

CREATING A MEMORY-FRIENDLY RESTAURANT

Through Sensory Experience Design

By

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Abstract

The majority of individuals living with memory impairment due to aging or stages of dementia reside independently in their community. They are still active, but often do not engage in activities they are accustomed to. One example of such an activity is eating out. This paper aims to support well-being and social engagement by providing a greater understanding of the sensory design elements of the restaurant environment. This will enhance the quality of the dining experience for individuals with memory impairments. Values, goals and needs were defined by individuals with mild dementia and their family in real-world dining experience through the use of a diary. Feedback loops and validation cycles were embedded in interviews with individuals with mild dementia, their family, and experts in the field of dementia. Themes which emerged from thematic analysis of data revealed five key principles for supporting memory-friendly environments. These include a welcoming and friendly environment, simplicity, inclusivity and flexibility, familiarity, and comfort and safety.

The goal is to create a guideline for restaurateurs who wish to improve the dining experience for clientele with memory-impairments.

Acknowledgement

I would like to take this opportunity to thank everyone who supported and helped me throughout this journey. I must express my gratitude to Dr. Gayle Nicoll for her monumental support, critical thinking, guidance and leadership. You made me a better researcher and showed me how to improve. During the hardest times, I looked up to you and you were there to inspire me and to help me complete a project on such an important issue when it almost seemed it was not going to be possible. You are magnificent scholar and an even a better person.

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Dedication

To all whom this project may make a positive change in their lives.

To my parents.

To Ehsan.

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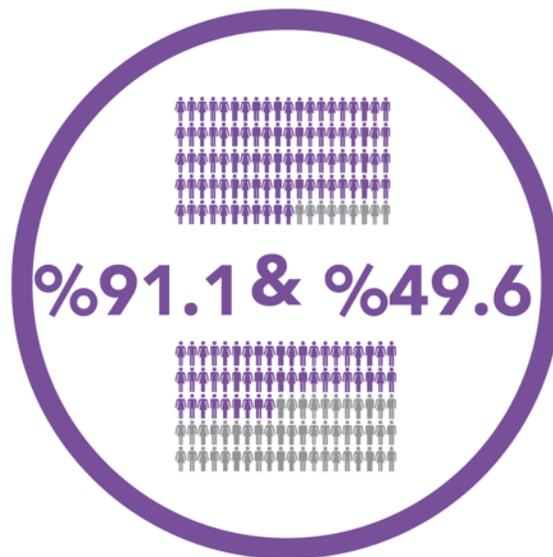
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Chapter 1: Introduction

1.1 Introduction

Memory impairments, as a result of Alzheimer's disease and other forms of dementia, can be invisible. Individuals living with memory impairment may not receive enough support to engage in community activities. Today, most individuals in early stages of dementia are living independently in the community with 91.7% of persons with mild dementia and 49.6% of individuals with moderate dementia are living in the community (Chambers, Bancej & McDowell, 2016). It is pertinent to ensure they have enough support in their communities.

Figure1. This Graphic illustrates that 91.7% of persons with mild dementia and 49.6% of individuals with moderate dementia are living in the community (Chambers, Bancej & McDowell, 2016)



1.2 Overview of Memory-Related Conditions in Canada

Based on the 2012 Canadian Survey on Disability (CSD), 13.7 % of Canadian adults aged 15 years and older reported some type of disability and 2.3% of Canadian adults have been identified to have a memory disability (Marshall, Bizier, Gilbert & Fawcett, 2015). Alzheimer's, dementia, and amnesia are reported as the most common underlying memory-related conditions. However, a considerable number of people reported underlying conditions and/or comorbidities including fibromyalgia, stroke, brain injury, multiple sclerosis, learning disabilities, developmental disabilities, mental health-related issues, Parkinson's, epilepsy, arthritis, heart disease, and back pain (Marshall, Bizier, Gilbert & Fawcett, 2015).

Memory-related diagnosis impact people differently. Based on information from the Alzheimer Society of Canada, there are many different types of dementia, however, some of them are more common than the others. Hence the focus of this study is on social aspect of dining for individuals with mild dementia. Details about various types of dementia are not included.

According to the Alzheimer's Association, "dementia is not a specific disease. It is an overall term that describes a group of symptoms associated with a decline in memory or other thinking skills severe enough to reduce a person's ability to perform everyday activities. Alzheimer's is the most common type of dementia" ("Alzheimer's Association", 2017).

The Alzheimer Association and Alzheimer's Society of UK categorizes Alzheimer's disease into three general stages: mild (early-stage), moderate (middle-stage), and severe (late-stage) ("The progression of Alzheimer's disease and other dementias", 2018).

In the early stage of Alzheimer's (mild), a person may function independently. They may still drive, work and be part of social activities. Despite this, the person may feel as if they are having memory lapses, such as forgetting familiar words or the location of everyday objects. Moderate Alzheimer's is typically the longest stage and can last for many years. It is characterized by the need initially for cuing, and later for assistance with personal basic activities of daily living. As the disease progresses, the person with Alzheimer's will require a greater level of care ("Alzheimer's Association", 2017).

In severe dementia or late-stage dementia people may need constant assistance with their daily activities and personal care. Individuals may further experience changes in their physical abilities such as their ability to walk, sit and swallow ("Alzheimer's Association", 2017). Generally people are more aware of specific behaviours associated with Alzheimer's such as confusing words, getting frustrated or angry, or acting in unexpected ways, such as refusing to bathe. Damage to nerve cells in the brain can make it difficult to express thoughts and perform routine tasks ("Alzheimer's Association", 2017).

Dementia is the most common type of memory-related condition and has many different types. According to the Age UK report (2014), there are more than 100 types of dementia. The most common types of dementia include Alzheimer's disease, Vascular Dementia, and Dementia

with Lewy Bodies (DLB) and Frontotemporal Dementia (FTD) (Ray & Davidson, 2014). Other health conditions can have an impact on memory including: stroke, Parkinson’s disease and brain injuries.

Based on the UpToDate website, as an evidence-based clinical decision support resource, there are different conditions that can cause memory loss. Figure 2 below from the UpToDate website represents different underlying memory loss conditions, symptoms and examples ("Smarter Decisions. Better Care.", 2018 ; Jorm, Fratiglioni, & Winblad, 1993).

Figure 2. UpToDate Differential Diagnosis of Memory Loss Graphic ("Smarter Decisions. Better Care.", 2018 ; Jorm, Fratiglioni, & Winblad, 1993)

Symptom	Usual cause	Examples
Gradual onset of short-term memory loss and functional impairment in more than one domain: I. Executive function (finances, shopping, cooking, laundry, transportation) II. Basic activities of daily living (feeding, dressing, bathing, toileting, transfers)	Dementia	Alzheimer disease, Parkinson dementia, Lewy body dementia, frontotemporal dementia, alcohol-related dementia, Creutzfeld-Jacob disease
Stepwise, sudden deterioration in cognition; episodes of confusion, aphasia, slurred speech, focal weakness	Cerebrovascular disease	Vascular dementia, multi-infarct dementia, Binswanger dementia (subcortical dementia)
Acute cognitive impairment with clouded sensorium; difficulty with attention; may have hypersomnolence	Delirium	Hypo- or hyperglycemia, hypo- or hypernatremia, hypoxemia, anemia, intermittent cerebral ischemia, thyrotoxicosis, myxedema, alcohol withdrawal, sepsis, drugs (especially cholinergics, benzodiazepines, etc)
Complains of memory loss, decreased concentration, impaired judgment, feels worse in morning and hopeless	Depression	Minor depression, dysthymic disorder, major depression, pathologic grief reaction

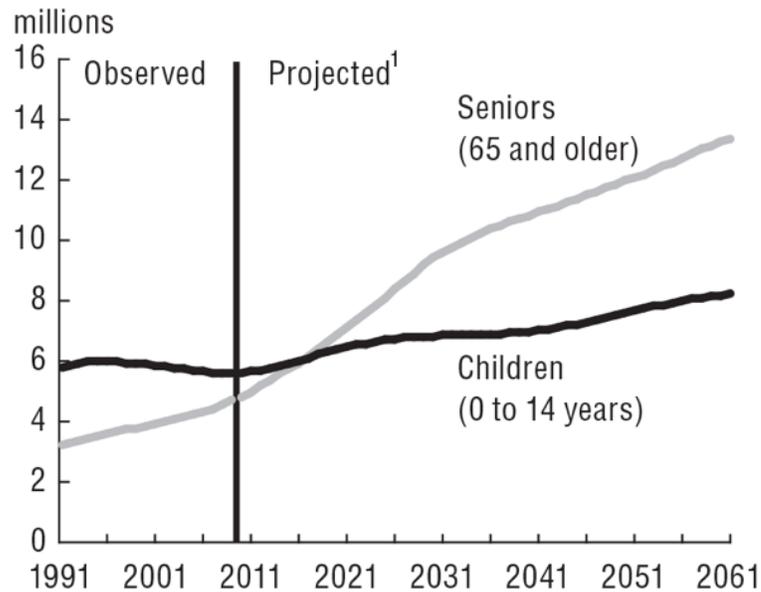
Although dementia impacts people differently, to be diagnosed with dementia one needs to have at least two of the following core mental function impairments:

- Memory
- Communication and language
- Ability to focus and pay attention
- Reasoning and judgment
- Visual perception ("What Is Dementia?", 2018)

1.2.1 Dementia in Canada

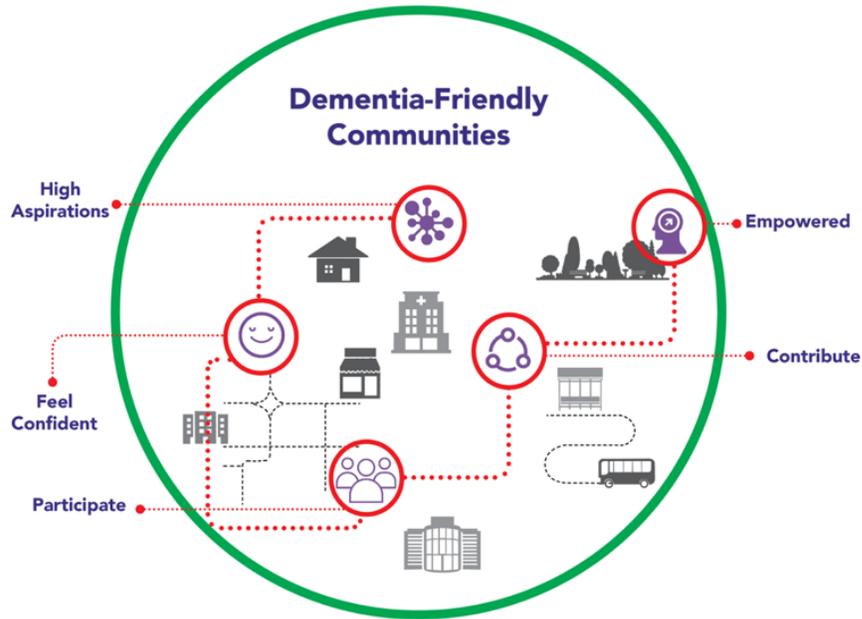
The focus of this study is on early-stage dementia because it is the most common memory-related condition amongst older adults who live in the community. According to projections using the Canadian Study of Health and Aging (1994) data, as of 2016 there are an estimated 564,000 Canadians living with dementia. By 2031, this number is expected to rise to 937,000, an increase of 66% (Wong, Gilmour & Ramage-Morin, 2018). This is likely the result of the baby boomer generation (born between 1946-1965), many of whom have reached the age of 65. In 2017 people aged 65 and older out-numbered children aged 15 and younger in Canada. By 2031 all baby boomers will have reached the age of 65 (Statistics Canada, 2018).

Figure 3. In 2017 people aged 65 and older out-numbered children aged 15 and younger in Canada (Statistics Canada, 2018)



Considering the fact that baby boomers represent one of the largest age groups in Canada, it is important to make sure that this population are empowered to have a high quality of life. To fulfil this, building dementia-friendly communities with relevant services is extremely pertinent. A dementia-friendly community based on the Alzheimer Society's definition is one in which people with dementia are empowered to have high aspirations and feel confident, knowing they can contribute and participate in activities that are meaningful to them. To achieve this, one of the key areas is accessible community activities. It is essential to ensure that existing leisure services and entertainment activities include people with dementia (Green & Lakey, 2013).

Figure 4: Graphic below highlights important factors in dementia-friendly communities.



Individuals with dementia and other forms of memory impairment are challenged by the absence of sufficient support to take part in activities they used to do such as dining out. Some key issues in a restaurant setting include, but are not limited to, the lack of appropriate social connection, a difficult-to-navigate environment, the lack of staff training, a visually complex table setting, noisy background, poor signage and difficult to read menus. In addition, people with dementia are not aware of places they can go to eat which are dementia-friendly.

People with memory impairment due to aging and/or early stages of dementia can lose touch with friends and loved-ones. Poor engagement in social activities can increase their social isolation. When individuals with memory impairment do not participate in the community, it results in a lack of awareness by the community about individuals with memory impairment. It also furthers the lack of awareness about the design of services and activities with awareness of individuals with memory impairment in mind. When individuals with memory impairment do not engage in the community it also decreases the diversity of the community.

Dementia can alter how people perceive what they see, hear, feel, smell and taste. Although these changes vary for different individuals, evidence strongly suggests that people with dementia are affected by their physical environment. Sensory stimulations including either overstimulation or under stimulation for people with dementia can result in confusion, illusion, frustration and agitation. Thus, it is important to understand what efficient sensory stimuli are for people with memory impairment. (2003). The literature suggests that exposure to stimuli such as that which is experienced in busy and crowded environments, patterned walls, flooring and décor, noise from television and alarm are not helpful for individuals with dementia. The use of symbols and colour cues support the independence of people with memory impairment (“Dementia-friendly Health and Social Care Environments”, 2015).

1.3 Objectives

Sensory design including olfactory, auditory, visual and tactile elements within a restaurant setting can have an impact on the dining experience. Relaxed social surroundings can give a sense of security and familiarity to a person with dementia. When setting tables, reducing unnecessary cutlery, for example, can help to reduce distress or confusion ("Dementia; The Dining Experience - INDI", 2018).

This research project will develop sensory-focused design principles and interventions specific to restaurant settings in order to include people with memory impairment due to aging and/or early stages of dementia. This will be achieved using participant feedback from real-world dining experiences to understand sensory-focused design elements that support a quality experience for individuals with memory impairment. Also, various stakeholders will be interviewed to understand ways to support dining experience for individuals with dementia. These stakeholders will also provide feedback on the prototype of design guidelines. The outcome will be a guideline of design principles, interventions and strategies aimed at improving the communal dining experience of people with memory impairment.

1.4 Research Questions and Methodology

A literature search was conducted to identify prior knowledge within this subject area. The research study was conducted in several stages, beginning with a review of published

literature. The literature was reviewed on dementia and memory impairments in adults. The focus was on defining background knowledge about the challenges of social engagement in the community as a result of memory loss. The next stage of the research focused on the dining experience and used a diary method whereby persons with mild dementia and their family members identified their needs, barriers and goals for social engagement, associated with dining out. To validate information obtained from the diary information and the literature search, as well as obtain additional information, various stakeholders including individuals with mild dementia and their family members, and experts (two geriatricians, an interior designer and a restaurateur) were interviewed. This mixed-method approach was used to address the following questions:

1. How can current practices like memory-friendly settings be applied to a restaurant setting?
2. How can sensory design elements help a restaurant to be inclusive of individuals with memory impairment?
3. What are the important factors in restaurant experience for individuals with memory impairment?

