Designing for Neurodiversity: Spatial and Sensory Approaches to Inclusive Grocery Stores

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Abstract

Grocery stores are an essential part of daily life, yet they are rarely examined as environments of accessibility. For many neurodivergent adults, sensory and spatial characteristics such as fluorescent lighting, background noise, and crowded aisles can create significant barriers to shopping independently and comfortably. While some retailers have introduced *sensory-friendly* shopping hours, these initiatives often provide temporary accommodations rather than addressing the environmental factors that contribute to sensory overload. Existing research has primarily focused on autistic children [autism spectrum disorder (ASD)] and their caregivers, leaving the experiences of neurodivergent adults underrepresented. The findings highlight the importance of predictability, and advocacy for sensory regulation that centres the voices and experiences of neurodivergent individuals in addressing and guiding more accessible retail design. The evolving design recommendations aim to move beyond temporary accommodations toward more inclusive and equitable environments that support a wider range of human needs.

Key Words: Neurodiversity, Neurodivergent Adults, Inclusive Design, Grocery Stores, Retail Design, Sensory Accessibility, Wayfinding

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Dedication

To my sister, Aimee.

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Grocery stores are rarely questioned as spaces of access, yet their layered sensory and spatial design can significantly impact who feels comfortable navigating them and who does not. Neurodivergent individuals, including those with autism, often experience heightened sensory sensitivities, which can make everyday activities, such as grocery shopping, particularly challenging. Common struggles among neurodivergent people include sensitivity to loud noises, bright lights, and crowded places, all of which can trigger stress or discomfort. These challenges are often increased in grocery stores due to the environment including fluorescent lighting, background music, and crowded aisles. The sensory overload that many individuals with autism face in these settings can lead to avoidance behaviours (Brachman, 2019, p. 5).

In response to these challenges, some stores have begun implementing sensory-friendly shopping hours, designed to create a more accommodating environment for neurodivergent shoppers. These designated hours reduce or eliminate factors such as bright lighting and music, and often feature quieter, less crowded conditions. Despite these efforts, significant challenges remain in making grocery shopping fully accessible to neurodivergent individuals.

Neurodiversity encompasses a broad spectrum of cognitive differences, and recognizes variations in how people think, perceive, and process information (Cleveland Clinic, 2022). For the purposes of this research, the term neurodivergent refers to individuals whose brains develop or function differently for a range of reasons, shaping distinct patterns of sensory processing, communication, and interaction with their environments. The definition of neurodivergence and what is included within neurodiversity has shifted over time as it is no longer viewed solely from a medical lens, but rather within social and cultural contexts. As explained by Dr. Megan Neff “The biggest difference is that disability is typically defined as something a person has within the medical model, while within the social disability model it is an experience a person with impairment has” (Neff, 2022). While this shift reflects a more inclusive understanding, it also exposes a gap: many individuals who would now be considered neurodivergent were not accounted for in earlier research nor in the design of everyday spaces. This gap is reinforced by a tendency to approach difference through a “one thing at a time” lens, where certain needs are prioritized while others remain secondary (Castle, 2024). In practice, this can create a hierarchy

of accessibility in which more visible forms of disability are addressed, while less visible or sensory-based experiences are overlooked. This is notable given that many disabilities are not immediately apparent; from The Hidden Disabilities Sunflower Scheme Ltd., although 61 million people in the United States live with a disability, an estimated 80% of disabilities are non-visible (Fray, n.d.). As a result, sensory accessibility has often remained in the background of both research and design decision-making.

Within the context of grocery stores, this oversight becomes particularly significant. These environments are dense with sensory stimuli and navigating them relies heavily on wayfinding, or the processes through which individuals orient themselves, make decisions, and move through space. Wayfinding is not only dependent on spatial layout and signage but is shaped by how sensory information is processed. When environments are overstimulating or difficult to interpret, navigation becomes more cognitively demanding and, at times, disorienting.

For neurodivergent individuals, these conditions can contribute to sensory overload, which may result in increased heart rate, rapid breathing, elevated blood pressure, confusion, anxiety, and mental distress (Brachman, 2019, p. 6, as cited in Venes, 2009). Rather than being occasional disruptions, these responses can form part of routine shopping experiences, influencing both comfort and access. Estimating how many people are affected by these conditions in Canada is not straightforward, as definitions and diagnostic criteria vary. Some organizations suggest that 15–20% of the Canadian population may be neurodivergent, although the sources of these figures are not always clearly defined (Association of Canadian Financial Officers, 2025). More specific data indicates that 1 in 50 Canadian children and youth were diagnosed with autism spectrum disorder as of 2019 (Government of Canada, 2025). While incomplete, these figures point to a sizeable portion of the population whose sensory and spatial needs remain underrepresented in the design of everyday environments such as grocery stores.

These gaps are not only evident in the literature but are also reflected in lived experience, including my own as a neurodivergent adult navigating everyday retail environments. I have often sought out sensory-friendly shopping hours at grocery stores in my area, yet many do not offer them, or they are scheduled at times that do not align with my daily routines. As a result, these accommodations are not consistently accessible in practice. This also makes them more difficult to advocate for, particularly when the need is not visibly apparent. While I may appear

to navigate these spaces with ease, the experience of shopping can be significantly more challenging. These experiences prompted me to consider who else may be facing similar conditions, and who might benefit from these accommodations without realizing they exist.

This study aimed to explore the design challenges experienced by neurodivergent customers in grocery stores. Just as there are many forms of neurodivergence, there are also many ways that this research could be approached. To hear from a range of neurodivergent experiences, multiple methods of data collection were used, including a co-design session where participants could lead the conversation and share what an accessible and comfortable shopping experience would look like to them. While the focus of this research was on neurodivergent shoppers, many of the challenges identified are not unique to this population. The findings have the potential to support individuals who experience migraines, PTSD, and other forms of sensory sensitivity, while also contributing to grocery environments that are easier to navigate, more comfortable, and more welcoming for everyone.

1.1 History of Grocery Store Design

Prior to addressing the challenges of neurodivergent shoppers, understanding the evolution of the 'Grocery Store' is a prominent place to start. Bottom-line driven criteria supported by aggressive marketing and branding of when, how, and where we buy our food, has impacted the grocery store that we have come to be familiar with today. Tracing this evolution is essential for understanding which elements of the contemporary supermarket are functionally necessary, and which are historical byproducts of economic, technological, and cultural shifts. Although grocery stores are widely recognized as essential infrastructure, their design has rarely centred the needs of the people who use them. Instead, they are guided by efficiency and profit.

The origins of the modern grocery store are often traced to the opening of Piggly Wiggly in 1916 in Memphis, Tennessee (SLATE, n.d.). Unlike earlier food retail models, which required customers to visit separate butchers, greengrocers, and bakeries and rely on clerks to retrieve goods from behind a counter, this new format introduced self-service and centralized shopping. Customers could move through the space independently, view products directly, and compare prices in a single location (Tarazano & Daemmrich, 2020). This shift reconfigured the relationship between shopper and space.

Figure 1: Piggly *Wiggly*

Note: From Interior of the Original Piggly Wiggly Grocery Store, Memphis Tennessee, by Clarence Saunders, 1918, COR3 Design (https://cor3design.com/the-evolution-of-grocery-store-design/). In the public domain

Following the success of the Piggly Wiggly, the grocery store market began to grow with the introduction of Loblaws in Toronto (1919) and the first supermarket, King Kullen in Long Island (1930) (SLATE, n.d.). These stores coincided with the rise of automobiles, refrigeration technology, and expansion of suburban neighbourhoods and strip malls. One of the first and largest strip malls in Canada, opened in Toronto in 1954. The Golden Mile featured Loblaws, Woolworth's, and Zellers stores (Rai, 2024). Increased mobility allowed shoppers to travel farther, while improved cold storage enabled retailers to stock a wider variety of perishable goods without worrying about food spoiling. As a result, stores grew in size and consolidated inventory under one roof. This expansion fundamentally altered the scale of grocery retail. Smaller neighborhood shops struggled to compete with the product range of large supermarkets, leading to consolidation and fewer but larger stores (SLATE, n.d.). The interior layout evolved to accommodate long aisles, expansive shelving, and large refrigerated cases. As shoppers purchased greater quantities in a single trip, the introduction of the shopping cart became a necessity (COR3 Design, 2024). The cart not only solved a functional problem but also subtly influenced consumer behavior by increasing carrying capacity and encouraging higher-volume purchasing (Hsiao, 2025).

After the Second World War, supermarket growth accelerated dramatically. ‘The American Dream’ defined as the ideal of freedom and equality for people who have the will to succeed (Murtoff, 2026), also spread to Canada, and reshaped both residential patterns and retail architecture (SLATE, n.d.). Large parking lots, wide entryways, fluorescent lighting, and abundant product displays reflected optimism about consumption and domestic abundance. Grocery stores were designed to symbolize prosperity and choice. The emphasis was on scale and spectacle. Bright lighting, polished floors, and densely stocked shelves communicated fullness and economic progress, even as they intensified visual and auditory stimulation within the space (See Figure 2). By the 1970s, economic stagnation and inflation prompted a shift in grocery retail strategy. Chains began developing private label brands, positioning them as both budget friendly and premium alternatives within the same store (SLATE, n.d.).

Figure 2: *1950s Grocery Store*

Note: 1950s Grocery Store. n.d. (Click Americana). Retrieved August 4, 2026, from https://clickamericana.com/topics/culture-and-lifestyle/scenes-from-grocery-stores-supermarkets-of-yesteryear

Figure 3: *1970s Grocery Store*

Note: From Vintage pharmacy/beauty section at a 1970s grocery store. n.d. (Click Americana). Retrieved August 4, 2026, from https://clickamericana.com/topics/culture-and-lifestyle/check-out-100-vintage-1970s-supermarkets-retro-grocery-stores

The 1970s grocery store utilizes a more muted colour palette compared to the bright reds and blues depicted in the 1950s store. The space also features fewer decorative elements and more simplified flooring patterns, contributing to a more visually restrained environment.

Architectural and aesthetic investment slowed during this period. Many supermarkets adopted a more utilitarian appearance characterized by metal shelving, pallet displays, and minimal decorative elements (SGA Design Group, 2024) (See Figure 3). This restrained aesthetic signalled cost savings to consumers. Efficiency and price competitiveness were prioritized over spatial experience. At the same time, stores introduced in-house pharmacies and other services, reinforcing the idea of one stop shopping. Convenience became a defining principle, even if the environment itself remained stark and overstimulating.

From the 1980s through the late 1990s, the overall supermarket layout remained stable. However, the early 2000s marked another shift driven by sustainability and technological advancement. Retailers invested in green building initiatives and energy efficiency, with 21.6% of stores reporting green building initiatives as part of their organizational goals (SGA Design Group, 2024). Checkout processes were streamlined through the rapid adoption of self-checkout systems, fundamentally altering the social dynamics of the store. By the mid 2000s, self-checkout was present in 95% of major chains (SGA Design Group, 2024). These systems reduced staffing needs and increased transaction speed, but they also transferred additional cognitive and physical labor onto shoppers.

A significant turning point occurred in 2017 when Amazon acquired Whole Foods Market (SLATE, n.d.). This acquisition symbolized the convergence of digital commerce and

brick and mortar grocery retail. App based shopping, and integrated delivery platforms began reshaping expectations around speed and personalization. Physical stores no longer functioned as the standalone destinations. The COVID 19 pandemic further exposed the essential nature of grocery stores while simultaneously disrupting their operations. Lockdowns and public health measures accelerated the adoption of online ordering, delivery, and click and collect services (SGA Design Group, 2024). For many individuals, grocery stores were among the few publicly accessible indoor spaces during prolonged periods of confinement. Retailers had to rapidly expanded their online capabilities to meet unprecedented demand.

This historical trajectory shows that grocery store design has been shaped by technological change and economic pressure with profound influence on zoning, building, and design. Efficiency has remained a consistent priority. In contrast, the sensory, cognitive, and emotional experiences of shoppers have rarely been treated as central considerations. Supermarkets are typically organized to support circulation, visibility, and purchasing volume. Comfort and accessibility tend to come second, and considerations of neurodiversity are often absent altogether. Looking at this progression creates a foundation for examining modern grocery environments more critically. It also opens space to question which aspects of the current model are necessary, and which could be reconsidered.

1.2 Objectives

The main objectives of this research are to:

1. Examine how wayfinding strategies and environmental communication systems can be adapted to better support neurodivergent shoppers within grocery store environments.
2. Develop a set of practical, evidence informed design guidelines that can be implemented within existing stores without requiring major structural renovations.
3. Evaluate the proposed guidelines to assess their potential impact on neurodivergent individuals and to consider how these strategies may inform the future design of grocery retail environments.

This research also explores the role of sensory friendly shopping hours as a current response to overstimulation within grocery store environments, while situating them within a broader discussion of the sensory challenges typically embedded in grocery stores. By examining both

temporary accommodations and more permanent design strategies, this study seeks to identify opportunities for creating grocery environments that are more inclusive and responsive to neurodivergent shoppers.

1.3 Research Questions

How can grocery store design, including layout, wayfinding, and retail strategies, reduce barriers and create more accessible and supportive environments for neurodivergent adults?

2 Literature Review

2.1 Neurodivergent Adults

Despite the growing recognition of neurodiversity, much of the existing research that explores neurodivergent perspectives in relation to design has concentrated on children and adolescents. For example, Jang et al., (2014) report that 94 percent of autism design research focuses on individuals under the age of 18. This emphasis has produced valuable insights into educational and therapeutic environments, yet it leaves comparatively limited understanding of how neurodivergent adults navigate everyday public spaces. As neurodivergent individuals age, their coping strategies, preferences, and environmental sensitivities may evolve, yet the literature offers little examination of these shifts over time (Ghanouni & Quirke, 2022). This literature review positions itself as a bridge between youth-focused research and the lived experiences of adult participants, identifying points of alignment with existing findings while also considering which traits, challenges, or supports may become prominent with age.

Retail environments provide a particularly relevant context for examining these dynamics. Commercial spaces are typically designed to stimulate engagement, encourage movement, and maximize exposure to products. However, elements commonly embedded in retail design can present significant challenges for neurodivergent individuals (Retail Industry New Australia: Australian Retail News, 2026). Research and industry discussions frequently identify factors such as intense or poorly positioned lighting, glare from reflective materials, and complex visual patterns as sources of visual strain. Auditory stimuli, including overlapping music and public announcements, can compound this strain. Additional sensory inputs such as strong or mixed scents, crowded layouts, queuing systems, and obstructed pathways may further heighten stress. Navigational ambiguity, and experiences of misunderstanding or judgement from others can also shape the overall retail experience.

While many of these environmental conditions may be inconvenient or uncomfortable for a wide range of shoppers, differences in sensory processing mean that neurodivergent individuals may experience them with greater intensity or cumulative impact. Understanding these distinctions is essential for evaluating how retail design can move beyond generalized notions of accessibility toward environments that more meaningfully accommodate cognitive diversity. This review therefore examines the intersection of neurodivergence and spatial design, with

particular attention to how sensory, social, and organizational elements of retail settings influence adult experiences.

2.1.1 Sensory Processing Differences

Research has demonstrated that the hierarchy of sensory processing varies between neurotypical and neurodivergent individuals, with sensory experiences being processed in distinct orders (Fradette, 2024). For neurotypical people, vision typically takes precedence, followed by hearing, smell, taste, and touch. In contrast, neurodivergent people often prioritize auditory processing, followed by visual, tactile, olfactory, and gustatory stimuli.

Figure 4: *The Hierarchy of Senses for Neurodivergent People*

Note: From Sensory Atypical Person's Hierarchy of the Senses, by (Fradette, 2024)

Figure 5: *The Hierarchy of Senses for Neurotypical People*

Note: From Pallasama's Hierarchy of the Senses, by (Fradette, 2024)

This difference in sensory hierarchy highlights the necessity of designing environments that accommodate the diverse sensory needs of all individuals, ensuring greater inclusivity and accessibility in the built environment. With 70% of people with ASD having a heightened sensitivity to sound (Fradette, 2024), being aware of the acoustic properties of the materials you are selecting is of a stronger importance over the initial visual impact of a space. However, sensory processing is influenced not only by which senses are prioritized, but also by the intensity with which sensory information is perceived.

These differences in sensory processing extend beyond the hierarchy of perception and can influence how sensory stimuli are physically experienced. For some neurodivergent

individuals, certain sensory inputs may be experienced with an intensity that can create physical discomfort or restrict participation in everyday activities. Morgan (2019) notes that previous studies have found that prolonged exposure to fluorescent or artificial lighting can be physically painful for some neurodivergent people. As Morgan explains, “These examples represent experiences that are not commonly reported among the general population as problematic.” This demonstrates how sensory stimuli that may be considered neutral or unnoticeable by many people can become significant barriers for others.

Many neurodivergent individuals may also lean toward being sensory seeking or sensory avoidant, often described in the literature as hyposensitive or hypersensitive (Star Institute, n.d.). Those who are hypersensitive may experience certain stimuli such as bright lighting, layered soundscapes, strong scents, or tactile textures with heightened intensity, sometimes leading to discomfort, distraction, or distress. In contrast, individuals who are hyposensitive may actively seek additional sensory input to regulate attention or maintain engagement, gravitating toward movement, touch, sound, or visual complexity. These are not fixed categories but exist on a spectrum, and people may have different sensory responses in different contexts.

Importantly, these variations influence not only how environments are perceived but also how they are navigated, tolerated, and interpreted. A setting that feels stimulating and energizing to one person may feel overwhelming or disorienting to another. In commercial environments, where multiple sensory inputs are layered simultaneously and often intentionally amplified, these differences can significantly shape the overall experience of access, comfort, and participation. Recognizing the diversity of sensory processing across neurodivergent populations highlights the limitations of one size fits all design approaches.

2.2 Sensory Friendly Design

The conversation surrounding sensory friendly design is not new, yet it has rarely been positioned as a central priority within mainstream architectural practice. As Castle (2024) observes, there is often a “one thing at a time mentality when exploring and understanding diverse characteristics” (para. 3). This fragmented approach has contributed to built environments that satisfy minimum accessibility standards while overlooking sensory experience as a foundational dimension of inclusion. Accessibility is frequently interpreted through mobility

and code compliance, leaving lighting, acoustics, materiality, and spatial sequencing treated as secondary concerns rather than integral design considerations.

In response to this gap, the British Standards Institution released a comprehensive design guide for neurodiversity in the built environment in 2022 (The British Standards institution, 2022). While such documents outline best practices, they are advisory rather than mandatory, placing responsibility for implementation on individual designers, organizations, and clients (BSI, 2025). The guide emphasizes environmental factors that may appear subtle when considered independently but collectively shape the sensory experience of a space. These include adjustable lighting systems and their interaction with interior finishes, the tactile qualities of materials, and the acoustic performance of surfaces. Although many users may not consciously identify these elements, their cumulative effect can significantly reduce sensory overwhelm and increase comfort.

When applied to retail settings, these principles translate into tangible design strategies. Fradette (2024) recommends incorporating sound absorbing materials, natural elements, lower ceiling planes paired with diffused lighting layouts, wood finishes, and softened glazing treatments to cultivate a calmer atmosphere. Together, these interventions shift the sensory register of a store from highly stimulating to more moderated and predictable. Rather than relying solely on signage or policy changes, they address the physical environment itself as a contributor to stress or ease.

Sensory friendly design also extends beyond material choices to include spatial organization and zoning. The 2022 guide from the British Standards Institution highlights the importance of acoustic zoning, noting that individuals should be able to transition gradually from quieter to louder areas within a building (The British Standards institution, 2022). In a grocery store context, this could involve buffering high noise zones such as checkout areas from calmer perimeters or creating identifiable spaces that allow for brief respite without leaving the store entirely. The layout can then become a tool for regulating sensory intensity rather than simply maximizing product exposure.

