

Grocery Shopping Performance and Occupational Therapy Intervention to Target Participation Following Moderate to Severe Traumatic Brain Injury

Submitted by

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Abstract

Background and Objectives

Evidence highlights that people with moderate to severe traumatic brain injury have continued difficulty with instrumental activities of daily living, such as grocery shopping. There is limited research that investigates specific occupational performance difficulties or interventions related to this occupation. Therefore, this research aims to understand how people with traumatic brain injury participate in grocery shopping and current occupational therapy intervention approaches for this population.

Method

Three interrelated studies were completed; study 1 aimed to understand how grocery shopping fitted in a wider routine, as described by adults living with a moderate to severe traumatic brain injury. Study 2 explored how people with moderate to severe traumatic brain injury completed specific steps within the occupation of grocery shopping. Finally study 3 aimed to describe grocery shopping rehabilitation components and then determine the relationship between cognitive and motor disabilities and grocery shopping independence after traumatic brain injury. Therefore, a multiple method design was used. Studies 1 and 2 used a qualitative approach to understand 14 participants' perceptions of grocery shopping after traumatic brain injury. Study 3 used a quantitative approach, auditing rehabilitation files to describe rehabilitation components, and administering the Mayo-Portland Adaptability Inventory and the Functional Autonomy System to determine correlations between impairments and community shopping independence after traumatic brain injury.

Results

Studies one and two had a total of 14 participants with severe or very severe traumatic brain injury were recruited from the inpatient and community rehabilitation settings of a specialised brain injury service in Melbourne. Therefore, time post injury varied with 36% of participants in the initial recovery phase (0-6 months), 36% of participants 2+ years post injury and the remaining participants in between 6 months to 2 years post injury. The majority of participants were in the 25-44 year old bracket (64%). Study three had a total of 39 people with moderate to severe traumatic brain injury that engaged in rehabilitation to support participation with grocery shopping were recruited. The majority of participants were male (62%) with a mean age of 41.89 and time post brain injury 47.43. Findings support that there is a standard set of steps of grocery shopping as outlined in the AOTA framework definition with our participants describing in depth the importance of the occupation of community access as being closely lined with grocery shopping. Participants also described grocery shopping as one of the core occupations that is embedded within a person's wider routine with factors such as the social context and familiarity of the environment shaping how people engaged in this occupation. Study three did show that grocery shopping performance can improve over time with 11 of the 32 participants showing improvement in grocery shopping performance from being dependent or needing assistance to managing independently at the 12 month post brain injury mark.

All three studies highlighted the impact that cognitive, physical and visual changes had on all steps of grocery shopping, with study 3 revealing that for those who were community living at 12-months, specific impairments such as memory, novel problem and mobility were also significantly related to shopping performance dependency ($p \leq .05$). Study three provided evidence that grocery shopping performance can improve over time.

Conclusion

Grocery shopping is a complex occupation that is embedded within a person's wider routine and has multiple cognitive, visual-perceptual, and physical demands that may be impaired following a traumatic brain injury. Despite often severe impairments, however, many people do attain a level of autonomy within the occupation of grocery shopping across their rehabilitation journey and once discharged to community living. Clinical practice should include consideration of the familiarity of the grocery shopping task and environment to optimise grocery shopping performance after traumatic brain injury.

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List of Abbreviations

EC- Ethics committee

FIM™ – Functional Independence Measure

MPAI-4- Mayo Portland Adaptability Inventory 4

PTA – Post Traumatic Amnesia

SMAF- Functional Autonomy Measurement System

TBI- Traumatic Brain Injury

Statement of Authorship

Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis submitted for the award of any other degree or diploma. No other person's work has been used without due acknowledgement in the main text of the thesis. This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution. All substantive contributions by others to the work presented, including jointly authored publications, is clearly acknowledged. Laura De Lacy is the sole author of Chapter 1 (Introduction), Chapter 2 (Background), Chapter 5 (Study 3) and Chapter 6 (Discussion). The remaining chapters (listed in Dissemination of Findings) are multi-authored where Laura De Lacy was the lead author and completed the majority of the work, including conception, design and management of studies; data collection and analysis; writing and revisions of draft chapters and the publication submissions.

All research procedures reported in this thesis were approved by relevant Ethics Committees (EC) prior to the commencement of each study. Ethics approval was required for the work presented in this thesis by La Trobe University Human Ethics Committee (UHEC acceptance of Alfred EC project 598/19), and Alfred Health Human Ethics Committee (598/19; 164/21). Copies of ethics approvals are provided in the Appendix.

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Signature: Laura De Lacy

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Dissemination of Findings

Peer-reviewed publications:

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De Lacy L., Lannin N., Fleming J., Sansonetti D. (2021). Shopping routines: A qualitative study of adults living with traumatic brain injury. *Poster presentation* at the 18th NR-SIG-WFNR conference, 06/07/2021, Lorne, Victoria, Australia (virtual conference).

Statement of the Impact of COVID-19

Like many higher-degree candidates, Laura De Lacy has had to make changes to their research due to the impact of COVID. Below you will find a statement from the candidate, approved by their Supervisory Panel, that indicates how their original research plan has been affected by COVID restrictions.

Candidate's Statement:

Studies 1 and 2 were originally designed to recruit 20 people living with brain injury, and investigate their perceived role within the occupation of grocery shopping (study 1) and the processes of the occupation as well as the perceived impact of the brain injury (study 2). When COVID restrictions came into effect on 25/03/2020 in Melbourne, grocery shopping was impacted with respect to stay-at-home orders, restrictions on numbers of household members who were permitted to shop, restrictions on item purchasing (both availability of items as well as restrictions on numbers that may be purchased), and restrictions on the number of people permitted inside stores at any time (resulting in queuing). Grocery shopping pre-COVID and the experience of shopping during the COVID restrictions could not be meaningfully combined, and I therefore ceased recruitment to these studies earlier than planned. As a result, the final sample size was fewer than planned for these two studies.

Signature:

Laura De Lacy

Date: 20/04/2022

Chapter 1: Introduction

Chapter 1 will provide a background to grocery shopping and will describe the American Occupational Therapy Practice Framework (American Occupational Therapy Association, 2020) as a theoretical framework for understanding the relationship between traumatic brain injury, occupational participation, environmental factors and occupational therapy. The aims of this program of research and an outline of the thesis structure will also be presented.

Grocery shopping is a core instrumental activity of daily living that involves the steps of planning, selecting, purchasing, and transporting items (American Occupational Therapy Association, 2020). Moderate to severe traumatic brain injury can have long term impacts on a person's ability to complete more complex activities of daily living such as grocery shopping. To date research has looked more broadly at difficulties encountered following traumatic brain injury within instrumental activities of daily living, but there is a gap in the literature that looks specifically at the occupation of grocery shopping and the occupational therapy assessments and interventions that support participation in this occupation.

Problem Under Study

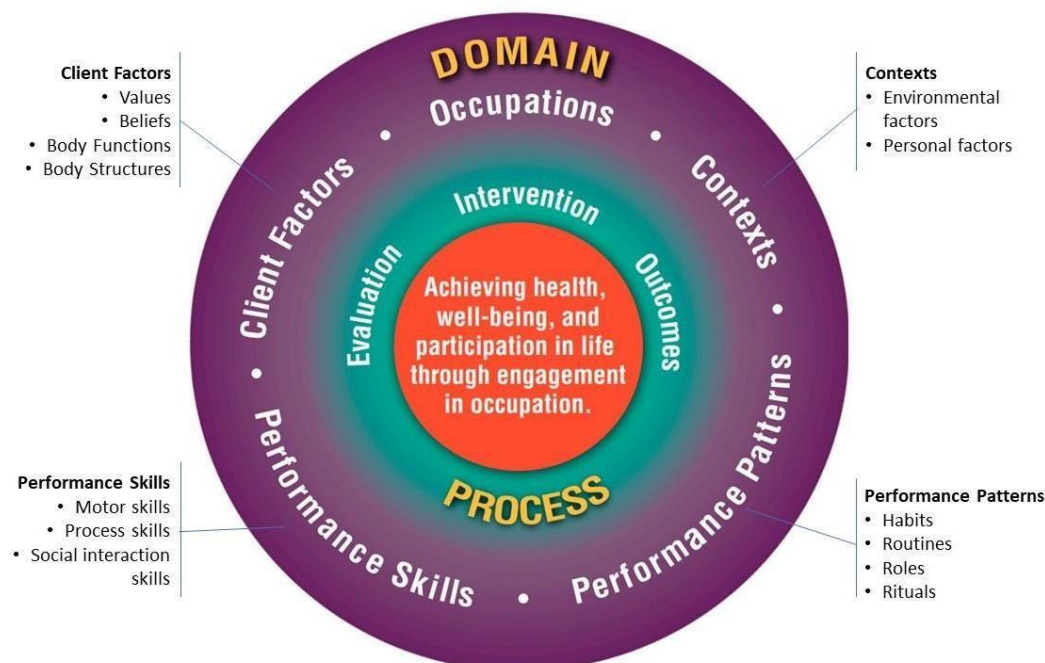
Traumatic brain injury can result in a range of impairments (i.e., physical, cognitive, visual, communication and behavioural). People with moderate to severe traumatic brain injury and associated impairments can experience long term impacts on their level of functioning and integration into the community. Following moderate to severe traumatic brain injury, people are more likely to regain independence with basic self-care tasks, while continuing to have difficulty completing instrumental activities of daily living such as grocery shopping (Giles et al., 2019; Sloan et al., 2004; Sloan et al., 2007; Tate et al., 2020).

Many studies have shown that rehabilitation following traumatic brain injury leads to positive outcomes such as improvements in function, social participation, and community integration (e.g., Evans & Brewis, 2008; Kim & Colantonio, 2010; Geurtsen et al., 2010). Occupational therapists often work as part of a wider rehabilitation team within the hospital and community settings, with the role of considering the impact that changes in health have on occupation, along with the relationship between the person (and their capabilities), the occupation and the environment. Grocery shopping is one of the occupations that occupational therapists often address as a goal in brain injury rehabilitation.

Occupational therapy aims to build skills, maximise independence and quality of life, as well as reduce care needs and additional costs (American Occupational Therapy Association, 2016, 2020). One framework used within the occupational therapy profession is the American Occupational Therapy Practice Framework. The framework has two core components, the first being the ‘domain’ or underlying principles and knowledge base of the profession, and the second being the ‘process’, which describes the process of service delivery within the occupational therapy profession (American Occupational Therapy Association, 2016) (Figure 1.1). This framework has been used throughout this thesis to conceptualise grocery shopping following moderate to severe traumatic brain injury. Given the aims of this research were to understand the occupational therapy process to support resumption in grocery shopping as well as understand the person, occupation and contextual factors that shape grocery shopping performance post brain injury the American Occupational Therapy Practice Framework was chosen. Unlike other occupational therapy models or frameworks, such as the Person Environment Occupation model or the Model of Human Occupation this framework describes both underlying concepts (domain) of the occupational therapy profession in addition to the process (Ie. assessment and intervention) that occupational therapists use.