Note: I am the principal researcher and refer to myself as either I, or researcher throughout the paper.

Chapter 2: Research Methods

This study used a mixed-method research approach. Inductive and deductive approaches are used to integrate the data and findings and cross-check their reliability. Qualitative data was gathered through the diaries with contributions of individuals with mild dementia and their family. Data from the available literature and statistics are examined, validated and/or modified in interviews with various stakeholders.

2.1 Research Ethics

Research ethical considerations for this research involving human participants approved by OCAD University Research Ethics Board. Research project titled “Create a Memory-Friendly Restaurant through Sensory Experience Design” with the approval number 101093. Diary and interview guides are included in Appendix A.

2.2 Main Domains of Inquiry

The domain of inquiry was a casual restaurant where table service was available, and people could sit and socialize as they were dining. The restaurant was part of a chain to ensure that it complied with accessibility standards.

2.3 Research Design

This study was designed with the following stages:

2.3.1 Stage1. Literature Review

The literature review provided a background and examines the following domains of inquiry:

- The nature of dementia and its impact on the social lives of individuals with memory impairment;
- Current practices and programs in the community that support individuals with memory impairment;
- Current evidence and best practices in senior-friendly and dementia-friendly physical environments and the dining environment of hospitals, assisted living, and long-term care homes, to see if they can be applied to a restaurant setting; (Table 1)

The literature was analyzed thematically to inform these key themes. The key themes from this stage became the basis for early development of the prototype for guidelines. The six key themes include: simplicity, flexibility, inclusiveness, realistic, convenient and welcoming.

2.3.2 Stage 2: Diary

Couples, comprised of an individual with memory impairment and their chosen companion were asked to dine at a specific restaurant. Prior to dinner the diary researcher met in person with participants. In that meeting the researcher introduced the consent form and the diary guide to participants. The researcher also explained the diary questionnaire and how it should be filled in. Participants looked through the diary questionnaire to see if they had any questions, then they arranged a time to fill in the diary. The restaurant in which this took place was chosen by the researcher in advance of the meeting. Participants were asked to record their experience by filling out the diary questionnaire to record their feelings as well as what is important to them throughout their real-life restaurant experience. The diary guide contained 11 questions about how participants felt in different stages of their restaurant experience (See appendix A for the diary questionnaire). The researcher was present at the restaurant to observe and have the same dining experience from a different table. Participants only had interaction with the researcher when they first arrived and at the time of departure from the restaurant. In some cases, there were more interactions. These were related to questions about the diary guide and/or a desire to share more insights.

Diary questionnaire questions focused on different steps in the restaurant journey as touchpoints including arriving at the restaurant, heading to the table, reading the menu, ordering the food, dining, going to the washroom, heading back to the table, leaving the restaurant.

Participants were asked to fill out the questions while they are at the restaurant. For instance, after their arrival and when they sit at the table, questions regarding arrival and heading to the table could be answered.

The diary did not include paying the bill step because the research funding covered that and there was an arrangement for the payments by the researcher. Restaurant staff knew that a research project was involved, however, they did not know about the topic and the details of the study.

2.1.3 Stage 3: Semi-structured Interviews

In this stage various stakeholders including individuals with memory impairment in concert with their family members (in pairs), and experts such as a geriatrician, an interior designer, and a restaurant manager were interviewed (individually) to explore the following areas:

- Social needs, social interactions, and unmet needs of individuals with memory impairment and their loved ones in a restaurant setting;
- Restaurant design principles gathered from the best practices and evidence-based guidelines and strategies scan; and a review of literature in this domain;
- Goals, values, principles, and strategies that complement the design principles and guidelines based on the research to date;
- Validate and adjust the early prototype of guidelines based on the literature;

- An overview of restaurant services and how they are delivered to people with memory impairment. (Table 1)

2.3.4 Stage 4: Data Analysis

The analysis of the data collected from the diary and interview stages focused on identifying environmental and communication features and other influences that would inform a set of design guidelines for a memory-friendly restaurant. Data analysis was qualitative and key themes emerged from the thematic analysis of the data from various methods.

2.3.4.1 Literature Analysis

Analysis of the main themes that emerged from the review of the literature related to the needs of individuals with memory-impairment due to aging and/or early stages of dementia in the context of a restaurant setting. These main themes were used to identify physical, organizational, and communication features of restaurants. They were also used to identify and analyze the sensory-related design characteristics that could enhance or be barriers to the independent and satisfactory dining experience for a person with mild dementia. These design features when organized in a multi-sensory and functional lens of existing guidelines in senior-friendly physical environments were analyzed and validated through feedback from interviews with experts in gerontology, interior design and restaurant management.

2.3.4.2 Diary Analysis

Analysis of data from the diaries was undertaken through open and thematic coding. A series of themes emerged regarding what was important to memory impaired individuals and their companions:

- Welcoming & Friendly;
- Simplicity;
- Inclusivity & Flexibility;
- Familiarity;
- Comfort & Safety.

2.3.4.3 Semi-Structured Interviews Analysis

Data from semi-structured Interviews was also analyzed thematically. In the semi-structured interviews, a sample of sensory design guidelines was presented for feedback and to validate the findings to date. The main themes that emerged from the interviews were similar to those of the diary analysis with a slight difference in details which was the result of more informed interview responses provided by the expert.

2.3.5 Stage 5: Evidence-based Design Prototyping: A Memory-friendly Restaurant Design Guideline

The goal of the research study was the development of evidence-supported design guidelines aimed at restaurateurs to provide them with a set of memory-friendly restaurant design principles. This required detailed analysis and examination of existing guidelines, current practices, unique individual needs, and an understanding of the needs of people with memory impairment in a restaurant context. As there appears to be a gap in terms of design guidelines for restaurant settings; this work also aims to start a conversation about the unmet needs of individuals with memory impairment in restaurants and the strategies that can address those needs. This guideline document is at an entry level to open discussion in this area; therefore, further research and refinement of the guidelines is anticipated. (Table 3)

Table 1. Research Phase (Exploration)

Research Participants	Research Method	Rationale for method	How/Where
Researcher-led (no research participants)	Horizon scanning	Documenting emerging and existing memory-friendly settings and dining environments	Self-directed research online, offline
Researcher-led (no research participants)	Literature review	Reviewing prior research in the domain	Self-directed research
7 Pairs of individuals with memory impairment and a family member of individuals with memory impairment	Diary	Discover elements that support a quality experience as well as barriers for individuals with memory impairment in a restaurant setting.	In person/In a restaurant.
2- Experts including: 1 geriatrician, 1 interior designer	Semi-structured interview	define goals, values, principles and strategies, complementing the design principles and guidelines based on the research to date	In person and via Skype
2- Service Provider 1 restaurant manager	Semi-structured interview	Gain a deeper understanding of how restaurant services are delivered to the persons with dementia and complementing the design principles and guidelines based on the research to date	In person.
3- Individuals with memory impairment due to aging and/or early stages of dementia	Semi-structured interview	Understand their social needs, social interactions, unmet needs, thoughts on restaurant guidelines and principles gathered from horizon scan, literature review, and expert interviews.	In person and over the phone.
3- Families/friends of individuals with memory impairment	Semi-structured interviews	Understand the nature of their interactions with their loved ones, their challenges in restaurants, overall experiences, and thoughts on memory-friendly principles and guidelines gathered from horizon scan, literature review.	In person and over the phone.

Table 2. Analysis Phase (Analysis & Synthesis)

Research Participants	Research Method	Rationale for method	How/Where
Researcher-led (no research participants)	Thematic analysis	Method for synthesizing emergent themes in data	Self-directed
Individuals with memory mild dementia and their family, and experts	Validation and modification	The emerged themes were further validated and modified through interviews with various stakeholders	

Table 3. Evidence-based Design Phase (Concept prototype, Design and Feedback Loops)

Research Participants	Research Method	Rationale for method	How/Where
Individuals with memory impairment and their family members, and experts	Prototyping and getting feedback Note: Due to time limitation, early prototype was done by the researcher and during the interviews based on the feedback from various participants the prototype was revised.	To gather feedback from various groups of stakeholders	The feedback on the prototypes was in person, Skype and email.

Chapter 3: Data Analysis

3.1 Literature Review

The literature review explored several areas including mild dementia, the dining experience, sensory design elements, existing dementia-friendly settings and social needs in a restaurant. These areas overlap, therefore interaction was investigated as well to facilitate solutions that support the restaurant experience for individuals with memory impairment.

3.1.1 Literature Insights

The table below highlights some of the memory-related experiences that dementia can have on people. Findings in this table are based on the citations in this domain. (Society, 2018; "Alzheimer Europe - Dementia - Alzheimer's disease - Main characteristics of Alzheimer's disease", 2018; "What Is Dementia?" 2018)

Table 4. Literature Findings, Memory-Related Context

Memory	Communication and language	Ability to focus and pay attention	Reasoning and judgment	Visual perception
short-term memory loss procedural memory loss, which is about the ability to carry out actions both physically and mentally (e.g. How to use fork)	Difficulty to find the right word and/ or forgot what just has been said Become slower to process information Communication abilities are altered Difficulty to grasp new ideas Loss the ability to read or interpret signs	Difficulty to ignore background noise Difficulty to focus on details Difficulty with concentration	Poor judgment Difficulty to plan and make decisions Ability to think in an abstract way is reduced Difficulty to orient time and place Speed of thought is lessened	depth perception is distorted Problem in perception of distance or 3D objects (e.g. Navigating stairs) Ability to differentiate between different surfaces with similar colors is lessened Difficulty with orientation in a place Slower response to stimuli

3.1.1.1 Early Stages of Dementia and Dementia-friendly Environments

Considering that most individuals with memory impairment still live in the community, it is very important to build dementia-friendly communities with dementia-friendly services. A dementia-friendly community/service is where people who live with dementia are supported to have a higher quality of life with meaning, purpose and value. A dementia friendly community/service can include many adaptive design changes, including those related to nutrition and the dining experience as explored in Dementia-Friendly Cafes ("Dementia-Friendly Communities", 2017).Based on the Alzheimer Society's brief about memory cafes, the concept

of a memory café started in the UK in 1997. Memory cafés provide people with dementia and their care givers with education and support services. It also includes entertainment, refreshments and socialization. (Alzheimer Society of New Brunswick, 2017)

3.1.1.2 Social Life and Well-being

Many people with dementia do not engage in the activities they used to. Results of a survey by the Alzheimer's Society in the UK state that more than one third of people with dementia go out once a week or less, and that 10% go out once a month or less. One of the most common activities people with dementia do in their local area, is eating out ("Building dementia-friendly communities: A priority for everyone", 2013).

Persons with dementia can benefit from engagement in society and meaningful activities. Existing literature suggests that engaging in meaningful activities that are relevant to one's day to day roles and interests results in more positive state of being. This engagement may lead to satisfaction about personal roles as well as development of satisfying relationships with others (Chung, 2004). This involvement can be in a wide range of activities including leisure pastimes, household chores, work-related endeavors, and social involvements (Phinney, Chaudhury & O'connor, 2007).

“Dementia remains a largely invisible disease often unrecognized or underappreciated as a cause for issues of weight loss, anxiety, weight gain, excess

alcohol consumption and poor adherence to medication and medical management regimes.” (J. Ingram, personal communication, 2017)

3.1.1.3 Design Elements in a Restaurant

Sensory design elements can enhance dining experience for people with mild dementia. For example, studies carried out in the dining environments of long-term care facilities suggest that enhanced lighting and lower background noise can improve dining experience for individuals with dementia.

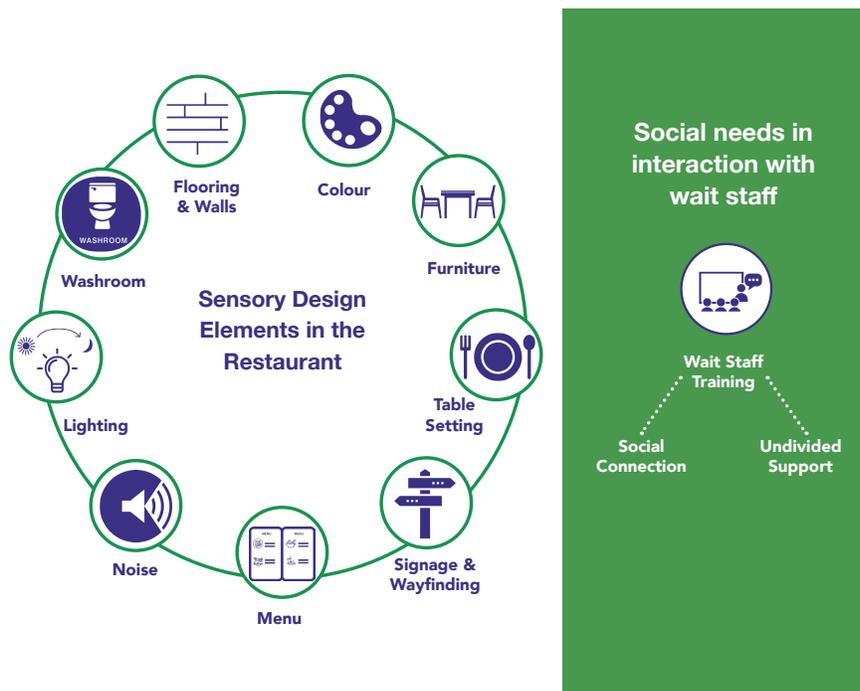
3.1.2 Literature Findings

There are numerous published studies focusing both on senior-and dementia-friendly environmental design and design guidelines for hospitals, assisted living facilities, and long-term care facilities. Previous research from a variety of countries includes some initial considerations for dementia -friendly guidelines and details about staff training. ("Dementia-Friendly Restaurant", 2016). Building on this research, this study aims to create evidence-based guidelines for memory-friendly restaurant settings through an emphasis on sensory experience design elements. Design elements in a restaurant setting include but are not limited to lighting, acoustics, colours, flooring and walls, wayfinding and signage, furniture, washrooms, table setting, space between the tables and menus. While persons with dementia within in a

restaurant can also benefit or experience barriers through the service they receive in the restaurant setting, service design is not included in this study.

Findings from the review of dementia-friendly design evidence- based practices and best-practices suggest that sensory design elements can have an impact on the independence of individuals with dementia. These elements include lighting, acoustics, colours, flooring, walls, wayfinding, signage, furniture and the washrooms (see figure 5).

Figure5. Graphic below illustrates the sensory design elements in the restaurant as well as the socials needs in a restaurant.