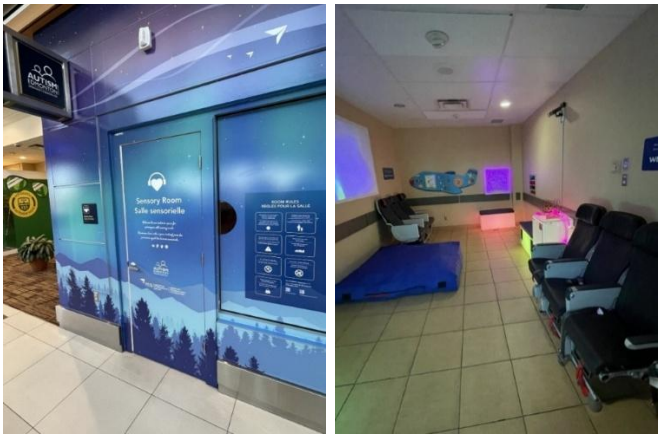
Recent industry commentary reinforces the growing recognition that retail environments must be adaptable. In an interview published by Modern Retail (Parton, 2024), Huddleston

discusses the increasing adoption of dimmable lighting systems that enable retailers to adjust brightness levels throughout the day or implement designated sensory friendly hours with reduced lighting and softened music. Additional measures, such as limiting synthetic fragrances and carefully managing scent diffusion, acknowledge olfactory sensitivities that are often overlooked in retail design. Importantly, these adjustments are framed not as optional enhancements but as matters of dignity and respect. This reframing signals a shift from reactive accommodation toward proactive inclusion, positioning sensory considerations as central to equitable design rather than peripheral add-ons.

2.2.1 Recovery Spaces

Sensory friendly design can also be support by the environments around it. Recovery spaces are an example of these support environments. A recovery space can be defined as a place "designed to support people physically, emotionally, or mentally" (McLaughlin D. , 2025). These spaces are provided to aid people in self-regulation and to provide a brief escape from the environment around them. "In environments where stress and sensory overload are likely to be especially intense for some people, the provision of quiet spaces can be particularly beneficial" (The British Standards institution, 2022, p. 87). The most common occurrence of these spaces exists as sensory rooms within schools (National Autism Resources, n.d.). However, these rooms are not available to the public and are designed for children. You may have also seen versions of these spaces in airports (See Figure 6) which provide a moment of respite in an otherwise sensory hostile environment.

Figure 6*: Sensory Room*



Note: Sensory Room at Edmonton International Airport (2025). Photos captured by author.

While full on sensory rooms are not always able to be provided, smaller recovery spaces can still be added. When creating a recovery space, it is important to include both low and high stimuli options (The British Standards institution, 2022).

2.2.2 Building Codes and Canadian Disabilities Act

Accessibility within Canadian building regulation is primarily framed through physical access. The 2020 edition of the National Building Code of Canada (NBC) introduced expanded technical requirements related to mobility, barrier free paths of travel, washrooms, entrances, and spatial clearances (Canadian Commission on Building and Fire Codes, 2020). These updates represent meaningful progress in addressing structural barriers. However, the scope of these provisions remains dimensional and mobility focused. Lighting quality, acoustics, material reflectivity, scent, and other sensory variables are not treated as central accessibility concerns. As a result, compliance does not necessarily equate to environments that are comfortable or usable for individuals with diverse sensory processing needs.

Alongside the NBC, the Canadian Standards Association published CSA B651:23, *Accessible Design for the Built Environment* (Canadian Standards Association, 2023). This document provides more detailed best practice guidance and, in some areas, goes beyond minimum code requirements. However, standards differ from regulations. As the Government of Canada (2022) explains, standards are voluntary unless formally adopted into regulation. This distinction mirrors the earlier discussion of guidance issued by the British Standards Institution, where neurodiversity focused recommendations exist but are not inherently enforceable. In Canada, designers and local authorities may reference either the NBC accessibility provisions or CSA B651, but they are not typically applied in combination. In practice, projects often default to the minimum requirement necessary for approval, reinforcing a compliance based rather than experience-based approach to accessibility.

At the federal level, the Accessible Canada Act (ACA), passed in 2019, established a national goal of achieving a barrier free Canada by 2040 (Government of Canada, 2022). While the Act signals a significant policy commitment, it applies primarily to federally regulated entities. Most retail environments, including grocery stores, fall under provincial jurisdiction. Oversight and enforcement therefore vary across the country. The Canadian Human Rights

Commission (2022) notes that the Act's scope does not extend universally to private commercial spaces, leaving a regulatory gap for many everyday retail settings.

Provincial accessibility legislation further complicates the landscape. Ontario enacted the Accessibility for Ontarians with Disabilities Act (AODA) with a target of a fully accessible province by 2025 (Government of Ontario, 2005). Other provinces have since introduced their own frameworks, including Manitoba, Nova Scotia, British Columbia, Newfoundland and Labrador, New Brunswick, Saskatchewan, and Quebec, each at various stages of implementation and enforcement (Siteimprove, 2026). Although these acts demonstrate growing recognition of accessibility as a human rights issue, they differ in timelines, scope, and regulatory mechanisms. This patchwork approach contributes to inconsistencies in how accessibility is defined and operationalized across Canada.

As of 2026, it is evident that legislative ambition alone does not guarantee transformative change. Targets such as Ontario's 2025 benchmark illustrate the challenge of moving beyond compliance toward meaningful inclusion. Within retail environments, accessibility is often interpreted through ramps, door widths, and washroom clearances, while sensory complexity remains unregulated. The NBC establishes minimum technical thresholds. CSA standards offer more robust guidance but are not automatically mandatory. Federal legislation sets aspirational goals but does not comprehensively govern commercial grocery spaces. Collectively, this regulatory structure reveals a critical gap. Accessibility policy in Canada has advanced significantly in relation to physical barriers, yet sensory design remains peripheral within enforceable frameworks. For grocery stores, this means that environments may meet code requirements while continuing to present overwhelming lighting, noise, spatial density, and other sensory stressors. Addressing this gap requires not only legislative evolution but also a reframing of accessibility to include sensory experience as a fundamental component of equitable design.

2.2.3 Wayfinding

Wayfinding refers to the systems and cues that help individuals orient themselves within an environment and move from one location to another. In public space, this is often intuitive and highly visible. Kevin Lynch, a pioneer in city planning and spatial design coined the term *wayfinding* in 1960, in his seminal book *Image of the City* (1960). Street signs, landmarks, lighting, and landscaping contribute to legibility, while digital tools such as mapping applications

allow people to preview routes and adjust plans in real time. Within private commercial interiors, the principle is similar, though the execution differs. In grocery stores, wayfinding may include overhead department signage, shelving displays, promotional graphics, colour coding, floor markings, or auditory signals. Some stores also provide directories or digital search tools to help customers locate items. While these tools do not replace environmental cues, they function as assistive supports that shape how easily a shopper can form a mental map of the space.

Despite its importance, wayfinding is only partially regulated within Canadian accessibility frameworks. Certain signage, such as washroom identification, must meet standardized requirements for placement, contrast, and tactile features, promoting consistency across buildings (Canadian Standards Association, 2023). Internal retail wayfinding systems, however, are largely unregulated. Aisle markers and departmental signs often vary in scale, contrast, and positioning, and may be obscured by merchandise or designed to reflect branding rather than legibility. As a result, shoppers can struggle to quickly interpret navigational cues, particularly in large format stores.

Accessible wayfinding extends beyond minimum signage compliance. Guidance from the British Standards Institution (2022) recommends that information be communicated through at least two sensory channels, allowing it to be interpreted visually, audibly, or tactually. This multi-sensory approach acknowledges that no single method serves all users equally. In practice, accessible wayfinding may incorporate high contrast colour schemes, consistent departmental colour coding, tactile signage and braille, simplified maps, and visible staff assistance. Zoning strategies are especially relevant in grocery settings. Produce departments are often associated with green tones, while meat sections commonly use red, contributing to a shared retail lexicon that can ease navigation in unfamiliar stores. When colour, layout, and signage align with established conventions, cognitive load is reduced.

Research on commercial and healthcare environments suggests that redundancy strengthens navigational clarity. Combining maps, verbal directions, visual markers, and opportunities for interpersonal assistance allow individuals to select the method that best aligns with their cognitive and sensory preferences (Huelat, 2007). Designing for wayfinding also involves broader spatial considerations, including opportunities for previewing the layout, managing sensory load, maintaining appropriate lighting, and ensuring logical circulation with

clear sightlines. In environments that are already dense with visual and auditory stimuli, layered and intentional wayfinding systems can reduce confusion, minimize stress, and support greater independence for neurodivergent shoppers.

2.2.4 Preview Information and Predictability

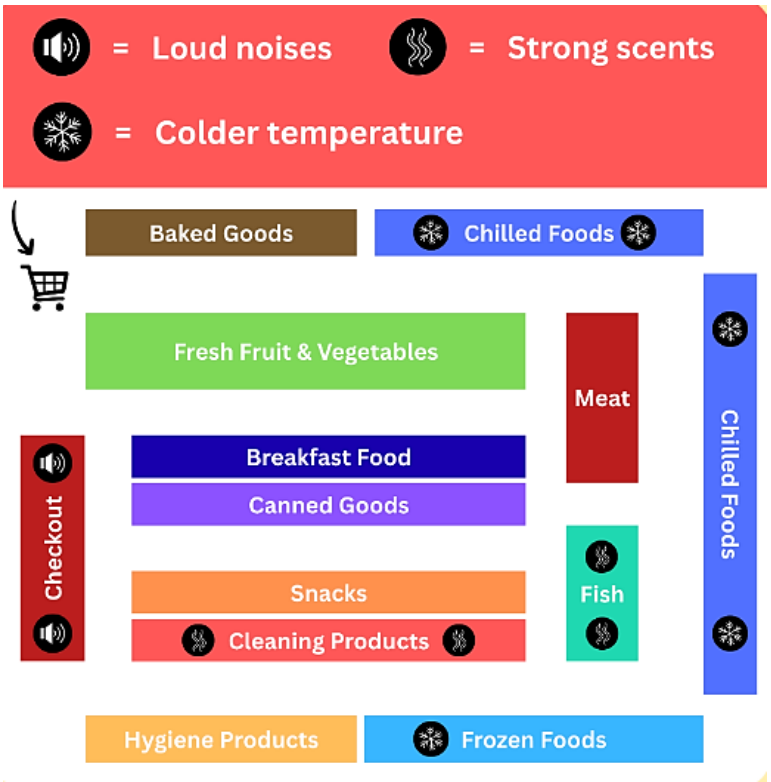
Predictability is a key factor in reducing anxiety and uncertainty for many patrons, and it can be particularly important for neurodivergent shoppers. Routine and consistency can support sensory regulation by allowing individuals to anticipate aspects of their environment (Fradette, 2024). While wayfinding contributes to this sense of structure by helping people orient themselves within a space, predictability also extends beyond navigation to the broader experience of moving through an environment.

Retail spaces, and grocery stores in particular, contain many elements that are inherently difficult to anticipate. Shoppers may encounter strong scents, fluctuating noise levels, crowded aisles, or unexpected changes in product displays (Oastler & Phillips-Mason, 2024). These factors introduce a degree of uncertainty that cannot be fully eliminated. However, reducing uncertainty in other aspects of the environment can help mitigate this stress. When shoppers can reliably predict where departments are located, how circulation flows through the store, or what conditions they might encounter, the overall experience becomes easier to manage.

One challenge is that many stores, even within the same brand, use different layouts depending on the size, configuration, and operational needs of their buildings. This inconsistency can make it difficult for shoppers to rely on previous experience when entering a new location. Digital tools offer one way to address this issue. Online store maps allow individuals to preview layouts, plan efficient routes, and reduce the amount of time spent navigating unfamiliar aisles. For shoppers who find grocery environments overwhelming, this ability to prepare in advance can make the visit more manageable and intentional. In many cases, these layouts already exist internally to support stocking and inventory management, suggesting that sharing them publicly may require minimal additional effort. As retail websites and mobile applications become more common, integrating navigational resources such as maps or virtual walkthroughs has become increasingly feasible.

Emerging approaches to wayfinding also explore the idea of '*sensory mapping*' (See Figure 7). Rather than only indicating product locations, sensory maps highlight areas based on environmental conditions such as strong scents, temperature changes near refrigerated sections, or spaces with higher noise levels (Oastler & Phillips-Mason, 2024). This type of information can help individuals anticipate potentially overwhelming stimuli and plan accordingly. For example, someone sensitive to strong smells or prone to headaches might choose to bypass certain aisles, shorten their time in those areas, or prepare by bringing items such as masks or headphones.

Figure 7: *Sensory Map*



Note: Adapted from LIDL Adventurers Autism Awareness Store. 2020. https://www.dublinlive.ie/whats-on/shopping/lidl-ireland-autism-aware-14435661

The British Standards Institution (2022) further emphasizes the importance of helping users anticipate an environment before entering it by recommending providing opportunities to preview spaces through clear descriptions, maps, or virtual experiences that reduce uncertainty and anxiety. Strategies may include offering website-based walkthrough videos, audio descriptions for individuals who cannot fully interpret visual material, and consistent links to

environmental information within public communications. At the building scale, simple floor plans displayed at entrances can also support orientation and planning.

2.3 Grocery Shopping

The layout of grocery stores is closely tied to strategies intended to influence shopping behaviour. While design decisions may appear neutral, many elements of the supermarket environment are deliberately arranged to encourage increased purchasing. Product placement, aisle organization, lighting, and even the order in which customers walk through departments are frequently informed by retail psychology and marketing research rather than by considerations of comfort or accessibility.

One common example is the placement of frozen foods near the end of the shopping route. Research suggests that once shoppers place frozen items in their carts, they tend to move more quickly through the store to prevent the products from thawing (Hsiao, 2025). By positioning these departments later in the shopping sequence, retailers encourage customers to spend more time browsing other aisles beforehand. This strategy illustrates how circulation patterns within the store are intentionally structured to maximize exposure to products. Studies of shopper movement have also identified the “right turn phenomenon,” in which customers tend to turn right upon entering a store (Hsiao, 2025). As a result, higher margin products are often placed on the right side of the entrance or along the right-hand side of aisles to increase visibility. Similarly, the merchandising principle often summarized as “eye level is buy level” reflects the tendency for customers to select items positioned directly within their line of sight. Given that many purchasing decisions are made within seconds, product placement at eye level becomes a powerful tool for influencing consumer choice.

Beyond individual shelves, broader spatial strategies are also used to shape purchasing behaviour. According to industry analysis from JRTech Solutions (2025), supermarket layouts are frequently adjusted to encourage impulse buying and increase the time shoppers spend in the store. Larger baskets and carts allow customers to carry more items, while carefully arranged displays prompt impulse purchases. Reorganizing product locations can make the environment feel new or engaging for returning customers, prompting them to explore different areas of the store (Global Display Solution, 2025). However, this approach may conflict with the needs of shoppers who rely on consistency and predictability. For neurodivergent individuals in

particular, frequent layout changes can increase cognitive load and make it more difficult to develop reliable mental maps of the space.

Many stores also incorporate what are known as decompression zones near the entrance (JRTech Solutions, 2025). These areas are intended to transition customers from the exterior environment into the shopping experience. Industry guidance often recommends features such as open produce displays, floral sections, or nearby cafés that introduce colour, scent, and visual interest. While these features are designed to create a welcoming atmosphere and encourage engagement, they also stimulate the senses and signal the beginning of the retail experience.

2.3.1 Marketing Techniques

Grocery store marketing techniques extend beyond layout and product placement. Within the store, lighting plays a key role in directing attention and shaping how products are evaluated. For example, vertical direct lighting can be used to put emphasis on products with laser precision and is often recommended for high ticket items (Richporter Lighting, n.d.). This targeted lighting operates as a visual marketing strategy, isolating premium products and increasing their perceived value. In this way, lighting does not simply improve visibility but actively guides consumer decision-making at the point of purchase.

Beyond spotlighting, broader lighting strategies further reinforce marketing objectives through the strategic use of colour temperature. Research on supermarket lighting design indicates that warmer lighting (2700K–3000K) is often used in areas such as meat, bakery, and prepared foods to enhance richness, warmth, and perceived freshness, making these products more visually appealing and desirable. In contrast, cooler lighting (4500K–6000K) is commonly applied in produce, seafood, and refrigerated sections to create a sense of cleanliness and vibrancy, reinforcing perceptions of freshness and quality (Richporter Lighting, n.d.). These variations function as targeted marketing tools that shape how consumers interpret product quality at a glance. The integration of multiple lighting sources further softens the retail environment, reducing associations with sterile or institutional spaces and encouraging longer browsing times, which are linked to increased impulse purchasing.

Outside of the physical environment, community-based marketing is used to cultivate brand loyalty and local identity. However, as Brachman (2019) observes, this engagement is

often limited to financial contributions such as sponsorships, which function more as branding exercises than as meaningful forms of community integration. While these efforts contribute to a positive public image, they remain primarily transactional and reflect a marketing strategy focused on visibility rather than engagement. Expanding beyond financial support, alternative forms of community contribution could operate as more relational and experiential marketing strategies. For example, stores could host community events, workshops, or sensory-friendly shopping hours, positioning themselves as inclusive social environments rather than purely commercial spaces. These approaches shift community engagement from passive sponsorship to active participation, strengthening emotional connections between consumers and the store. From a marketing perspective, this deeper integration has the potential to build stronger brand loyalty, differentiate the store within a competitive market, and encourage repeat visitation.

2.3.2 Sensory Friendly Shopping Hours

Common modifications implemented during sensory-friendly shopping hours can include dimmed lighting, reduced noise levels such as the elimination of background music, decreased crowd density, additional staff training, and, in some cases, the provision of sensory support tools (Seeberger, 2020; Brachman, 2019). These tools may include sensory kits or bags designed to assist individuals in managing overstimulation while shopping. As described by Quinine (n.d.), “the bags contain items that can lessen sensory overload, such as noise-cancelling ear defenders, various anti-anxiety fidget toys and visual cue cards, so that people that are overwhelmed or non-verbal can point to what they need.” These modifications reflect an increasing awareness of the diverse sensory and communication needs present within retail environments.

Despite these recommendations, the implementation of sensory-friendly shopping hours remains inconsistent. While some grocery stores have introduced these initiatives, they are often temporary and lack reliable availability. Furthermore, for stores that do provide such hours, the timing and consistency vary significantly. For instance, in Canada, Walmart typically offers sensory-friendly hours from opening until 10:00 a.m., Monday through Wednesday (Walmart, 2024), whereas Sobeys schedules its sensory-friendly hours from 6:00 p.m. to 8:00 p.m. on Thursdays (Lombardo, 2019). While this variation may provide some flexibility, it may still fail

to align with the routines, energy levels, and support needs of many neurodivergent individuals, particularly those who rely on predictability.

Another notable issue with existing systems is the inconsistency in terminology used to describe these low-stimulation shopping hours. Terms such as "Autism Hour" and "Sensory Friendly Shopping Hours" are used interchangeably across different retailers (Seeberger, 2020). Although the intent behind these initiatives is often similar, the language used warrants further consideration. Specifically, labeling these periods as “Autism Hour” may unintentionally create a perceived boundary around who the service is intended for. Some neurodivergent individuals may feel they are not “autistic enough” to access these accommodations, reflecting broader dynamics of internalized ableism and uncertainty around eligibility for support. Additionally, more literal, or black-and-white means of interpretation may reinforce the perception that these hours are exclusively reserved for a specific group. As a result, the terminology used may inadvertently discourage broader use by individuals who could benefit from reduced sensory environments.