Figure 1.1

The American Occupational Therapy Practice Framework, adapted image from American Occupational Therapy Association (2020).



There is extensive literature which highlights the long-term support needs of people following moderate to severe traumatic brain injury, including support for instrumental activities of daily living inclusive of grocery shopping (e.g., Giles et al., 2019; Sloan et al., 2004; Sloan et al., 2007; Tate et al., 2020). There is, however, very little which explores the nature of impairments influencing the specific steps within grocery shopping performance that people find most difficult. There is also a gap in terms of understanding the importance that people with traumatic brain injury place on grocery shopping, and the occupational therapy practices that support people to resume this occupation. This research program aimed to address these gaps by investigating people's experience of participating in grocery shopping following traumatic brain injury.

Research Aims

The central aim of this program of research was to develop an in-depth understanding of how people with moderate to severe traumatic brain injury complete grocery shopping. In addition, the knowledge created is expected to provide key information for occupational therapists on how

rehabilitation for grocery shopping may be improved.

The specific aims of this research program were:

1. To investigate how adults with moderate to severe traumatic brain injury complete the occupation of grocery shopping, including factors that influence performance within this occupation.
2. To explore the values and preferences of adults living with moderate to severe traumatic brain injury towards grocery shopping.
3. To understand the changes that occur within grocery shopping performance as a result of moderate to severe traumatic brain injury (i.e., reliance on others, frequency, method of grocery shopping such as instore verses online, and types of items).
4. To understand the importance of grocery shopping as a rehabilitation goal following traumatic brain injury.
5. To examine what brain injury impairments (i.e., cognitive and motor) lead to grocery shopping dependence after moderate to severe traumatic brain injury
6. To describe the occupational therapy grocery shopping rehabilitation interventions provided for people with moderate to severe traumatic brain injury.

To achieve the aims of this program, three studies were conducted. *Chapter 3* reports a qualitative study which sought to understand grocery shopping routines, as described by adults living with a traumatic brain injury (study 1). *Chapter 4* is a qualitative study that explored the preferences for grocery shopping, as expressed by adults living with traumatic brain injury (study 2). Together, these qualitative research studies address research aims 1, 2, 3 and 4. *Chapter 5* presents a prospective cohort study which audited rehabilitation provided to a cohort of adults with moderate to severe traumatic brain injury to address grocery shopping-related performance gaps, then longitudinally assessed their grocery shopping independence alongside cognitive and motor disability (study 3). This quantitative study addressed research questions 5 and 6. *Chapter 6* then summarises the results of the program, and discusses clinical implications and limitations to the

thesis, concluding with recommendations for clinical practice and further research.

Scope and Delimitations

The intent of this program of research is to understand grocery shopping of adults with significant brain injury from trauma, with the focus on the perspectives of people living with the brain injury. Therefore, study 1 and 2 used descriptive and exploratory approaches, seeking to address the research questions with a lived-experience lens. In-depth, semi-structured interviews with adults living with traumatic brain injury who were participating in rehabilitation (either inpatient or community) were conducted. Although people with cognitive impairment, such as traumatic brain injury, can contribute in a positive way to research there can be a tendency to interview caregivers rather than survivors of traumatic brain injury due to the added complexities of interviewing people with cognitive impairment (Paterson & Scott-Findlay, 2002). Within this program, I determined that to understand post-brain injury grocery shopping, it was important to involve people with traumatic brain injury directly. Therefore, these studies were limited to lived experience interviews and do not cover the perspectives of caregivers or clinicians.

Study 3 was a longitudinal study of the performance skills which correlate with grocery shopping dependence after moderate to severe traumatic brain injury. It also described the occupational therapy grocery shopping rehabilitation interventions provided to this population. This study was completed within a state-wide specialised brain injury rehabilitation service, focused on public-funded and slow-stream rehabilitation. In this way, this study was limited to those people admitted to the service, who commonly lived remote to the service. Therefore, the data gathered on occupational therapy interventions that were clinically provided will reflect this target population.

These studies were also limited to instore shopping. The studies presented in this thesis commenced prior to 2020, and data collection were completed prior to the COVID pandemic restrictions to grocery shopping. While I acknowledge changes to instore shopping during COVID (including restrictions to access, store selection, social distancing, item limits and brand availability

and the increase in online grocery shopping), the context in which the research has been conducted

is delimited to non-COVID grocery shopping situations.

Summary

It is well documented that traumatic brain injury can have a long-term impact on a person's performance and it is often characterised by the need for support with instrumental activities of daily living which includes grocery shopping (e.g., Giles et al., 2019; Sloan et al., 2004; Sloan et al., 2007; Tate et al., 2020). The literature to date covers broadly the difficulties faced with resumption of instrumental activities of daily living, including grocery shopping (Bottari et al., 2014; Warren, 2009), however there is limited research which looks specifically at the particular difficulties within grocery shopping. The evidence has not yet explored the views of those people with traumatic brain injuries as to the importance they place on grocery shopping or their experience of rehabilitation to support grocery shopping participation. Given that occupational therapists routinely work on this occupational goal with people following traumatic brain injury in the hospital and community settings, it is also important to understand current practice within the occupational therapy profession, such as assessment and intervention methods used to address grocery shopping. By investigating the current practice within occupational therapy to support resumption of grocery shopping after traumatic brain injury, recommendations for both further research and ongoing rehabilitation will be developed.

Chapter 2: Background

Together, the studies presented in this thesis aim to increase the clinical understanding of the occupation of grocery shopping from the perspective of people with lived experience of moderate to severe traumatic brain injury including how this occupation is completed post-discharge from rehabilitation. *Chapter 2* provides a review of the current literature regarding traumatic brain injury within Australia, including incidence, impairments that arise from the injury, and the common rehabilitation provided (including the role of occupational therapy). The occupation of grocery shopping will also be analysed including a review of current literature regarding post-injury engagement and studies conducted to date.

Grocery shopping can be considered as both an instrumental activity of daily living and a community activity. It is now well-acknowledged that adults often require ongoing support with community activities following moderate to severe traumatic brain injury (Colantonio et al., 2004; Ponsford et al., 2008). What remains unclear, however, is how important people with brain injury believe it is to resume engagement of an occupation like grocery shopping. It is also unknown how they perceive the role of rehabilitation in supporting them to resume grocery shopping. In building this knowledge, it is important to understand the views of those with lived experience of brain injury, as well as the interventions provided during rehabilitation, so as to understand whether current practice is effective or if improvements can be made to improve outcomes for people with moderate to severe traumatic brain injury.

Overview of Brain Injury

Brain injury is defined more broadly as “any damage to the brain that occurs after birth. It results in deterioration in cognitive, physical, emotional or independent functioning. It can be a result of accidents, stroke, brain tumours, infection, positioning, lack of oxygen, degenerative diseases etc” (Brain Injury Australia, 2016, para. 2). Traumatic brain injury is one type of brain injury, specifically arising due to force (i.e., trauma) (Brain Injury Australia, 2016). Traumatic brain injury can be classified in several ways. The first classification is whether the injury is closed or open, depending on whether the skull is fractured by the force of the accident (open) or not (closed). The second classification is dependent on whether the brain injury was caused as a direct impact (primary) or was caused as a consequence of the injury (secondary) (American Occupational Therapy Association, 2016). Such classifications will often influence the medical and surgical management of the traumatic brain injury. Severity of traumatic brain injury can range from concussion through to a disorder of consciousness and therefore outcomes can vary significantly (Khan et al., 2003).

One way of predicting outcomes post traumatic brain injury is by measuring the severity of the injury. Measuring the severity of traumatic brain injury is often calculated by a person's duration of Post Traumatic Amnesia (PTA). Using PTA duration, moderate traumatic brain injury is classified as a PTA duration of 1–7 days, severe traumatic brain injury as 1-4 weeks and very severe being a PTA duration of more than 4 weeks. The most common cause of moderate to severe traumatic brain injury is motor vehicle accident, with other causes including fall, assault, sporting injury, and bicycle accident (Khan et al., 2003; Ponsford et al., 2013). Men are more commonly affected than women by traumatic brain injury (Brain Injury Australia, 2016). In terms of traumatic brain injury, during the period of 2004-05 there was a rate of 107 traumatic brain injury related hospital stays per 100,000, with 69% of these being male (Australian Institute of Health and Welfare, 2007). Pozzato et al. (2019) in their study which looked at hospitalisations in New South Wales during 2007, found that there was an estimated rate of 99 per 100,000 population.

Traumatic brain injury can result in a wide range of impairments such as cognitive impairments (inattention, memory, planning, problem solving, initiation, self-awareness, cognitive fatigue), behavioural and emotional changes (irritability, impulsivity, disinhibition, depression, anxiety), sensory changes (visual and perceptual changes), communication (aphasia, poor turn taking, word finding difficulties) and physical changes (reduced strength, endurance, and coordination, and spasticity) (American Occupational Therapy Association, 2016; Ponsford et al., 2013). Other common symptoms include sleep disturbance, incontinence, seizures, swallowing difficulties and gastrointestinal difficulties (American Occupational Therapy Association, 2016). All of these changes after traumatic brain injury can impact on a person's social relationships, ability to live independently and work (American Occupational Therapy Association, 2016; Ponsford et al., 2013).

Functional Performance Following Traumatic Brain Injury

Functional outcomes following moderate to severe brain injury are varied, with people more likely to regain independence with basic occupations but have ongoing difficulty with more complex occupations that can result in poor integration into the community (Giles et al., 2019; Sloan et al., 2004; Sloan et al., 2007; Tate et al., 2020). This results in changes to living situations and a greater reliance on family or external services for support (Fleming et al., 1997; Turner et al., 2007). Turner et al. (2009) found that within the transition period from hospital to home, few were able to return to work and instead engaged in community and household occupations. Fleming et al. (1997) found that post discharge from hospital, the majority of participants with severe traumatic brain injury had a change in living situation and many returned home to live with parents, with 25% of participants having difficulty with home management tasks 12-months after injury. These findings support the importance of care and support after moderate to severe traumatic brain injury.

Longer-term support needs following moderate to severe traumatic brain injury have been shown to remain consistently high (Sloan et al., 2004; Sloan et al., 2007). Bottari et al. (2011) used the budgeting task on the IADL profile with 27 people with moderate to severe traumatic brain injury and found that participants had difficulty with the budgeting task due to planning difficulties, maintaining the goal of the task and completing calculations. Tate et al. (2020) found that a high number of people still required help with instrumental activities of daily living (63%) at 3 to 5 years post injury. Sloan et al. (2007) found that 62% of participants with severe brain injury required support to access the community and 85% needed assistance with financial management, which are both occupations that are closely linked with grocery shopping. Brain injury-related impairments not only impact a person's level of independence early in recovery but can have long-term effects meaning people require ongoing support years post injury.