The table 5 (below) presents the findings from the review of dementia-friendly design, evidence-based practices and best practices. It also includes discoveries from the literature that provide a memory-related explanation concerning why these sensory design factors prove beneficial for individuals with memory impairment. (Noell-Waggoner,2002; Torrington & Tregenza, 2007; McDaniel, Hunt, Hackes & Pope, 2001; Brush, Meehan & Calkins, 2002; "Living with Dementia", 2018; Brawley, 2006; Schlanger, H. 2008; "Design and dementia | brainXchange", 2018; Brawley, 1992; Fleming, Forbes & Bennett, 2003; Brawley,1997; Parke & Friesen, 2010; "Improving the design of housing to assist people with dementia", 2018; "DH health building notes - GOV.UK", 2018; Marquardt & Schmieg, 2009; Rousek, & Hallbeck, 2011; "DH health building notes - GOV.UK", 2018; O'Keeffe, 2003; Calkins, 2009).

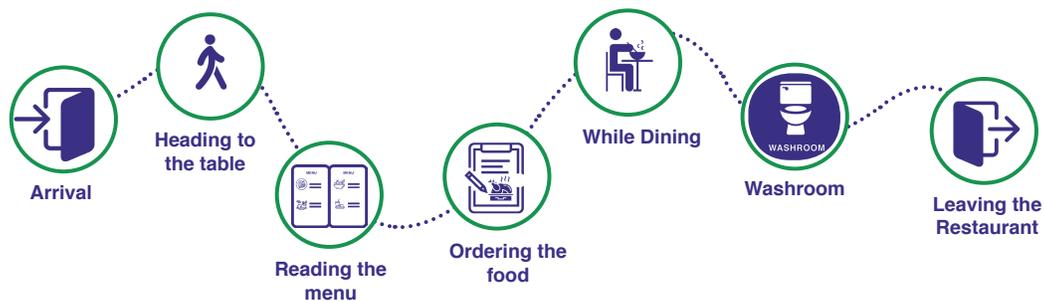
Table 5. Literature Findings, Sensory Design Elements & Dementia Context

Design Elements	Key Themes from Review of Literature
Lighting	<p>Alzheimer’s disease is not known to cause vision impairment, although problems with depth perception have been shown to worsen in persons with Alzheimer’s. Factors that can lead to difficulty interpreting the environment and further result in responsive behavior can include low lighting, shadows and glare. People with dementia need appropriate lighting to avoid misperception and misinterpretation of the environment.</p> <p>Adequate lighting for people with dementia is associated with a reduction in behavioural disturbances, enhance dining, and improve communication and well-being. Individuals with dementia may response to the difficult to navigate environment in the following ways: wandering, anxiety/fidgeting, combativeness, and negative verbalizations. Studies of long-term care home facilities and Alzheimer units suggest that increase in lighting that might improve caloric intake.</p>
Acoustics	<p>There is strong evidence that excessive and unwanted noise can increase stress and it further can impact one’s health such as experiencing higher anxiety, increased hearth rate, blood pressure and fatigue, delayed wound healing, decreased weight gain, impaired immune function and impaired hearing. Impact of noise on medical and behavioral health can be magnified for people with dementia. Adequate noise level can vary for different people in various time and context.Noise reduction may further improve individuals’ caloric intake of individuals with dementia.</p>
Colors	<p>Dementia can impact colour perception as well, to avoid this misperception high contrast colours can be used in the environment.</p>
Flooring & Walls	<p>Change in colour of flooring can be misinterpreted as stairs or holes. Use slip-resistant flooring to support safety. Texture change and color change in flooring can assist with the wayfinding.</p>
Wayfinding & Signage	<p>Person with dementia can have difficulty with spatial orientation. Design elements including floor plan layout, landmarks and signage (pictogram, words and sensory cues) to support these individuals in the environment.</p>
Furniture	<p>Due to impact of dementia on colour and visual perception, it is important to use high contrast colors for furniture as well as the décor. Also, it is very pertinent to avoid using objects or furniture that may cause optical illusions.</p> <p>Some researchers also suggest that “homelike” furniture can give sense of familiarity for example elements like wood or upholstered as oppose to metal or plastics.</p>
Washroom	<p>People with dementia might have difficulty with visual perception and orientation in a place. Visual signs, colour cues and words can be helpful for the wayfinding.</p> <p>Make sure that all the signs have focused lighting also the washrooms are well-lit. Literature recommends providing at least one wheelchair and/ or walker accessible vestibules or privacy stalls that is accessible for people with assistive devices or individuals who might need assistance of their family/caregiver.</p>

3.2 Diary and Restaurant Observation

To explore the dining experience in its natural context (a restaurant) the diary method was chosen. The diary facilitated obtaining first person complementary information through the contribution of individuals with memory impairment and their family members in a real-life dining experience. One of the most important points to consider in diary method is how questions are designed (Bolger, Davis & Rafaeli, 2003). Diary guide questions were designed to cover various touchpoints and interactions that one might have during the restaurant journey with design elements as well as the wait staff. Also, diary guide was used to further define important factors that can support individuals with memory impairment and their loved ones in restaurants. The figure 6 (below) shows considered step for the restaurant journey.

Figure 6. Restaurant journey steps



The design of the diary guide included questions about the above steps and how participants feel in each step and why.

This stage of the study asked individuals with mild dementia and their dining companions to participate during a real-life experience of restaurant dining to define the elements that support a quality experience in a restaurant. Participants were asked to go to a restaurant with their dining companion who would assist with the following:

1. The diary questionnaire, to be filled out at the restaurant (see appendix A for the diary questionnaire);
2. The researcher observed the participants experience in the restaurant. At the end of the restaurant experience, the researcher had a short informal chat (10-15 minutes) with participants to see if they had any insights or feedback about their experience.

Note: Participants' meals were covered by a grant from the Geriatric Health Inc.

3.2.1 Participants

Individuals with mild dementia and one of their family members were recruited to engage in the restaurant stage of the study. Recruitment took place in the health clinic which they attended on a regular basis. People, who already expressed their interest to the clinic, were recruited to be involved in the research. The recruitment process had three steps: First, the clinic contacted individuals who had expressed their interest and introduced the researcher and

research briefly. After that, the researcher called these individuals to give them a brief description of the research and to arrange a time to meet in person. This meeting also provided the opportunity to share more details and introduce the consent form. The final step was a session to inform the potential participants about the details of the study and relevant information about their involvement. It was also an opportunity to acquire informed consent from each of those wishing to participate.

In the recruitment process, eleven couples received calls from the clinic and they all expressed their interest in participating in this research project. The researcher called them back to explain the project and arrange a time to meet in person for more details. Ten calls went through from which eight couples arranged a time to come to an information session. In the information session one of the couples decided not to participate. Seven couples of individuals with mild dementia and one of their family members participated in this part of the study. The participants with mild dementia were six women and one man with the age range of 68-84. The research session for the diary method also took place in the same clinic.

3.2.2 Diary Setting

The restaurant chosen for the diary method was a casual breakfast and lunch restaurant which was part of a chain and had table service. Arrangements for the diary method's time and place were made in the introductory sessions in person. The time of the restaurant experience was

based on the restaurant opening hours as well as participants' preferences and convenience. All the participants came to the restaurant around noon to 1 pm and the dining experience took around 60 to 90 minutes of their time.

3.2.3 Diary Findings

Findings from this stage of the research are based on the answers of the participants to the questions within the diary guide. After the first three couples completed the process and filled out the diary guide, the results indicated that the participants found some of the questions vague. Based on their feedback, the researcher changed some of the wording of the questions in the subsequent diaries to be more specific. The nature of the questions remained the same. Also, the first three sets of participants stated that it would be beneficial to have some options for answers in the diary. The researcher decided to provide the last four couples of participants with options for the answers. The options for answers included an equal number of positive options, negative options and one neutral option.

However, all the answers from the diary guide are presented in the same table since the nature of the questions remained the same and refer to the same journey steps. Themes which emerged from all of the participants fell under 5 main themes: welcoming and friendly, familiarity, simplicity, inclusiveness and flexibility, as well as comfort and safety.

Analysis of the data was qualitative and main themes emerged from open coding and thematic analysis of the data. Nvivo qualitative data analysis computer software package was used to analyze and sort the data. Data in Nvivo was coded manually.

Note:

1. Numbers in the parentheses refers to the number of times it was identified as an item.
2. Direct quotes are not used in the tables, what is presented below are interpretations of quotations. To avoid the bias regarding the use of gendered pronouns, this study refers to participants in the third person with plural pronouns ("Purdue OWL: APA Formatting and Style Guide", 2018).
3. All the answers to the diary guide were further analyzed thematically. Each participant had their own diary questionnaire to fill out. Table six and seven present findings from all the participants with memory impairment.

Table 6. Emerged Themes from Diary

((x) = Individuals with Mild Dementia that identified the specific theme)

Themes/ Journey Steps	Welcoming & Friendly	Familiarity	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Pre- Restaurant		They picked what they wanted to eat in advance. (4)			
Arrival	Host/hostess made them feel welcome. There was a good light at entrance. (4)	They love to eat there, since they go there frequently. (1)			There was no waiting area. (2)
Heading to the Table	Staff were friendly. A host/hostess helped them to find their table. (6)			There were some table options and it was good. (2)	
Reading the Menu			Menu was very easy to read Menu was really long. (4)	Menu had pictures and helped with choosing the food. (2)	
Ordering the Food	Wait staff were very friendly. Ambient was friendly too. Wait staff helped them to pick their food. (2)	They knew the menu, they come here regularly. (1)	They thought that menu was long, and they didn't read it all. (4)	Menu had lots of interesting foods to order! (1)	
While Dining	Wait staff were very helpful & friendly. (1)		They liked the ambient light and noise when they were eating. (3)		It was too noisy. Kitchen noise on one side and 3 people next to them was distracting. (2)
Washroom			They did not see any signs for the washroom, but it was easy enough to find. (4)		
Leaving the Restaurant			It was very easy. There were exit signs. (3)		

There were also questions about things that they liked and things they did not like in the restaurant. The final questions focused on things they wanted to improve as well as any additional insights. The participants' responses are presented in Table 7 below.

Table 7. Important Aspect

((x) = Individuals with Mild Dementia that identified the specific point)

Things they liked	Things they didn't like	Things to Improve
Friendly wait staff (4) Bright and friendly atmosphere (2)	Kitchen noises (1) Other table noises (2) Small entrance (1) Big menu (1) Table close to the entrance (1)	Environment noise (2)

Following the participants dining experience and completion of the questionnaire; the researcher and participants engaged in a short informal chat to ensure if they had any additional points or feedback.

Participants, through diary brought up that they knew in advance what they wanted to eat which added pre-restaurant step to the restaurant journey. One step that is not included in this table is paying the bill, because the restaurant expenses was covered and researcher arranged for the payments.

Family of individuals with memory impairment had their own diary questionnaire to fill out. Table eight and nine presents the findings from the Diary for all the participant who were family of individuals with memory impairment.

Table 8. Emerged Themes from Diary

((x) = the number of Family of Individuals with Mild Dementia that identified the theme)

Themes/ Journey Steps	Welcoming & Friendly	Familiarity	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Arrival	It was very welcoming, A host/ hostess made them feel welcome. (3) There was a good light at the entrance.(3)	It felt comfortable, because they knew the restaurant. (1)			There was no waiting area. (1)
Heading to the Table	The wait staff helped them to find a table. (3)		It was very easy to find a table. (3)	There were some table options. (2)	
Reading the Menu			Menu was very easy to read. (6) Menu was really long. (2)	Menu had pictures which were helpful. (4)	Menu size was too large. (1)
Ordering the Food	The wait staff didn't tell them about the specials. (1)		Specials were not in the menu. (1)	Menu had lots of interesting foods to order. (1)	There too much noise from the tables beside them. (2) There were also a lot of noise from the kitchen. (2)
While Dining	Wait staff were helpful and friendly. (1)		Ambient light and noise made dining enjoyable. (2)		There too much noise from the tables beside them and the kitchen. (1)
Washroom			There were clear signs. (3)		The space was small, and it was easy to find. (1) The open concept made it easier to find the table. (1)
Leaving the Restaurant			It was very easy. There were exit signs. (4)		

Table 9. Important Aspects

((x) = Family of Individuals with Mild Dementia that identified the specific point)

Things they liked	Things they didn't like	Things to Improve
Friendly wait staff (4) Bright environment (2) Great décor (2)	Too Noisy (2) Unclear signs (1) Menu size (1) Small entrance (1) No waiting area (1)	Environment noise (1) Washroom signs (1) Menu (1) Entrance (1)

3.2.4 Observation Notes

I observed the diary method by sitting at a different table. Since participants had a diary guide to record their own experience, I observed the environment and the sensory elements in the space. I went to the restaurant with each pair of participants and took notes each time. One of the issues that I considered in observation was the diary guide questions. Also, I thought about the restaurant journey steps. I had the opportunity to go to the same environment several times. I could look at how within the same environment sensory design elements like lighting, and/or noise might change and had an impact on individuals dining experience.

All the notes from my observations are sorted and analyzed thematically. Table 10, below, presents the findings from observation.

Table 10. Emerged Themes from the Observation

Principles/ Elements	Welcoming & Friendly	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Lighting				Light in the washroom was poor. There was harsh natural light on the tables by the window.
Acoustics			When all tables are occupied it gets really noisy.	Place had open kitchen.
Wayfinding & Signage		Signs are hanging from the ceiling and have a matching colour with walls and ceiling which make it difficult to see.		
Furniture & Decor			There were three kinds of seats boots, chairs and combination of boots and chairs.	Chair (without arm) and table size were small. Table had very sharp edges. Wooden tables.
Washroom			There was no family washroom.	
Menu		Menu was too long.		Menu size is very large. Menu spread shit is bigger than the table width.
Wait Staff	Wait staff were helpful with the menu.			
Space Between the Tables			When all tables and chairs are occupied it leaves a very narrow aisle between the tables.	
Colour		Walls and flooring have contrasting colours, however flooring and table top have a matching colour.		
Waiting Area	They were changing the welcome rugs so there was no place to stand.			There was no waiting area.

Based on the research data, and the analysis of diary themes an initial prototype of design guidelines was created. The literature review focused on the evidence-based dementia-friendly design, dementia-friendly environment, and senior-friendly physical environment ("Design and dementia | brainXchange", 2018; "Dementia-friendly Health and Social Care Environments", 2015; "Dementia Design Series", 2013; Mitchell, 2012; O'Keeffe, 2003). Universal design guidelines and the three dimensions of inclusive design were considered in development of the first prototype ("The 7 Principles | Centre for Excellence in Universal Design", 2018; "Inclusive Design Research Centre", 2018).

The themes that emerged from the analysis of the diaries was depicted in the initial prototype of guidelines which was a high-level model. It had six pages in which the principles were presented. Each page contained one principle with up to three strategies relevant to the principle. Under each strategy relevant visual icons were included.

The initial prototype of the guidelines was reviewed in the interviews with diverse participants to receive feedback and any insights. Participants also validated the guidelines.

3.3 Semi-Structured Interviews

In this stage of the study, three different groups of stakeholders including individuals with mild dementia and their family members (three pairs), experts (a geriatrician and an interior designer) and a service provider (a restaurant manager) were interviewed separately.

Interviews had two steps, which included asking around four or five questions from their knowledge of this subject area. The second step was guiding them through the initial prototype of a memory friendly restaurant design guidelines and asking for their feedback.

Note: The interview time and setting were based on the participants' preferences.