Sensory-friendly shopping hours often function as a band-aid solution rather than a fully integrated component of retail design. Their limited availability and reliance on specific time windows highlights the broader issue of accessibility continuing to be treated as an exception rather than a baseline condition. This emphasizes the need for more inclusive design approaches that embed sensory considerations into everyday retail environments, rather than isolating them within designated hours.

2.3.3 Future of Grocery Store Design

The future of grocery store design is being shaped by a convergence of large-scale global pressures, including climate change, population growth, economic instability, and shifting consumer expectations. These forces introduce a degree of uncertainty, but existing literature points toward several emerging trends that are likely to redefine how grocery stores operate and how they are accessed.

In the wake of the COVID-19 pandemic, grocery shopping behaviours have undergone a lasting transformation. Many consumers continue to prefer click-and-collect and delivery services, prompting retailers rethink their store operations. One key response has been the

development of micro-fulfillment centres, which are typically attached to or located near existing stores but function as dedicated spaces for assembling online orders. This allows retailers to increase order capacity without disrupting in-store shopping experiences or relying solely on traditional warehouse infrastructure (SGA Design Group, 2024). As noted by JRTech Solutions (2024), this shift contributes to the rise of "phygital" retail environments, where physical and digital shopping channels are fully integrated. From a design perspective, this omnichannel approach reduces the importance of the storefront as the sole point of access, instead positioning grocery stores as one part of a larger network.

At the same time, spatial layouts within stores are also evolving in response to both public health considerations and changing consumer expectations. Eberle-Lott (2020) suggests that future store designs may incorporate wider aisles, expanded checkout areas, and more visible and accessible sanitation infrastructure. These changes reflect an increased emphasis on safety, hygiene, and comfort, not only for customers but also for employees, whose needs are beginning to be more explicitly considered through the inclusion of designated rest areas. Additionally, while smaller-format stores were gaining popularity prior to the pandemic due to their focus on local and curated products, there is now a growing need to adopt these models to meet the spatial demands of online order fulfillment. As a result, future grocery environments may adopt hybrid formats, where compact, experience-focused retail spaces are supported by larger, warehouse-like back-of-house areas.

Environmental sustainability is another major driver of change in grocery store design and operations. Increasing consumer awareness of the climate crisis has led to greater demand for transparency, reduced packaging, and more sustainable sourcing practices. As Fitch (2017) argues, "closing the information loop" between consumers and the origins of products is becoming a significant selling point. In this context, design strategies may include clearer communication of product sourcing, integration of local supply chains, and the reduction of waste through bulk systems or reusable packaging initiatives. These measures function not only as environmental responses but also as marketing strategies that align with consumer values, further influencing purchasing decisions.

Technological innovation, particularly in the form of artificial intelligence, is also playing a significant role in shaping the future grocery experience. Amazon's acquisition of Whole

Foods Market and the introduction of "Just Walk Out" technology exemplify attempts to automate the checkout process through sensor-based tracking and automated payment systems (Maruf, 2024). While initially positioned as a frictionless retail solution, the implementation of this technology has revealed underlying complexities. Consumer responses have been mixed, and the system has faced criticism for its reliance on human oversight behind the scenes, including remote monitoring labour. As a result, Amazon has begun to scale back this model in larger grocery formats, instead focusing on smaller convenience-based applications. This suggests that while AI-driven retail holds potential, full integration into grocery environments remains under development.

Looking ahead, these developments point toward a grocery landscape that is increasingly automated, hybridized, and distributed. Micro-fulfillment centres, AI-assisted shopping systems, and omnichannel retail models will continue to expand, reshaping both the physical and digital dimensions of grocery access. However, these changes also raise important questions about inclusivity. As grocery stores become more technologically mediated, there is a risk that certain populations, including those with limited digital literacy, financial barriers, or sensory sensitivities, may face new forms of exclusion.

From an inclusive design perspective, the future of grocery stores must therefore balance efficiency with accessibility. While automation and digital integration can improve convenience for some users, they must be implemented in ways that do not create additional barriers for others. This may involve maintaining multiple modes of access, designing intuitive and low-sensory digital interfaces, and ensuring that physical store environments remain navigable, comfortable, and socially inclusive. The future of grocery store design is not only about responding to technological and environmental change, but also about determining who is able to participate in these evolving systems of access.

3 Research Design

3.1 Framework

This study was conducted using inclusive design for the research framework. Inclusive design can be described as “design that considers the full range of human diversity with respect to ability, language, culture, gender, age, and other forms of human difference” (Inclusive Design Research Centre, n.d.). Inclusive design focuses on the concept that one size fits one. Meaning that what works for one neurodivergent person, works for one neurodivergent person. With the neurodivergent population having such a diverse spectrum of needs and experiences, it makes sense to view this study from an inclusive design lens. This framework promotes working with communities to develop the solutions that will work best for them. This allows for researchers and designers to open up to ideas and concepts that they may not have originally considered. Following the principle of “nothing about us without us”. When designing with the community, the experience shifts from being a research subject or token participant into being an integral part of the design process.

While inclusive design does provide a positive outlook on the design process, it is not without flaw. Community members are often told that their contribution will have direct impact on the problem at hand. And while the participants are directly impacting and shaping the design they are working on, that does not guarantee impact and change on a larger scale. The study may not have any direct or immediate result. Inclusive design is not perfect by any means, but it allows us the opportunity to move in the right direction by working with the people we are hoping to impact.

3.1.1 Grounded Theory

Grounded theory informed the analytical approach used throughout this research. Originally developed by Glaser and Strauss (1967), grounded theory seeks to generate understanding through an inductive and comparative approach rather than testing predetermined hypotheses. Rather than beginning with predetermined categories, grounded theory encourages concepts, categories, and relationships to emerge through an iterative process of data collection, coding, constant comparison, and interpretation.

This study was guided by Charmaz's (2000) constructivist grounded theory while drawing on the systematic data coding procedures developed by Strauss and Corbin (1998). Strauss and Corbin emphasize a structured analytical process in which data are examined through iterative coding, constant comparison, and the continual refinement of concepts and categories. These procedures provided a systematic framework for organizing and analyzing the qualitative data collected throughout the study. Charmaz's constructivist perspective builds upon these methods by recognizing that knowledge is co-constructed through the interactions between the researcher and participants and that researchers inevitably influence the interpretation of data through their experiences, perspectives, and theoretical lenses (Mills, Bonner, & Francis, 2006). This perspective aligned with the aims of the study, which sought to understand the lived experiences of neurodivergent adults within grocery store environments while acknowledging that both participant narratives and researcher interpretation contributed to the development of the findings. It also supported a reflexive approach to analysis by recognizing the researcher's positionality as a neurodivergent individual and considering how this perspective shaped the interpretation of participants' experiences.

3.1.2 Narrative Inquiry

While constructivist grounded theory provided the primary analytical framework for this study, Narrative Inquiry informed the interpretation of participants' experiences. Narrative Inquiry focuses on understanding “how individuals derive meaning from their life experiences through storytelling” (Gilstein, 2023). Rather than viewing participants' accounts as isolated descriptions of events, this approach recognizes that experiences are shaped by personal, social, and environmental contexts. The stories participants shared about navigating grocery stores therefore offered insight not only into the barriers they encountered, but also into how those barriers influenced their daily routines, decision-making, and sense of belonging within retail environments.

A narrative perspective emphasizes participants as experts of their own experiences. Rather than seeking a single objective account of grocery shopping, the study acknowledged that each participant's experiences were shaped by their unique sensory preferences, identities, and previous interactions with retail spaces. These individual narratives provided context for

understanding why certain environmental features, such as lighting, crowding, or wayfinding, were experienced differently across participants.

The principles of a narrative inquiry approach complemented constructivist grounded theory by emphasizing participants' voices throughout data collection and analysis. Participants' narratives informed the development of emerging concepts while preserving the context in which those experiences occurred. By incorporating Narrative Inquiry as a guiding framework, the study remained grounded in participants lived experiences while recognizing the role of storytelling in shaping understandings of accessibility and inclusive design.

3.2 Research Methods

This study employed a mixed-method participatory design approach to investigate the experiences of neurodivergent adults within grocery store environments and to develop recommendations for more inclusive retail design. Combining qualitative and quantitative methods allowed the research to explore participants lived experiences while also examining measurable emotional responses to different store environments. Together, these methods provided a more comprehensive understanding of how grocery store design influences sensory experiences, accessibility, and overall comfort.

The participatory design approach positioned neurodivergent individuals as active contributors throughout the research process rather than passive participants. By involving individuals with lived experience in discussions, interviews, and collaborative design activities, the study sought to ensure that recommendations were informed directly by those most affected. The quantitative component complemented these findings by providing an additional method of evaluating participants' emotional responses to visual characteristics within grocery store environments.

3.2.1 Qualitative

The qualitative component of this study consisted of a non-identifying survey, semi-structured interviews, and a participatory co-design workshop. These methods were selected to capture the lived experiences of participants, and to identify common accessibility barriers while collaboratively exploring opportunities for improving grocery store design. While interviews provided detailed several individual perspectives, the co-design workshop encouraged discussion

and generation of ideas among participants, creating opportunities for design solutions to emerge that may not have surfaced through individual interviews alone.

A participatory co-design approach was particularly appropriate as neurodivergence encompasses a broad range of sensory, cognitive, and social experiences that cannot be represented by a single perspective. Rather than making assumptions about users' needs, co-design recognizes participants as experts in their own experiences and positions them as collaborators in the design process. As Castle (2024) explains, inclusive design requires designers to acknowledge the limits of their own knowledge and to collaborate directly with individuals who have lived experience of neurodivergence. Castle quotes inclusive design consultant Kyle, who states:

> "You cannot make decisions on their behalf," she says. "It's about collaborating and understanding that each person's experience is unique." It is also about "recognizing your own limits." This requires "seeking guidance from inclusive design consultants," she says, "and, most importantly, from individuals with lived experience of neurodivergence" (Castle, 2024).

By incorporating participants throughout the research process, the study sought to develop recommendations that reflected the diverse experiences and priorities of neurodivergent shoppers rather than relying solely on researcher interpretation.

3.2.2 Quantitative

The quantitative component of this study drew upon the longtime research of Steve Orfield, president of Orfield Laboratories in Minneapolis Minnesota, whose research focuses on designing environments for individuals with invisible disabilities, including neurodivergence (Orfield Laboratories, 2025). Orfield has developed a method known as *visual jurying*, which quantitatively measures participants' emotional responses to environmental stimuli. Rather than asking participants to evaluate a space solely through conscious reflection, visual jurying aims to capture instinctive emotional reactions to different environmental conditions. As Orfield explained, "We measure responses that are essentially tuned to be unconscious response. So, what we are trying to do is find the emotional response to stimulus and so we call it quantitative pre-verbal measurement" (personal communication, May 26, 2025).

Within this study, visual jurying provided a structured means of evaluating participants' responses to images of grocery store environments. These quantitative measurements complemented the qualitative findings by identifying patterns in participants' emotional responses to specific design features, while allowing those responses to be further explored and contextualized through surveys, interviews, and co-design discussions. Together, the qualitative and quantitative findings contributed to a more holistic understanding of how grocery store environments are experienced by neurodivergent adults.

3.3 Research Participants

3.3.1 Participant Requirements

As the aims of this study focus on the needs of neurodivergent adults, emphasis was placed on ensuring neurodivergent candidates were selected. However, to further explore the differences in sensory perceptions, all study methods were available to both neurotypical and neurodivergent adults. To identify these differences, participants were asked to self-identify as neurodivergent, neurotypical, or other. All participants were required to be above 18 years of age or above 16 years of age and legally emancipated. The co-design session required participants to reside in Saskatoon, as the session was held in person.

3.3.2 Recruitment and Consent

Participants were recruited through posters posted in local grocery stores, and in businesses such as Autism Services Saskatoon and Spectrum Services. The link to the anonymous survey was also shared with the Inclusive Design Research Center (IDRC) emailing list and the city of Saskatoon subreddit. The recruitment resulted in 68 total participants. 56 participants were from the anonymous survey, four were subject matter experts, two participated in the co-design workshop and six completed the perceptual jury. Three of these participants backed out of the study prior to the workshop beginning due to illness. To accommodate for the small number of responses for the perceptual jury, a digital version of the form was created. This was then shared to people who had previously expressed interest in the study but were unable to attend the in-person session. This resulted in six additional participants.

Participants were informed of the study details through an information letter sent via email. This letter outlined the study purpose, time commitment, schedule, and types of questions

to be asked. Participants were able to contact the principal investigator directly to review the materials and ask any questions prior to providing consent.

Participants were informed of their right to withdraw from the study in the consent form and before each session. They were also informed that in group settings such as the co-design workshop, full data removal may not be possible once contributions have been integrated into the collaborative work. A statement was made during the workshop to clearly indicate when the session shifted to group collaboration, at which point individual data could no longer be withdrawn. Since the survey was completely anonymous, participants could not request to have their responses removed from the study. However, participants were informed that they may exit the survey at any time.

3.3.3 Ethical Considerations

This study received approval from the OCAD University Research Ethics Board (REB102772) prior to data collection, and all research activities were conducted in accordance with the approved ethics protocol. Given that the study explored the experiences of neurodivergent adults, particular attention was paid to creating a research process that prioritized participant autonomy, comfort, and psychological safety throughout each stage of the project.

Participants were provided with an information letter and activity-specific consent form before taking part in the research. Providing these materials in advance allowed participants time to review the purpose of the study, understand what participation would involve, and ask questions before deciding whether to participate. Individuals who participated in more than one component of the study completed a separate consent form for each activity, ensuring that consent was informed and specific to each method of data collection. For the anonymous survey, completion of the questionnaire constituted implied consent.

Respecting participants' autonomy extended beyond the initial consent process. Participants were reminded of their right to withdraw before each research activity and were informed that they could request the removal of their data within 48 hours of participation where feasible. Because the co-design workshop relied on collaborative idea generation, participants were also informed when activities transitioned from individual reflection to collective discussion. Once ideas had become integrated into the group's collaborative work, individual

contributions could no longer be separated from the shared dataset and therefore could not be fully withdrawn. This process was explained to participants before and during the workshop to ensure they understood the implications of collaborative participation.

Creating a supportive research environment was another important ethical consideration. The co-design workshop was supported by Hailey Walchuk, a speech-language pathologist with experience facilitating groups for neurodivergent adults. Her role was to provide support if participants became overwhelmed or required assistance during the session. Sensory regulation tools, including fidget items, were made available throughout the workshop so that participants could engage in ways that best supported their individual sensory and self-regulation needs.

Participant privacy was maintained throughout the research process. The survey represented the only fully anonymous component of the study and was administered using software that did not require participants to provide identifying information, such as an email address, nor did it collect IP address data. Information collected through the interviews, perceptual jury, and co-design workshop remained confidential and was securely stored in accordance with the approved ethics protocol.

3.4 Data Collection

The data for this study was collected using four main methods; a perceptual jury, co-design session, interviews, and an anonymous survey. These methods were chosen to gather data from different demographics while ensuring that neurodivergent voices were at the centre of the research. The following sections provide deeper insight as to why each method was chosen and explain how the methods were conducted.

3.4.1 Perceptual Jury

Definition

Perceptual jurying involves presenting participants with images and asking them to rate each image along a series of scales (e.g., Clear–Confusing, Safe–Unsafe, Welcoming–Unfriendly). These scales are designed to capture intuitive, emotional, and sensory impressions rather than rational or verbal evaluations. The juries were available in both physical and digital formats. The data were then noted based on the Likert scale responses.

Process and Relevance

This method has been widely used to uncover responses that participants may not be able to articulate directly. As Orfield Laboratories (2025) notes, "As the psychology and market research fields have known for decades, users cannot accurately self-report on their design preferences or motivations." Perceptual jurying helps bridge that gap by focusing on participants' immediate impressions rather than requiring them to explain or justify their preferences.

By using visual stimuli rather than solely relying on verbal interviews or surveys, this method aims to surface emotional and sensory responses that participants may not even be consciously aware of. As stated by Steve Orfield, "visual juries are a way to measure people's feelings about an environment which they don't know they have" (personal communication, May 26, 2025). Visual jurying is especially valuable when working with neurodivergent participants, who may process and communicate sensory experiences differently. It allows for accessible, low-pressure participation and centers lived, embodied experience in the research process.

The workshop day began with the perceptual jury. Each participant was provided with eight jury sheets which each included an image from a grocery store, a set of seven-point scales, and a comment box to explain their ratings (see Appendix C: Visual Jury). Participants were given three minutes to rate each image. After the participants rated each image, we moved on to the feedback and participatory design segment.

A second version of the jury was created to make it accessible in a digital format to reach participants who were unable to meet in person. This version had to be formatted slightly differently to be compatible with survey software. While a Likert scale was still used, there was not an option to modify each scale. Therefore, the wording was changed to be on a scale from strongly disagree to strongly agree. Participants could rate on much they agreed or disagreed with each statement. The number of scale options and the positive / negative framing of each question aligned with the original version of the perceptual jury so that the responses could still be compared. (See Appendix C.1: Example of Adapted Jury)

3.4.2. Co-design Session

Definition

Co-design builds from the inclusive design framework. It provides an opportunity for a target demographic, in this case neurodivergent people, to actively contribute to the design decisions being made and provide information based on lived experience. As there is such a wide spectrum of what it means to be neurodivergent, having direct conversation with people allows for more insight to be gained than what I would be able to offer from my experiences alone.

Process and Relevance

For the application of this study, co-design was executed by having an interactive design session. The design session allowed for participants to further discuss the images from the perceptual jury, as well as mark up the photos and add their own drawings to show what they would like to see improved / how they would design it. The participants were provided with paper, crayons, and sticky notes to convey their ideas. The drawings and mark-ups from the participants were accompanied by journal notes of the session to help maintain the context of the comments and in which application they are relevant.

In the design session, participants were given an opportunity to discuss any of the photos from the jury and mark them up to show what elements were most distressing. This led into more discussions regarding the elements of grocery stores that were not represented in the jury but felt important to touch on. After the discussion portion, the session moved on to drawing out unique design improvements and providing sticky note ideas of ways to adapt the store to make it more welcoming. The workshop concluded with a review of the most critical themes and design elements to ensure that the participants voices were being accurately represented.

The original method for the co-design involved three separate sessions, two exploring participant design and one with feedback on a researcher provided solution. Since there were fewer participants, the discussion and activities planned for the two design sessions were completed at an increased pace. Since there was less direct feedback to incorporate as well, the third session transitioned into an email where the key themes and take always from the co-design sessions were compiled and used to develop a recommended design. Participants were then able to send back feedback that they had on the recommendations.

3.4.4 Interviews

Semi-structured interviews were conducted with subject matter experts to better understand the context of neurodiversity and sensory friendly design. The expert backgrounds included two architectural designers, one occupational therapist, and one person with lived experience. The interview questions were provided to the experts prior to meeting to allow adequate time for them to prepare their responses to the questions (see appendix for list of questions). The interviews took place over Microsoft Teams and were recorded or transcribed. The transcribed copies of the interviews and the themes / notes used were then shared with the participants to ensure accuracy in what was being conveyed and to make sure that the person's voice was being maintained.

This method was chosen to provide support / work in tandem with the narrative inquiry process. As some of the experts self-identified as neurodivergent as well, they were able to offer unique insights into how their field of work and their lived experience combine. The semi-structure nature of the interviews also allowed for the subject matter experts to expand upon the given questions as they related it to their field. These perspectives were then able to provide context to the themes that emerged through the other data collection methods.