Implications for Care and Support

Given that people with moderate to severe traumatic brain injury experience both high support needs and have difficulty with instrumental activities, it is important to understand in what ways they spend their time, so as to tailor rehabilitation. Adult disability can have a negative impact on the types and frequency of participation in activities (as compared to the general population) (Farnsworth, 2003). There have been published studies, both international and Australian, that show that gaps in occupational performance are commonly reported after moderate to severe traumatic brain injury. Erikson et al. (2009) completed a cross-sectional study with 116 adults with traumatic brain injury or subarachnoid haemorrhage who were between 1 and 4 years post injury. Using the Occupational Gaps Questionnaire, Erikson et al. (2009) found a strong relationship between perceived occupational gaps and life satisfaction, with few participants (35%) reporting a high level of satisfaction with life.

More recently, the Occupational Gaps Questionnaire was used to understand the perceived discrepancy between current and desired occupational participation for 59 people with severe traumatic brain injury up to 15 years post (Beadle et al., 2020). While there was a wide discrepancy between the number and type of occupational engagement, participants tended to participate in more sedentary activities post-brain injury. When specifically looking at grocery shopping, 93.2% of participants identified they completed grocery shopping prior to their injury, 71.2% completed it as a current occupational and 84.7% indicated that grocery shopping was an occupation they wanted to do (Beadle et al., 2020). Similarly, Ownsworth et al. (2004) investigated the perceptions of long-term support for people with severe brain injury and they found that there was a consensus amongst participants that there was a need for support with community-based activities with 87.5% of people reporting a need for support within grocery shopping. These important studies highlight both the reported reduction in grocery shopping that occurs after traumatic brain injury, and the importance placed on returning to a capability to participate in this activity.

People experience changes with time-use following traumatic brain injury. When comparing time-use to the general population, Winkler et al. (2005) showed that although people with severe traumatic brain injury spent less time in employment, they spent the same amount of time out in the community and engaging in activities such as shopping. Similarly, Finch et al. (2016) compared the time-use of 20 people living with traumatic brain injury in the community to a control group using a cross sectional study. Results indicated that the frequency of participating in shopping was the same across groups, but the traumatic brain injury group spent longer on this activity. These are important findings as grocery shopping appears to be an occupation that people continue to participate in post brain injury.

Defining the Occupation of Grocery Shopping

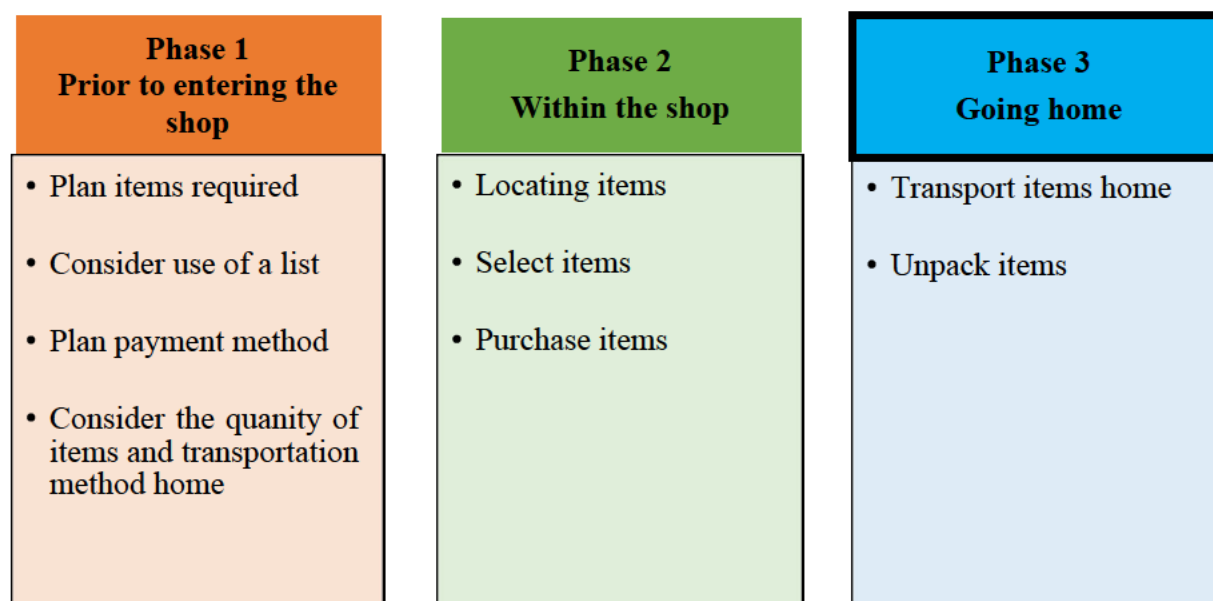
Shopping is one key instrumental activity of daily living which includes the steps of “being able to generate a list, select items and make payment” (American Occupational Therapy Association, 2020, p. 620). As per the American Occupational Therapy Practice Framework, grocery shopping is classified as an instrumental activities of daily living, Prus and Dawson (1991) investigated people’s attitudes towards shopping within the general population and found perceptions of the purpose of this occupation could be classified as either a leisure or work activity. These attitudes towards shopping were influenced by the product being purchased, the occupation linked to the product and the shopping environment. Although not specific to grocery shopping, these findings suggest that the individual client will likely hold their own opinion on not only the value of returning to shopping after brain injury, but also whether for them, the occupation is *work* or *leisure*.

Grocery shopping is a specific category of shopping and involves purchasing food-related and other essential supplies (Collins, 2022). There are different stages and environments in which the shopping task occurs (Figure 2.1). In the textbook Occupational Therapy Interventions: Function and Occupation, Merino and Latella (2008) expand on the definition of grocery shopping as outlined by the American Occupational Therapy Practice Framework to conceptualise the different

phases of grocery shopping. Figure 2.1 is an interpretation of Merino and Latella's (2008) work which conceptualises the phases of grocery shopping. During the initial phase, prior to entering the store, the individual must consider and plan multiple factors which may include consideration as to whether to use a list required to assist with recall of items, what the method of payment will be (i.e., ensuring they have the card or amount of cash required), and consideration of the quantity of items to be purchased and how they will be transported home. The second phase is entering the store and locating, selecting and purchasing items. In the final phase of the occupation, once items are purchased, the items need to be transported home and unpacked (Merino & Latella, 2008). With advancements in technology, grocery shopping can now be either completed instore or online (Farag et al., 2007).

Figure 2.1

The Phases of Shopping According to Merino & Latella (2008)



The American Occupational Therapy Practice framework 'domain' section can also be used to conceptualise the occupation of grocery shopping. The different aspects such as client factors (value placed on grocery shopping, body structures and body functions including mental, sensory, movement functions etc), performance skills (motor, process, social interaction skills), performance patterns (how grocery shopping fits within a wider routine, possible specific habits within grocery

shopping and a person's life roles which may impact on the need to engage in grocery shopping) and context and environments (such as the person's social context, the physical grocery shopping environment, temporal context) all interact to shape how an individual may engage in the occupation of grocery shopping (American Occupational Therapy Association, 2020).

Grocery shopping is considered a routine instrumental activity of daily living that is assessed and/or treated by occupational therapists during rehabilitation for people with brain injury. Despite this, there is limited research which looks specifically at participation in grocery shopping after traumatic brain injury. Warren (2009) completed a pilot study investigating how hemianopsia and quadrantanopia after acquired brain injury impacted on performance within activities of daily living, including shopping. This study recruited a mixed sample of adults with diagnoses of stroke or traumatic brain injury and administered a combination of visual assessments (including visual acuity, hemi-inattention screen, reading performance test) alongside a semi-structured interview about activities of daily living. Of interest is that adults with visual impairments arising from their brain injury reported shopping as one of the most challenging activities, second only to driving. Participants described the following difficulties within the task of shopping: ability to read labels, locate items and navigate around the environment and use card machines. Other specific challenges included getting to the store, orientation within the store, avoiding collisions with people, displays and other objects, and locating needed items in aisles. Warren's study was not without limitations; they used an interview tool which had not been subjected to psychometric testing (so may suffer from validity issues), and a convenience sample was recruited (which was a mixed population, with only 1 of the 46 participants had sustained a traumatic brain injury). These potential limitations do not detract from the important findings, which suggest that adults with brain injury-related visual impairments will experience challenges in returning to all three phases of shopping.

It is not only visual impairments, however, that may affect performance. Given the known cognitive difficulties and impact these have on instrumental activities of daily living (Ponsford, 2014; Toglia & Foster, 2021), there have been studies that have used grocery shopping tasks to

observe functional cognitive performance. Bottari et al. (2014) examined how people with severe traumatic brain injury use self-generated strategic behaviour within an ecological shopping task (from the Instrumental Activities of Daily Living Profile) in the community. Analysis of the performance of five participants with severe traumatic brain injury showed that participants who performed better used a greater variety of internal and external self-generated cognitive strategies to aid performance. There were some limitations with the assessment process in identifying use of internal strategies, therefore the authors acknowledged that participants may have used a wider repertoire than reported.

Virtual shopping tasks have been utilised in a few research studies to assess performance with specific cognitive demands. Kinsella et al. (2009) used a virtual shopping task to assess whether performance differed when the prospective memory target was self, or experimenter generated. They found in their assessment that people with traumatic brain injury had more difficulty than healthy controls with remembering items in a timely manner, identifying specials, and allocating attention across the task demands within a virtual task. Okahasi et al. (2013) compared their virtual shopping task with other assessments such as the Mini Mental State Examination, the authors indicated that there were some items on the virtual shopping task that correlated with some attention and everyday memory items on other cognitive assessments. The study also indicated that the brain injury cohort spent a significantly longer time completing the virtual shopping task and made more reference to the list compared to the control group (Okahasi et al., 2013). There were some limitations with this study in that it had a small number of participants ($n=20$) with a mixed cohort of stroke and traumatic brain injury and half of the total number being healthy controls. Collectively these studies of grocery shopping following traumatic brain injury provide some preliminary evidence of the difficulties that people may experience, however further research is needed to understand the impact of traumatic brain injury on shopping and to inform intervention strategies.

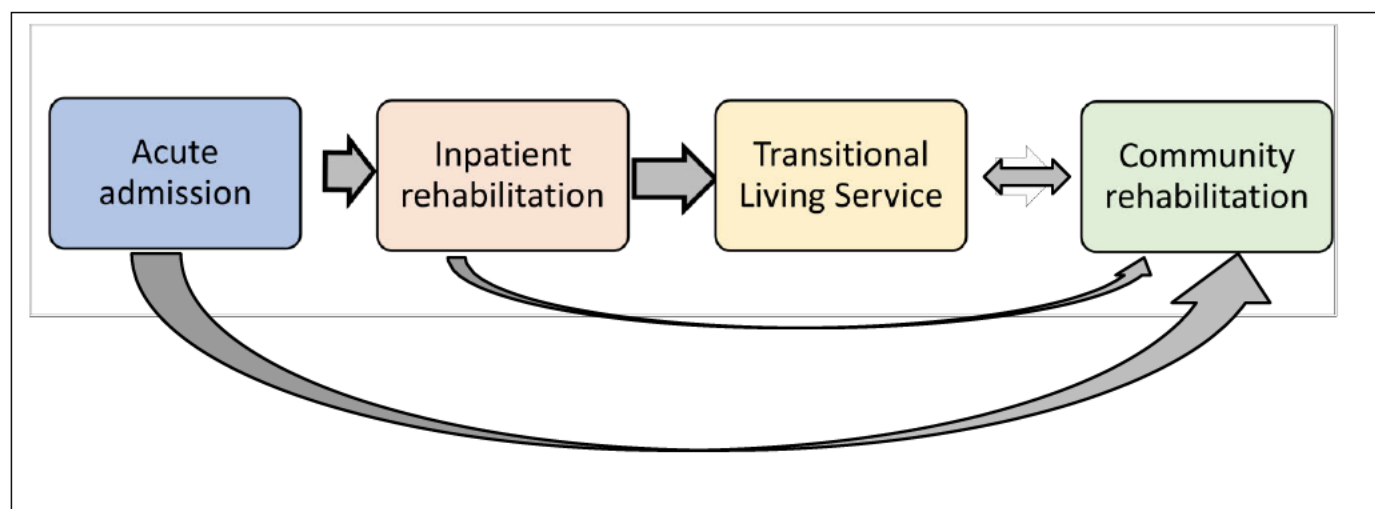
Rehabilitation Approaches

Traumatic brain injury often involves physical, cognitive, visual and behavioural changes that

impact on a person's function which require management using a multidisciplinary team approach (Powell et al., 2016). Given the long-term nature of traumatic brain injury, rehabilitation is often provided in different phases (Figure 2.2).