3.3.1 Interview with Individuals with Mild Dementia and their Family Members

3.3.1.1 Participants as Experts in their own Dining Experience

Three of the individuals who participated in the diary method with their family members were further engaged through the interviews to identify factors that were important to them based on their restaurant experiences. As experts in their own experiences, they were engaged to investigate the following areas:

- Important factors in a restaurant;
- Memory-related concerns in a restaurant;
- The impact of the sensory design elements as well as the wait staff on their dining experience;
- Feedback on the initial prototype for a memory-friendly restaurant based on principles gathered from the literature review;

The interviews were conversational and open-ended; however, the following questions were considered during the interview:

1. What was the restaurant experience that you loved? Can you tell me more about things you liked about it?
2. How was your last restaurant experience? Can you tell me more about things you liked about it? Also, what were the top things you didn't like about it?
3. What was comfortable in those experiences?

To discover the most important factors from the lens of individuals with memory impairment, findings from the interviews were thematically sorted into three themes including design principles, sensory design elements and social needs for further examination and subthemes. The themes that emerged from the interviews with respect to sensory design elements as well as the wait staff were similar to the diary themes. Individuals with mild dementia and their family were interviewed in pairs. Tables 11 and 12 show the findings from the interviews with all the participants with mild dementia and their family. To make sure all the opinions are recorded all the questions were asked from both individuals with memory impairment and their family member. Table 11 presents the findings from interviews with individuals with memory impairment. Table 12 presents the findings with the family of individuals with memory impairment.

Table 11. Emerged from the interview with Individuals with mild dementia.
 ((x) = number of participants identifying these themes)

Principles/ Elements	Welcoming & Friendly	Familiarity	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Lighting				Low light makes it difficult to read the menu. (2) Some people carry flashlights with them. (1)	When it is super bright it can hurt one's eyes. Very low light can cause discomfort. (1) When there it is too bright can give one headache. (1)
Acoustics				It is good if they offer to bring down background noise. (1)	It is annoying when music is too loud, and it is difficult to have a conversation. (2) Noise from other tables can be displeasing. (1) When it is too busy it can get confusing. (1)
Wayfinding & Signage			Signs are clear most of the times but if it is not one need to ask from the staff. (1) When there is no sign one can go to a wrong place.(1)	Finding the way to washroom and back to the table can be stressful, especially when you don't know who to ask. (1)	
Furniture & Decor					Some places don't have armchair and their table's height is not standard. (1) Huge statues can block people's way. (1)

Principles/ Elements	Welcoming & Friendly	Familiarity	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Washroom				When washroom is in a different level make it difficult to find the way back to the table. (2) In older building most of the time washrooms are in a different level. Sometimes they have narrow stairways and the washrooms are very small and unappealing. (1)	
Menu		When one goes to the same place there is no problem with the menu because it is the same. (1)	It is useful when menus are broken down to types of food people can go to the type of food they are interested in. (1) Sometimes menus are very long. (2)		Menu size is very large at times. (1)
Wait Staff	Friendly wait staff makes can improve the whole restaurant experience. (3)	When there is no socialization, one might feel they are not part of the family. (1) Places in which wait staff treat individuals as people they know are preferable. (1)		Some places do not make reservations. (1)	It can be bothersome when something is needed but wait staff are constantly not around. (1)
Waiting Area				Some places do not make reservations. (1)	It can be annoying to wait in the line. (2)

Table 12. Emerged theme from the interview with family of individuals with mild dementia
 ((x) = number of participants identifying these themes)

Principles/ Elements	Welcoming & Friendly	Familiarity	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Lighting					When light is unsteady it can be bothering. (1) It can hurt the eyes when it is too bright. (1)
Acoustics		When used materials are like what one uses in their homes it feels intimate. E.g. paper cloth instead of napkins. (1)		We prefer to dine at our home because we can choose what to listen to. (1)	Noise can be annoying when you cannot have a conversation. (1)
Wayfinding & Signage	Sometimes one cannot see the signs and they need to ask the staff. (1)		The size of the signs was big, and they were easy to read. (1)		When washrooms are in a different level it is difficult to find the way back to the table. (1)
Furniture & Decor					Armchairs are more comfortable. (1)
Washroom				When washrooms are downstairs it can be an accessibility issue. (1)	
Menu		It's not an issue, because most of the time we go to the place that we know. (1)	It is helpful when menus are broken down to smaller parts. (1)		
Wait Staff	It improves the experience when wait staff are friendly. (1)				

Principles/ Elements	Welcoming & Friendly	Familiarity	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Waiting Area					When there is a line and there is no waiting area it is displeasing. (2)

3.3.1.3 Social Needs

Another theme that emerged from interviewing individuals with mild dementia and their family members is the ‘social connection with staff in the restaurant environment’. In fact, social needs in interaction with wait staff was one of the most important factors mentioned in the interviews.

In each interview, participants with memory impairment and their family members identified the importance of wait staff and their interactions. Social needs based on the data from the interview can be broken down into three subthemes including: socialization; attention needs and undivided support. While the scope of this project does not include the service design, it was identified by participant to have a significant role.

Table 13. Social Needs Identified in Interview with individuals with mild dementia and their family
(x) = number of individuals identifying these items)

Socialization	Attention Needs	Undivided Support
<p>It really improves the quality of the experience when wait staff are friendly. (4) What stands out about various restaurant experiences is how the wait staff treat a person. (3)</p>	<p>It is beneficial when staff check on guests wait. (2) When wait staff are ongoing it enhances one's experience. (2)</p>	<p>It can enhance one's experience when wait staff does not rush them. (2) When wait staff know the menu items very well it is useful. (2)</p>

3.3.2 Interview with Experts

The scope of this project is on the impact of sensory design elements on the dining experience of individuals with memory impairment and their loved ones in a restaurant. Experts including an interior designer, a geriatrician and a restaurateur were interviewed to further identify the important factors to consider based on their knowledge in this area. Areas that were investigated include:

- Current practices that can be applied to a restaurant;
- Evidence-based design principles and guidelines applicable to restaurants;
- Validation of the findings from literature review;
- Make additions to the guidelines based on their insights;

Experts also provided feedback on early prototypes of memory-friendly restaurant design guidelines.

3.3.2.1 Semi-Structured Interview with a Specialist in the Geriatric medicine

In an interview session with a geriatric physician the following questions were kept in mind:

1. What special needs do individuals with memory impairment and different physical and mental abilities have in a restaurant setting?
2. What memory-friendly dining environment/ restaurant design principles and guidelines have you heard about or seen that you think I should have a look at? They can be ones I mentioned or ones I haven't mentioned.
3. Do you have any recommendations regarding staff training?
4. Can you think of the ways that a restaurant setting can facilitate the needs of the target population?
5. Do you have any suggestions about other individuals or stakeholders I should interview to learn more about this field?

Table14. Emerged themes from the interview with a geriatrician (personal communication, January 29, 2018)

Principles/ Elements	Welcoming & Friendly	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Lighting	Well-lit environment with bright colours is preferable.			
Acoustics	Zoning can be effective to control the noise in the environment.			
Wayfinding & Signage		Clear signs and wayfinding directions are important.		
Furniture & Decor				Armchairs are the most comfortable option.
Washroom			Provide at least one accessible washroom for individuals with assistive devices and/or people who might need assistance.	
Flooring			Non-slip flooring should be used.	
Menu		Simple menu simplifies decision making. Simple and readable font should be used. Visual menu is advantageous.		
Wait Staff	They should make eye contact and help with the menu.		Wait staff should be trained about short term memory difficulty, therefore be prepared to repeat what they just said and answer the question that they just answered. They also should be prepared to speak loudly.	Ideally, there should be a person with some behavior techniques.
Activities			It can be beneficial to offer some kind of activities such as books or small puzzles.	

3.3.2.1 Semi-Structured Interview with an Interior Designer

An interior designer was also interviewed to add more knowledge based on their expertise and experience in this domain. In addition, they were asked to provide feedback on the prototype of guidelines (A. Stranks, personal communication, February 7, 2018). Questions that were kept in mind in the interview are as follows:

1. Do you have any recommendation regarding the ambient design elements as well as interior sensory design elements that can make a restaurant setting inclusive? (for individuals with memory impairment)
2. What memory-friendly dining environment/ restaurant design principles and guidelines have you heard about or seen that you think I should have a look at? They can be ones I mentioned or ones I haven't mentioned.
3. How interior design elements can allow for flexibility and individualization?
4. Do you have any suggestions on other individuals or stakeholders I should interview to learn more about this area?

3.3.2.1.1 Semi- Structured interview with an Interior Designer

Findings

Themes, which emerged through open coding and thematic analysis, were categorized into four main areas including: welcoming and friendly, simplicity, inclusivity and flexibility, and comfort and safety. Subthemes which emerged include; social connection, creating zones, sensory design elements and their compatibility as well as the balance of the design principles with existing building codes, standards and design. Table 15 presents the findings from the interview with the interior designer.

Table 15. Emerged themes from the interview with an Interior Designer and Design educator (A. Stranks, personal communication, February 7, 2018)

Principles/ Elements	Welcoming & Friendly	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Lighting	Minimum of three levels of lighting are needed in the restaurant including ambient lighting, task lighting and accent lighting.			To allow for modification dimmers can be used. Window coverings of various density can control natural day light exposure.
Acoustics			To allow for different levels of privacy as well to control the noise in the environment zones can be created.	
Wayfinding & Signage				Accent lighting can help with wayfinding and signage. Acoustics and flooring can be wayfinding tools.
Furniture, Décor & Colour		Use table finishes that define edges. Makes sure that chair and table top contrast the floor and the walls.		
Flooring			Use non-slip flooring.	
Menu			Strong visual menu is useful.	
Wait Staff	Socialization is a key factor in supporting people with dementia.		Wait staff should be trained. People with dementia have very diverse needs.	
Space between the tables				There needs to be wider aisles between the tables to help with orientation in the space.

3.3.3 Interview with a Restaurateur

A restaurant manager was engaged in an interview session to explore:

- Current considerations in terms of customers with diverse needs

The restaurant manager was also involved in giving feedback on the very early prototype of the memory-friendly restaurant design guidelines. Table 16 shows the findings from the interview with the restaurateur (personal communication, January 25, 2018).

Table 16. Emerged themes from the interview with a Restaurant Manager (personal communication, January 25, 2018)

Principles/ Elements	Welcoming & Friendly	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Lighting				Light has not been an issue in here, when it is very sunny the blinds are drawn.
Acoustics				People call and ask for a quieter area.
Furniture & Decor			People call to book a table that is wheelchair accessible frequently. Sometimes there is a request for bright area or the opposite.	There is no waiting area in this restaurant but if there is a line up chairs will be provided. At times two people need table for six if restaurant is not busy we accommodate that.
Menu		Pictures are provided in the menu which some find it helpful. However, the menu is long.		

Principles/ Elements	Welcoming & Friendly	Simplicity	Inclusivity & Flexibility	Comfort & Safety
Wait Staff	That's a basic service, wait staff are trained to socialize and give information about the menu. They are trained to answer questions and speak louder if its needed.		Staff are trained not to rush people if they need more time. Part of their training is about how to help individuals who might need assistance.	
Table setting		There are minimum items on the table in this restaurant, we bring different sauces or cutlery relevant to what people order.		

3.4 Main points of Convergence

Thematic analysis and open coding of data from the diaries and semi-structured interviews with various stakeholders revealed the subsequent themes. Direct quotes are not used, rather interpretations of various stakeholders' data has been used instead.

3.4.1 Theme 1-Social Support & Connection

Although I chose not to examine all aspects of service design in depth within the study, the importance of social connection in respect to wait staff was mentioned by all groups of participants in both diaries and interviews. The consistency of the service and attention by the

wait staff was an important factor for individuals with memory impairment and their family which was further emphasized by experts as well.

The restaurateur who was interviewed stated that wait staff training regarding socialization is the basic level of training that restaurants should have (specifically chain restaurants). They further explained that restaurateurs are not aware of the considerations relevant to individuals with memory impairment since it is not included in trainings. Based on the experiences of individuals with mild dementia and their family in restaurants there are more details that are not considered.

Through the diaries and interviews, individuals with memory impairment and their family emphasized the importance of consistency of the service. For example, when they want to ask about their food, their order, or request their bill, it is sometimes difficult to find the wait staff. A gerontologist, suggested that using a uniform or clothing cues can make identification of wait staff easier (J. Ingram, personal communication, March 13, 2018).

3.4.2 Theme 2- Create Zones to allow for Privacy and Acoustic Control in the Environment

Noise in the restaurant including the music, TV, radio, noise from the other tables and noise from the kitchen can impact dining experience according to individuals with mild dementia and their loved ones. Noise is a factor that can impact dining experience especially when one

cannot have a conversation or enjoy their food. In interview sessions, experts including gerontologists and the interior designer highlighted the noise as a strong negative aspect in the restaurant experience. What they suggested as a solution was to create zones that allows for both privacy and noise control. The Interior designer interviewed for the study added that creating zones can happen overhead structures. They suggested that noise control needs the expertise of the acoustician for different settings.

One important factor to consider about creating zones, is that it should not create structures that block the way or view. Individuals with memory impairment and their loved ones identified places that have an open layout where nothing blocks your view and it is easy to navigate.

3.4.3 Clear and Intuitive Space Elements and Features.

Participants indicated the significance of visibility and clarity of design elements through their diaries and the interviews. Elements that were mentioned include signage, wayfinding, menu, waiting area and washroom. Additionally, they stated that identification of the wait staff can be challenging when there is no sensor-based identification cue. Through their diaries participants indicated that a pictorial menu with the corresponding number was easier to read than non-pictorial menus.

Another example, provided by a gerontologist, was that the washroom door lock needs to be visible and easy to find. To indicate the door is locked colour and sound cues can be used. Further, slowness in the decision-making process can make the use of automated doors difficult. Slowest level setting for automated doors may work better for individuals with mild dementia, however, other patrons may find it challenging. In this respect, a non-automated door family bathroom option which can be locked by hand would simplify this process (J. Ingram, personal communication, March 13, 2018).

If there is a waiting area, it needs to be easily seen. Some restaurants offer seating areas for those who prefer to seat while they are waiting for their table. If the table is not visually apparent, restaurants need to illustrate it at the front reception and make sure people who are waiting are informed. In their diaries and interviews, participants indicated they found it bothersome when there is a wait line and no designated waiting area. The restaurateur stated that this would be very simple to solve. If there are no available seats in the waiting area, individuals can ask and it will be provided for them.

Another detail of wayfinding and signage revealed by individuals with memory impairment was that when there are often complex paths and structures that block the view of destinations, it is difficult to find the way either to the washroom or back to the table. Size and colour of the signs will impact their visibility. They also described that the path to and from the washroom can be very complex to navigate when the washroom is on a different level.

Identification of the wait staff was identified through diaries and interviews with individuals with memory impairment as an important factor in their comfort. One of the strategies that was mentioned by a gerontologist was using uniforms and other distinguishing clothing cues to support sensor-based identification of wait staff (J. Ingram, personal communication, March 13, 2018). Colour cues and lighting can be used as tools to support clarity and visibility. Colour cues are useful as identification tools of different elements. To use visual cues as identification tools restaurants should consider providing adequate lighting to allow for visibility of colour cues.