3.4.5 Anonymous Survey

The last method of data collection used was an anonymous survey. The online survey was posted on a variety of social media platforms and within multiple inclusive design email forums. The survey was conducted through Microsoft forms and was available for 90 days.

To ensure complete anonymity, a meeting was set with the school's IT department to ensure that the platform would not track the IP addresses of the participants. The only identity related information required was ensuring that participants met the age requirements, their gender, and whether the identified as neurodivergent or not. The survey was open to both neurodivergent and neurotypical adults to identify the differences in responses and to highlight overlap and areas of concern that impact all shoppers.

The survey was chosen to provide support to the themes and discussions that emerged from the co-design session. The anonymous nature of the survey allowed for participants to share more details about their shopping experience. The survey questions covered participants

experiences with sensory friendly hours, why they did or did not use them, and the typical factors that provided the most overwhelm. The survey concluded with an open-ended question where participants could include any information about their shopping experience which they felt was not captured by the survey, but important to include.

3.5 Data Analysis

3.5.1 Analytic Approach

The analysis for this research uses an inductive approach. Instead of beginning with a fixed hypothesis, the research began by identifying some specific observations and using them in tandem with multiple data sources to develop broader themes and conclusions. The themes and patterns were identified by continually engaging with the material across multiple stages of data collection to build upon the understanding of the insights gained generated. This approach is particularly beneficial when using co-design and participant-forward methods, as the data is grounded in individuals lived experiences. At the same time, the wide range of neurodiversity means that experiences are not universal; things that may apply to myself, may not apply to others. This multi-phased approach created opportunities to reflect on potential unconscious bias while also identifying areas of shared concern across participants.

Continuing with this iterative approach, the primary coding strategy for this analysis was informed by grounded theory. The coding process unfolded in multiple stages. Initial coding involved close reading line by line through the various collection methods to identify significant concepts from experts related to sensory perception and design implications. The codes at this stage remained open to prioritize capturing the nuanced ideas over early categorization.

This was followed by focused coding through constant comparison. Codes identified in the initial stage were compared across methods to identify stronger themes and more defined categories. Revisiting the data through this comparative lens helped refine emerging patterns and clarify relationships between concepts. Throughout this process, memo writing served as a critical analytical tool. Memos documented initial insights, thematic connections, and questions requiring further exploration. This helped to support the transition from early observations to more cohesive analytical themes. Repeated engagement with the coded material ensured that categories remained grounded in the source data and that interpretations were continually tested rather than assumed.

Following this stage of comparison, a final phase of analysis was conducted in which the developed themes and outcomes were compared with those identified in the literature review. This step helped to situate the findings within existing research, highlighting areas of alignment as well as points of divergence. In doing so, it became possible to identify which insights were supported by prior studies and which contributed new perspectives that warrant further investigation.

3.5.2 Analytical Rigor and Reflexivity

To support rigor, the analysis employed iterative coding, constant comparison, and systematic memo writing. Repeated engagement with the data reduced the risk of selective interpretation and allowed categories to be refined through critical reflection. Reflexivity was maintained by documenting analytical decisions and acknowledging how perspectives from different disciplines influenced interpretation. This transparency contributes to the credibility of the findings and helps clarify the conceptual pathway from data to discussion.

4 Findings

4.1 Participant Profile and Survey Overview

The survey was distributed publicly through social media, as well as posters placed in local grocery stores and at Spectrum Paediatric Services. The first section established participant eligibility, requiring respondents to be either over 18 years of age or over 16 and legally emancipated. The survey was open to both neurodivergent and neurotypical individuals, resulting in a total of 56 responses. Of these, 84% of participants self-identified as neurodivergent, 11% as neurotypical, and 5% preferred not to answer. Participants were also invited to share demographic information, including age and gender. Among respondents, 68% identified as female, 20% as male, and 12% as non-binary or agender. Most participants were between the ages of 26–35, followed by those aged 18–25 (See Table 1).

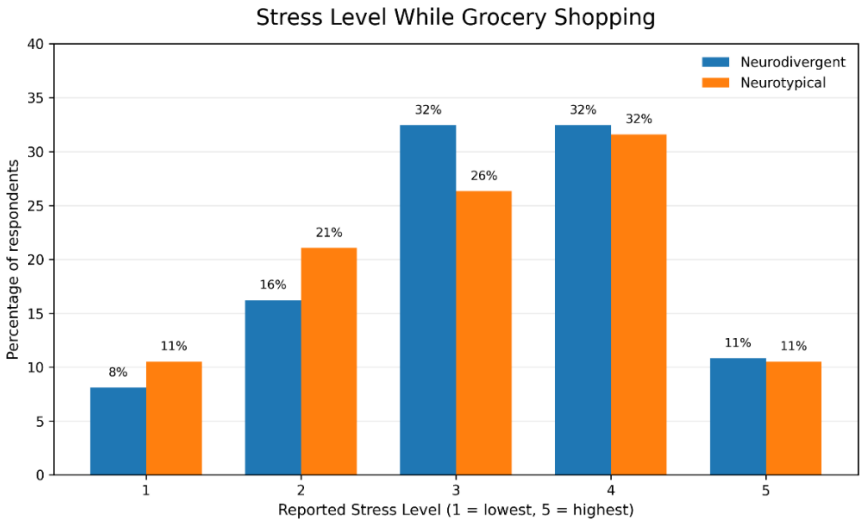
Table 1: *Survey Demographic*

Age of Participants	Percentage of Respondents
18-25	23%
26-35	43%
36-45	16%
46-55	9%
56-65	5%
65+	4%

Note: The number of survey responses categorized into age groups.

Following the demographic section, participants were asked to report their average stress levels while grocery shopping and the frequency with which they experience sensory overstimulation. To better understand variation in responses, results were separated between neurodivergent and neurotypical participants.

Figure 8: *Stress Levels of Shoppers*



Note: Percentages represent the proportion of respondents within each group reporting each level of stress while grocery shopping. Neurodivergent respondents (n = 37); neurotypical respondents (n = 19). Stress was rated on a scale of 1 (lowest) to 5 (highest).

Similar proportions of both groups reported moderate stress levels, with 32.43% of neurodivergent respondents and 31.58% of neurotypical respondents selecting a level 4. Overall, 23% of participants indicated that they always experience overstimulation while grocery shopping. Specific sources of overstimulation are explored further in the thematic findings below.

Figure 9: *Overstimulation Occurrences While Shopping*

Note: Percentages represent the proportion of respondents reporting the commonality of overstimulation while grocery shopping. Occurrences were rated on a scale of 'Never' to 'Always.'

The survey also asked participants to reflect on their experiences with sensory-friendly shopping hours, including perceived benefits and barriers to access. Many respondents described

these environments positively, particularly highlighting reduced lighting and noise levels. Participants noted that these conditions supported faster emotional and physical regulation following shopping. Some comments include:

- "I walked out of the store and didn't have to sit in my car for 10 minutes just to get my heart rate back to resting, it was so much calmer"
- "Very nice, I wish more spaces that are intense would have lower lights and music. Even for neurotypical people."
- "It was much improved. Easier to navigate and think."
- "It was an improved experience except that the quiet hours are never at a convenient time of day."

Despite these positive responses, participants also identified several limitations. Sensory-friendly hours were often described as inconveniently scheduled or located, limiting their accessibility. Additionally, 27% of respondents indicated they were unaware that such programs existed, suggesting a lack of effective communication and visibility.

Figure 10: *Barriers to Sensory-Friendly Shopping Hours*

Note: Percentages represent respondents' explanation as to why they are unable to access sensory-friendly shopping hours.

4.2 Divergent Perceptions of the Grocery Environment

The varying perspectives from experts and participants highlight how differences in sensory perception shape customers' experiences of grocery environments. Participants consistently described processing both external and internal sensory inputs in ways that differed from neurotypical expectations, often making everyday spaces more difficult to navigate. An occupational therapist (OT) interviewed for this study explained that, in addition to the five

external senses (sight, smell, hearing, touch, and taste), there are three internal sensory systems: proprioception, vestibular processing, and interoception. Proprioception refers to the body's awareness of its position and movement in space through muscles and joints. The vestibular system, located in the inner ear, governs balance and spatial orientation. Interoception involves internal bodily signals, such as hunger, thirst, temperature, and the need for rest or bodily regulation. And with these internal senses, each person's experience will vary based on how they are wired (Maslin, 2022). Variations in these internal systems were reflected in participant accounts, particularly in descriptions of discomfort that were difficult to identify or communicate.

This difference and heightened sensory awareness can trigger as a traumatic response for some neurodivergent adults as "their nervous system registers intense senses as dangerous" (personal communication, 2025). This framing was reflected in participant experiences, where heightened sensory input was associated with distress and reduced capacity to engage with the environment. Despite this, participants emphasized that these environments are not optional. Grocery stores were described as necessary spaces that must be navigated regardless of discomfort. Many participants spoke about enduring rather than engaging with these environments, including the need to "white knuckle" through routine tasks.

The resulting isolation, depression, and fear caused by this approach only reinforces trauma responses while trying to complete an everyday task. These results are also fed by stereotypes and preconceived notions on what disabled people look like and thoughts around adults with disabilities all having caregivers to support them.

4.3 Regulation, Stress, and the Window of Tolerance

Across interviews, surveys, and co-design sessions, participants consistently referred to limits in what they could tolerate before becoming overwhelmed. Often described by therapists as a "window of tolerance," referring to the range of input a person can manage while remaining regulated. The OT interviewed as part of this study noted that many of her clients experience everyday environments, including grocery stores, as pushing them beyond this range in ways that feel distressing.

Survey responses reinforced this experience, with multiple participants describing feeling physically and mentally drained after shopping, often requiring time to regulate afterwards. One participant shared that they "normally have to lay down to decompress even if it was just a short grocery trip." Others pointed out that even though they had self-regulation strategies to use while grocery shopping, store policies around bags and personal items can limit access to them, restricting their ability to regulate in the moment.

Participants also discussed the mental preparation required before entering the store and how this preparation can be draining. Remembering to make a list, bring reusable bags, travel to the store, and navigate the parking lot can all require mental effort before shopping has even begun. While these tasks may seem minor individually, their cumulative demands can be significant for neurodivergent shoppers. This mental load may reduce their window of tolerance before they even begin navigating the store, leaving less capacity to manage the sensory and cognitive demands encountered during the shopping experience.

Interview and co-design participants identified in-store recovery spaces as a potential way to support regulation during shopping. While recovery spaces were not explicitly mentioned by name, discussion around these spaces emerged indirectly through talks of fatigue, overwhelm, and the need for preparation or recovery time. Participants frequently described needing to pause, leave, or decompress after exposure to the grocery environment, suggesting a gap in the current design of stores. These types of spaces are rarely provided, with participants referencing locations such as pharmacy seating or blood pressure stations as the only available options for briefly stepping away. This need was further articulated by Michelle Thorkelson, an interior designer focused on design for sensory regulation, who noted that "an element of design that's important in supporting people is retreat spaces" (personal communication, 2026). These were described as areas of refuge integrated throughout the store, offering opportunities to step away from sensory input without exiting the environment entirely. When discussing the qualities of these spaces, participants emphasized the importance of reduced stimulation. Thorkelson specifically highlighted the use of biophilic elements and natural lighting as features that could contribute to a more calming atmosphere.

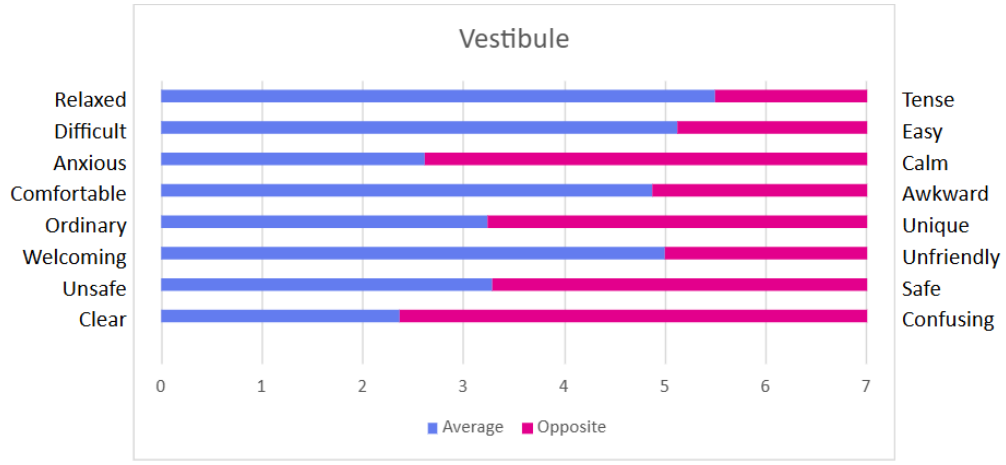
4.4 Lighting as a Persistent Sensory Stressor

Lighting was one of the most consistently identified sources of discomfort across all data collection methods. Participants described a range of issues, including glare reflecting off floors and the ambient hum of overhead fixtures, positioning lighting as a common and persistent stressor. In the survey, 67.85% of respondents indicated that lighting impacted their shopping experience. This concern was reinforced in the co-design sessions, where participants identified harsh fluorescent lighting as a key point of friction. Participants discussed how the harsh lighting creates a sterile and corporate feel, rather than a warm inviting one. This is further supported by the visual jury, in which comments echoed this sentiment. One participant, responding to an image of a brightly lit and highly saturated vestibule (see Figure 11), noted that "the yellow walls are harsh with the fluorescent lights and concrete, making the space feel closed-off and industrial."

Figure 11: *Jury Image 1*

Note: A bright yellow grocery store vestibule. 2025. Photo captured by author.

Figure 12: *Results of Jury Image 1*



Note: Responses were measured using a 7-point semantic differential scale between each pair of opposing descriptors. Ratings closer to 1 indicate the descriptor on the left, while ratings closer to 7 indicate the descriptor on the right.

Results from the jury indicated that participants found the vestibule to be particularly unwelcoming, with many comments citing the intensity of the lighting and its reflection off the surrounding walls as the main reason. This is particularly significant given that the vestibule is one of the first spaces shoppers encounter when entering the store, potentially shaping their initial impression of the environment before they have even begun shopping.

Thorkelson further contextualized these responses by emphasizing the importance of natural lighting, noting that "natural lighting is the best, when possible, it has the greatest effect on sensory comfort and regulation" (personal communication, 2026). She also described how access to natural light can support intuitive wayfinding by drawing shoppers toward more comfortable areas. In addition, she recommended the use of flicker- and hum-free lighting systems to reduce less perceptible but still impactful sources of discomfort.

While lighting was frequently identified as an issue, participants provided fewer specific design solutions compared to other sensory categories. Many were able to clearly articulate a dislike of fluorescent lighting but had more difficulty identifying preferred alternatives. This may reflect a broader shift toward LED lighting in commercial environments, where sources of discomfort such as flicker or hum are less immediately recognizable. Despite this, lighting remained a key factor in positive experiences as well. Multiple survey respondents identified reduced lighting as one of the most beneficial aspects of sensory-friendly shopping hours.

4.5 Wayfinding and Cognitive Load

Another consistent tribulation participants reported throughout the various research methods was store navigation. While stores kept similar styles of signage throughout the various locations, the constant reorganization of departments reduced the usefulness of these signs and wayfinding methods. As the occupational therapist mentioned in our interview, “many neurodivergent people have a hard time figuring out what to pay attention to or what information is important” (personal communication, 2026). So, signage is not as effective for neurodivergent wayfinding; a hierarchy of visual information is needed to clearly convey where people should go versus an overload of visual information. This is highlighted in the perceptual jury, as all the neurodivergent participants mentioned that they did not notice the directions about number of items allowed on the image below (Figure 13). It was only because of the image description that they recognized that it was there.

Figure 13: *Jury Image 2*

Note: The self-checkout banner at a grocery store. 2025. Photo captured by author.

Even when people were able to identify the directional signage, they mentioned that the increased surrounding stimuli exceeded their window of tolerance and resulted in decision paralysis.

- “The sign says what I need to do, but there is too much stimulus, and I hate being surrounded by objects trying to get my attention so I will buy them at the last minute. It is oppressive, and I cannot move any direction but forward without causing a disturbance”

When discussing methods to improve the effectiveness of signage as a wayfinding method, co-design participant Carter, mentioned using a ‘Fisher-price model’ of using large print that toddlers can read as a base point for font size and legibility. This was paired with the suggestion of reducing the number of graphics on the sign itself to reduce visual clutter. Participants’ comments regarding signage also highlighted a broader concern with the amount and consistency of information presented throughout the store.

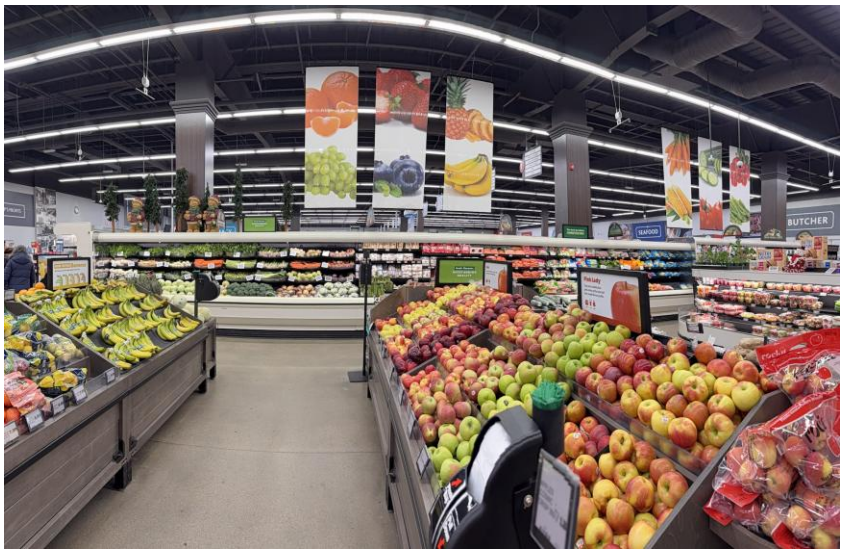
Respondents of the interviews and surveys commented on the variety of store layouts between different chains and locations and how that set up reduces the predictability of their shop and can cause added stress. While this information was captured in the literature review, participants were able to expand upon it by describing how the lack of defined departments also impacted the quality of their shop. One participant mentioned how they specifically avoided certain stores because of the way the produce, deli and bakery sections were combined. In addition to being an unexpected change in routine, participants commented on the time-consuming nature of these layout discrepancies.

The importance of predictability within grocery stores was particularly emphasized by interviewed experts. Thorkelson noted that “wayfinding is critical for people who are neurodivergent because it helps with predictability” (personal communication, 2026), highlighting how clear navigation can reduce uncertainty within the shopping experience. Participants frequently connected distress and overwhelm to not knowing where items were located, how a store was organized, or what to expect from the environment before entering it. In response to these challenges, Caroline Clevenger and Bing Han discussed their development of an app intended to support people with intellectual disabilities in navigating indoor spaces. Rather than simply replicating store directories, the app provides an additional layer of guidance by directing users through spaces in a more detailed and structured way. As described by Clevenger, the system not only identifies the correct aisle, but also provides more specific locational information within the aisle itself (personal communication, 2025). These discussions suggest that participants valued both physical and digital forms of wayfinding that increase clarity, reduce uncertainty, and support a more predictable shopping experience.