Figure 2.2

Continuum of Care Following Traumatic Brain Injury



For those with moderate to severe traumatic brain injury, the initial phase often occurs within the inpatient hospital setting with a focus on assessment, retraining of activities of daily living, education for supports and organisation of equipment and services. The next stage occurs once someone has been discharged from hospital into the community and aims to continue to build on independence within activities of daily living, support the person to integrate back into the community, and build upon social skills (Khan et al., 2003).

For some, an additional step of rehabilitation within a transitional living program is beneficial to maximise function and support a transition from hospital to the community. The Australian Faculty of Rehabilitation Medicine guidelines describe minimum standards for rehabilitation programs and within staffing profiles recognise the need for employment of occupational therapists within rehabilitation programs (The Royal Australasian College of Physicians, 2020). Within rehabilitation programs, occupational therapy is often provided in a home like environment and support skill development in domestic, community, social and vocational areas (American Occupational Therapy Association, 2016).

Often the initial phase of transition from hospital to the community can be met with discrepancies between expectations of returning to a normal life (including previous occupations such as employment and driving) and a person's actual performance due to reduced awareness and unrealistic expectations. There has been research investigating community integration post brain injury as this is often the focus for rehabilitation programs (Cicerone et al., 2004; Goranson et al., 2003; McCabe et al., 2007). Community integration has been defined as including the components of (1) activities to fill one's time, (2) independence in one's living situation and (3) relationships with others (Kim & Colantonio, 2010; McColl et al., 2001). Within the context of community integration, grocery shopping is a key occupation that is addressed within traumatic brain injury rehabilitation programs.

Several studies have broadly investigated the effectiveness of occupational therapy and rehabilitation to support community integration following traumatic brain injury. Kim and Colantonio (2010) used a systematic review to determine the evidence behind intervention programs that targeted community integration and found that many community integration programs had positive results in relation to supporting community integration. Powell et al. (2016) found in their systematic review investigating the evidence around occupation-based intervention to support people following traumatic brain injury that the role of occupational therapy was endorsed within community integration programs. However, they did note that further research needed in terms of the effectiveness of specific occupational therapy interventions. As grocery shopping is one component of community integration, this research project aims to contribute to this.

Occupational Therapy and Rehabilitation

Occupational Therapists consider not only a person's strengths but also brain injury related changes or impairments (ie. physical, cognitive, visual, communication impairments) which may lead to restrictions in activity or participation. The World Health Organisation (2022) define disability as the interplay between a person's health condition, the environment and personal factors which limit participation. At the core of the occupational therapy profession is the goal to

support people to be able participate in occupations that hold importance and meaning with participation being defined as “engagement in desired occupations in ways that are personally satisfying and congruent with expectations within the culture” (American Occupational Therapy Association, 2016, p 35). As part of the occupational therapy process outlined in the American occupational therapy practice framework occupational therapists gather information including previous performance patterns, values and needs to shape goals. (American Occupational Therapy Association, 2016). Occupational Therapists work to minimise these factors to support participation in meaningful Many occupation therapy assessment tools such as the Functional Independence Measure or the SMAF, break down this level of participation into further detail such completing instrumental activities of daily living, such as grocery shopping, into levels such as independent or assistance. After traumatic brain injury, people may continue to experience impairments which necessitate support for participation in occupations and may have difficulty engaging in core occupations such as grocery shopping. Therefore, occupational therapists use of a range of different client and occupation-based approaches and interventions to support maximising a person’s function with consideration of personal, occupational and environmental factors (American Occupational Therapy Association, 2016; Radomski et al., 2016). The American Occupational Therapy Practice Framework describes five intervention approaches (Ie. create, restore, maintain, modify and prevent) with each approach varying in terms of the focus on changing either environmental factors, personal factors or changing attitudes and policies. Some of the intervention strategies outlined in the framework may look at the remediation of skills whereas others look at a compensatory approach (ie. using equipment or aids) (Meriano et al, 2008). While there have been studies to date investigating occupational therapy interventions, none have been specific to grocery shopping.

A systematic review investigating occupational therapy interventions post brain injury reported moderate evidence that a variety of multidisciplinary and interdisciplinary community-based rehabilitation approaches might be effective in improving occupational performance and

participation outcomes (Powell et al., 2016). Kim and Colantonio (2010) undertook a systematic review looking specifically at interventions relevant to occupational therapy that may improve community integration. Their findings showed the importance of rehabilitation programs to support improvements with community integration and the importance of occupational therapists within these rehabilitation programs but provided little guidance to occupational therapists about the interventions, as well as when they should be provided.

Summary

While there is much discussion in the published literature about the types of occupations people need support with following moderate to severe brain injury, there is currently limited research that specifically investigates the occupation of grocery shopping or the experience of rehabilitation. There remains a gap in the literature to support clinical understanding of the importance of grocery shopping following traumatic brain injury. So, while grocery shopping is often addressed within rehabilitation programs by occupational therapists, research is still needed to guide therapists in understanding how brain injury impacts on someone's ability to complete this occupation, and on who benefits and at what time-point in recovery given the long-term trajectory for recovery.

This chapter has described the short- and long-term impact traumatic brain injury has on instrumental activities of daily living such as grocery shopping. Despite the volume of research that demonstrates the impact traumatic brain injury has on independence and the need for support, limited research has explored grocery shopping specifically. There was also an absence of the views of people living with traumatic brain injury about shopping located in the literature. Appreciating that the value of grocery shopping and the way shopping is conducted will vary across different clients, developing an understanding of the lived experience of grocery shopping after traumatic brain injury is critical. Along with an increased understanding of the clinical interventions and rehabilitation programs provided to address grocery shopping, these insights will have the potential to inform future rehabilitation.

Chapter 3: A Qualitative Study of Grocery Shopping Preferences for Adults with Traumatic Brain Injury

Chapter 2 showed that grocery shopping independence is affected by traumatic brain injury, and that while there is agreement that grocery shopping is a complex instrumental activity of daily living, there is limited research specifically investigating grocery shopping after brain injury. Given that there was also an absence of the views of people living with traumatic brain injury about grocery shopping found in the literature review, the aim of *Chapter 3* was to describe how people with traumatic brain injury undertake grocery shopping and the importance they place on performing this occupation post-traumatic brain injury.

The study described in *Chapter 3* has been submitted to the journal, Occupational Therapy Journal of Research, for peer-review:

De Lacy, L., Fleming, J., Sansonetti, D., & Lannin, N.A. (under review). A qualitative study of grocery shopping preferences for adults with brain injury. *Occupational Therapy Journal of Research* (submitted 27/02/2022).

Grocery shopping is a core occupation for adults, which includes the steps of “being able to generate a list, select items and make payment” (American Occupational Therapy Association, 2020, p. 620). After traumatic brain injury, people often regain independence performing basic occupations, yet continue to experience difficulties completing more complex activities (including grocery shopping) limiting their full return to pre-traumatic life (Ponsford et al., 2013; Sloan et al., 2004, Sloan et al., 2007; Tate, 2004; Tate et al., 2020)

In the research to date, findings highlight the impact of visual and cognitive changes on grocery shopping performance. For example, people with hemianopia have demonstrated poorer performance when compared to their normative peers, with post-brain injury visual impairments impacting on the ability to read labels, locate items and navigate the environment (Warren, 2009). In another study which examined the performance of grocery shopping in a person’s local community after severe traumatic brain injury, it was found that participants who performed better on task performance used more cognitive strategies to aid their performance (Bottari et al., 2014) suggesting cognition and strategy use both play an important role in this population.

The potential for virtual reality to assess and improve grocery shopping skills is a more recent phenomenon within research. Using a virtual shopping task, Kinsella et al. (2009) found that those with traumatic brain injury demonstrated more difficulty in tasks of remembering items in a timely manner, identifying sale items and allocating attention within the virtual task. There has not yet, however, been research comparing virtual task completion to real life grocery shopping performance, and thus, rehabilitation to date focuses on hospital-simulated and local grocery shopping practice approaches.

While there is research highlighting the difficulty people have returning to community activities after traumatic brain injury, and these few studies correlating specific impairments to grocery shopping performance, there has been limited research to guide grocery shopping rehabilitation approaches. In particular, there is an absence of research exploring the perspectives of people living with traumatic brain injury and therefore, building an understanding of the value and

importance of grocery this occupation is required so as to inform rehabilitation and ensure programs are developed to meet client needs. Therefore, the aim of this study was to understand how people with moderate to severe traumatic brain injury undertake the occupation of shopping for groceries, and the importance they place on performing this occupation post-traumatic brain injury.

Method

Study Design

A descriptive and exploratory approach was used to facilitate the investigation and interpretation of participants' perceptions of grocery shopping after traumatic brain injury. In-depth, semi-structured interviews with adults living with traumatic brain injury were conducted.

The Human Research Ethics Committee of Alfred Health approved this study prior to commencement (598/19) (Appendix A) and all participants provided informed consent before their interview.

Participants and Setting

Participants were recruited from a specialist brain injury rehabilitation service at a large metropolitan hospital in Melbourne, Australia. Maximum variation purposive sampling was used to select participants in both the inpatient and community settings who were actively participating in, or previously participated in, rehabilitation to address grocery shopping to gain a range of perspectives. This approach allowed the research team to gain an in-depth understanding about issues of central importance to the purpose of the study (Patton, 2002). To recruit a range of participants, the following inclusion criteria was used; adults who had suffered a traumatic brain injury and were aged over 18 years, living in a variety of geographical areas, as well as receiving a range of services and supports. Participants needed to have identified participation in grocery shopping prior to their traumatic brain injury and had participated in (or have a rehabilitation goal to participate in) grocery shopping post injury. Participants were excluded if they had a vascular, progressive or hypoxic brain injury, if they were still in post-traumatic amnesia (PTA), had

significant communication deficits which impacted on their ability to participate in an interview or if they were unable to provide consent to participate.