Chapter 4: Design Phase

4.1 Prototype for a Memory-Friendly Guideline for Restaurant Design

Based on the findings from the literature, I began developing an initial prototype of design guidelines with a focus on sensory design elements that could improve dining experience for individuals with memory impairment in a restaurant. The design process was Iterative. The initial version of the design guidelines was created based on the evidence-based literature in dementia-friendly design, dementia-friendly environment, and senior-friendly physical environment ("Design and dementia | brainXchange", 2018; "Dementia-friendly Health and Social Care Environments", 2015; "Dementia Design Series", 2013; Mitchell, 2012; O'Keeffe, 2003). In addition, universal design guidelines and the three dimensions of inclusive design were considered in development of the first prototype ("The 7 Principles | Centre for Excellence in Universal Design", 2018; "Inclusive Design Research Centre", 2018).

To include diverse stakeholders' view points and expertise in the process of design guidelines, individuals with memory impairment and their loved ones, an interior designer, a geriatric physician and a restaurateur were involved in reviews of various versions of the design guidelines.

4.1.1 Prototyping

The process of prototyping was parallel with interviews and guidelines' feedback loops were embedded in the interviews. As the interview phase was progressing the guidelines prototype was revised simultaneously. The very early prototype of guidelines contained six principles with very brief one-line strategies for each principle. Each principle with its strategies was presented on a single page. It also included the visual symbols for strategies. This prototype was used in the first interviews with individuals with mild dementia and their family to receive their feedback. At this stage, needs, barriers and goals were defined. Prototyping continued as interviews were progressing. With experts, the emphasis was on defining current practices, strategies and solutions to address the defined needs, barriers and goals.

The scope of the project had an impact on the organization of the guidelines. Guidelines reflected visual, tactile and auditory features as sensory design elements which were significant within a restaurant environment. However, through the diaries and interviews with individuals with memory impairment and their loved ones, social connection and social needs regarding the wait staff were identified as the most important factor that has an impact on the dining experience.

The five main themes that emerged from the literature, diaries and interviews were used as the main design principles of the memory-friendly restaurant including Welcoming and Friendly, Simplicity, Familiarity, Inclusivity and Flexibility, Comfort and Safety.

These defined contexts, needs and barriers with individuals with memory impairment and their family during stages of the study served as input for the proposed design strategies and action plans. Sensory and design elements that were identified to support the dining experience include acoustics, colour, décor, doorways, hallways, washrooms, flooring, furniture, lighting, menu, signage, table setting, space between the tables and walls. Social aspects regarding the wait staff was defined as one of the most important factors to enhance the quality of the dining experience. Factors that were considered in respect to wait staff included social connection, consistency of the service and undivided attention.

The final prototype was revised based on all the participants' feedback from interviews. To provide deeper understanding for restaurateurs, design guidelines further expanded to include the memory related issues as a rationale for proposed principles and strategies. Design guidelines include, introduction to memory related context for each principle followed by a definition of the principle and proposed strategies. Under the title of action plan strategy details in respect to design elements are explained along with visual symbols for design features. This continues to encompass pictorial examples that are encouraged and/or discouraged in a restaurant.

The following are the main themes that consist of the main principles. Each theme is presented with an introduction to the memory related context, principle and strategy.

4.1.1.1 Principles 1: Welcoming and Friendly, Context & Strategies (Table#17)

One of the most important themes that emerged from the diaries and interviews was the importance of the restaurant and wait staff being welcoming and friendly. Wait staff, have a leading role in this regard. Lighting and acoustics can be used as tools to make a warm and welcoming environment inside the restaurants (see table #17). Adequate lighting at the entrance can enhance the sense of being welcome. Additionally, when there are noises from various sources including the kitchen area, other tables and music might have an impact on the ability of individuals to socialize with each other. The environment that allows for controlling the noise and provide spaces that are quiet enough for individuals to have a conversation are friendlier to people with diverse needs. Table 17 presents memory-related context as a

rationale to provide deeper understanding why the proposed strategies can be beneficial for individuals with memory impairment.

Table 17. Welcoming & Friendly: Memory-related Context and Strategies

Memory-Related Context	Strategy
<p>Ability to focus and concentration may alter due to dementia. People with dementia can have difficulty:</p> <ul style="list-style-type: none"> • to ignore background noise • to orient time and place • with depth perception • with spatial orientation. <p>Lighting: People with dementia need appropriate lighting to avoid misperception and misinterpretation of the environment.</p> <p>Adequate lighting for people with dementia is associated with reduce in behavioral disturbances, enhance dining, improve communication and well-being (Torrington & Tregenza, 2007; McDaniel, Hunt, Hackes & Pope, 2001; Brush, Meehan & Calkins, 2002; "Living with Dementia", 2018).</p> <p>Acoustics: Impact of noise on medical and behavioral health can be magnified for people with dementia. Adequate noise level can vary for different people in various time and context (Brawley, 2006; Schlanger, H. 2008; "Design and dementia brainXchange", 2018). Noise reduction may further improve individuals' caloric intake of individuals with dementia (McDaniel, Hunt, Hackes & Pope, 2001; Brush, Meehan & Calkins, 2002).</p>	<p>Prioritize social connection and use barrier free design elements.</p> <p>Social Connection: Social Connection is one of the most important factors when it comes to memory impairment based on the literature review and experts' opinions . Poor quality engagement in social activities can increase isolation. To emphasis on social connection, restaurant should train wait staff to be aware of context of memory impairment .</p> <p>If wait staff answered a question, they should be ready to answer the same question and/or what they just have said. If someone need help with the menu, ask them and help with choosing their food, if they need more time do not rush them.</p> <p>Barrier-free Design Element: Barrier-free Design Elements can include wide range of design elements in the space. Well-lit environment can support individuals in several ways like wayfinding, signage, reading the menu and orientation in the place . Acoustics also can be a wayfinding tool. It also can improve socialization and may further enhance caloric</p>

4.1.1.2 Principle 2: Simplicity, Context and Strategies (Table #18)

Another important theme that emerged through the diaries and interviews was simplicity. Simplicity as a design consideration is applicable to all the design features in a restaurant. Consistency in the use of colours can enhance simplicity. For instance, colour cues can operate as a tool for finding their way. To avoid depth misperception, high contrast colours can be used. It can be applied to the décor, furniture, walls, flooring, washrooms, table setting and the menu. Menu readability is enhanced by the use of high contrast colours for the menu text and background. The most readable printed material is in black and white. Coloured text should be limited to titles and headings. Point size differs for different fonts. The preferable size is between 12 to 18 points. The space between the lines should be a minimum of 25 to 30 percent of the point size. Standard fonts like Arial and Vernada are good choices. Avoid the use of light type and choose fonts with medium heaviness. Avoid use of italics or upper-case letters. For spacing between letters choose a monospaced font. Text that is separated into columns is easier to read because it means less eye movement and less peripheral vision. Also, use a non-glossy paper. Use simple solid colour background design to avoid distractions ("Clear Print Accessibility Guidelines", 2018). Examples relevant to memory impairment and how simplicity can enhance the dining experience for individuals with mild dementia is included in Table 18. It further expands to include helpful strategy.

Table 18. Simplicity Memory-Related Context and Strategies

Memory-Related Context	Strategy
<p>Dementia can reduce people’s ability to focus and pay attention to details. People become slower to process information due to dementia.</p> <ul style="list-style-type: none"> • Busy table settings and menus can cause confusion. <p>It can be difficult to remember a very recent event or information for someone with memory impairment due to short term memory loss.</p> <ul style="list-style-type: none"> • If they are reading a long menu, they may forget the first items on the menu. <p>Memory-related conditions can reduce one’s ability to differentiate between different surfaces with similar colors.</p> <p>People with dementia can have distorted depth perception and, sometimes, having delusions.</p> <ul style="list-style-type: none"> • To avoid this misperception high contrast colours can be used in the environment (Brawley, 1992; Fleming, Forbes & Bennett, 2003; Brawley,1997). <p>Dementia impact people’s sensory abilities including sight, hearing, smell, taste and touch. For an individual with dementia several sensory stimulations at the same time can be confusing. It is important to use solid high contrast colors for furniture as well as the décor. Also, it is very pertinent to avoid using objects or furniture that may cause optical illusions.</p>	<p>Use Easy to Understand Language and design.</p> <p>Simplicity: Use simplified language in the menu and signs to make it easier to understand. Long menus can be broken down to types of food to make process of choosing food easier, unnecessary details can be eliminated. In the layout and the décor consider simplicity, one way is to avoid clutter.</p> <p>Consistency: Colour contrast can play a major role in making the design elements clearer. Menu that has high contrast colours is easier to read. In terms of wayfinding colour contrast can be used as a cue to location and direction. Use of high contrast colours in various design elements highlight the presence of useful stimuli, for instance when table top and floor have contrasting colours. One thing to keep in mind is that to see the impact of high contrast colours there needs to be adequate lighting to perceive the colour (Hodges, Bridge & Chaudhary, 2006) .(See principle 1)</p> <p>Balanced Sensory Stimulation: Enhance useful stimulation like easy to understand art works, visual cues and tactile walls. Decrease not useful stimulation like glare finishes, crowded environment and patterned walls, flooring and décor.</p>

4.1.1.3 Principles 3: Inclusivity & Flexibility, Context & Strategies

(Table #19)

Data gathered through the literature review, the diaries and the interviews validate that dementia impacts people differently. One of the themes identified by various stakeholders was inclusivity and flexibility. Considering the fact that dementia is progressive and its impact on people's abilities to function, it is important to allow for flexibility in various design elements to stretch and encompass diverse needs. Providing various options facilitates flexibility. Providing chairs and tables with different heights and sizes and/or adjustable chairs and tables with blocks can accommodate people with different heights (See table #19).

Table 19. Inclusivity & Flexibility: Memory-Related Context & Strategies

Memory-Related Context	Strategy
<p>Communication and Language</p> <ul style="list-style-type: none"> • One’s ability to read or interpret signs can be influenced by dementia. <p>Individuals with memory impairment might have difficulty with spatial orientation. To provide prompts to location and direction in wayfinding several modalities can be used such as:</p> <ul style="list-style-type: none"> • visual signs, • colour cues and • words. <p>Design elements including</p> <ul style="list-style-type: none"> • floor plan layout, • landmarks and • signage <p>as well as aids in navigation such as</p> <ul style="list-style-type: none"> • pictogram, • words and • sensory cues <p>can be used in wayfinding as prompts for direction as well (Marquardt & Schmieg, 2009; Rousek, & Hallbeck, 2011; "Design and dementia brainXchange", 2018). Literature recommends providing at least one wheelchair and/ or walker accessible vestibules or privacy stalls that is accessible for people with assistive devices or individuals who might need assistance of their family/caregiver (Parke & Friesen, 2010; O’Keeffe, 2003).</p>	<p>A design that encompasses diverse individuals.</p> <p>Provide Options: Provide strong visual option to the menu and signs. Use clear and realistic pictures in the menu in addition to the text. Also, provide realistic symbols for signs. Avoid using abstract signs, symbols and pictures. Be prepared to have variety of seating and table options with different height and sizes .</p> <p>Use Accessible Design Elements: In use of design elements be aware of their accessibility for diverse individual. Use even flooring. Doorways, hallways, washrooms and space between the tables should be wide enough for people to orient themselves in the space also for individuals who use wheelchair, walkers and/or might need assistance . Provide at least one accessible family washroom for people who might need assistance.</p>

4.1.1.4 Principle 4: Familiarity, Context & Strategies (Table #20)

Participants in their diary and interviews stated that they prefer to go to places that they already know. All the participants in their diaries and interviews identified familiarity as having an important role. Familiarity was mentioned regarding the menu design and sensory design elements in the place. For instance, one of the participants mentioned in their diary that cloth napkins provide a sense of familiarity. In interaction with the wait staff socialization and consistent attention can give a sense of familiarity as well.

Some strategies that can support a sense of familiarity in a restaurant include providing activities. Wait times in a restaurant can be distressing, especially for someone with memory impairment. Activities that engage individuals in a meaningful way can make wait times more enjoyable. To involve diverse individuals with diverse backgrounds it can be advantageous to consider multiple activities that people might do in their spare time. Some of the activities suggested by experts include various books, magazines, brainteaser puzzles, podcasts, table settings with small games, an aquarium and comfortable seats help to make wait times more pleasant.

Providing the option to book in advance in a place that is desirable for individuals like near the window or a place where people usually sit can also give sense of familiarity (See table # 20).

Table 20. Familiarity: Memory-Related Context & Strategies

Memory-Related Context	Strategy
<p>Some researchers also suggest that “homelike” furniture can give sense of familiarity for example elements like wood or upholstered as oppose to metal or plastics (Calkins, 2009).</p> <p>Waiting Times Waiting for the service including table, order, food, and/or bill can be stressful. Short wait times for a person with mild dementia may feel long. According to a gerontologist, wait times for services including table, food, bill can cause distress for someone with dementia (J. Ingram, personal communication, March 13, 2018). Providing engaging and familiar environment can make waiting more pleasing.</p>	<p>Design elements and materials with characteristics proper to their use.</p> <p>Materials Use of “home like” materials including wood and natural wood colour, and cloth napkins can give a sense of familiarity and relaxing. Communal dining platter also may give sense of familiarity and further reduce stress. Use of art works in the waiting area and/or aquarium can make wait times more enjoyable</p> <p>Activities One strategy that has been mentioned by a gerontologist to reduce distress is to consider activities. Activities can include providing books, small puzzles, table tent of quizzes and table setting with a small game (checker style entertainment) (J. Ingram, personal communication, March 13, 2018).</p> <p>Wait staff Consistent and friendly attention of wait staff can support sense of being known in the space. Consistent presence of the wait staff can reduce the chance of keeping people waiting if they have a question or they need anything.</p> <p>Washroom Locks inside the bathrooms needs to be easy to find, for example it can be on the handle. It also needs to indicate whether it is locked or not, visual and sound cues can be used.</p>

4.1.1.5 Principle 5: Comfort & Safety, Context & Strategies (Table #21)

All the participants identified comfort and safety as a critical factor to support the experience of participants with memory impairment and their companions. Some features they identified were the waiting area, table settings, and space layout. Two other sensory design factors that can be used as tools to enhance comfort and safety are lighting and noise. Participants, through their diaries and interviews, identified adequate lighting as an important factor to maximize comfort. Another important point to consider is noise. Acceptable levels of noise is subjective and can vary for diverse individuals in different contexts ("Design and dementia | brainXchange", 2018) (See table # 21).

Table 21. Comfort and Safety: Memory-Related Context & Strategies

Memory-Related Context	Strategy
<p>Ability to focus and concentration may alter due to dementia. People with dementia can have difficulty:</p> <ul style="list-style-type: none"> • to ignore background noise • to orient time and place • with depth perception • with spatial orientation. <p>Appropriate design elements in a memory-friendly environment should be safe. For instance, solid colour floorings and walls, nonslip flooring, high contrast furniture can enhance safety.</p> <p>Although adequate lighting can differ for different people and considering time and place, it can be beneficial to be mindful of impact of noise on behavior and one's health that can be amplified in a person with dementia, while designing and setting a dining environment.</p>	<p>A design that support comfort and safety.</p> <p>Enhance Comfort In different design elements consider comfort. For instance, consider a waiting area with seating and low noise. While choosing furniture keep in mind to include comfortable options. For example, armchair and stable seating with clearance under front of seat to allow feet under front edge, minimal back recline and backwards seat tilt are preferable.</p> <p>Provide a Safe Environment: Consider enough space between the tables, noise from other tables can be displeasing. Be aware of the space between the tables and kitchen area in terms of the noise from the kitchen . Consider safety while choosing design elements and materials. Use non-slip flooring. Use standard size for the menu and signs. It can be beneficial to have menu with large font.</p>

Note: These design guidelines and strategies are in response to define needs and important factors by individuals with mild dementia and their family. These guidelines are based on their unique individuals needs, therefore can be beneficial for the rest of population with similar needs.

