Design and Construction for Cognitive Aging in Place

Eunhwa Yang
School of Building Construction, College of Design
Director of Workplace Ecology Lab (WELab)
Affiliated Faculty at SimTigrate Design Lab (SDL)
Aging Adults, Cognitive Decline, & Built Environment

Mild Cognitive Impairment (MCI)
Cognitive decline that many advance to dementia

CHALLENGES:
- Memory
- Executive Function & Practical Judgement
- Visuospatial Function
- Language
- Socialization

Building on Aging-in-Place & Universal Design
Project 1: Cognitive-Aging-in-Place

Conceptual Framework
Study Team: Herminia Machry, Fatemeh Motamed Rastegar, Yasaman Gholami, Eunhwa Yang, Elahn Little, Maureen Burke, Ibrahim Bilau, Jennifer DuBose, Craig Zimring

Environmental Factors
1. ENVIRONMENTAL MASTERY
2. ENVIRONMENTAL STIMULATION
3. ENVIRONMENTAL FAMILIARITY
4. PHYSICAL COMFORT

CAIP Outcomes
1. Maximize SAFETY
2. Facilitate FUNCTIONAL INDEPENDENCE
3. Maximize SITUATIONAL AWARENESS
4. Improve COGNITIVE RESERVE
5. Maximize WELLBEING
Project 1: Cognitive-Aging-in-Place

Themes

**MAIN OUTCOMES**

1. **LESS IS EASIER**
2. **VISUAL ACCESSIBILITY: OUT OF SIGHT, OUT OF MIND**
3. **PHYSICAL ACCESSIBILITY**
4. **THERAPEUTIC ACTIVITIES AT HOME**
5. **PRESERVING/SETTING UP ROUTINE ITEM LOCATIONS AT HOME**

**Building on Aging-in-Place & Universal Design**

1. Simplify Environment: Less to take care of, Less to lose, Less space to navigate
2. Visual Reminders, Easy to be seen
3. Accessibility To Items/Areas: Housework Is Better At Arms Length, Sitting Down, And At Eye Level
4. Space Availability for Therapeutic Tasks
5. Keep Routine Locations in Environment
Project 2: Impacts of Kitchen Interior Design on Functional Independence and Self-efficacy of Older Adults Living with MCI

Study Team: Ibrahim Bilau, Madhuparna Sastakar, Katie Schreiber, Eunhwa Yang, Zhi Tan, Jiachen Li, Hyeokhyen Kwon, Elizabeth Mynatt, Jennifer DuBose

Research Questions
1. Is open shelving beneficial/useful for people with MCI to perform kitchen-related activities?
2. Is digital stickies beneficial/useful for people with MCI to perform kitchen-related activities?
3. Can sensor-based data be used to predict cognitive health (detect MCI)?
Project 3: Home Design Guidelines

Tool Development

Study Team: Eunhwa Yang, Elahn Little, Harshika Seth, Herminia Machry, Madhuparna Sastakar, Jennifer DuBose, Maureen Burke, Craig Zimring

<table>
<thead>
<tr>
<th>MEDIA &amp; FORMAT</th>
<th>ORGANIZATION &amp; CONTENT</th>
<th>FEEDBACK</th>
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<tbody>
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**WHAT:**
Design strategies for each room in your home

**WHY:**
Benefits of improving your home

**HOW:**
How you can take actions to implement changes
Project 3: Home Design Guidelines

Design Strategies

Evidence-based
Best Practice-based
Expert-based

HOW CAN YOU IMPROVE YOUR KITCHEN?

Adapting your kitchen environment is critical to accommodate changing needs and facilitate challenging tasks while you age in place.

1. Ensure that flooring materials are non-slip, removing rugs and clutter from the floor.
2. Use LED lighting to adequately illuminate work and eating areas.
3. Use open shelving or cabinets with transparent doors, and add customized labels to items stored on shelves and cabinets so that they are easily identified when needed.
4. Choose an open floor plan that provides ample physical and visual connections between social spaces like the kitchen, dining room, and living room areas.
5. Automate venting systems and have active fire and smoke alarms for protection at selected kitchen devices.
6. Place video displays (i.e., tablets) containing reminders (i.e., cooking recipes, schedules, etc.) in kitchen areas that can be easily identified during tasks like cooking.
7. Modify the height of counter tops and kitchen appliances according to your current physical needs (i.e., sink height, microwave height).
8. Install automated safety technology to kitchen appliances to monitor temperature levels of the stoves, ovens, microwaves and toasters.
9. Use bulletin board at areas with clear visibility containing daily routines and ‘to-do’ lists.
10. Keep lights inside the back of/under cabinets for better visibility.
Project 4: Environments & Sleep for People with MCI in Underprivileged Communities

Study Team: Andrea Green, Ibrahim Bilau, Aliaa Ismail, Ece Erdogmus, Eunhwa Yang, Felicia Goldstein, Julie Boron, Nazanin Hatami

Research Question:

What are the relationships between building systems/system controls and sleep quality of individuals with Mild Cognitive Impairment (MCI) residing in underprivileged (MCI-UP) communities?
Project 4: Environments & Sleep for People with MCI in Underprivileged Communities

### Multiple Regression Analysis (n=35)

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<tr>
<th>Variable</th>
<th>Coefficient</th>
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Field Study: Light, Sound, Temperature, Relative Humidity

![Graphs showing 8 am to Midnight Light Exposure, Midnight to 8 am Sound Exposure, Midnight to 8 am Temperature, Midnight to 8 am Relative Humidity](image.png)
Project 4: Environments & Sleep for People with MCI in Underprivileged Communities

8 am to Midnight Lighting Exposure July 31 - Aug 19, 2023
Project 4: Environments & Sleep for People with MCI in Underprivileged Communities

Midnight to 8am Sound Exposure July 31 - Aug 19, 2023
Moving Forward

Environment, Health, Building Stakeholders, & Health Systems

Physical
Cognitive
Psychological
Social

needs

Residents (Aging Adults)
Care Partners /Families
Developer
Designer
Contractor

Evidence-based
design & practice

Health Systems
Building Codes & Policy

Living Environment

Health Systems

Residents (Aging Adults)

Care Partners /Families

Developer

Designer

Contractor

Georgia Tech
THANK YOU!

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