Guided by purposive sampling frame, participants were identified by their treating rehabilitation team members as being information-rich because of their experiences with grocery shopping either in the hospital or within the community post-discharge. Adults with traumatic brain injury were recruited between December 2019 and March 2020 using treating occupational therapists to inform potential participants and provide assent for a member the research team to contact them to discuss participation. Participants were then provided with written and verbal information of the details of the research as well as the benefits and risks of participating. Informed consent was gained from each participant prior to interview (Appendix B). Recruitment and interviewing were completed prior to COVID pandemic restrictions in Australia; perceptions therefore do not pertain to grocery shopping experienced during COVID.

Data Collection

Demographic data were collected from the medical record of each person interviewed and included information about the mechanism and severity of traumatic brain injury as well as their functional independence level (as measured using the Functional Independence Measure, FIM™), socioeconomic background (including employment) and grocery shopping rehabilitation activities.

Individual semi-structured interviews were completed by the first author. A semi-structured interview format allowed some of the same questions and prompts to be used in these interviews to ensure consistency with information gathered. Semi-structured interviews also allowed flexibility within the interview to follow interesting concepts raised by participants. Table 1 summarises the qualitative semi-structured questions which guided the interviews. All interviews were conducted in person, at the rehabilitation centre, and ranged in length from 20 to 60 minutes. Interviews were audio recorded and transcribed verbatim. Data were de-identified during the transcription and prior to analysis, and then stored in a password protected electronic database.

Table 3.1*Semi-Structured Interview Guide*

Interview topic	Questions
Shopping routine	Can you explain how you previously completed grocery shopping prior to coming into hospital?
Impact of brain injury	How do you feel your brain injury has impacted on your ability to complete grocery shopping? How have you adjusted to this?
Rehabilitation experience	Can you explain how your time in rehabilitation has prepared you for returning to the community and completing grocery shopping? <i>Additional question for community participants:</i> Looking back on your time in rehabilitation, do you have any suggestions for the therapists working with you, specifically about shopping or getting ready for being able to shop?
Importance	Has the importance you place on grocery shopping changed since sustaining a brain injury changed? How? <i>Additional question for community participants:</i> Can you tell me about how you feel about grocery shopping now that you are home from hospital?

Data Analysis

Following a thematic approach to analysis, we applied Braun and Clarke's (2006) six steps to guide the process (Cooper et al., 2012). Two researchers (LD and DS) initially read the transcripts to become familiar with the whole interview, before then individually completing deductive coding to identify the categories from the American Occupational Therapy Practice Framework (American Occupational Therapy Association, 2020) that were present in the data. The American Occupational

Therapy Practice Framework has two major sections of “domain” and “process”. The “domain” has five subcomponents (i.e., occupations, client factors, performance skills, performance patterns, contexts, and environments). The “process” includes evaluation, intervention and targeting outcomes. As part of the evaluation process within the American Occupational Therapy Practice Framework, standardised measures such as the Functional Independence Measure FIM™, can be used to determine functional independence level. The FIM scores for participants were collected to determine participants functional level as well as help conceptualise results.

By discussing categories that recurred in the data, and mapping interviews back to this framework, the two researchers provided input into the code book, which was jointly developed to ensure consistency both between and within researchers across interview transcripts (Appendix C). Double coding of more than 10% of interviews was completed to increase rigor during the development of the code book. Themes emerged from the data both within and outside of the framework constructs; all were captured during analysis (Appendix D).

Emergent themes were discussed between all researchers (LD, NL, JF, DS), and discussions continued until consensus was reached. Research triangulation was used to add to the validity of the study with team members ranging in experience in both research and the clinical setting. Validity was supported through use of bracketing and reflective journaling to document the researcher’s personal thoughts, feeling and biases that may influence undertaking interviews and data analysis.

Results

Fourteen adults with traumatic brain injury participated in face-to-face interviews; eight were current patients on the inpatient rehabilitation ward and the remaining six were community living. Participants’ age ranged from 24 to 71 years; 13 were male. Severity of traumatic brain injury was measured by PTA duration, with three participants classified in the very severe category and eleven participants in the extremely severe category. Six participants had a change in living arrangement post traumatic brain injury, with three participants moving into supported accommodation and three moving in with family. (See Table 2 for demographic details).

Table 3.2.

Participant characteristics at time of qualitative interview, and description of living situation and employment pre- and post-injury, n=14.

Characteristic	Count (%)
Gender (Male)	13 (93%)
Age (Years)	
18-24	1 (7%)
25-34	4 (29%)
35-44	5 (36%)
45-54	2 (14%)
55-64	1 (7%)
65+	1 (7%)
Time Post Injury	
0-6 months	5 (36%)
6-12 months	3 (21%)
1-2 years	1 (7%)
2+ years	5 (36%)
Post Traumatic Amnesia Duration	
1-4 weeks (very severe)	3 (21%)
Greater than 4 weeks (extremely severe)	11 (79%)
FIM (at time of interview)	
Motor FIM, mean (SD)	85.1 (9.4)
Motor FIM, median (Min – Max)	90.5 (58.0-91.0)
Cognitive FIM, mean (SD)	26.6 (5.4)
Cognitive FIM, median (Min – Max)	28.5 (14.0-33.0)

Characteristic	Count (%)	
Total FIM, mean (SD)	111.1 (10.0)	
Total FIM, median (Min – Max)	112.5 (86.0-123.0)	
Rehabilitation Setting		
Inpatient	8 (57%)	
Community	6 (43%)	
Living Situation	Prior to Injury	Post Injury
Alone	1 (7%)	0 (0%)
Housemates	4 (29%)	1 (7%)
Partner & children	3 (21%)	3 (21%)
Partner	3 (21%)	2 (14%)
Children	1 (7%)	0 (0%)
Parent	2(14%)	5 (36%)
Supported accommodation	0 (0%)	3 (21%)
Employment	Prior to Injury	Post Injury
Working	12 (86%)	1 (7%)
Not working, looking for work	1 (7%)	9 (64%)
Not working, not looking for work	1 (7%)	4 (29%)

Participants discussed the occupation of grocery shopping as embedded within a wider routine rather than an isolated task. All participants described many other factors, both pre and post brain injury, that were key in influencing the occupation of grocery shopping, including other occupations, client factors (values and body functions), performance patterns (roles) and context and environments (physical, social, and temporal). Grocery shopping was discussed by people living with severe traumatic brain injury in terms of six key themes: *Why*: Independence and Participation, *Who*: Individual or joint

occupation, *When*: My routine matters, *Where*: Instore and familiar, and *How*: Grocery shopping routines are driven by context (see Figure 1).

Why: Type of Independence and Participation

Participants described different reasons for completing grocery shopping. Roles and values were closely interrelated within this theme. While several participants explained that the importance, they placed on grocery shopping was closely linked to their role as a parent, others described it as a necessity.

“I would normally drive to the grocery shop and get what I needed...and go back home because I would get enough for me and the girls” (Participant 8, female, 35years).

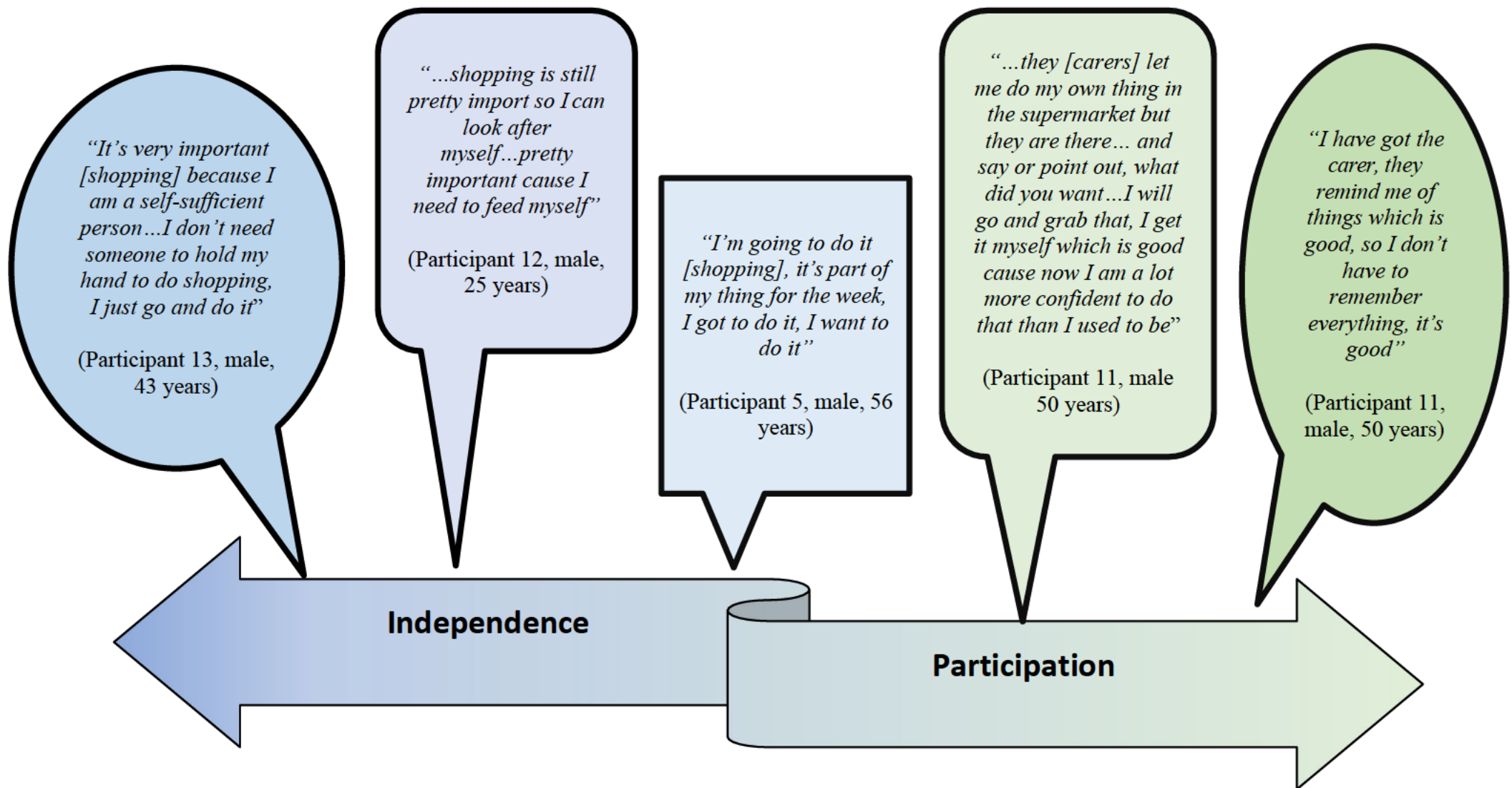
“I’m going to do it [shopping], it’s part of my thing for the week. I got to do it [shopping], I want to do it” (Participant 5, male, 56 years).

Grocery shopping was also seen as an enjoyable social occupation for some participants, enabling them to spend time with family and friends. Participant 8 (female, 35 years) reported *“...I used to go [to the market] with one of my friends, we used to make a day of it”*.