Chapter 5: Discussion

5.1 Why do we need memory-friendly strategies?

The existing literature as well as the existing evidence-based practices suggest that sensory design elements including olfactory, auditory, visual and tactile elements within a dining environment can impact dining experience for individuals with memory-impairment.

Although individuals with dementia are still active, there is not enough support for them to take part in activities they are used to doing. According to a study by the Alzheimer's Society of the UK, dining out is one of the most common activities that people with dementia do and can do to remain engaged in social life. (Green & Lakey, 2013). The literature suggests that sensory design elements including increased lighting, decreased noise, avoiding glare and using contrasting colours can facilitate independence for individuals with dementia (Brush, Meehan & Calkins, 2002; Davis, Byers, Nay, & Koch, 2009).

Evidence-based design and research-based design suggest that sensory design elements can impact dining experience for individuals with dementia. However, the domain of the existing evidence is mostly long-term care facilities, hospitals and assisted living homes.

5.2 Who will use the memory-friendly strategies?

These guidelines provide design strategies that can assist restaurant designers, and restaurant owners when planning additions, renovation and modifications to their restaurants.

The following strategies not only help restaurants to make their places memory-friendly for individuals with memory impairment but also it may be beneficial for everyone with diverse physical and learning abilities.

The main purpose of the guidelines is to provide greater understanding for restaurateurs on the design of their environment in order to encourage individuals with memory impairment to attend their restaurants.

5.3 Process of Design Guidelines

A diary was the first method in which individuals with memory impairment and their family defined the main themes that were later incorporated into the design guidelines.

The very early prototype of design guidelines was reviewed and modified through interviews with diverse participants, including experts in the field.

Through interviews diverse stakeholders were engaged to give feedback on the guidelines. Individuals with memory impairment and their loved ones, an interior designer, geriatric medicine physicians and a restaurateur provided feedback in their interviews.

First, individuals with mild dementia and a family companion (in pairs) were engaged in an interview session as experts in their own experience. In interviews, the researcher walked individuals through design guidelines to validate their experience and receive feedback. The guidelines prototype that was presented in this phase was very high level and included principles

and strategies. Strategies were presented in words and visual icons relevant to the guidelines. In this phase of the interviews, needs, barriers and goals in terms of restaurant experience were defined by participants. Additionally, they identified what is important to them for having a good dining experience in a restaurant.

Next, experts including a gerontologist, an interior designer and a restaurateur were interviewed about their knowledge of the topic. The gerontologist was interviewed about memory, sensory stimulus and functionality of those with memory loss. Interior designers were interviewed about sensory design and human behaviour in space, restaurateurs about restaurant organization, menus, and service. They provided suggestions regarding strategies and possible solutions in response to needs, barriers and goals in the design guidelines.

5.3.1 Prototyping

The initial prototype of design guidelines was created based on the evidence-based literature in dementia-friendly design, dementia-friendly environment, and senior-friendly physical environment ("Design and dementia | brainXchange", 2018; "Dementia-friendly Health and Social Care Environments", 2015; "Dementia Design Series", 2013; Mitchell, 2012; O'Keeffe, 2003).

Through the diary method and interviews with individuals with mild dementia and their family, main design principles emerged including needs, barriers and goals that informed the next iteration of the guideline.

Next, in the same interview session with experts including a restaurateur, a gerontologist and an interior designer the researcher walked them through design guidelines prototype. They were further engaged to provide feedback on the guidelines. A restaurateur was engaged to see what the current services are that are available for individuals with diverse needs. A restaurateur also provided feedback on the guidelines regarding design elements in a restaurant that may support or do not support the services. They additionally, provided insights about current practices in the design of the environment to include diverse individuals. They also added the current limitations in the physical environment. A gerontologist was engaged to provide feedback on the guidelines. They made additions to the needs and barriers that may exist in a restaurant based on their experience and knowledge of diverse individuals with memory impairment. They additionally made suggestions regarding the possible solutions and strategies that exist in health care. They also addressed needs, barriers and goals applicable to a restaurant setting. The gerontologist further explained the importance of the social connection in respect to wait staff and the availability of behavioural techniques in the environment that diverse individuals can benefit from. The design guidelines incorporated the feedback from each previous participant.

An interior designer also provided feedback and suggestions on strategies and action plans for the guidelines. The Interior designer with experience in the interior design of health care and restaurants environment provided deep feedbacks and insights regarding the sensory design elements and their application. They further explained how sensory elements including lighting and acoustics can be used as tools to maximize independence in the environment. They provided feedback which helped to eliminate or modify the examples that technically were not applicable or helpful based on the defined needs, barriers and goals. They further validated applicability of the guidelines to the restaurant environment.

Review and examination of guidelines further continued to make sure that guidelines reflect gathered data and feedback from the participants. Evaluation proceed to confirm that the key principles that are defined in the guidelines are applied to the prototype of the design guidelines itself.

The final prototype of the guidelines is the product of multiple iterations of accumulated knowledge, participants input, and review.

5.4 How to use this guideline?

It starts with introduction to the issue of memory impairment and the scope of this study. Next the importance and application of these guidelines are briefly explained. This section continues to encompass the main sensory features that are considered in the study as well as the

social needs. The guidelines include five principles that emerged through the diaries with individuals with memory impairment and their family and interviews with individuals with memory impairment and their family (in pairs), and experts including a gerontologist, an interior designer, and a restaurateur. Each principle has four components: memory related, principle strategies, an explanation, and action plan strategies along with pictorial examples (both recommendations and what to avoid). The guidelines include visual icons for each feature to provide visual options as well (Please see Appendix B for the design guidelines).

Chapter 6: Conclusion

The purpose of this research is to improve restaurants to be memory-friendly through sensory design elements. In addition, the research study defines the important issues in a restaurant by individuals with memory impairment. The research used a qualitative approach and also used mixed-methods. The key outcome of the study was a set of design guidelines based on the emergent themes from the research methods.

The literature was reviewed and confirmed that sensory elements can be beneficial in enhancing dining experience for individuals with memory impairment. Appropriate sensory stimulation can support independence in the use of the space by persons with memory impairment. In contrast, either overstimulation or under stimulation can cause confusion, illusion, frustration and agitation.

Through the use of the diary method, individuals with mild dementia and their family contributed to defining needs, barriers, goals and important factors about the dining experience. The diaries were filled in in a restaurant. The data gathered confirmed the findings of the literature review and also unveiled the most important factor which was social connection, and consistent support from the wait staff. The five main themes which emerged are: welcoming and friendly, simplicity, inclusivity and flexibility, familiarity, and comfort and safety.

Feedback loops were embedded in semi-structured interviews. In this phase, two groups of participants including individuals with memory impairment and their family, and experts (a geriatrician, an interior designer, and a restaurateur) were interviewed to gather data as well as to receive feedback on the prototype of the design guidelines. The themes which emerged from the interviews with experts were similar to those from the diaries.

This phase was complementary to the iterative prototype of design guidelines and helped to make essential adjustments to the prototype.

The primary outcome of the study was a set of design guidelines for a memory-friendly restaurant. To provide coherent understanding, set of design guidelines expanded to encompass the memory-related background as a rationale for the proposed strategies. Defined needs, barriers and goals became data for context and strategies. Feedback and data findings from interviews added crucial details to the guidelines either as action plans or examples.

Memory-friendly restaurant design guidelines is an initial exploration to provide deeper understanding for service providers to better support and engage individuals with memory impairment in their restaurants. Further research is required in regards to restaurant design and the applicability of the guidelines. The proposed set of design guidelines needs further study through engagement of individuals with mild dementia.

6.1 Limitations and Recommendations for Future Research

During this research process various challenges have been identified. Participants were engaged when the research approach was confirmed. The research would have benefitted from earlier engagement of individuals with memory impairment.

Through the diaries I learned that the presence of the researcher in the restaurant in some cases caused confusion and might have had an impact on the participant's experience.

Since the research focuses on the social aspect of the dining experience in all stages, a family member was involved as well. The engagement of the family members has the benefit of including their insight as well. However, in the interview sessions where they were interviewed in pairs the challenge was to capture both participants' answers.

The number of participants who were engaged in this study is relatively small and only one restaurant site and type was used in this study.

There are other identified factors that are important but not included in this study due to the focus of the research. Individuals with memory impairment and their families defined quality of food, food selection, quality of the service and affordability as important factors. Experts also touch upon dietary restrictions as another crucial factor.

Individuals with memory impairments and their families identified the quality of service as one of the important issues that has an impact on their restaurant experience. This study started with very high-level design guideline prototype to start a conversation about memory-friendly restaurants for restaurateurs. These guidelines can be applied in further work in this area. For application of these guidelines consulting more experts is needed. For instance, to create zones to control the noise of the environment acousticians should be consulted. To continue towards a memory-friendly restaurant the next step for future work could be a service design with individuals with memory impairment and their loved ones.

The design guidelines as the outcome of this study can be a base for further exploration in this area. This set of design guidelines is based on evidence-based practices and best practices in

dementia-friendly design. Additionally, it is validated by different groups of stakeholders including individuals with memory impairment and their families as experts on their own experiences. Other experts in this field, including a gerontologist, an interior designer and a restaurateur were all consulted. Design guidelines which include the memory-related context provides deeper understanding for individuals who are interested in attracting individuals with memory impairment to their establishment. Future research in this area can build on this study and use the principles, guidelines, and strategies from this research to engage individuals with memory impairment from the start of the research. Future work with engagement of individuals with memory impairment and their loved ones can expand on these guidelines to co-create a service design and/or a business model that supports individuals with memory impairment in restaurants. Further research can examine the suggested solutions and strategies in this project to provide an improved and efficient service design to include individuals with memory impairment. Moreover, future studies can look into current accessibility standards and how these standards may be modified to match needs of individuals with memory impairment.

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Appendix A - Diary Questionnaire (First)



Diary Guide Questionnaire

This guide includes 11 questions. Please answer the questions while you are at the restaurant.

1- How did you feel when you arrived at the restaurant? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

2- How did you feel when you were heading to your table? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

3- How did you feel when you were choosing your food? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

4- How did you feel when you were ordering food? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

5- How did you feel when you were eating? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

6- How did you feel when you were going to bathroom? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

7- How did you feel when you were leaving the restaurant? How strong was your feeling from 1 to 5?

Can you explain why you had such a feeling?

8- Do you like this restaurant? Can you name top 3-5 things you liked in this restaurant?

What were top 3-5 things you did not like?

9- What made you comfortable at this restaurant? Can you tell me why?

10- What can be improved in this restaurant?

11- Do you have any additional points/insights about your restaurant experience?

Diary Questionnaire (revised)



Diary Guide Questionnaire

This guide includes 11 questions. Please answer the questions while you are at the restaurant.

1- How welcoming was it when you arrived at the restaurant?

Check all that apply

- a) It was very welcoming
- b) A host/hostess came and made me feel welcome
- c) There was a good light at entrance
- d) It was ok
- e) There was no waiting area
- f) I had to wait and no one helped me
- g) It was not welcoming at all
- h) Other, Please specify.....

Can you tell me more?

2- Was it easy to find a table?

Check all that apply

- a) The flooring was uneven and it was difficult to walk on
- b) There were too many things on my way which was confusing
- c) Tables were too close I could not walk easily
- d) I did not notice anything special
- e) A host/hostess helped me to find my table
- f) There were some table options and it was good
- g) It was very easy
- h) Other, Please specify.....

Can you tell me more?

3- Was the menu easy to read and understand?

Check all that apply

- a) Menu was very easy to read
- b) Menu had pictures that helped me to pick my food
- c) Menu was simple
- d) Menu had contrast colors
- e) It was okay
- f) Menu was unclear, there were no pictures
- g) There was not enough light for me to read the menu
- h) It was noisy and I could not concentrate on the menu
- i) Menu was really long
- j) Other, Please specify.....

Can you tell me more?

4- Was the information in the menu enough for the ordering?

Check all that apply

- a) Menu was long and I didn't read it all
- b) Specials were not in the menu
- c) I think so
- d) The font size was small and I forgot my reading glasses
- e) Many foods had same ingredients and were similar I wanted waiter/ waitress opinion before ordering
- f) Other, Please specify.....

Can you tell me more?

5- Were staff helpful while you were ordering the food?

Check all that apply

- a) Yes, they were very helpful and friendly
- b) Yes, they helped me to pick my food
- c) Yes, they helped me, but they had to rush to other tables
- d) They were okay, I didn't need special help
- e) They gave me a lot of information and I was confused
- f) They wanted to take all the orders at the same time but I wasn't ready
- g) Other, Please specify.....

Can you tell me more?

6- How was the food when you were eating?

Check all that apply

- a) I expected something different
- b) It was really dark and I could not see my food
- c) I did not like the texture
- d) Food presentation was not good
- e) There were too many things at the table
- f) I did not have enough space on the table
- g) It was okay, nothing special
- h) Food was good
- i) I liked the table setting
- j) Taste was great
- k) Food presentation was good
- l) Food smell was great
- m) I liked the ambient light and noise when I was eating
- n) Other, Please specify.....

Can you tell me more?

7- Did you find the way to washroom easily?

Check all that apply

- a) Yes, there were clear signs for washroom
- b) Yes, the space was small and I could see the washroom easily
- c) It was okay, I found it
- d) No, I did not see any signs for washroom
- e) No, I preferred not to go
- f) Other, Please specify.....

Can you tell me more?

8- Was it easy to find your way back to your table from washroom?

Check all that apply

- a) No, I did not know which way I should go
- b) No, it was dark and it was hard to see where to go
- c) No, I looked around and walked a bit until I found my table
- d) I think it was okay
- e) Yes, contrasting tile colors helped me to find my way
- f) Yes, the space was small and I could see my table
- g) Yes, it was easy
- h) Other, Please specify.....

Can you tell me more?

9- Was it easy to find your way out of the restaurant?

Check all that apply

- a) Yes, it was very easy
- b) Yes, there were exit signs
- c) It was okay
- d) No, there were no signs
- e) No, I could not see the door
- f) Other, Please specify.....

Can you tell me more?

10- Do you like this restaurant? Can you name top 3 things you liked in this restaurant?

What were top 3 things you did not like?

11- What can be improved in this restaurant? Do you have any additional points/insights?

Appendix B - Design Guidelines

Memory-Friendly Restaurant Design Guidelines

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Focus of the Project

The focus of this study is to enhance dining experience for individuals with memory impairment through sensory design interventions, principles and strategies. Sensory design elements including olfactory, auditory, visual and tactile elements within a restaurant setting can impact dining experience. Relaxed social surroundings can give a sense of security and familiarity to a person with dementia. When setting tables, reducing unnecessary cutlery, for example, can help to reduce distress or confusion («Dementia; The Dining Experience - INDI», 2017). Alzheimer's, dementia, and amnesia are reported as the most common underlying memory-related conditions. This project is narrowed down to dementia as a most common underlying memory-related condition.