In contrast to the anxiety associated with navigating unfamiliar or unpredictable spaces, some participants identified areas of the store that felt easier to engage with. In the perceptual jury, the

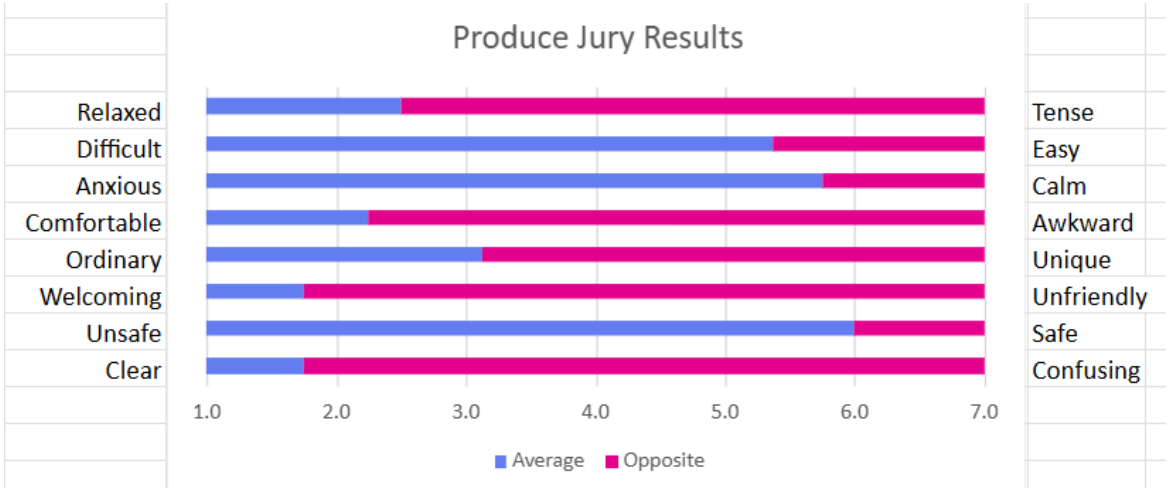
produce section was rated as the most comfortable, welcoming, and clear out of all the images shown (Figure 14 & 15). Comments from the jury praised the clear site lines and organization, while also pointing out the wider aisles and room for navigation. Jury results also showed that participants felt comfortable in the produce section with a rating of 2.5, vs all other areas of the store, in which participants rated between 4-5.

Figure 14: *Jury Image 3*



Note: A produce section at a grocery store. 2025. Photo captured by author.

Figure 15: *Results of Produce Jury Image*



Note: Responses were measured using a 7-point semantic differential scale between each pair of opposing descriptors. Ratings closer to 1 indicate the descriptor on the left, while ratings closer to 7 indicate the descriptor on the right.

4.6 Crowding, Proximity, and Social Stress

Crowding and proximity to others emerged as one of the most consistently identified stressors across the study. In addition to supporting easier wayfinding, participants frequently associated wider aisles and open circulation paths with a greater sense of comfort and regulation. When asked which factors impacted their shopping experience the most, 49 out of 56 survey respondents identified crowding and proximity to others as significant concerns. Participants described these experiences as being impacted not only by the number of people within the store, but also by the physical organization of the environment itself. Narrow aisles, bulk product piling, and temporary aisle displays were repeatedly mentioned as contributing to feelings of congestion and restriction in movement. Several participants noted that these obstructions made it more difficult to navigate the store, particularly during busy shopping periods.

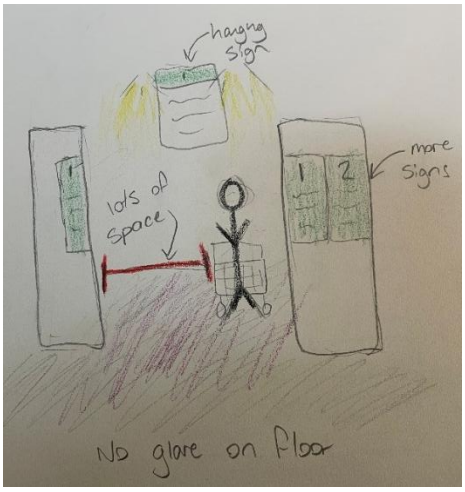
Experiences of crowding were also discussed in relation to the COVID-19 pandemic. Multiple participants reflected positively on the spacing regulations and capacity limits implemented during that time, noting that these measures made grocery shopping feel more manageable and less overwhelming. Participants described appreciating the additional personal space created through occupancy limits and directional circulation systems.

- “I mostly target quiet / slow hours at the grocery store. I do not like dealing with crowds of people pushing carts. It is less stressful to go when the store feels almost empty”
- “In general, I am not a fan of clumps of people in any shopping center”
- “I mostly just get annoyed at other shoppers' lack of spatial awareness”

These responses were also reflected within the perceptual jury findings. Across many of the store images, participants rated the spaces midway between relaxing and tense, with ratings tending further toward tense in areas that appeared more crowded or required direct employee interaction. In contrast, spaces with wider circulation paths and fewer visual obstructions were associated with greater comfort (see Appendix C.2: Jury Results). During the co-design sessions, participants consistently incorporated wider aisles and increased spacing between displays into their proposed store layouts, further reinforcing the importance of spatial openness within the shopping environment.

Figure 16: *Co-design Aisle Drawing*

Figure 17: *Co-design Signage Drawing*



Both participant drawings from the co-design session included notes about spacing within the aisles and the use of bright colours. Participants discussed how easily identifiable differences between aisles and products could make the store easier to navigate. Clear visual distinctions can help shoppers understand the organization of the space and develop a stronger sense of where they are within the store. The additional spacing shown in both drawings also supports the need for less congested circulation areas, providing greater room to move through the store while reducing feelings of crowding and visual clutter. Together, these elements suggest that participants valued an environment that was easy to navigate and visually distinguishable without relying on excessive information or stimulation.

Across the findings, participants described feelings of overwhelm as more often resulting from the combination of multiple sensory inputs rather than from a single isolated stimulus. Lighting, sound, visual clutter, crowds, scents, and the physical demands of navigating the store were frequently discussed as overlapping experiences, with the presence of several stimuli at once contributing to increased difficulty during a shopping trip. Participants' experiences also varied, with stimuli that may be manageable individually becoming more difficult when experienced alongside other cognitive demands, such as finding products, interpreting signage, or navigating an unfamiliar layout. This suggests that sensory experiences within the grocery store were not described as isolated factors, but as interconnected elements that collectively influenced participants' shopping experiences.

5 Discussion

5.1 Grocery stores as overstimulating environments

While the study is focused on the neurodivergent shopping experience, the response from the neurotypical respondents also indicated heighten stress levels while grocery shopping. The design of this system being stressful to all customers identifies a flaw in the store design. The stress levels for neurodivergent shoppers can range from mild discomfort to triggering full trauma responses. Understanding these perspectives aides in identifying the common themes and struggles that neurodivergent shoppers are facing and helps provide context as to why both interviewees and co-design participants mentioned the idea of recovery spaces in grocery stores.

The store confronts customers immediately. The use of floral displays and coffee shops positioned near store vestibules engage the customers' senses as soon as they enter the store. While the biophilic element of the floral displays is pleasant, the perfumes and pollen that are associated are not. It is not that shoppers are wanting these programs to disappear, but rather they would like to be able to orient themselves and make the choice to go into these departments, rather than be forced into them. The scent sensitivities mentioned throughout the data collection was also aimed at the scented products within the cleaning and pharmacy sections. This is another instance of customers being required to pass through scent heavy aisles to access the things they need, especially when it comes to over-the-counter medication. This is once again an area of the store that multiple demographics could benefit from changing, as these scent heavy areas can cause intense headache, asthma attacks, and skin irritations (Levi, 2026).

5.2 Regulation and Predictability

While the store entrance can be overwhelming, multiple participants also touched on how the stress of grocery shopping begins before they reach the store. The thought process of planning the shop, getting to the store, and making sure you have reusable bags are all things that can cause anxiety. This overwhelm then accumulates as they continue to shop. Responses indicated that the level of dysregulation was increased the most when sensory exposure was forced. These forced exposures are not limited to the previously discussed scented aisles but extended to unavoidable interactions and social stressors through means of congested aisles and busy shopping times. Shoppers attempts to self-regulate in these high sensory zones is also being restricted when the tools that they use are being confiscated from the people who need them.

Based on the findings results, these distress levels can be reduced using preview information and wayfinding strategies. Participants frequently mentioned how they preferred to shop at stores they were already familiar with; this adds to the level of predictability and ease of wayfinding when trying to navigate a store and complete a shop within a timely manner. When shoppers have that increased predictability, it reduces the cognitive load that they are carrying through the entirety of their shopping experience. Being able to pre-plan a shopping route can also prevent frustration from needing to double back to areas of the store they have already been and can allow people to visualize their route. Pairing this with the highly sought after wayfinding improvements would also provide customers with the opportunity to choose if / when to engage with certain sensory exposures, such as strong scents or employee engagement.

Participant feedback identified multiple elements that could support them while grocery shopping, with these forms of support consistently relating back to regulation and reducing stress levels. Participants expressed a desire to be able to shop without becoming overwhelmed or reaching a point of heightened stress. This included having the ability to navigate the store independently, understand their surroundings, and access strategies or spaces that allowed them to regulate themselves when needed. Across the responses, the ability to have greater control over their shopping experience was identified as an important factor in managing stress and maintaining a sense of independence.

5.3 Invisible disability and expanded accessibility

Through the survey, several participants noted that they were either unaware of sensory-friendly shopping hours or had developed their own strategies for navigating grocery stores instead. Others described these programs as occurring at inconvenient times or feeling as though they were not intended for them. When considered alongside the literature review, this response becomes more understandable. Many sensory-friendly shopping programs were originally developed to support parents shopping with autistic children, rather than addressing the broader experiences of neurodivergent adults. As a result, these accommodations often focus on temporary adjustments to the environment rather than rethinking the overall accessibility of the shopping experience itself.

While existing sensory-friendly shopping hours can provide meaningful support, participants' responses suggest that they are often viewed as specialized programs rather than examples of inclusive design integrated into the store environment. The findings of this study instead point towards the importance of predictability, emotional regulation, and sensory accessibility as consistent considerations rather than time-limited accommodations. Participants described challenges related not only to sensory input, but also to uncertainty, navigation, crowding, and the cognitive load required to remain regulated while shopping.

This also highlight the difficulties associated with designing for invisible disabilities. Unlike physical accessibility barriers, sensory distress and dysregulation are often internalized or masked, making them less visible to store owners and designers. Current accessibility systems frequently rely on individuals self-disclosing their needs or formally submitting complaints before changes are considered. However, participants consistently identified employee interactions and proximity to others as stressful aspects of the shopping experience. In conversations with interview participants and co-designers, many stated that they would be more likely to change stores, if possible, than raise concerns directly with management.

This reveals a contradiction within existing accessibility practices. The people most affected by these environments may also be the least likely to advocate for themselves within them. When individuals are already expending significant energy trying to remain regulated, the expectation that they should additionally justify or explain their need creates another barrier to accessibility. Participants' responses instead suggest the need for broader community engagement and more proactive approaches to inclusive design. Rather than being introduced as reactive accommodations or optional programs, sensory and cognitive accessibility considerations should be incorporated into the design process from the beginning.

5.4 Existing Examples of Supportive Design

Although many contemporary grocery stores continue to present significant sensory challenges, participants identified several existing design elements that already contribute to a more accessible shopping experience. These examples demonstrate that sensory-supportive environments are not purely theoretical. Rather, many effective design strategies have already

been implemented, either intentionally or because of operational changes, suggesting that creating more inclusive grocery stores may require adaptation rather than complete redesign.

One of the most frequently referenced examples was the temporary changes introduced during the COVID-19 pandemic. Public health measures required stores to implement one-way aisles, directional signage, and physical distancing markers to manage customer movement and reduce crowding. While these measures were introduced to reduce the spread of illness, many neurodivergent customers described them as significantly improving the shopping experience (Tarazano & Daemmrich, 2020). Participants described these changes as reducing anxiety by creating greater personal space and limiting unpredictable interactions with other shoppers. Clearly defined traffic patterns increased the predictability of movement throughout the store, reducing the cognitive effort required to navigate busy aisles or negotiate around other customers. Rather than constantly monitoring the movement of surrounding shoppers, participants reported feeling more confident about where people would be travelling, making the environment feel calmer and easier to navigate.

Although these operational changes were temporary, they illustrate how relatively minor modifications can improve accessibility without requiring stores to fundamentally alter their existing business model or physical layout. The positive responses from participants suggest that simple interventions, such as improving circulation patterns or reducing unnecessary congestion, can have a meaningful impact on the shopping experience. These findings reinforce that sensory-supportive grocery stores are a practical and achievable goal rather than an idealized concept.

Another example of supportive design identified by participants was the produce department. Across interviews, surveys, and the visual jury, produce sections were consistently perceived as more comfortable and welcoming than many other areas of the store.

- “This feels easier to navigate that some isles. It is easy to see most things, and the signs make it clear what section it is.”
- “The produce section is normally wide open to walk around in and nicely organized which I normally have no problem with. Easy to find what I need.”
- “Open options help with needing to escape people”

Participants attributed this positive experience to several environmental characteristics commonly found within produce departments. Compared to the remainder of the store, these spaces often feature wider circulation paths and more open layouts, allowing shoppers to move comfortably without feeling confined or crowded. Lower produce displays improve visibility across the department, making it easier to orient oneself and anticipate the movement of other customers.

The material qualities of produce sections were also viewed positively. The presence of fresh fruits, vegetables, wood finishes, and natural colours created an environment that participants described as feeling calmer and less clinical than the highly manufactured appearance of other grocery departments. Participants also noted that produce areas often incorporate softer or more natural lighting, which reduces glare and visual discomfort while creating a more relaxed atmosphere.

Together, these characteristics demonstrate how openness, visibility, natural materials, wider circulation, lower shelving, and softer lighting can contribute to a more supportive sensory environment. While these features were not necessarily designed with neurodivergent shoppers in mind, participants consistently identified them as making the shopping experience less overwhelming. These existing examples provide valuable precedents that can inform future sensory-inclusive grocery store design.

5.5 Technology and unrealized accessibility tools

Accessibility is often perceived as costly, time-consuming, and difficult to implement. However, this perception may be partly related to accessibility being considered only after existing systems and environments have already been established. As noted by Disability Belongs (2026) incorporating accessibility from the beginning can help avoid the additional costs and complexity associated with retrofitting an environment to address barriers after they have been identified. The findings of this study suggest that this distinction is particularly relevant to sensory accessibility in grocery stores.

Although many of the design changes identified by participants could require physical modifications to store environments, others could be addressed through technologies and systems that already exist within the grocery industry. This suggests that improving sensory accessibility

may not always require the development of entirely new tools and may instead require existing technologies to be reconsidered and adapted to support accessibility.

Wayfinding provides one example of this potential. Grocery retailers already use a range of technologies to manage inventory and support online ordering and click-and-collect services. These systems require retailers to maintain information about product availability and, in many cases, the location of products within a store. Electronic shelf labels and other inventory management technologies further demonstrate the capacity for retailers to maintain increasingly detailed information about the relationship between products and their physical locations.

In combination with emerging indoor navigation technologies, these systems could provide new opportunities to address the wayfinding challenges identified by participants. An example of this could be the software being developed and tested by Clevenger and Han (Han & Clevenger, 2024). Although the software is still in development, its testing demonstrates the possibility of creating tools that could provide shoppers with more individualized guidance through complex environments.

Such technology could be particularly valuable if it were designed to provide more than the most efficient route between two locations. A navigation system could potentially allow shoppers to select routes based on their individual sensory needs. For example, a shopper might choose to avoid areas that are particularly crowded, departments associated with strong scents, or areas with limited space for movement. If the system incorporated real-time or regularly updated information about traffic levels, routes could potentially be adjusted in response to changing conditions within the store. Rather than requiring all shoppers to navigate the store in the same way, this technology could provide individuals with greater control over how they move through the environment.

At the same time, the findings raise a broader question: if grocery retailers already possess technologies that could potentially contribute to greater accessibility, why are these technologies not more commonly being applied in this way? One possible explanation is that sensory accessibility is difficult to identify through traditional measures of customer demand. The absence of visible complaints should not be interpreted as evidence that accessibility barriers do not exist. Brachman (2019), alongside comments from participants in this study, indicates that

neurodivergent shoppers may respond to uncomfortable or overwhelming environments by avoiding them rather than by reporting their experiences directly to businesses. A shopper may choose to shop at a different store, shop online, change the time at which they shop, or avoid shopping altogether. From the perspective of the retailer, these behaviours may not be recognized as responses to an inaccessible environment.

This creates a significant challenge for accessibility planning. When businesses respond primarily to measurable demand, the needs of customers who are absent from the environment can remain invisible. The lack of complaints may therefore reflect avoidance rather than satisfaction. In the context of sensory accessibility, this creates a cycle in which customers who experience the greatest barriers may be the least likely to remain present within the environment long enough for their needs to become visible to the business. This suggests that a more proactive approach may therefore be necessary. Rather than waiting for accessibility needs to become visible through complaints or measurable customer demand, retailers could consider how existing systems and technologies might be adapted to support a broader range of sensory experiences. This does not mean that technology can replace physical environmental changes. Rather, technology may provide an additional layer of support that allows shoppers to exercise greater control over how they access and navigate the store.

The potential of these existing tools depends on whether sensory accessibility is recognized as a legitimate design consideration. The issue may not be a complete absence of technological capability, but rather a gap between what existing systems can do and the purposes for which they are currently being used. Closing this gap could provide an opportunity to improve accessibility without requiring every intervention to begin with a complete redesign of the grocery store environment.

5.6 Implications for inclusive grocery design

The findings of this study suggest that sensory-inclusive grocery store design has implications that extend beyond improving the experiences of neurodivergent shoppers alone. While this research focused specifically on understanding the experiences of neurodivergent adults, many of the environmental features identified by participants align with broader principles of inclusive design and have the potential to benefit a wide range of shoppers. These observations do not suggest that all individuals experience grocery stores in the same way.

Rather, they demonstrate that design strategies intended to reduce sensory and cognitive barriers may also improve usability, comfort, and independence for many customers.

Throughout this study, participants consistently described design features that increased predictability and reduced the cognitive effort required to navigate grocery stores. Wider aisles, clearer wayfinding, quieter environments, predictable circulation patterns, opportunities for rest, and reduced exposure to strong scents were all identified as contributing to a more positive shopping experience. Although these features were discussed primarily in relation to neurodivergent experiences, there is little about these interventions that limits their usefulness to a single population. For example, wider circulation routes may improve mobility for older adults, parents navigating strollers, individuals using mobility devices, and shoppers recovering from injury. Clearer wayfinding and predictable store layouts may reduce cognitive load for first-time visitors, individuals experiencing anxiety, or people shopping while fatigued. Similarly, quieter spaces, reduced scent exposure, and opportunities for rest may improve comfort for individuals living with migraines, asthma, chronic illness, or temporary conditions such as illness or fatigue. Employees working within these environments may also benefit from reductions in unnecessary sensory stimulation throughout the workday.

This does not suggest that universal solutions exist or that all shoppers share the same needs. Participants repeatedly emphasized that sensory experiences vary, even among neurodivergent individuals. Inclusive grocery store design should therefore not be understood as creating a single "ideal" shopping environment. Instead, it involves providing greater flexibility, choice, and opportunities for shoppers to interact with the environment in ways that best support their individual needs.

Taken together, these findings suggest that sensory accessibility should be viewed not as a niche consideration, but as an integral component of inclusive retail design. Grocery stores are essential community spaces that most people rely on throughout their lives. Designing these environments to better accommodate sensory, cognitive, and emotional differences has the potential to increase independence, reduce barriers to participation, and improve everyday experiences for a diverse range of shoppers. In this way, sensory-inclusive design extends beyond accessibility for a single user group and contributes to grocery stores that are more welcoming, equitable, and supportive for the communities they serve.