Participants did display varied views on the value and importance they placed on grocery shopping post-traumatic brain injury, ranging along a participation continuum from participating with supports (ie. family or carers) to full independence. Irrespective of where they sat on this continuum, engagement in the task appeared highly valued. Figure 1 represents this continuum. Participants’ social context, including their living arrangement and roles post traumatic brain injury, seemed to influence where along the continuum of grocery shopping the person’s expectations for themselves.

Figure 3.1

The Importance of Grocery Shopping: Type of Participation



Who: Individual or Joint Occupation

Grocery shopping routines were described by participants as either an occupation completed with other people, or an individual occupation (however was not raised as being both). Most described grocery shopping post-traumatic brain injury with another person such as a partner, housemate or parent: *“We [participant and wife] share [grocery shopping], we actually do everything, we do it at the same time, we go together”* (Participant 3, male, 34 years).

Others, however, complete grocery shopping on their own: *“... it [shopping] was important because...I was happy to make sure, you know, my dinner is covered...I bought it for myself so it was done, that gave me a sense of, you know, pride - maybe happiness - that I had done it”* (Participant 11, male, 50 years).

When participants were asked how they completed grocery shopping before their traumatic brain injury, they acknowledged a change in who they shopped with which appeared to be closely linked to their social context as well as the new need for caregiver support:

“No...I am still living with my parents at the moment, so mum does the shop and I go with her sort of a bit of a left- hand man...” (Participant 7, male, 38 years).

“It’s mainly just with the carer I might go and get a few things” (Participant 11, male, 50 years).

When: My Routine Matters

All participants reported that the timing of grocery shopping within their routine was influenced by other occupations and roles including work, meal preparation and leisure. Work hours meant that some participants completed grocery shopping after work on the way home or on a weekend. For example, participant 14 (male, 39 years) reported *“Usually on the weekend my wife and my son would go shopping and load up for the week...occasionally after work I’d have to pick up something for the days dinner...it’s usually the way we operate”*.

Some participants described that their role as a parent influenced the time that grocery shopping occurred within their routine (i.e., during or after school hours and in preparation for looking after their child): *“Usually a Thursday was my normal shopping day and then that way I*

would prepare for Friday because I would have my son on the Friday to Monday morning and so that way I could try and have all of his food” (Participant 2, male, 34 years).

Several participants explained that another person’s availability and routines influenced the frequency and timing that grocery shopping occurred for them. *“Wednesday is my shopping day, and my carer comes with the car and we go [to the shops] and do the shopping and take back home”* (Participant 4, male, 24 years). While participant 10 (male, 52 years) described his family’s grocery shopping routine was based around having access to money *“we do it on pay day, so either my pay day or her pay day and we just go with what we can afford”*.

Where: Instore and Familiar

All participants described completing grocery shopping instore following their traumatic brain injury (rather than online). Participants expressed a preference for grocery shopping instore as it provided the ability to independently select the quality of items and value for money when choosing where to purchase items and selecting between products:

“It [fruit shop] used to be quite large...and it used to be reasonably priced, but I suppose we went to the market...because it’s cheapest and it’s got the best, but you used to get very good quality stuff at those markets which is really important” (Participant 5, male, 56 years).

Some participants reported completing their grocery shopping at one type of store whereas others purchased groceries at multiple stores including the supermarket, produce market and other smaller stores including the deli, bakery, butcher, and fruit store.

“We used to go to the market, so fruit and veg was pretty easy and meat all that stuff was pretty sorted out...any other groceries like milk and all that sort of stuff we would have to go to [large national chain supermarket]” (Participant 5, male, 56 years).

Modes of transport selected to access the grocery store such as walking, driving, public transport and riding a bike influenced the location of where participants chose to shop. Post injury participants described a dependency on others (including partners, parents, friends, and support workers) for transport to reach the grocery store. Participant 8 (female, 35 years) described a need

to adapt where they shopped given restrictions placed on driving. *“It is easier for me to now...just have everything in the one spot rather than have to go here and go there to other places and just do it all in the one hit and be done with it”.*

Supermarkets were described as having a general common layout *“...all supermarkets are laid out vegies, then bread a little bit further and then milk”* (Participant 2, male, 34 years).

Although there were some common features, participants also described variation between supermarkets such as the size of the supermarket, the item selection and item locations along shelves.

How: Grocery Shopping Routines Are Driven by Context

Participants explained how temporal influences impacted their grocery shopping routine; the frequency of grocery shopping ranged from multiple grocery shopping trips to one large weekly shop and was described to be driven by broader routines. Some participants described planning to complete one large shop, and also needing to go to the supermarket throughout the week.

Participant 3 (male, 34 years) explained he shopped *“usually once a week... [but] sometimes we forget things and have to go after work to grab the little things that we forgot”*

Participants described preferences for the time of day they shopped, with a number of participants reporting to avoid peak times: *“...the earlier the better, we [family] do tend to go in the morning to beat the rush... after lunch it’s quite busy”* (Participant 14, male, 39 years). One participant described that since the traumatic brain injury the need to deliberately plan what time of day grocery shopping occurred: *“I suppose, going in the peak times, so having to deal with a lot of people...I find that a bit difficult at the moment...so the earlier I can go the easier it will be I think”* (Participant 3, male, 34 years).

There was variation in participants’ descriptions of the pace in which they completed grocery shopping, with a number of participants describing completing the task quickly: *“Just get in there and get it done that was the attitude I always had. It’s always been like that just get in there and get*

it done” (Participant 1, male, 41 years), whilst others described browsing. “*Yeh, I had a bit of time, , I wasn’t really rushed I could look and find something...*” (Participant 11, male, 50 years).

One participant reported the pace varied depending on who they shopped with: “when I shop with mum or dad, I need to be quick and precise and whereas when I shop with the carer, she is quite happy to peruse things with me so I’m like, yeah I can take a bit more time” (Participant 8, female, 35 years).

Cognition and vision were discussed by participants as either demands, lapses or errors which influenced their grocery shopping routine. In particular planning, memory, and attentional errors were discussed as impacting how grocery shopping was completed: “*I walked past them [signs] so many times looking for biscuits today, and the therapist is like “you walked past it about 5 aisles back there”... it’s the second time I’ve gone grocery shopping with her and the same thing happened again, I was just not paying attention to them [signs]...it is a lot more difficult now to concentrate on the task at hand and it is a little bit frustrating*” (Participant 2, male, 34 years). Participant 5 (male, 56 years) described supporting error prevention compensating for cognitive errors with the use of a list “*...the best way for me, and this is part of my brain injury, is I need to make the list...and I then need to show the list to my wife and for her to go yeh that’s fine*”. And for others there was the need post traumatic brain injury to have someone oversee aspects of the task such as writing a list. “*We share it [writing a list] ‘cause I will either go shopping with mum or shopping with my support worker with a list that mum and I have gone through and created together*” (Participant 8, female, 35 years)

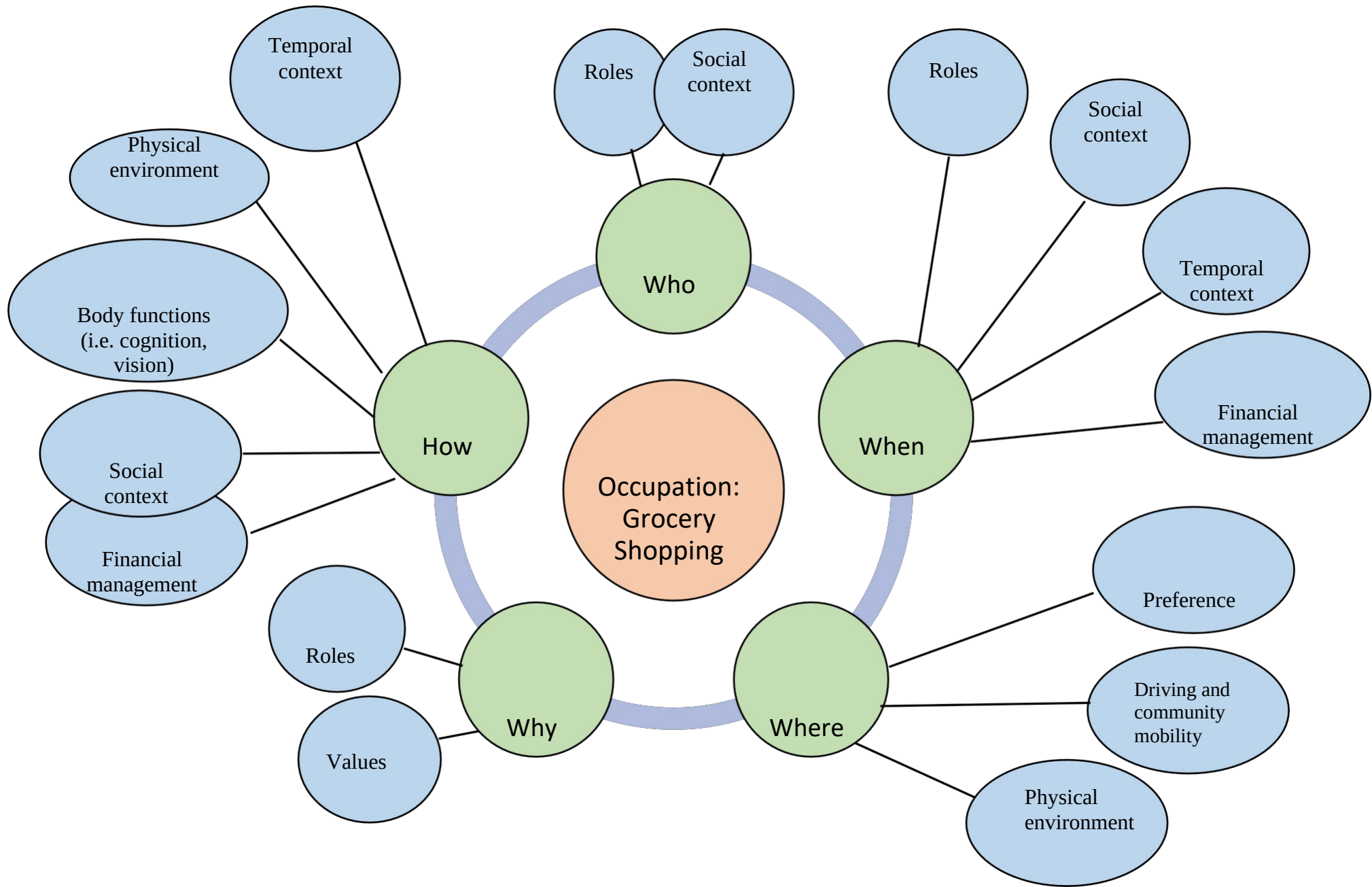
When asked about their grocery shopping routine, some participants described using a very systematic approach with a set time for grocery shopping and a list to assist with recall of items: “*I would go to the supermarket and I’d sort of have a system, I knew what I wanted I knew exactly where it was because I went to the same supermarket every time, so I’d go boom, boom, boom and I was done in about 15 minutes*” (Participant 7, male, 38 years). While others described a less

structured approach with no set method: *“I would just wing it. I would walk around until I found what I was looking for, grab it and go”* (Participant 1, male, 41 years).