Domain of inquiry is casual dining restaurant where they provide table service. Restaurant environment and design can be enhanced to improve the quality of dining experience for individuals with memory impairment. elements in a restaurant includes but are not limited to difficult to navigate environment, busy table setting, loud background noise, not adequate lighting, uneven flooring, difficult signs.

The initial prototype of design guidelines was created based on the evidence-based literature in dementia-friendly design, dementia-friendly environment, and senior-friendly physical environment. Through the diary method and interviews with individuals with mild dementia and their family, main design principles emerged including needs, barriers and goals that informed the next iteration of the guideline. Next, experts including a restaurateur, a gerontologist and an interior designer the researcher were engaged in interview sessions to provide feedback on the guidelines. They made additions to the needs and barriers that may exist in a restaurant based on their experience and knowledge of this domain. They additionally made suggestions regarding the possible solutions and strategies that exist. The design guidelines incorporated the feedback from each previous participant. This final prototype of the guidelines is the product of multiple iterations of accumulated knowledge, participants input, and review.

Introduction

Memory-Related

Memory impairments, as a result of Alzheimer's disease and other forms of dementia, can be invisible. Individuals living with memory impairment may not receive enough support to engage in community activities. Today, most individuals in early stages of dementia are living independently in the community with 91.7% of persons with mild dementia and 49.6% of individuals with moderate dementia are living in the community (Chambers, Bancej & McDowell, 2016). It is pertinent to ensure they have enough support in their communities.

Persons with dementia can benefit from engagement in society and meaningful activities. Existing literature suggests that engaging in meaningful activities that are relevant to one's day to day roles and interests results in more positive state of being. This engagement may lead to satisfaction about personal roles as well as development of satisfying relationships with others (Chung, 2004). One of the most common activities people with dementia do in their local area, is eating out (Green & Lakey, 2013).

Nature of Dementia

Memory-related conditions can impact people differently, the focus of this study is on individuals with mild dementia.

Although dementia impact people differently, to be diagnosed with dementia one needs to have at least two of the following core mental functions impairments:

- Memory
- Communication and language
- Ability to focus and pay attention
- Reasoning and judgment
- Visual perception

Application of Memory-Friendly Design Strategies

Why do we need the memory-friendly design strategies?

The existing literature as well as the existing evidence-based practices suggest that sensory design elements including olfactory, auditory, visual and tactile elements within a dining environment can impact dining experience for individuals with memory impairment.

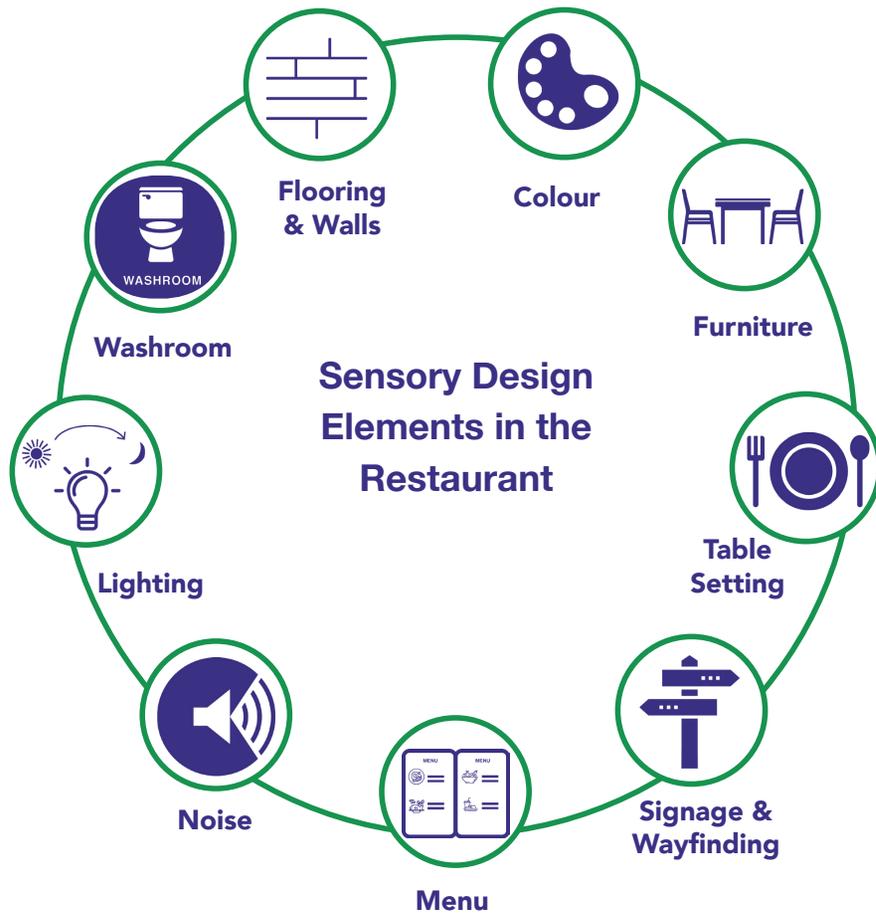
Although individuals with dementia are still active, there is not enough support for them to take part in activities they are used to doing. According to a study by the Alzheimer's Society of the UK, dining out is one of the most common activities that people with dementia do and can do to remain engaged in social life. (Green & Lakey, 2013). The literature suggests that sensory design elements including increased lighting, decreased noise, avoiding glare and using contrasting colours can facilitate independence for individuals with dementia (Brush, Meehan & Calkins, 2002; Davis, Byers, Nay, & Koch, 2009).

Evidence-based design and research-based design suggest that sensory design elements can impact dining experience for individuals with dementia. However, the domain of the existing evidence is mostly long-term care facilities, hospitals and assisted living homes.

Who will use the memory-friendly design strategies?

These guidelines provide design strategies that can assist restaurant designers, and restaurant owners when planning additions, renovation and modifications to their restaurants. The following strategies not only help restaurants to make their places memory-friendly for individuals with memory impairment but also it may be beneficial for everyone with diverse physical and learning abilities.

The main purpose of the guidelines is to provide greater understanding for restaurateurs on the design of their environment in order to encourage individuals with memory impairment to attend their restaurants.



Future Steps

How to use this guideline?

It starts with introduction to the issue of memory impairment and the scope of this study. Next the importance and application of these guidelines are briefly explained. This section continues to encompass the main sensory features that are considered in the study as well as the social needs. The guidelines include five principles that emerged through the diaries with individuals with memory impairment and their family and interviews with individuals with memory impairment and their family (in pairs), and experts including a gerontologist, an interior designer, and a restaurateur. Each principle has four components: memory-related context, principle strategies, explanations, and action plans strategies along with pictorial examples. The guidelines include visual icons for each feature to provide visual options as well.

To continue towards a memory-friendly restaurant the next step for future work could be a service design. The design guidelines as the outcome of this study can be a base for further exploration in this area. This set of design guidelines is based on evidence-based practices and best practices in dementia-friendly design. Additionally, it is validated by different groups of stakeholders including individuals with memory impairment and their families as experts on their own experiences. Other experts in this field, including a geriatrician, an interior designer and a restaurateur were all consulted. Design guidelines which include the memory-related context provides deeper understanding for individuals who are interested in attracting individuals with memory impairment to their establishment. Future research in this area can use the principles, guidelines, and strategies from this research to engage individuals with memory impairment from the start of the research. Future work with engagement of individuals with memory impairment and their loved ones can expand on these guidelines to co-create a service design and/or a business model that supports individuals with memory impairment in restaurants. Further research can examine the suggested solutions and strategies in this project to provide an improved and efficient service design to include individuals with memory impairment. Moreover, future studies can look into current accessibility standards and how these standards may be modified to match needs of individuals with memory impairment.

Design Principles & Strategies

Principle 1: Welcoming & Friendly Memory-Related Context

Dementia can impact communication and language ability. One with dementia might have difficulty to find the right word and/or forgot what just has been said. Ability to process the information might be affected as well.

Ability to focus and concentration may alter due to dementia.

People with dementia can have difficulty:

- to ignore background noise
- to orient time and place
- with depth perception
- with spatial orientation.

Lighting:

People with dementia need appropriate lighting to avoid misperception and misinterpretation of the environment.

Adequate lighting for people with dementia is associated with reduce in behavioral disturbances, enhance dining, improve communication and well-being (Torrington & Tregenza, 2007; McDaniel, Hunt, Hackes & Pope, 2001; Brush, Meehan & Calkins, 2002; «Living with Dementia», 2018).

Acoustics:

Impact of noise on medical and behavioral health can be magnified for people with dementia. Adequate noise level can vary for different people in various time and context (Brawley, 2006; «Design and dementia | brainXchange», 2018).

Memory-Friendly Restaurant Design Principles

Strategy

Prioritize social connection and use barrier free design elements.

Social connection

is one of the most important factors when it comes to memory impairment based on the literature review, individuals with memory impairments and their family viewpoint, and experts' opinions.

Poor quality engagement in social activities can increase isolation. To emphasis on social connection, restaurant should train wait staff to be aware of context of memory impairment.

For instance, if wait staff answered a question, they should be ready to answer the same question and/or what they just have said. If someone need help with the menu, ask them and help them with choosing their food, if they need more time do not rush them.

Barrier free design elements

can include wide range of design elements in the space. Well-lit environment can support individuals in several ways like wayfinding, signage, reading the menu and orientation in the place.

Acoustics also can be a wayfinding tool. It also can improve socialization and may further enhance caloric intake of individuals with dementia.

Principle 1: Welcoming & Friendly Action Plan

Wait Staff Training & Social Connection



Wait Staff: It is beneficial if wait staff are trained to recognize short term memory loss. There might be a need to answer the questions

they have just answered.

Also, wait staff awareness of multitasking and decision-making challenges that a person with dementia can have is helpful.

Wait staff can ask yes-no questions or questions that provides two choices to facilitate decision making process.

Menus with corresponding numbers can be useful. Use numbers and/or descriptor names for complex choices.

Break down menus to types of foods to makes process of choosing the food easier.

Provide complete inclusive food option.

Provide a sheet of paper that if individuals want they can write their order on it.

Create Welcoming Ambient



Lighting: Modify the light of the environment with dimmer. Provide bright areas and minimize shadows. Make sure to have three levels of the lighting including:

- **Ambient lighting:** general light in the environment to help people with orientation in the space.
- **Task Lighting:** localized light at the table to make reading the menu easier.
- **Accent lighting:** focus light on the particular area which can help with wayfinding.

Provide window covering of various densities to control natural day light exposure into the space.



Acoustics: Create zones to control the sounds in the environment. Zoning allows to create transition between noisy kitchen area and dining environment. You can create zones either with panels or overhead structures to control the sound. Consult an acoustician in regards of acoustics and for details about providing buffers in between different areas in the restaurant.

Principle1: Welcoming & Friendly

Examples



Lighting: Provide minimum of three levels of lighting to enhance wayfinding and support independence. It can further improve the dining experience.



Figure 1. Example of adequate ambient lighting as well as task lighting at the table for reading the menu.

Memory-Friendly Restaurant Design Principles



Figure 2. Example of providing a piece of paper for individuals to write their order.



Wait Staff: Wait staff can provide a piece of paper for individuals to write their order. This can be helpful specially if individuals need more time to go through the menu and/or if the menu options are long, therefore, not easy to remember or read.

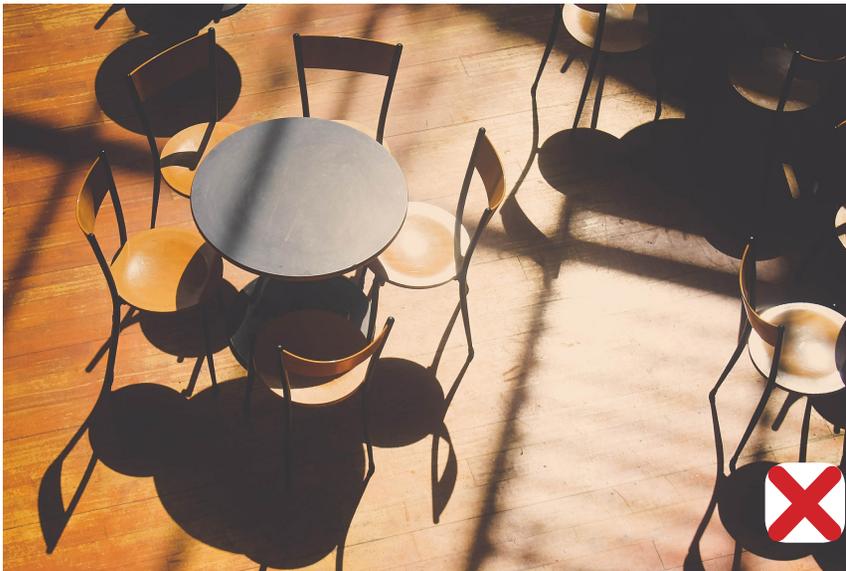
Other Populations Who May Benefit

Sensory processing abilities are different in 42 to 99 percent of individuals with autism spectrum disorder (ASD) some of these differences include over-responsiveness under-responsiveness and paradoxical responsiveness to the stimuli. For instance, preoccupation lights and hypersensitivity to certain frequencies and/or types of sound (eg, distant fire engines. Given that, some of these considerations might prove beneficial for individuals with ASDs like: creating zones to control the noise in the environment and provide buffers between different areas (Filipek et al., 2000).

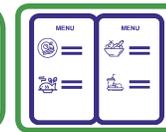


Lighting: Allow for modification of light in the environment. Minimize shadows in the environment and control the exposure of natural light into the space by providing window coverings.

Figure3. Example of long dark shadows which can cause depth misperception.



Memory-Friendly Restaurant Design Principles



Lighting & Menu: Lighting Provide adequate lighting in the environment. Provide task lighting at the tables to allow for sufficient light for reading the menu.

Figure 4. Example of dark environment that can cause discomfort.

Other Populations Who May Benefit

- Individuals with vision impairment
 - Individuals who are 65 years and older
 - Individuals with autism spectrum disorder (ASDs)
- Diverse individuals “with respect to ability, language, culture, gender, age and other forms of human difference” (“Inclusive Design Research Centre”, 2018).

Principle 2: Simplicity

Memory-Related Context

Dementia can reduce people's ability to focus and pay attention to details. People become slower to process information due to dementia. Busy table settings and menus can cause confusion.

It can be difficult to remember a very recent event or information for someone with memory impairment due to short term memory loss. If they are reading a long menu, they may forget the first items on the menu.

Memory-related conditions can reduce one's ability to differentiate between different surfaces with similar colors. People with dementia can have distorted depth perception and, sometimes, having delusions. To avoid this misperception high contrast colours can be used in the environment (Brawley, 1992; Fleming, Forbes & Bennett, 2003; Brawley, 1997).

Dementia impact people's sensory abilities including sight, hearing, smell, taste and touch. For an individual with dementia several sensory stimulations at the same time can be confusing. It is important to use solid high contrast colors for furniture as well as the décor. Also, it is very pertinent to avoid using objects or furniture that may cause optical illusions.