6 Recommendations

As research outcomes and findings suggest, there is a need to evolve or develop design parameters for updating current retail, as well as other built environments where inclusion of diverse experiences can be prioritized. The following presents a guideline intended for use by a wide range of entities engaged in the development, design, and implementation of retail environments.

While this guideline is developed specifically for the retail environments examined in this research, it is intended to function as a "living document" that can be expanded and adapted to suit other environments, including cultural, institutional, and commercial spaces. The guideline is organized into sections based on the thematic areas identified throughout the research. With the first section focusing on customer navigation throughout the retail environment, with each design consideration organized around the challenges identified by participants and the findings from this study. This approach helps clarify the intention behind each consideration and its connection to the research findings.

The guidelines are conceptual and are intended to be used alongside existing CSA accessibility standards and other applicable requirements. Some design considerations appear in multiple sections to highlight how a single thoughtful design choice can address a range of accessibility needs. The guide is grounded in the principles of Inclusive Design (Inclusive Design Research Centre, n.d.), which underpin this research and its findings, and aims to support the development of environments that are more responsive to a diverse range of users.

6.1 Guidelines for Sensory Friendly Retail Environments (SFRE)

6*.1.1 Spatial Organization and Navigation*

The recommendations begin with the physical aspects of navigating the grocery store, particularly the amount of space available for shoppers to move through the environment comfortably. While increasing the width between aisles can provide greater room for circulation, participants identified that spatial accessibility extends beyond aisle dimensions. Bulk displays, promotional stands, and other temporary fixtures can further restrict circulation, obstruct sight lines, and contribute to feelings of crowding and visual overwhelm. Maintaining clear and

unobstructed circulation paths is therefore an important consideration in creating a more navigable environment.

The ability to process and understand one's environment also plays a key role in navigating it comfortably. While grocery stores may vary in the organization and arrangement of their departments, establishing a consistent and recognizable organizational structure can improve the predictability of the shopping experience. Beyond organizing products by department, larger stores may benefit from creating smaller, clearly defined zones within these departments. For example, distinguishing between fresh and commercially produced bread, or between fish and meat, can provide additional spatial cues that help shoppers understand where they are within the store and what to expect within each area.

Reducing visual clutter further supports this process by allowing shoppers to distinguish relevant information from competing visual stimuli. Excessive promotional materials, displays, and signage can introduce numerous competing cues, making it more difficult to identify the information needed to navigate the store. Wayfinding should therefore incorporate multiple forms of environmental information rather than relying solely on signage. Clear and consistent signage remains important but can be supported through additional cues such as variations in floor colour or pattern to define zones, recognizable landmarks, changes in materials, and the use of natural lighting to reinforce spatial boundaries. Together, these strategies can create a more legible and predictable environment that supports navigation without requiring shoppers to process an overwhelming amount of information.

Table 2: *Spatial Organization Guidelines*

Challenge	**Proposed Design Response**
Improving Circulation	- Limit unnecessary floor displays and promotional materials - Avoid the use of bulk display piles in aisles and tighter areas of circulation - Aisles to go beyond minimum required widths to allow for sufficient space to pass, stop, and navigate without feeling crowded (7'-8') - Identify one-way aisles - Avoid the rearrangement of displays where possible, or include a designated area for rotating displays / products
Reducing Visual Clutter	- Minimize hanging displays that obstruct sight lines - Reduce the use of promotional banners and signs - Minimize impulse displays positioned around wayfinding information
Wayfinding Strategies	- Use changes in flooring colour, material, or subtle area rugs to communicate transitions between departments. - Use consistent spatial cues to distinguish different areas. - Stores to provide multiple wayfinding strategies at each location (multisensory options) - Increase usage of tactile signage throughout (See **Table *3***: Visual and Lighting Guidelines)
Preview Information	- Provide maps and store inventory online for customers to acquaint themselves with prior to entering the store - Supply physical maps or guides in-store - Ensure preview information is updated regularly to remain beneficial - Provide access to store activity levels

Note: The guidelines in this section focus on creating a more open and navigable environment by reducing physical and visual barriers. Strategies such as wider aisles, reduced clutter, and improved sightlines can provide greater space for movement while also making the environment easier to understand.

While the preview information represents less of a direct design response, it remains an important consideration within these guidelines. Rather than identifying a specific intervention, it establishes a broader principle for inclusive design by emphasizing the importance of predictability, clarity, and reduced cognitive load for neurodivergent shoppers. Including these considerations alongside specific design interventions provides a reminder that individual strategies should ultimately work toward creating environments that are easier to understand, navigate, and process.

6.1.2 Visual and Lighting Environment

Visibility influences not only how shoppers navigate and organize themselves within a space, but also how they experience and process the environment more broadly. Natural lighting should be prioritized where possible, particularly in areas that involve key activities such as checkouts, customer service desks, and regulation spaces. Lighting levels may also be varied between departments, with lower-intensity lighting used where appropriate to reduce unnecessary visual stimulation. Beyond lighting itself, material selection can further influence the visual experience of the store. The use of low-glare flooring and flicker-free lighting, for example, can address sources of visual discomfort that may otherwise go unnoticed during the design process. Together, these considerations demonstrate the importance of treating visibility as more than simply the ability to see, but as an aspect of the environment that can influence sensory comfort and regulation.

The signage recommendations presented in the table below are closely aligned with those identified in the CSA guidelines. While the overall direction of these recommendations is similar, the findings of this study provide additional insight into the reasoning behind them, particularly the importance of clear, easily distinguishable information without competing imagery or unnecessary visual content. This distinction reinforces the need to consider not only whether information is present and accessible, but also how much competing information a shopper must process in order to use it effectively.

Table 3*: Visual and Lighting Guidelines*

Challenge	Proposed Design Response
Lighting Variations	- Prioritize natural lighting where possible, followed by warm lighting - Reduce harsh or inconsistent artificial lighting - Position key activities and departments in areas receiving natural light (entrance, checkout, recovery space) - Use varied lighting levels where appropriate, particularly in areas such as produce or product displays. - Incorporate roof line windows to provide addition natural lighting where feasible
Signage	- Reduce competing signs, promotional materials, and decorative imagery. - Make valuable information visually prominent rather than presenting numerous competing messages. - Use simple, consistent signage. - Minimize background imagery behind text. - Use high-contrast type and backgrounds in accordance with the RGD Canada Access Guidelines. - Utilized digital price displays where feasible (preview information)
Material Considerations	- Use flicker-free and hum-free lighting. - Use non-glare flooring and finishes to reduce unwanted visual stimulation. - Use more muted and neutral colours and wood tones
Sight Lines	- Maintain clear views through departments where possible. - Avoid displays that unexpectedly obstruct the shopper's view. - Reduce shelving heights to extend sight lines

Notes: These guidelines focus on making the store easier to understand and navigate by providing consistent visual cues and reducing the amount of information shoppers must process at once.

6.1.3 Multisensory Environmental Conditions

While visual and navigational design elements generated the most frequent discussion throughout the study, auditory, olfactory, and tactile characteristics also had a significant impact on participants' experiences of the grocery store. These categories have been grouped together due to the smaller number of specific design responses identified through the current study. As the perceptual jury develops, these guidelines can be expanded to incorporate additional considerations and responses related to each sensory experience.

The auditory recommendations primarily focus on reducing repetitive mechanical noise and managing the volume of sounds commonly present within the retail environment, including music, announcements, and other background noise. However, these recommendations also highlight the need to recognize that sensory preferences are not universal among neurodivergent shoppers. An environmental condition that provides comfort for a hyper-sensitive shopper may be experienced differently by someone with reduced sensory sensitivity. Providing variation and choice, such as different shopping times with varying music levels or designated quieter zones, can therefore offer greater control over the shopping experience rather than assuming that a single sensory condition will meet the needs of all shoppers.

Similar considerations apply to olfactory and tactile experiences. The location and ventilation of bakeries, floral departments, cleaning areas, and other strong-smelling spaces can influence the distribution and intensity of scents throughout the store. Likewise, tactile elements such as flooring and surface materials can serve both functional and sensory purposes. Washable rugs or other removable materials may be used where appropriate to create tactile or spatially defined zones without permanently altering circulation paths. Together, these recommendations demonstrate the importance of considering sensory variation and providing multiple environmental conditions where feasible, allowing shoppers greater opportunity to find an environment that supports their individual needs.

Table 4: Auditory, Olfactory, and Tactile Guidelines

Challenge	**Proposed Design Response**

Auditory Environment	- Address common sources of unwanted noise such as:
	  o squeaky shopping carts
	  o freezer/refrigeration noise
	  o public announcements
	- Provide quieter areas where shoppers can regulate their sensory experience.
	- Reduce echo and reverberation through appropriate acoustic treatments.
	- Incorporate soft surfaces where feasible
	- Identify times when music will be playing in the store

Olfactory Environment	- Separate scent-heavy departments where possible. - Included scent-free aisles - Avoid unnecessary exposure to cleaning-product scents. - Position seasonal floral displays away from main entrance - Avoid the placement of heavily scented items such as essential oils and candles near the pharmacy and healthcare items
Tactile Environment	- Where hard flooring is necessary, consider localized softer flooring or defined sensory zones to reduce impact noise and provide alternative tactile experiences. - Provide comfortable seating surfaces. - Provide hand sanitizer or wet wipes next to grocery cart corral - Incorporate wood finishes for additional biophilic elements - Where feasible, avoid the use of air curtains at entrances

Notes: These guidelines focus on making the store easier to navigate by reducing the amount of external stimuli and separating high sensory environments.

6.1.4 Environmental Transitions and Regulation

The sensory impact of entering a grocery store can begin before a shopper reaches the sales floor. The transition from the parking lot or surrounding environment into the store can involve simultaneous changes in lighting, temperature, sound, and spatial conditions, creating a significant sensory shift before shopping has even begun. To minimize this impact, the recommendations in this section focus on easing transitions between the various environmental zones of a grocery store, beginning with the transition from the exterior into the store.

Lighting and temperature represent two areas where the difference between indoor and outdoor conditions can be particularly pronounced. Where possible, gradual changes in lighting intensity and temperature can allow shoppers time to acclimate to the new environment rather than requiring them to adjust immediately upon entering. Providing a transitional area at the store entrance can also give shoppers an opportunity to orient themselves before proceeding into the sales floor. These spaces may serve not only as physical transitions, but also as opportunities for shoppers to pause and regulate before engaging with the more stimulating retail environment.

Environmental changes of this kind may not be immediately apparent to store owners or designers, particularly when they are subtle or do not significantly affect many shoppers. As one occupational therapist noted, “just because it's imperceptible to me, doesn't mean it's not there” (Personal communication, 2025). This observation highlights the importance of recognizing that environmental changes that may be insignificant to one shopper can represent meaningful sensory transitions for another. Designing with these transitions in mind can support a more gradual and predictable experience from the moment a shopper approaches the store through to their navigation of the sales floor. Regulation is introduced within this section as an extension of this approach, particularly in relation to transition spaces and providing opportunities for shoppers to pause, reorient, and adjust to their surroundings when needed. While these spaces can support regulation during transitions, the broader application of regulation tools within the grocery store is explored in the following section.

Table 5: *Transition Guidelines*

Challenges	Proposed Design Response
Exterior Transitions	- Gradually transition between significantly different lighting conditions. - Minimize abrupt changes between indoor and outdoor temperatures. - Avoid the use of turnstile gates at entrance - Where feasible, avoid the use of air curtains at entrances

Interior Transitions	- Consider transition zones between:
	  o entrance and sales floor
	  o parking lot and store
	  o quieter and busier areas
	  o natural and artificial lighting conditions
	- Include temperature transitions in and out of the frozen aisle
	- Mark interior transitions with gradual lighting changes

Regulation	- Provide spaces where shoppers can pause and regulate throughout the store.

Note: These guidelines focus on providing shoppers with greater choice in how they plan, navigate, and experience the store. Rather than assuming that one intervention will meet the needs of all shoppers, multiple options can support different sensory and cognitive preferences.

6.1.5 Flexibility, Choice, and Individual Control

The final section focuses on creating an environment in which shoppers can choose how they interact with the space and determine which forms of regulation work best for them. Because neurodivergent experiences and sensory preferences vary, inclusive design should avoid assuming that a single intervention or environmental condition will meet the needs of all shoppers. Instead, stores can provide optional sensory supports and multiple ways for shoppers to plan, navigate, pause, and regulate throughout their visit. Providing these choices can reduce the sensory and cognitive demands associated with grocery shopping, allowing neurodivergent shoppers to complete necessary tasks with less fatigue and greater independence. In this way,

inclusive design moves beyond accommodating a specific sensory preference and instead provides shoppers with greater control over how they experience and interact with the store.

Table 6: *Regulation Guidelines*

Challenges	**Proposed Design Response**

Sensory supports not available	- Provide sensory kits or resources
	- Kits can include items such as:
	  o Over-ear noise cancelling headphones
	  o Small fidget toys
	  o Sunglasses
	  o Sensory map
	  o Etc.

Recovery spaces	- Provide seating options through out the store
	- Include a designated recovery space
	  o Natural lighting
	  o Softer flooring finishes
	  o Biophilic elements
	- Position recovery spaces away from high traffic areas
	- Recovery spaces do not need to be fully enclosed, but should offer some barrier from other stimuli

Community involvement	- Set up opportunities to communicate with community members to determine what design considerations would be most impactful - Provide choices that allow shoppers to modify their experience where possible

Taken together, these recommendations demonstrate that creating a more inclusive grocery store does not require a single solution or a complete restructuring of the traditional grocery store model. Rather, accessibility can be supported through a combination of spatial, sensory, and experiential considerations that reduce unnecessary environmental demands, increase predictability, and provide opportunities for individual regulation and choice. While the

recommendations are informed by the experiences of neurodivergent shoppers, many of the proposed interventions have the potential to support a much broader range of customers. Wider aisles, clearer wayfinding, reduced visual and auditory clutter, comfortable transition spaces, and opportunities to pause or regulate can benefit shoppers with a variety of physical, sensory, cognitive, and situational needs. Ultimately, inclusive grocery store design should not seek to create a single environment that is universally comfortable, but rather an environment that provides sufficient flexibility and choice for shoppers to navigate, process, and interact with the space in ways that support their individual needs.

6.2 Final Guide

The findings of this research suggest an opportunity to reconsider the conventional grocery store model rather than relying solely on isolated sensory-friendly interventions. The proposed approach combines the convenience and technological capabilities of an omnichannel grocery model with the scale, familiarity, and community-oriented character of smaller local grocery stores. This model is intended to create a grocery environment that is more predictable, navigable, and adaptable to the needs of its surrounding community. Rather than treating accessibility as an additional feature applied to an existing store model, the recommendations position accessibility as a consideration embedded within the planning and operation of the store.

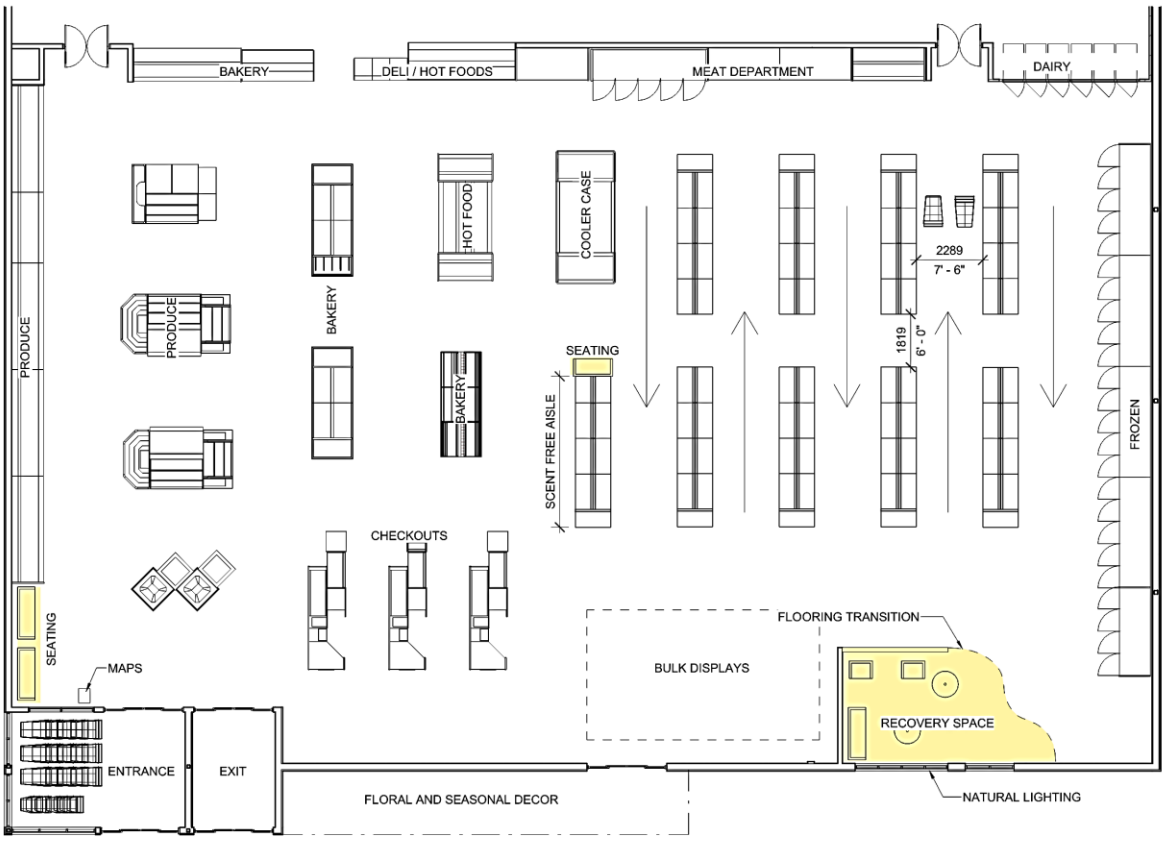
A key component of this model is the use of micro-fulfillment centres to reduce the amount of inventory that must be stored directly on the sales floor. While traditional grocery stores require substantial floor area for product displays and customer access, micro-fulfillment systems create an opportunity to shift a greater proportion of inventory into dedicated storage areas. This could allow future grocery stores to operate within a smaller customer-facing footprint while maintaining access to a comparable range of products. A reduced sales floor could, in turn, create opportunities for more intentional spatial planning, including improved circulation, greater separation between shoppers, and more controlled environmental conditions. Smaller customer-facing spaces may also make it more feasible to implement efficient lighting systems with warmer colour temperatures and reduced visual intensity.

This approach also offers an opportunity to reconsider the spatial organization of modern grocery stores. Early grocery store models, such as Piggly Wiggly, were organized around a more compact and structured shopping experience, in which customers moved through defined

aisles to select their own products. Rather than returning directly to this historical model, the proposed approach draws on its smaller scale and clear organization while incorporating contemporary technology and customer choice. The result could resemble a modernized version of the neighbourhood or “mom-and-pop” grocery store, where the environment feels more familiar, manageable, and connected to its surrounding community. A smaller footprint may also allow individual stores to respond more directly to local needs rather than relying on a standardized design across all locations.