Several participants described having a set budget whilst others bought groceries as required. For some participants, budgeting and adhering to a set amount for groceries became more apparent post traumatic brain injury due to changes to employment and subsequent reduced income. *“It will be budgeted cause I have been unemployed since the incident, because I am self-employed, I have had no income for the past two months, so I am going to be on a very strict budget”* (Participant 2, male, 34 years). Finances were described to impact the location where grocery shopping occurred. *“And I did it, I did [the market] for a while until money was becoming a real problem... So, Aldi is where we are going...”* (Participant 5, male, 56 years). Following traumatic brain injury participants also described changes to financial control and having another person managing their money and allocating an amount for groceries. *“...they [State Trustees] look after my finances so they make a budget for me they manage everything”* (Participant 4, male, 24 years).

Figure 3.2.

The Relationship Between Shopping Routines and Influencing Factors



Discussion

This study identified a number of key findings in regard to the importance placed on grocery shopping and how people with moderate to severe traumatic brain injury engage in this occupation. A predominant finding from this study was that participants perceive grocery shopping both pre and post brain injury to be multifactorial in nature (i.e. an occupation described as embedded within a broader routine which is closely linked with other occupations and roles). This finding is consistent with occupational therapy literature, which suggests that occupations such as grocery shopping may be considered one of the building blocks of a broader routine concept, with this occupation triggered by completion of other activities in the day (Clark, 2000). When discussing life after brain injury, there was limited discussion from participants around their grocery shopping routine being guided by other occupations or roles, instead it seemed to focus on others' availability. The main changes participants described in terms of grocery shopping performance post injury were the impact of medical restrictions (i.e. driving, managing finances) on aspects such as getting to the shops and budgeting for groceries. Participants also discussed cognitive errors within components of shopping such as planning and needing oversight from others to minimise errors. For some this increased dependence on others meant that their routines change around others availability.

It has been well documented in the literature that routines and habits are shaped by the surrounding environment and cultural factors and can be important for enabling automatic completion of tasks, reducing the cognitive load required and allowing more attention to be directed towards unfamiliar or complex tasks (Clark, 2000; Gallimore & Lopez, 2002). Cognitive impairment post traumatic brain injury can increase the cognitive demands on previously automatic tasks and can therefore disrupt routines (American Occupational Therapy Association, 2020; Clark, 2000) which is consistent with the results from this study where participants described cognitive demands and errors within their grocery shopping routine.

Like prior quantitative research (Sloan et al., 2007; Tate et al., 2020; Warren, 2009), many of the participants in the qualitative study described needing, or anticipating needing, support with

more complex instrumental activities of daily living such as grocery shopping, driving and financial management. Whilst research describes the impact of traumatic brain injury on individual occupations, there has previously been limited discussion around the complex interplay between reduced independence in one occupation and the impact on other occupations or an overall routine. In this study participants described the impact restrictions on driving, accessing the community and financial management had on their ability to complete their grocery shopping routine and subsequent dependence on others. This finding is consistent with work by Gallimore and Lopez (2002), who discussed how the environment and social context can be important in forming routines and how factors such as income, living arrangement and availability of others shape routines. Given there is very little occupational therapy research that has explored how to support routine development after severe traumatic brain injury, this is an area for further research which has arisen from this study.

Within this qualitative study, social supports were perceived as key to support participation in grocery shopping by those living with a traumatic brain injury. There is extensive literature suggesting that across both acute and chronic stages of recovery, people have difficulty resuming life roles, integrating back into the community and returning to independence with more complex instrumental activities of daily living including grocery shopping (e.g., Sloan et al., 2004; Sloan et al., 2007). High levels of disability post traumatic brain injury and subsequent restrictions with driving and financial management mean that family members and other social supports often play a significant role in supporting individuals to adjust back into community life post traumatic brain injury (Turner et al., 2007). The majority of participants who had returned to community living described difficulties with shopping and needing the support of others. Given this dependency on other people, participants described the need to adapt and adjust routines to work around others' availability, and how the expectations of key social supports shaped how they completed grocery shopping and their responsibilities within the occupation. In a study investigating environmental barriers in the initial phase post discharge for people with traumatic brain injury, Fleming et al.

(2014) found that the attitudes and availability of supports had a significant influence on community integration. Therefore, it is important for therapists to acknowledge a person's social supports and resources available when supporting engagement in grocery shopping post traumatic brain injury.

There was no single perceived view on grocery shopping expressed by the participants, instead different expectations of the impact of their traumatic brain injury on their ability to engage in grocery shopping was discussed. Turner et al. (2009) also found that during the early stages of recovery, and during the transition phase from hospital to community, people can experience a discrepancy between desired and actual performance. In this study, participants described changes or anticipated changes to their routine because of their traumatic brain injury. While they could articulate that these changes were driven by cognitive errors or lapses, the changes (and losses) of life roles such as the worker or parenting role and reduced ability to perform other occupations (in particular driving) or changes in social and living context were all linked to changes in grocery shopping. For some participants, particularly those who were still inpatients at the time of interview, there seemed to be an expectation that life would return to normal once they returned home, or an uncertainty around how their traumatic brain injury would impact on their ability to complete grocery shopping. This finding highlights the importance of *where* grocery shopping rehabilitation occurs, and suggests that future rehabilitation should take this into account (i.e. by considering whether or not to address grocery shopping goals during inpatient rehabilitation, and by selecting familiar grocery stores to each client as part of the therapy program).

While all participants described grocery shopping as important, it was clear that participants saw this occupation as belonging on a continuum of independence (rather than a dichotomy of being able to complete grocery shopping independently or not). Many participants explained that even prior to their traumatic brain injury that they had shared responsibility or completed only components of the task; for them, participation did not equate to independence. Whilst for others, they spoke of the importance of being self-sufficient, of completing the whole task without support. This articulation of a continuum (from participation to independence) is a key finding for the

profession of occupational therapy, suggesting that it would be important for treating occupational therapists to understand each persons' own beliefs about grocery shopping independence before establishing a grocery shopping rehabilitation program.

Based on findings from the present study, participants' roles, social context, values, and expectations appeared to influence how they perceived their responsibilities within the occupation of grocery shopping. Eriksson et al. (2013) acknowledged the importance of determining where a person sees gaps in participation in occupations and their expectations around participation, with consideration to how occupations would be completed, including the presence of supports. Tate (2004) found that even in the chronic phase following severe traumatic brain injury, people continued to need support and that fewer than 30% of people are fully independent in basic occupations. The anticipated requirement for future supports due to the impairments of traumatic brain injury is thus likely to be more easily accommodated by some people more than others, and so appreciating how a family supported grocery shopping prior to the injury may provide insights into a person's expectations for their post-discharge grocery shopping independence. This emphasises the importance of patient-centred rehabilitation and clinicians' consideration of expectations and values placed on the occupation of grocery shopping, whether this is a participation level or to support the person to achieve independence.

As with all research, there are some limitations that should be considered when interpreting the findings. This study used in-depth verbal interviews to collect information on people's experiences, therefore people with significant communication impairments were excluded from this study. Findings should be interpreted knowing that they may not have addressed key issues for the cohort of patients who experience similar communication impairments. I investigated this issue from the perspective of people's experience post traumatic brain injury, therefore it is also acknowledged that these results are not able to be generalised to other neurological conditions (such as hypoxia) or those with milder injuries. Future research should be undertaken to better understand the experience of such populations so as to understand if the values expressed by the traumatic brain

injury population and from those with more significant injuries are also held by these other acquired brain injury groups. Finally, I acknowledge that there was an underrepresentation of females within the sample. While this is not atypical within brain injury rehabilitation (i.e. there is a high prevalence of males who suffer severe traumatic brain injury), it may mean that findings are not as applicable to women who may have been the primary shopper prior to their traumatic brain injury.

Conclusion

In conclusion, this study explored the views of people with moderate to severe traumatic brain injury to gather their perspectives on how they complete grocery shopping, and the value they place on successful engagement within this occupation. There are a number of important clinical implications that arose from this program of research. Firstly, to enhance rehabilitation programs and future engagement in grocery shopping it is important for occupational therapists to consider a person's wider routine and the factors which influence how grocery shopping could be embedded into this routine. Occupational therapists should also seek to understand the person with traumatic brain injury's expectations about their involvement in grocery shopping so as to tailor rehabilitation interventions at a level of independence to participation. Finally, social supports should be involved in the rehabilitation process so as to optimise their understanding of how the person's traumatic brain injury impacts on grocery shopping as well as to support strategy use post-discharge and promotion of the occupational role of grocery shopping.

Chapter 4: Resuming the Occupation of Shopping Following Moderate to Severe Traumatic Brain Injury: A Qualitative Descriptive Exploratory Study

The qualitative findings presented in *Chapter 3* provided insights into how grocery shopping is performed after traumatic brain injury, and the value that survivors of brain injury place on successful engagement within this occupation. Given that participants spoke of the routine of shopping, in this chapter we explored this in-depth. The aim of *Chapter 4* was to explore the perceptions of adults living with traumatic brain injury who had received occupational therapy rehabilitation to address the occupation of grocery shopping as part of their rehabilitation experience. Specifically seeking to appreciate their perceptions about how their brain injury had affected shopping and what rehabilitation had supported shopping activities.

The manuscript for this study has been submitted to the journal, Australian Occupational Therapy Journal, for peer-review:

De Lacy, L., Fleming, J., Sansonetti, D., Lannin, N.A. (2022). Resuming the occupation of shopping following severe traumatic brain injury: a qualitative descriptive exploratory study. *Australian Occupational Therapy Journal*.

After traumatic brain injury, occupational therapists work with adults across hospital and community settings to address functional changes which impact on independence, routines, and life roles (American Occupational Therapy Association, 2020). Grocery shopping is often interrupted by traumatic brain injury. It includes the steps of “being able to generate a list, select items and make payment” and can be completed instore or online (American Occupational Therapy Association, 2020, p. 620). It is well documented that people often regain independence performing basic occupations (i.e., selfcare) but have difficulty completing such instrumental activities after traumatic brain injury (Ponsford et al., 2013; Rand et al., 2009, Tate et al., 2020).

In a study investigating long term outcomes following severe traumatic brain injury, Sloan et al. (2007) found that 62% required support with community access and 85% with financial management, both activities closely linked with shopping. Despite the extensive literature outlining the level and types of support needed after moderate to severe traumatic brain injury, there is minimal research that specifically seeks to understand the process of grocery shopping, nor how people living with traumatic brain injury perceive their newly acquired impairments impact on their ability to shop.

Research has shown that traumatic brain injury related cognitive and visual changes increase the difficulty of shopping (Bottari et al., 2014; Warren, 2009), and that there is the potential to use virtual reality to assess and improve grocery shopping skills (Kinsella et al., 2009; Okahashi et al., 2013). These virtual reality projects suggest that difficulty in tasks such as remembering items in a timely manner, identifying ‘specials’ and allocating attention across the task demands are common after brain injury (Kinsella et al., 2009). As there has not yet been research comparing virtual task completion to real life grocery shopping, current rehabilitation focuses on hospital-simulated and local grocery shopping interventions. The challenge is to better understand the occupation of grocery shopping after traumatic brain injury to develop meaningful and effective rehabilitation opportunities. The aim of this project, therefore, was to investigate the perceptions of adults living

with traumatic brain injury who had received occupational therapy rehabilitation to address the occupation of grocery shopping as part of their rehabilitation experience.

