI, IoT, VR, AR, ABM, and digital twin technology have emerged as powerful tools for scenario modeling in design construction and planning. These approaches and instruments allow for real-time simulation and analysis of various "what-if" scenarios. Integrating real-world data within computational models enhances decision-making, reduces errors, and bridges the gap between conceptual design and practical implementation. Designers can create more innovative, efficient, and health-promoting environments by leveraging these advanced technological tools, including health impact assessments and predictive modeling for urban health outcomes. This data-driven approach enables better anticipation of health impacts from environmental interventions, ultimately leading to more informed and effective urban design decisions.

Products generated through the Health in the Built Environment Initiative RCN

A highly qualified team with unique and valuable expertise leads the HBE RCN initiative. It is well-positioned to address the effects of built environment design, construction, and planning on health infrastructure resilience. The collective knowledge of the investigators, educators, collaborators, and their respective resources provides a strong foundation for developing data-driven models and resources as a critical component of this initiative.

The RCN development and inquiry mobilization strategy presented in this application proposes using mixed methods research as an analysis, inference, and decision support framework to guide health in the built environment research and education. This

approach aims to advance transdisciplinary convergent systems approaches, informing design frameworks and strategies for community infrastructure planning. This collaborative effort will primarily focus on serving counties and populations at risk of adverse effects due to changing demographics, climate conditions, and escalating multifactorial issues causing community vulnerability.

The HBE RCN initiative proposes to strategically evaluate and design approaches for creating the following key deliverables:

- Evidence-driven suite of salutogenic planning strategies to enhance community health and resilience
- Innovative, integrative frameworks for holistic environment design that prioritize human health and well-being
- Interactive, dynamic online tools for assessing and enhancing environmental health and resilience
- Comprehensive web-based platforms for interdisciplinary teaching and research in healthy built environments

The HBE team aspires to bridge the gap between research and practice through these resources, fostering a new generation of built environments that actively contribute to human health, well-being, and resilience. This comprehensive approach will enable the integration of cutting-edge research into training and practical applications, ultimately leading to more sustainable and health-promoting built environments.

Coordination Plan

Our HBE project involves concurrent, interdependent steps with flexible management. We'll establish mechanisms to assess progress and refine efficiency. First-year seed funding of $50,000 is crucial to launch the collaborative, establish infrastructure, recruit participants, and develop frameworks. This initial investment will support our project plan, facilitate network evolution, and implement assessment mechanisms. It will create a proof of concept, positioning us for federal grants like NIH R13 Conference and NSF Research Coordination Network grants and foundation-funded initiatives. Demonstrating viability will increase our chances of attracting more significant investments and validating our project's potential impact.

Central to our implementation strategy is a commitment to continuous improvement and resource updating. Given the rapid evolution of healthy environment design, we will schedule regular reviews and updates of our repository and tools to incorporate new research findings, technological advancements, and lessons learned from practical applications. Engagement with industry partners, including designers, urban planners, developers, and technology companies, is crucial to our interdisciplinary approach. These collaborations will ensure that academic research translates into real-world applications and will enable valuable feedback loops for refining theoretical concepts in practical settings. The imperative of having multiple fields of expertise contributing to this effort is evident. For example, developing viable health impact assessment tools should involve epidemiologists, data scientists, planners, and designers working in concert. Similarly, creating resilient community designs requires input from climate scientists, social psychologists, medical professionals, and engineers. This approach will merge scientific rigor with societal relevance to provide practical solutions for pressing challenges in the built environment, ultimately improving the quality of life for individuals and communities.

The DCP Health in the Built Environment research coordination and resource development will focus on converging health infrastructure design, planning, and salutogenic principles, enhancing pedagogy and practice. This comprehensive suite of strategies and resources will equip educators, students, and professionals with innovative and resilient design strategies to promote community well-being. This initiative aims to advance health equity and improve individual and public health outcomes across diverse community settings by bridging the gap between theory and application. The interdisciplinary approach of this effort will foster the development of built environments that actively contribute to population health, resilience, and overall quality of life. This collaborative, transdisciplinary approach aims to create more holistic and practical solutions to complex challenges in the built environment, ultimately improving the health and well-being of communities, particularly those most vulnerable to environmental and social stressors.

HBE Strengths, Weaknesses, Opportunities, and Challenges:

Strengths	• Strong research & scholarship expertise in HBE • Established industry partnerships • High student interest • Active industry partner engagement	• Lack of funding • Need for Increased Health System Engagement	**Weakness**
Opportunities	• Ability to quantify the benefits of infrastructure improvements on community & individual Health • Expanding partnerships with healthcare systems • Leveraging new funding opportunities • Knowledge and expertise of RCN team members in a diversity of care settings – housing, neighborhoods and health care settings – and policy • Collaboration with public health, medical, and environmental sciences departments • Leveraging emerging technologies	• Faculty support for engaging in research • Uncertainty about federal funding availability and continuity	**Challenges**