Within this model, one-way aisles and reduced shelving heights could be used to establish clearer circulation patterns while increasing visual openness throughout the store. One-way movement can improve predictability by providing shoppers with a clearer understanding of how others are expected to move through the space. Lower shelving can further support orientation by maintaining longer sight lines between areas of the store and allowing shoppers to preview upcoming spaces. These strategies can also increase the perceived distance between customers, potentially reducing some of the discomfort associated with crowded or visually congested environments. One-way circulation should not, however, require shoppers to travel through the entire length of an aisle to reach a desired product. Incorporating periodic openings between aisles, like the cut-throughs used in some IKEA layouts, could provide alternative routes through the store. These openings would allow shoppers to leave an aisle before reaching its end, reducing unnecessary travel, and providing greater control over their route. Combined with clear wayfinding, this approach could create a circulation system that is both predictable and flexible, allowing shoppers to choose between a more direct route and a more complete browsing experience.

Figure 18: *Example Store Layout*



Note: Example Store Layout featuring one-way aisles and highlighted recovery spaces. 2026. Illustration created by author

Predictability and preview information are particularly important within this framework. In addition to providing information about the physical organization of the store, retailers could provide shoppers with information about current or anticipated levels of activity. The QueVision system explored by Kroger, for example, demonstrated the potential for retailers to monitor and predict customer traffic within stores (McLaughlin, 2014). Building on this concept, real-time or near-real-time information about store activity could be made accessible to shoppers before and during their visit. Similar to the activity information available for some locations through digital mapping platforms, this could allow shoppers to identify quieter periods and make decisions about when to visit based on their individual sensory needs. Providing this information does not require the store itself to always be less active. Instead, it gives shoppers greater control over when they interact with the environment.

Technology can also support accessibility by extending the planning process beyond the physical store. As discussed earlier, many grocery stores already use electronic shelf labels and digital inventory systems. Mapping these existing systems could create an opportunity to develop detailed digital representations of the store and its products. Rather than requiring shoppers to independently navigate the physical environment to locate products, a digital store map could allow them to identify product locations and plan a route before entering the store. Over time, this information could be integrated with additional environmental data, such as areas of higher traffic, strong scents, noise, or other potential sensory stimuli. This would allow shoppers to select routes based not only on efficiency but also on their individual sensory preferences.

The combination of digital planning tools and a more intentionally designed physical environment could therefore provide multiple layers of accessibility. A shopper could preview the store, determine an appropriate time to visit, identify the location of required products, and select a preferred route before entering the building. Once inside, clear circulation patterns, lower shelving, accessible wayfinding, and opportunities to move between aisles would provide additional support. These strategies shift accessibility away from a single intervention and toward a system in which shoppers have greater control over how they interact with the grocery environment.

The proposed model is not intended to create a separate type of grocery store exclusively for neurodivergent shoppers. Instead, it demonstrates how the grocery store can be reconsidered as a more adaptable and community-responsive environment. Many of the recommendations identified through this research, including wider circulation paths, clearer wayfinding, reduced visual and sensory intensity, predictable layouts, rest opportunities, and improved access to information, may benefit a broad range of shoppers. Designing for neurodivergent experiences can therefore serve as a starting point for creating grocery environments that offer greater choice, predictability, and comfort to everyone. The accompanying sensory-friendly design guidelines provide a framework through which these principles can be adapted to different store formats and community contexts, ensuring that accessibility remains responsive to the people who use each space.

7 Conclusions

7.1 Limitations and Future Research

The use of multiple data collection methods helped provide confirmation and further insight into the themes that emerged from the co-design sessions. Future research could benefit from having a larger group of co-designers and more follow-up sessions to allow for a consistent, iterative process and further development of the store design recommendations. Having an extended timeline for the research would also be beneficial, as more time could be allocated to collecting data on the physical aspects of the stores, such as lighting and noise levels. These elements could then be compared to the visual jury results to identify potential physical correlations with areas that were identified as anxiety-inducing. An alternative approach would be to include these same elements in the perceptual jury to collect direct participant feedback on their responses to specific sensory inputs.

Future iterations of this research will be used to develop a more extensive and in-depth set of guidelines for retailers to follow when renovating or constructing sensory-friendly environments. While the primary focus remains on grocery stores, expanding this research to other retail environments would allow for further discussion of what commercial accessibility can look like. This could help identify which design strategies are specific to grocery stores and which can be applied more broadly across different types of retail environments.

7.2 Closing Remarks

Navigating everyday spaces is complicated enough without having to constantly adapt to environments that were not designed with you in mind. For neurodivergent people, this adaptation can become a regular part of completing necessary everyday tasks, while existing accommodations have often focused on children and their caregivers rather than the experiences of neurodivergent adults. Grocery stores should not require shoppers to overcome the environment in order to use it. Instead, they can provide opportunities for people to determine how they navigate and experience the space based on their own needs. Inclusive grocery store design is not about creating one ideal environment for neurodivergent shoppers, but about creating environments that can accommodate diverse ways of experiencing the world. Many of the interventions identified through this research, such as clearer wayfinding, wider aisles, reduced visual clutter, and opportunities to pause, can therefore support a much broader range of

users. This also means recognizing the importance of working with the communities these spaces are intended to serve.

Co-design provides an opportunity for lived experiences to directly inform the development of more responsive and inclusive environments, rather than assuming what people need on their behalf. By considering sensory differences as part of the diversity of everyday users and involving those users in the design process, grocery stores can move toward a more inclusive approach to commercial design that benefits not only neurodivergent shoppers, but anyone who uses these spaces. The guidelines developed through this research are intended as a starting point for considering how grocery environments can become more responsive to different needs, rather than as a checklist for creating a "perfect" store. Ultimately, designing with neurodivergent experiences in mind can help create grocery stores that are easier to navigate, more comfortable to use, and more welcoming to everyone.

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Appendix A: Participant Materials

Appendix B: Co-design Session Structure Outline

CO-DESIGN SESSION 1: EXPLORING THE EXISTING STORE DESIGN

Duration: 45 minutes

INTRODUCTION TO CO-DESIGN WORKSHOP

Hello everyone, and welcome to the second part of this workshop.

My name is Kai Balkwill, and I am a student at OCAD University. I would also like to introduce Hailey Walchuk, who is here today to support us during this process.

- Explanation of resources available

Today begins a two-part co-design process where we will work together to imagine what a more sensory-friendly store could look like. These sessions are meant to be collaborative and creative. Your experiences and ideas are central to shaping the final concept of store layout.

SESSION PURPOSE

The purpose of today's session is to reflect on your experiences in grocery store environments—what works, what does not, and what might be missing. These insights will help guide future layout planning.

0:00–0:10 – INTRODUCTIONS AND SESSION OVERVIEW

- Welcome and reintroductions

- Quick review of what we are doing today and what to expect in future sessions

- Emphasize that all input is valuable. There are no wrong ideas

- Announce shift to collaborative work

0:10–0:30 – DISCUSSION: WHAT WORKS AND WHAT DOESN'T

Prompt Questions: (Sticky Notes, markers)

- What were some things that stood out to you in the visual jury?

- bring out the markers and mark up the pictures

- What parts of stores feel overwhelming or uncomfortable to you?

- What store features or design elements help you feel more at ease or supported?

- Are there examples of store environments you enjoy and why?

- Are there things that did not come up in that process that you think are important?

- Were there sensory elements you did not see reflected in the image sets?

- What would you want a store designer to know about your lived experience that images alone might not show?

0:30–0:40 – GROUP SKETCHING AND LAYOUT DESIGN

- Begin sketching design ideas—individually or in groups

- Use templates, markers, or collage materials to express ideas

- Focus on areas of the store that are most important to participants

Prompts for Sketching:

- What would the entrance look like?

- What kind of lighting or signage would you want?

- How should space be organized to reduce overwhelm?

0:40–0:45 – CLOSING AND PREPARATION FOR SESSION 2

Thanks again for your creative ideas today. I will be creating a summary of everything we have discussed so far. In our final session, we will review that summary together and make sure it reflects your ideas before anything is incorporated into the design.

CO-DESIGN SESSION 2: REVIEWING IDEAS

Duration: 45 minutes

WELCOME AND INTRODUCTION TO FINAL SESSION

Welcome to our final co-design session!

Today, I will be showing you a summary of information based on everything you have shared in Sessions 1. We will walk through it together, and then you will have a chance to give final feedback, suggest changes, or flag anything that needs more thought.

Hailey Walchuk is also here again to support the discussion.

0:00–0:15 – PRESENTATION OF DRAFT STORE LAYOUT

- Walk through the summary

- Highlight where specific participant suggestions were used

- Use visuals to show space, layout, and design elements

- Announce shift to collaborative work

0:15–0:35 – FEEDBACK AND REVISIONS

Open discussion:

- What do you like or feel reflects your input?

- What is missing or could be improved?

- What would you want to change before this becomes part of the final report?

Participants may annotate the design, sketch additions, or offer verbal feedback.

0:35–0:45 – FINAL REFLECTIONS

Thank you so much for participating in this co-design process. Your insights have been critical in shaping a more inclusive store design. I will take the ideas we developed here together and create a sample plan. I will then email this to you all to review before it is incorporated into the final report.

You have helped design something truly meaningful—thank you.

Appendix C: Visual Jury

Visual Jury

Code: _____

Date: _____

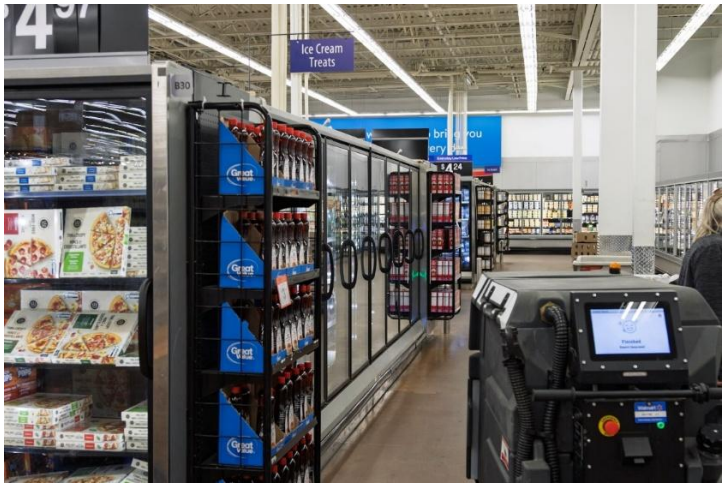
Example 1

Scale	1	2	3	4	5	6	7	
Clear	☐	●	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	●	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	●	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	●	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	●	Awkward
Anxious	☐	☐	☐	●	☐	☐	☐	Calm
Difficult	☐	☐	☐	●	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	●	☐	☐	Tense

Explanation:

The font used was hard to read and the red felt a little harsh.

Example 2



Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	●	☐	Confusing
Unsafe	☐	☐	●	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	●	☐	☐	Unfriendly
Ordinary	☐	●	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	●	☐	Awkward
Anxious	●	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	●	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	●	☐	☐	Tense

Explanation:

This picture made me feel like I would be confused and anxious in this situation. With the cleaning robot in the way, it would be hard to access the food I want, and I wouldn't want to have to ask an employee for help.

Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

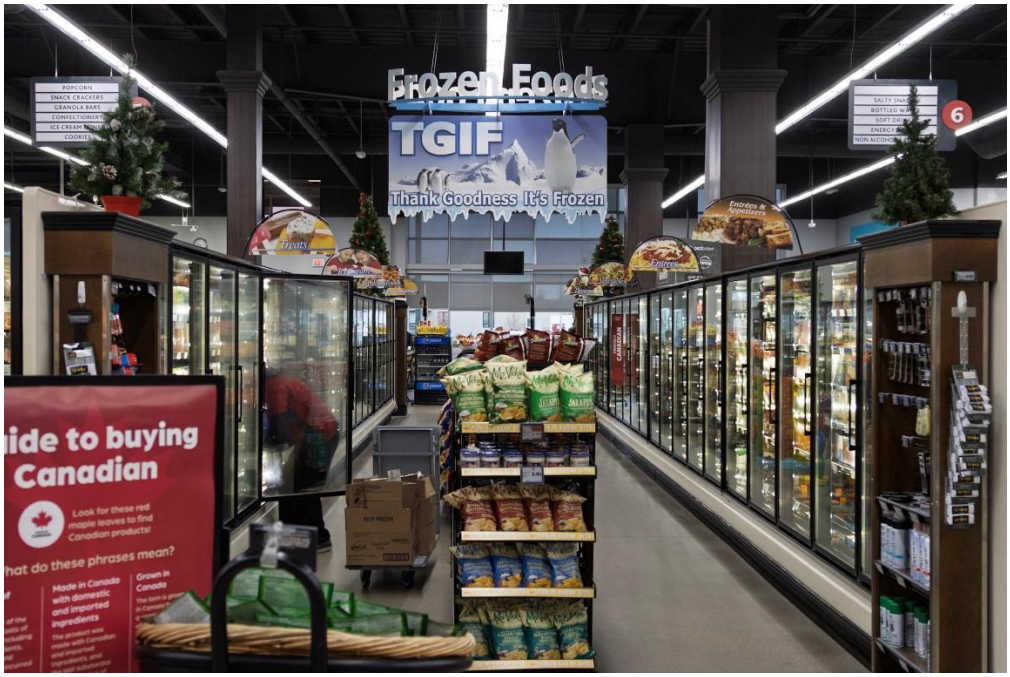
Explanation:

Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:

Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:



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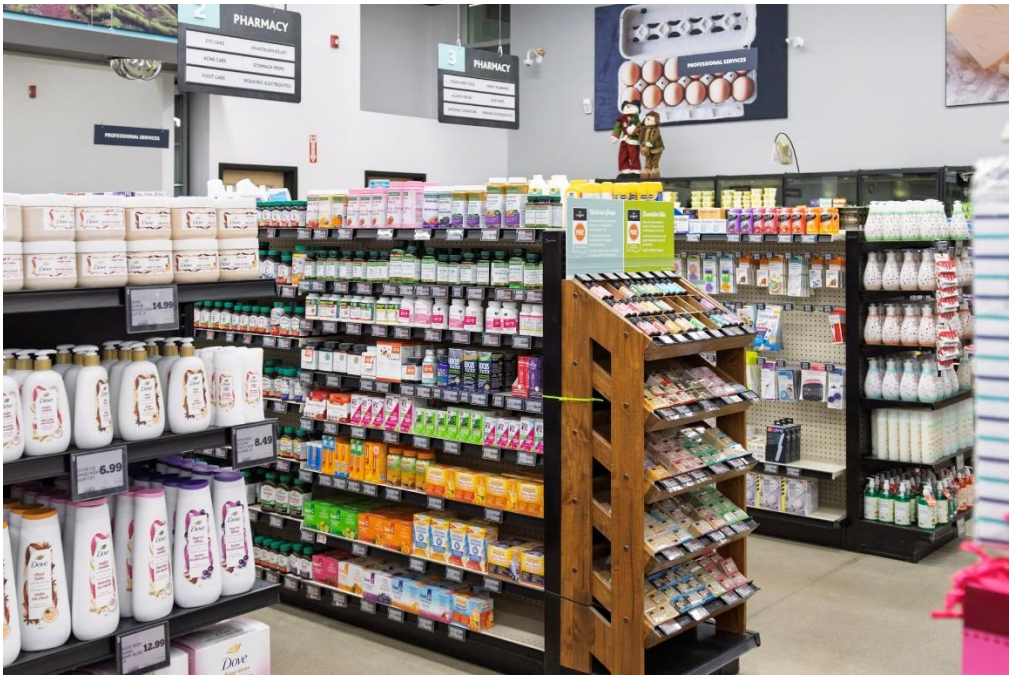
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:



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Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:

Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:

Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:

Scale	1	2	3	4	5	6	7	
Clear	☐	☐	☐	☐	☐	☐	☐	Confusing
Unsafe	☐	☐	☐	☐	☐	☐	☐	Safe
Welcoming	☐	☐	☐	☐	☐	☐	☐	Unfriendly
Ordinary	☐	☐	☐	☐	☐	☐	☐	Unique
Comfortable	☐	☐	☐	☐	☐	☐	☐	Awkward
Anxious	☐	☐	☐	☐	☐	☐	☐	Calm
Difficult	☐	☐	☐	☐	☐	☐	☐	Easy
Relaxed	☐	☐	☐	☐	☐	☐	☐	Tense

Explanation:

C.1: Example of Adapted Jury

Image One

Rate the image on the following scales:

3

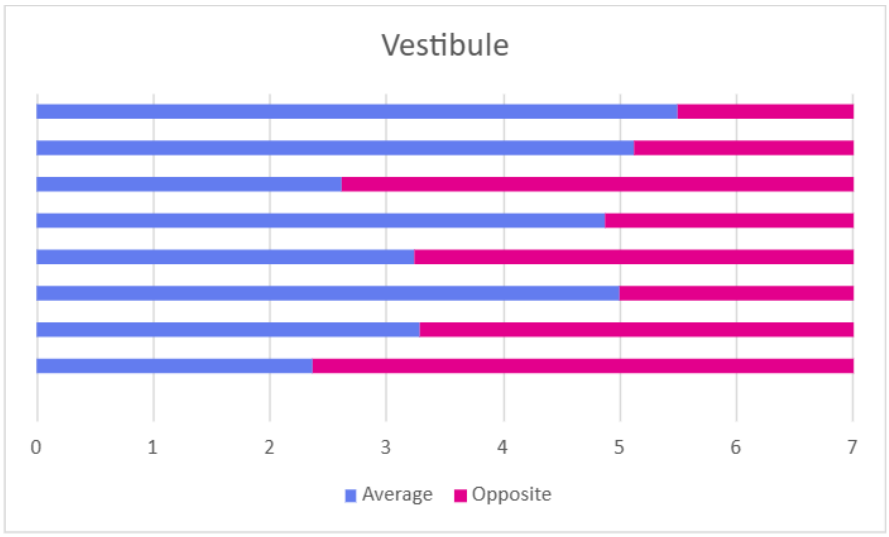
A large vestibule with bright yellow walls. In the middle of the room is the cart corral. The carts require a coin to be inserted into them in order to be used.