Memory-Friendly Restaurant Design Principles

Strategy

Use easy to understand language and design.

Simplicity

Use simplified language in the menu and signs to make it easier to understand. Long menus can be broken down to types of food to make process of choosing food easier, unnecessary details can be eliminated. In the layout and the décor consider simplicity, one way is to avoid clutter.

Consistency

Colour contrast can play a major role in making the design elements clearer. Menu that has high contrast colours is easier to read. In terms of wayfinding colour contrast can be used as a cue to location and direction. Use of high contrast colours in various design elements highlight the presence of useful stimuli, for instance table top and floor should have contrasting colours.

- One thing to keep in mind is that to see the impact of high contrast colours there needs to be an adequate level of lighting to perceive the colour (Hodges, Bridge & Chaudhary, 2006). (See principle 1)

Balanced Sensory Stimulation

Enhance useful stimulation like easy to understand art works, visual cues and tactile walls. Decrease not useful stimulation like glare finishes, crowded environment and patterned walls, flooring and décor.

Principle 2: Simplicity

Action Plan

Keep It Simple



Cut out unnecessary items while setting tables.



Use simple menu design and signage with a simple message to avoid too much information.



Menu: Limit coloured text to titles and headlines. Preferable fonts point size is between 12 to 18.

Use minimum of 25 to 30 per cent of the point size for space between the lines. Avoid decorative and complicated fonts. Standard fonts like Arial and Vernada are good choices. Choose fonts with medium heaviness. Avoid use of italics or upper-case letters. Text that is separated into Columns is easier to read because of less eye movement and less peripheral vision. Use non-glossy finish paper.

Be Consistent



Menu: Use high-contrast colours. Examples for the menu text and background are black/dark blue on a white/yellow background, or white/yellow text on a black/dark blue background. The most readable printed material is in black and white. Use simple solid color background design to avoid distractions.



Walls, Furniture & Flooring: Make sure that chairs and table top contrast the walls and the floor.

Use solid color for flooring and walls. Plain materials are preferable for design elements, patterns might cause confusion (plain fabric, etc.).



Washroom: In washrooms flooring colour contrast is important, toilet seat and toilet bowl contrast are important as well.

Make sure other elements in the washroom have contrasting colours and/or easily can be found including hand soap, hand cream, garbage container and extra toilet paper. (For more details see principle 3: Inclusivity & Flexibility)

Principle 2: Simplicity

Examples



Figure 5. Example of contrasting colours in washrooms toilet seat contrasts toilet bowl. Flooring and walls have contrasting colours.



Flooring & Walls

Use solid high contrast colours for Flooring and walls.



Washroom

Toilet seat should contrast the toilet bowl.



Colour

Use solid high contrast colours for different design elements.



Signage

Use both words and symbols for signs. Avoid using abstract symbols.



Figure 6. Example of contrasting colours for table settings.



Table Setting

Avoid busy table settings, it can cause confusion.



Use solid high contrast colours.



Figure 7. Example of use of high contrast colours for signage. Use both words and images for signs.

Other Populations Who May Benefit

Differences in sensory processing abilities in individuals with ASDs can result in preoccupation with shiny surfaces, therefore, Using non-glare finishes might be useful for persons with ASDs as well (Filipek et al., 2000).
 Individuals with vision impairment
 Individuals who are 65 years and older
 Individuals and families with children



Colour: Make sure that chairs and table top contrast the walls and the floor.



Figure 8. Example of chair and table top contrast the flooring and walls.

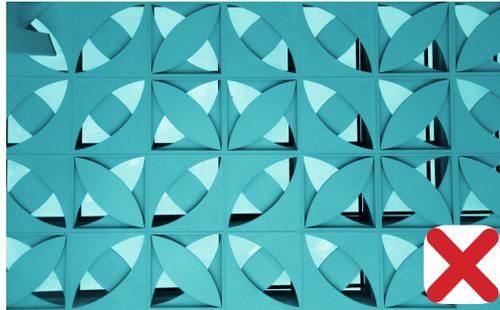


Figure 9. Example of use of abstract design elements that can cause optical illusion.



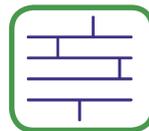
Décor: Avoid using design elements that cause optical illusions.



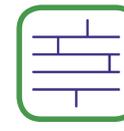
Figure 10. Example of use of reflective materials.



Figure 11. Example of patterned walls and floorings that can cause optical illusion. Use solid colours for walls and flooring.



Flooring: Use non-glare finish. Avoid the use of mirrors and reflective materials.



Flooring & Walls: Patterns can create visual perception challenges.

Principle 3: Inclusivity & Flexibility

Memory-Related Context

Communication and Language

- One's ability to read or interpret signs can be influenced by dementia.

Individuals with memory impairment might have difficulty with spatial orientation. To provide prompts to location and direction in wayfinding several modalities can be used such as:

- visual signs,
- colour cues and
- words.

Design elements including

- floor plan layout,
- landmarks and
- signage

as well as aids in navigation such as pictogram, words and sensory cues can be used in wayfinding as prompts for direction as well (Marquardt & Schmieg, 2009; Rousek, & Hallbeck, 2011; «Design and dementia | brainXchange», 2018).

Literature recommends providing at least one wheelchair and/ or walker accessible vestibules or privacy stalls that is accessible for people with assistive devices or individuals who might need assistance of their family/caregiver (Parke & Friesen, 2010;

Memory-Friendly Restaurant Design Principles

Strategy

A design that encompasses diverse individuals.

Provide Options

Provide strong visual option to the menu and signs. Use clear and realistic pictures in the menu in addition to the text. Also, provide realistic symbols for signs. Avoid using abstract signs, symbols and pictures.

Be prepared to have variety of seating and table options with different height and sizes.

Use Accessible Design Elements

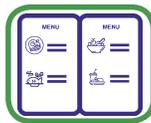
In use of design elements be aware of their accessibility for diverse individual. Use even flooring. Doorways, hallways, washrooms and space between the tables should be wide enough for people to orient themselves in the space also for individuals who use wheelchair, walkers and/or might need assistance.

Provide at least one accessible family washroom for people who might need assistance.

Principle 3: Inclusivity & Flexibility

Action Plan

Provide Options



Include visual representation of food in the menu.

Consider iBeacon-powered mobile application that include

restaurant information. When individuals are in the restaurant, they can turn on Bluetooth on their devices and receive push notifications to receive the menu and information about the daily specials.



Provide realistic symbols for signs in addition to words.



Provide chairs and tables with adjustable height. Or provide various table and chair options including chairs with arms, and/or chairs in different size and/or provide chairs/

tables that the chair/table legs able to be fit with blocks to further allow for individualization of seat height.

Tables with Rounded Corners are preferable.

Be open to make adjustments in the table setting.

Use Accessible Design Elements



Make sure doorways, hallways, washrooms and space between the tables comply with accessibility standards for people to orient themselves in the space also for individuals who use wheelchair,

walkers and/or might need assistance.



Provide at least one accessible family washroom for people who might need assistance.

Providing gender neutral washroom option can be beneficial.

Door lock design should be intuitive and easy to find. For instance, it can be on the door handle. Visual and auditory cues can be used to indicate that the door is locked.

Difficulty with decision making and orientation in a place may make automated doors difficult to use. Consider non-automated door for family washroom which can be locked easily by hand. Considering a shelf in a washroom might be beneficial.

Availability of the sink in the bathroom can be advantageous.

Principle 3: Inclusivity & Flexibility Examples



Signage: Use realistic symbols and use both words and visual for signs.



Figure 12. Example of providing gender neutral washroom option.



Figure 13. Example of allowing for reservation in advance.



Allow for reservation of tables in advance for individuals who are interested to sit at the tables that are known to them. It further allows for accommodating people based on their desire some people may prefer to sit in a quiet area and/or in a bright space.



Restroom: Provide minimum one family restroom for individuals who might need assistance and/ or need more space for orientation. Gender neutral restroom is useful as well.



Figure 14. Example of providing at the minimum one family washroom.



Figure. 15 Example of doorways and hallways that are not wide enough for individuals who need assistance as well as individuals who use assistive devices.



Doorways & Hallways:

Make sure doorways and hallways complies

with accessibility standards and it is wide enough for individuals who need assistance as well as people who use assistive devices like wheelchair, walker and cane.



Figure 16. Example of doorways and hallways that are wide enough for individuals who need assistance as well as individuals who use assistive devices.

Other Populations Who May Benefit

Individuals who use assistive devices including wheelchair, walker and cane.

Individuals who carry baby stroller, carry-on baggage and/or personal items.

Diverse individuals “with respect to ability, language, culture, gender, age and other forms of human difference” (“Inclusive Design Research Centre”, 2018).

Principle 4: Familiarity

Memory-Related Context

Some researchers also suggest that “homelike” furniture can give sense of familiarity for example elements like wood or upholstered as oppose to metal or plastics (Calkins, 2009).

Waiting Times

Waiting for the service including table, order, food, and/or bill can be stressful. Short wait times for a person with mild dementia may feel long.

According to a geriatrician, wait times for services including table, food, bill can cause distress for someone with dementia (J. Ingram, personal communication, March 13 ,2018). Providing engaging and familiar environment can make waiting more pleasing.

Strategy

Design elements and materials with characteristics proper to their use.

Materials

Use of “home-like” materials including wood and natural wood colour, and cloth napkins can give a sense of familiarity and relaxing. Communal dining platter also may give sense of familiarity and further reduce stress. Use of art works in the waiting area and/or aquarium can make wait times more enjoyable

Activities

One strategy that has been mentioned by a geriatrician to reduce distress is to consider activities.

Activities can include providing books, small puzzles, table tent of quizzes and table setting with a small game (checker style entertainment).

Wait staff

Consistent and friendly attention of wait staff can support sense of being known in the space. Consistent presence of the wait staff can reduce the chance of keeping people waiting if they have a question or they need anything.

Washroom

Locks inside the bathrooms needs to be easy to find, for example it can be on the handle. It needs to indicate whether it is locked or not, visual and sound cues can be used.

Principle 4: Familiarity

Action Plan

Use Homelike Materials



Consider creating a familiar environment by using materials like wood, upholstered chair, and cloth napkins.

Allow for making reservation and requesting tables that are known to individuals and/or requesting a table near the window and/or in the quieter area.



Communal dining platter also may give sense of familiarity.

Engage Diverse Individuals



Considering activities that engage individuals in a way that is meaningful to them can make waiting times more enjoyable.

To involve diverse individuals with diverse backgrounds it can be advantageous to consider multiple activities that people might do in their spare time. Some of the activities suggested by experts include various books, magazines, brainteaser puzzles, podcasts, table settings with small games, aquarium and comfortable seats might help to make wait times more pleasant.



Using uniforms and other distinguishing clothing cues can support sensor-based identification of wait staff as information features within a restaurant.

It can be confusing and stressful when one has a question and do not know who to ask.

Principle 4: Familiarity

Examples



Figure 18. Example of tables setting with games that can make wait times more enjoyable.



Activities that engage individuals in a way that is meaningful to them can make waiting times more enjoyable.



Figure 17. Example of providing activities that are meaningful to diverse individuals like books.



Communal dining platter may give sense of familiarity.



Figure 19. Example of communal platter that can improve the sense of familiarity.



Wooden and upholstered furniture can give a sense of friendliness as oppose to plastic and metal materials (Calkins, 2009).



Figure 21. Example of wooden material.



Figure 20. Example of Wooden and upholstered materials.



Figure 22. Example of cloth napkin and wooden material.

Cloth napkins as oppose to paper napkins give sense of familiarity.

Principle 5: Comfort & Safety

Memory-Related Context

Ability to focus and concentration may alter due to dementia.

People with dementia can have difficulty:

- to ignore background noise
- to orient time and place
- with depth perception
- with spatial orientation.

Appropriate design elements in a memory-friendly environment should be safe. For instance, solid colour floorings and walls, nonslip flooring, high contrast furniture can enhance safety.

Although adequate lighting can differ for different people and considering time and place, it can be beneficial to be mindful of impact of noise on behavior and one's health that can be amplified in a person with dementia, while designing and setting a dining environment.

Strategy

A design that support comfort and safety.

Enhance Comfort

In different design elements consider comfort. For instance, consider a waiting area with seats and low noise. While choosing furniture keep in mind to include comfortable options. For example, armchair and stable seating with clearance under front of seat to allow feet under front edge, minimal back recline and backwards seat tilt are preferable.

Provide a safe environment

Consider enough space between the tables, noise from other tables can be displeasing.

Be aware of the space between the tables and kitchen area in terms of the noise from the kitchen.

Consider safety while choosing design elements and materials.

Use non-slip flooring.

Use standard size for the menu and signs. It can be beneficial to have menu with large font.

Principle 5: Comfort & Safety

Action Plan

Enhance Comfort



Use Appropriate Contrast and Size for menu, signage and typography.
Provide menu with large font.



Use Appropriate Contrast and Size for menu, signage and typography.
Be open to make adjustments in the table setting, families might need larger tables for their personal items.

their personal items.

Consider a waiting area with adequate seating.

If seats will be provided upon request in the waiting area, publish that at the front.

Provide a safe environment



Use tables finishes that define edges. Tables with rounded corners are preferable. Safety foams can be used for sharp edges and corners.



Use non-slip flooring.
Avoid un-even flooring.



To avoid discomfort from the noise in the environment, Consider standard space between the table, also between tables and kitchen area. (See principle -1 create zones)

If a restaurant is open to modify the sound and light, it would be beneficial to publish it at the front. One important point to consider about environment noise is that acceptable level of noise is subjective and can vary for diverse individuals in different context ("Design and dementia I brainXchange", 2018).

Television and radio sound is not helpful stimulation for individuals with memory impairment.

Principle 5: Comfort & Safety Examples



Consider a waiting area with adequate seating.



Figure 23. Example of providing seats and activities in the waiting area.



Figure 24. Example of table finishes with defined edges.



Use table finishes that define edges. Tables with rounded corners are preferable. Safety foams can be used for sharp edges and corners.



To avoid spills placemats with sticky quality can be provided.



Figure 25. Example of sticky placemat with contrasting colour.



Figure 26. Example of uneven flooring.



Figure 28. Example of sign with appropriate size and contrast.



Use appropriate size for typography, signs and menus. Use high contrast colours.

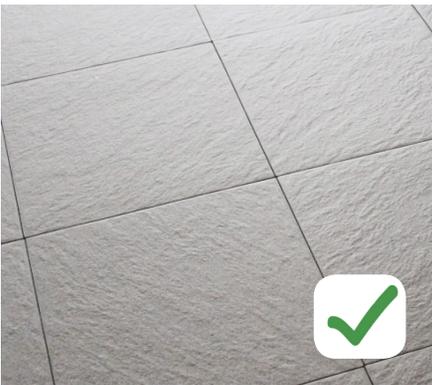
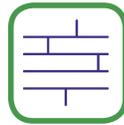


Figure 27. Example of non-slip flooring.



Flooring: Use non-slip flooring. Avoid un-even flooring.

Other Populations Who May Benefit

Individuals who use assistive devices including wheelchair, walker and cane.
Individuals who carry baby stroller, carry-on baggage and/or personal items.
Diverse individuals “with respect to ability, language, culture, gender, age and other forms of human difference” (“Inclusive Design Research Centre”, 2018).

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