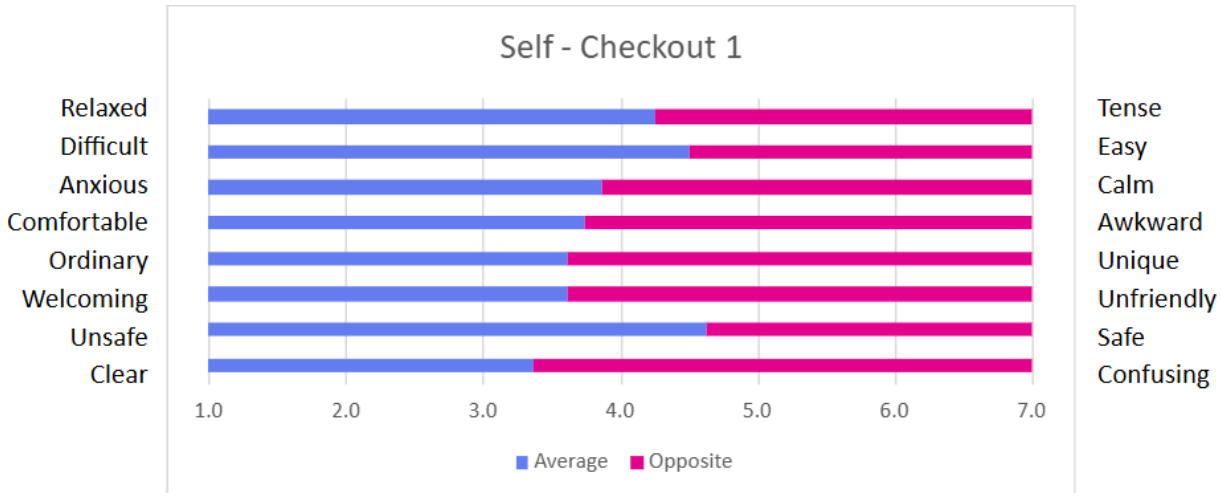
	Strongly Agree	Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Disagree	Strongly Disagree
This space feels clear and understandable	○	○	○	○	○	○	○
This space feels safe to be in	○	○	○	○	○	○	○
This space feels welcoming	○	○	○	○	○	○	○
This space feels unique	○	○	○	○	○	○	○
This space feels comfortable to be in	○	○	○	○	○	○	○
This space make my body feel tense	○	○	○	○	○	○	○
This space makes me feel anxious	○	○	○	○	○	○	○
This space feels easy to navigate	○	○	○	○	○	○	○

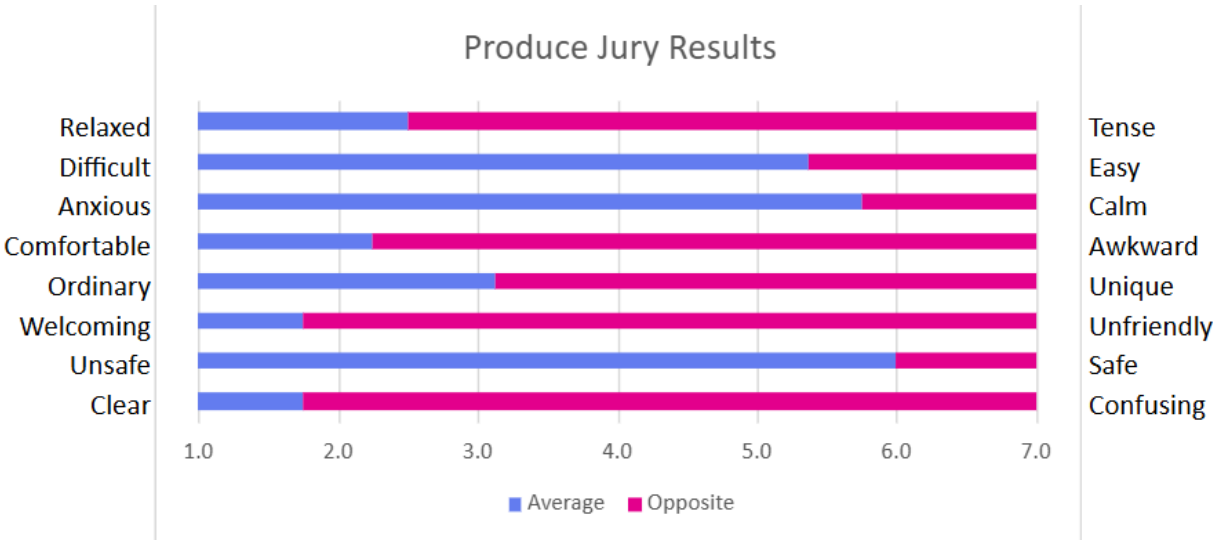
4

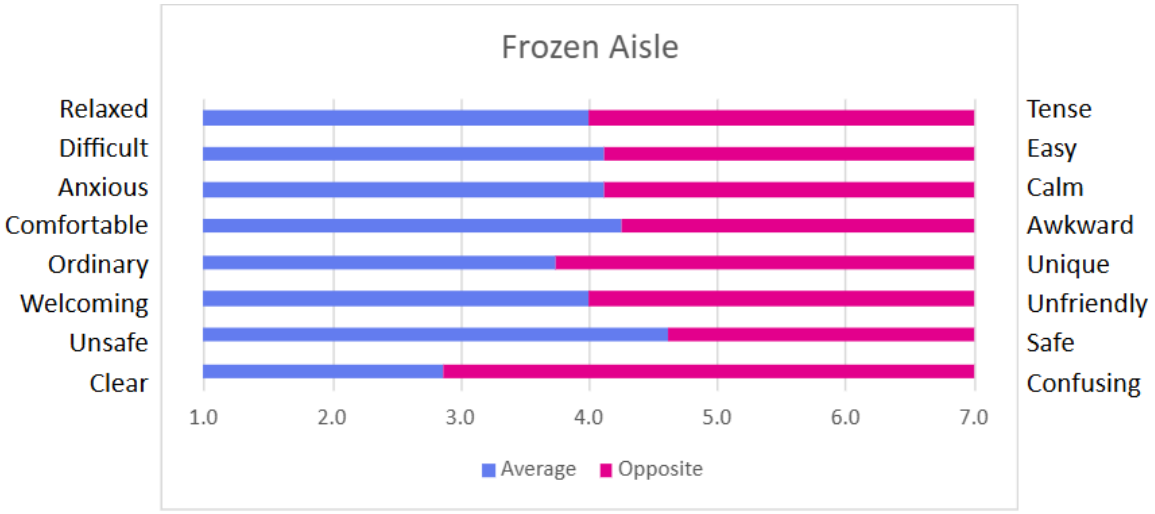
Please provide a short explanation for your choices above

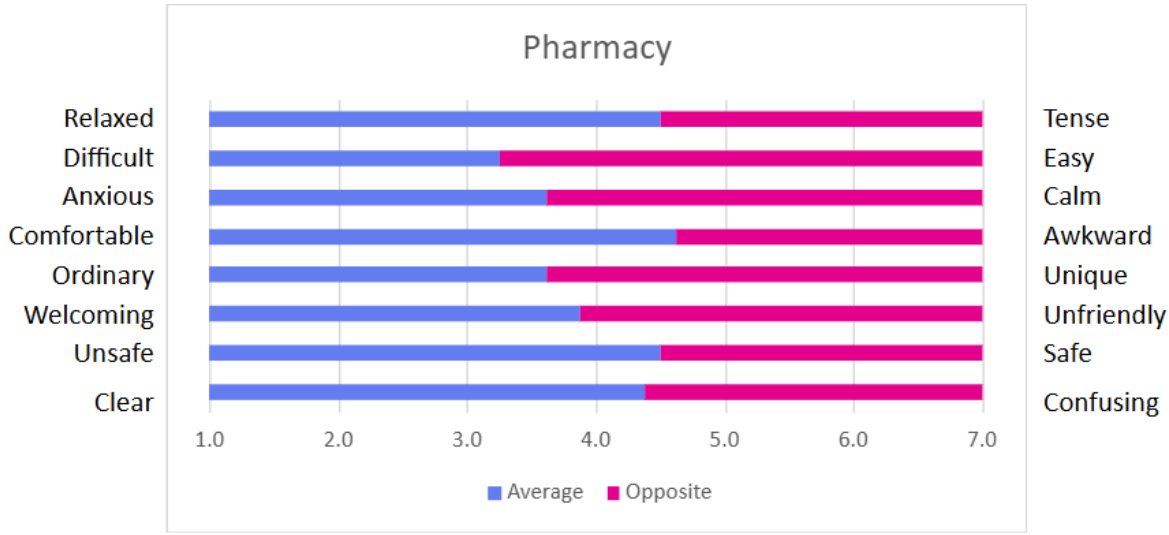
C.2: Jury Results

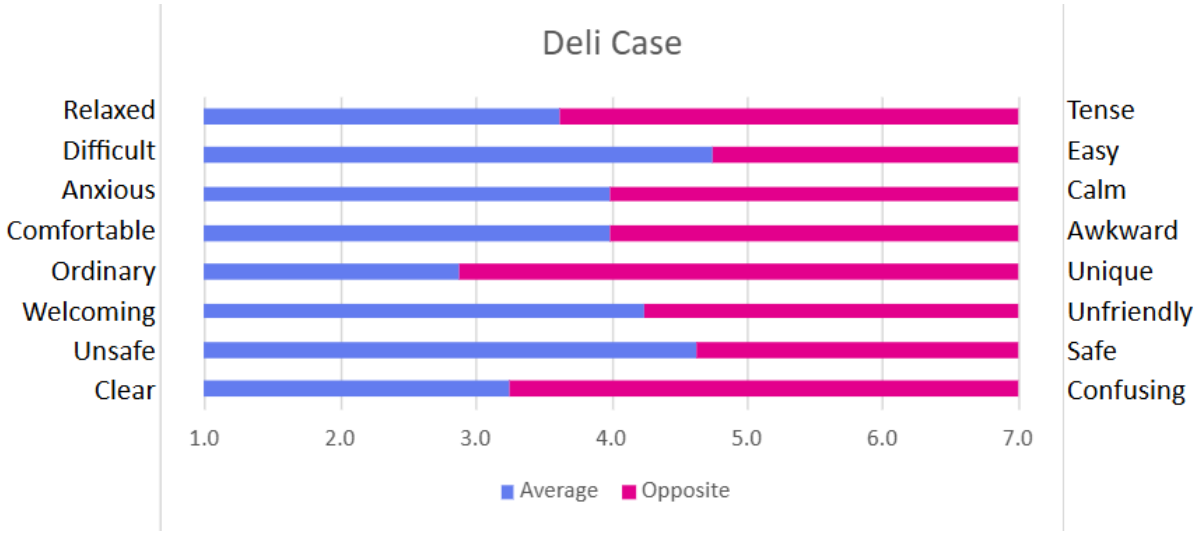







Frozen Aisle
Relaxed
Difficult
Anxious
Comfortable
Ordinary
Welcoming
Unsafe
Clear
Tense
Easy
Calm
Awkward
Unique
Unfriendly
Safe
Confusing
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Average
Opposite


Pharmacy
Relaxed
Difficult
Anxious
Comfortable
Ordinary
Welcoming
Unsafe
Clear
Tense
Easy
Calm
Awkward
Unique
Unfriendly
Safe
Confusing
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Average
Opposite


Deli Case
Relaxed
Difficult
Anxious
Comfortable
Ordinary
Welcoming
Unsafe
Clear
Tense
Easy
Calm
Awkward
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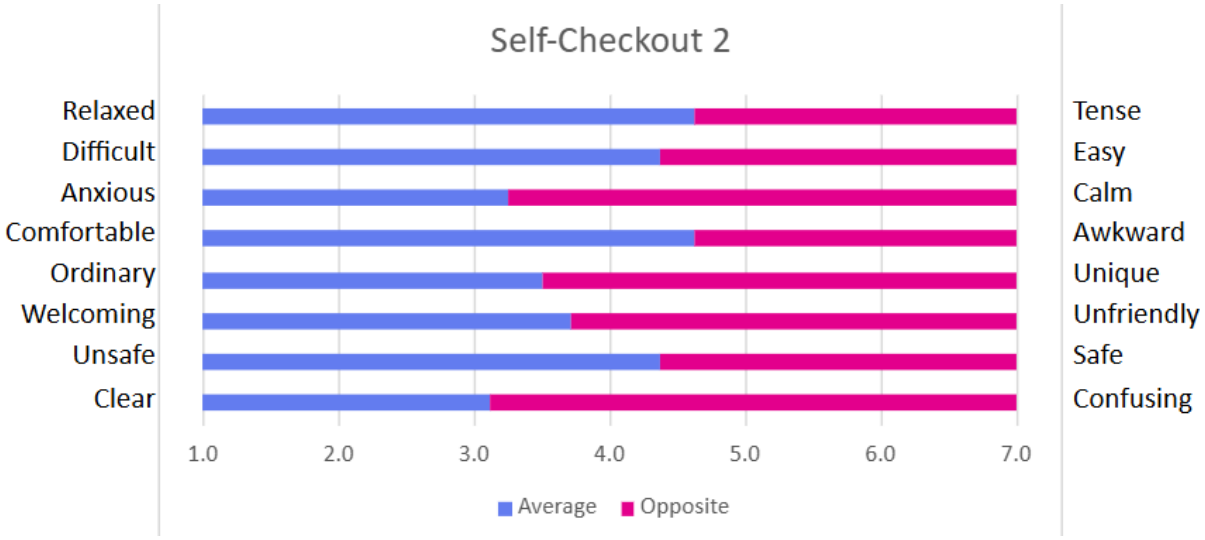
Confusing
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Average
Opposite


Self-Checkout 2
Relaxed
Difficult
Anxious
Comfortable
Ordinary
Welcoming
Unsafe
Clear
Tense
Easy
Calm
Awkward
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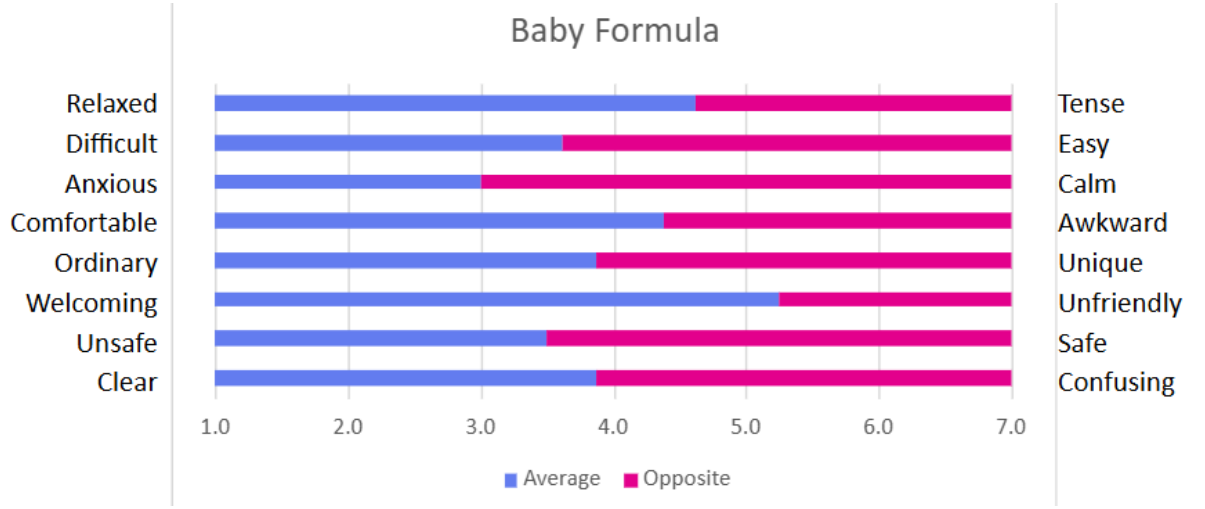
Confusing
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Average
Opposite


Baby Formula
Relaxed
Difficult
Anxious
Comfortable
Ordinary
Welcoming
Unsafe
Clear
Tense
Easy
Calm
Awkward
Unique
Unfriendly
Safe
Confusing
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Average
Opposite

Appendix D: Interviews

Introduction

Hello, and thank you for joining me today. My name is Kai Balkwill, and I am a student at OCAD University. This interview is part of my research on sensory-friendly design in grocery stores, with a focus on the experiences of neurodivergent adults. Your insights will help inform recommendations for more inclusive and accessible retail environments.

Before we begin, I would like to confirm—are you comfortable with me recording this interview for the purposes of transcription and analysis? The recording will be stored securely and used only for research. As noted in the consent form, you may choose to remain anonymous or be identified by name and/or organization.

Please remember that your participation is voluntary—you are free to skip any questions or end the interview at any time. Do you have any questions before we start?

Interview Script for All Experts

1. How do you define “sensory-friendly” in your work or practice?
2. What is your understanding of how environment affects emotional or behavioural regulation for neurodivergent people?
3. What are some effective methods for assessing people’s experiences of a space, especially when self-reporting is limited or unreliable?

For Architects and Designers

4. Can you describe your approach to inclusive or sensory-friendly design in built environments?
5. What design elements do you find most effective in supporting sensory accessibility?
6. What are common design pitfalls when trying to create spaces for neurodivergent individuals?
7. How do you typically evaluate the sensory impact of a space on its users?

8. How do you balance universal design principles with more individualized sensory needs?
9. Can you describe a project where sensory experience was a core design priority? What were the outcomes?
10. What tools or methods (e.g., mock-ups, visual juries, simulations) have you used to assess or prototype sensory design features?
11. How do you navigate conversations about sensory-friendly design with the client?

For Professionals working with Neurodivergent Adults

12. How do sensory environments impact the people you work with on a day-to-day basis?
13. What are the most common sensory challenges that neurodivergent individuals experience in public spaces like stores or offices?
14. Are there particular environmental factors (e.g., lighting, sound, texture) that your clients often mention as distressing or helpful?
15. How do you support clients in navigating overstimulating environments?
16. In your view, what does a truly sensory-friendly or inclusive environment look like?
17. Have you been involved in any advocacy or consultation around the design of inclusive spaces? If so, what did that look like?
18. What do you think designers or planners often overlook when trying to create accessible spaces for neurodivergent users?

Appendix E: Survey

Sensory Shopping Experience Survey

This survey aims to collect data about the neurodivergent grocery shopping experiences. Your responses will remain anonymous; you can stop answering at any time. You do not need to identify as neurodivergent to complete this survey.

Survey Details and Consent

This study will contribute to a Major Research Project (MRP) as part of completing the Inclusive Design program at OCAD University. This survey aims to propose guidelines for inclusive grocery store space planning aimed at those who are neurodivergent or experience sensory overwhelm. The answers gathered by this survey will help the researcher understand who is impacted by current grocery store designs and to identify key areas that should be redeveloped with an inclusive design lens. This survey will take about 5-10 minutes of your time. It is completely anonymous, it will not collect names, contact info, IP address, or other identifiable data, and does not represent any risk for the participants. You can stop answering at any given moment throughout the survey, but your answers may not be changed after you have submitted them. If you have any questions about this study or require further information, you may contact the Principal Investigator, Kai Balkwill at kbalkwill@ocadu.ca or the Faculty Supervisor Cheryl Giraudy at cgiraudy@ocadu.ca. If you have questions regarding your rights as a participant in this study please contact: Research Ethics Board c/o Office of the Vice President, Research and Innovation at research@ocadu.ca.

* Required

About you

Your information is highly confidential, the following information is for internal research purpose only, all information will not be shared externally.

1. Do you agree to participate in the described study, and do you understand the information stated before about the implications of the study and who to contact in case you have any questions? * *
   *If the answer is no, this is the end of the survey, thank you for your response
   - o Yes
   - o No

2. Are you 18 years of age or older? Or are you 16 years of age or older and legally emancipated? * *
   *If the answer is no, this is the end of the survey, thank you for your response
   - o Yes
   - o No

3. Do you identify as any of the following:

- Neurodivergent
- Neurotypical (not neurodivergent)
- Prefer not to say
- Other

4. How old are you?

- 18 - 25
- 26 - 35
- 36 - 45
- 46 - 55
- 56-65
- 65+

5. What gender do you identify with?

- Female
- Male
- Non-binary
- Prefer not to say
- Other

6. What grocery chain do you shop at most frequently?

- Sobeys / Safeway
- Costco
- Co-op
- Walmart
- Fresh-Co
- Independent
- Save-on Foods
- No Frills
- Other

7. How would you rate your stress level while grocery shopping on a scale of 1-5 (1 being not stressed and 5 being very stressed)

1	2	3	4	5

8. How often do you feel overstimulated by lights, sounds, or smells in grocery stores?

- Always
- Often
- Sometimes
- Rarely
- Never

9. Which sensory factors, if any, impact your shopping experience the most? (select all that apply)

- Bright or flickering lights
- Background music
- Intercom announcements
- Crowds or close proximity to others
- Strong food smells
- Temperature (too hot/cold)
- None of the above

10. Have you ever ordered groceries online or through a service, such as Instacart?

- Yes, and I like it
- Yes, but I don't like it
- No
- Other

11. Have you ever shopped during quiet/sensory friendly hours?

- Yes
- No

12. If no, why not?

- My grocery store doesn’t offer it
- It isn’t available when I want to shop
- I didn’t know this was available
- I don't feel like I need to shop during these hours
- Other

13. If yes, how was your experience?

14. Is there anything else you would like to share about your grocery shopping experiences?