Method

Study Design

A descriptive and exploratory qualitative design was used to understand participants' perceptions of shopping after traumatic brain injury (Nayar and Stanley, 2015). In-depth, semi-structured interviews with adults living with traumatic brain injury were conducted. The Human Research Ethics Committees of Alfred Health and La Trobe University approved this study prior to commencement (598/19) (Appendix A) and all participants provided written, informed consent (Appendix B).

Participants and Setting

To achieve diversity and gain an in-depth understanding about issues of central importance (Patton, 2002), participants were purposefully chosen with maximum variation from both inpatient and community settings of a specialised brain injury service at a large metropolitan hospital in Melbourne, Australia. All participants had previously participated in rehabilitation which involved a personally stated or therapist goal related to grocery shopping. Adults who had sustained a traumatic brain injury, were able to participate in an interview, had participated in grocery shopping prior to their brain injury and planned to return to grocery shopping post rehabilitation were eligible to participate. Participants were excluded if they were unable to provide consent, were in post-traumatic amnesia, or had significant communication deficits that would make participating in an interview difficult. Guided by purposive sampling, participants were identified by their treating rehabilitation team as being information-rich because of their experiences with shopping either in the hospital or within the community post-discharge. Recruitment of adults with traumatic brain

injury occurred between December 2019 and March 2020 (pre-COVID19 community restrictions in Australia).

Data Collection

Demographic data were collated from electronic medical records and included information about the mechanism and severity of brain injury, their functional independence level (as measured using the Functional Independence Measure, FIM™), socioeconomic background (including employment), and reported shopping rehabilitation activities. A semi-structured interview was conducted face-to-face with each participant within the rehabilitation hospital by the first or senior author and ranged in length from 20 to 60 minutes. The semi-structured interview format allowed for consistency to explore core questions across all the interviews, as well as flexibility to follow new concepts raised by participants (Liamputtong & Ezzy, 2005); Table 4.1 summarises the interview guide. Interviews were audio recorded and then immediately transcribed verbatim.

Table 4.1

Semi-Structured Interview Guide

Topic	Questions
Shopping routine	Can you explain how you previously completed grocery shopping prior to coming into hospital?
Impact of brain injury	How do you feel your brain injury has impacted on your ability to complete grocery shopping? How have you adjusted to this?
Rehabilitation experience	Can you explain how your time in rehabilitation has prepared you for returning to the community and completing grocery shopping? <i>Additional question for community participants: Looking back on your</i>

Topic	Questions
	time in rehabilitation, do you have any suggestions for the therapists working with you, specifically about shopping or getting ready for being able to shop?
Importance	Has the importance you place on grocery shopping changed since sustaining a brain injury changed? How? <i>Additional question for community participants:</i> Can you tell me about how you feel about grocery shopping now that you are home from hospital?

Data Analysis

Transcripts were coded independently by two members of the research team (LD and DS) using a thematic approach to analysis and applying Braun and Clarke's (2006) six steps to guide the process (Cooper et al., 2012). Each transcript was first read to become familiar with the whole interview, before then deductively coding to identify the categories from the American Occupational Therapy Practice Framework (American Occupational Therapy Association, 2017). The American Occupational Therapy Practice Framework has two major sections of "domain" and "process"; the "domain" has five subcomponents (occupations, client factors, performance skills, performance patterns, contexts, and environments) while the "process" includes three (evaluation, intervention and targeting outcomes). By discussing categories that recurred in the data, and mapping interviews back to the Occupational Therapy Practice Framework, the two researchers provided input into the code book (Appendix C), which was jointly developed to ensure consistency both between and within researchers across interview transcripts. Double coding of more than 10% of interviews was completed to increase rigor during the development of the code book. Themes

that emerged from the data both within and outside of the framework constructs were captured during analysis. Validity was supported through use of bracketing and reflective journaling to document researcher’s personal thoughts, feeling and biases that may influence undertaking interviews and data analysis.

Emergent themes were discussed between all members of the research team (LD, NL, JF, DS), and discussions continued until consensus was reached (Appendix D). Research triangulation was used to add to the validity of the study with team members ranging in experience in both research and the clinical setting. All members of the research team concurred on the final categorisation of key themes and subthemes.

Results

Fourteen participants were recruited, including eight people from the inpatient service and six who were community living. Table 4.2 shows the demographic characteristics of participants.

Table 4.2

Participant Characteristics at time of qualitative interview, and description of living situation and employment pre- and post-injury, n=14.

Characteristic	%
Gender (Male)	13 (93%)
Age (Years)	
18-24	1 (7%)
25-34	4 (29%)
35-44	5 (36%)
45-54	2 (14%)
55-64	1 (7%)
65+	1 (7%)

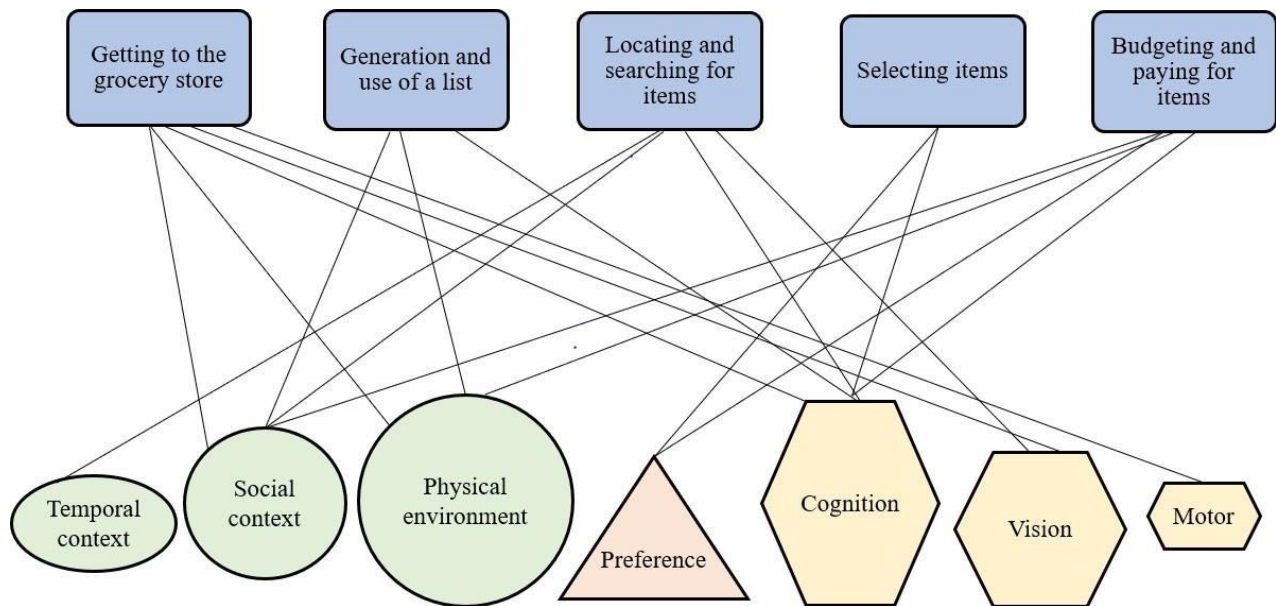
Characteristic	%	
Time Post Injury		
0-6 months	5 (36%)	
6-12 months	3 (21%)	
1-2 years	1 (7%)	
2+ years	5 (36%)	
Post Traumatic Amnesia Duration		
1-4 weeks (very severe)	3 (21%)	
Greater than 4 weeks (extremely severe)	11 (79%)	
Rehabilitation Setting		
Inpatient	8 (57%)	
Community	6 (43%)	
FIM (at time of interview)		
Motor FIM, mean (SD)	85.1 (9.4)	
Motor FIM, median (Min – Max)	90.5 (58.0-91.0)	
Cognitive FIM, mean (SD)	26.6 (5.4)	
Cognitive FIM, median (Min – Max)	28.5 (14.0-33.0)	
Total FIM, mean (SD)	111.1 (10.0)	
Total FIM, median (Min – Max)	112.5 (86.0-123.0)	
Living Situation	Prior to Injury	Post Injury
Alone	1 (7%)	0 (0%)
Housemates	4 (29%)	1 (7%)
Partner & children	3 (21%)	3 (21%)
Partner	3 (21%)	2 (14%)
Children	1 (7%)	0 (0%)

Characteristic	%	
Parent	2(14%)	5 (36%)
Supported accommodation	0 (0%)	3 (21%)
Employment	Prior to Injury	Post Injury
Working	12 (86%)	1 (7%)
Not working, looking for work	1 (7%)	9 (64%)
Not working, not looking for work	1 (7%)	4 (29%)

The occupation of grocery shopping was discussed with respect to *how* it is completed, associated *demands* of participation, and *influences* on task performance. Participants identified several key steps to performing grocery shopping (Figure 1). While they described steps consistent with the American Occupational Therapy Practice Framework (including preparing lists, selecting, purchasing, transporting, and paying for items) along with additional steps (including getting to the grocery store and locating items). Rehabilitation interventions provided to address post-brain injury grocery shopping goals were coded to an additional theme which emerged from the data. Therefore, there were six key themes emerged from the data including key five steps of grocery shopping: getting to the grocery store, generation and use of a list, locating and searching for items, budgeting and paying for items. With a final theme; rehabilitation for shopping.

Figure 4.1.

The Steps within Grocery Shopping and the Relationship Between Occupation, Person and Environment



Getting to the Grocery Store

All participants perceived that transportation to get to the grocery store is an important component of grocery shopping. Grocery stores were accessed using multiple options of transport, including walking, driving, public transport, and riding a bike. Prior to their brain injury, most spoke of getting to the grocery store independently by driving:

“I would normally drive to the grocery shop and get what I needed and go back home...”

(Participant 8, female, 35 years).

However most described the impact of traumatic brain injury related impairments and medical driving restrictions had on their independence, becoming reliant on others for transport or needing

to alter the way they accessed the grocery store. *“If we had to go basically, they [carers] were driving. I couldn’t drive...”* (Participant 7, male, 38 years).

Dependency on others post traumatic brain injury to provide transport to access the grocery store meant some participants had to plan their grocery shop around others’ availability: *“Once a week I go[shopping], I have a carer twice a week. Monday, Wednesday is my shopping day, and my carer comes with the car and we go and do the shopping...”* (Participant 4, male, 24 years).

As explained by Participant 2 (male, 34 years) cognitive changes, such as attention and concentration made walking to the grocery store harder and had potential safety implications: *“...paying attention to things is a lot harder now, even just walking along the street seems harder but I am constantly reviewing the street, not knowing if a car is coming off the street into a driveway”*.

Sensory functions also such as blurred vision and changes with peripheral vision were described to make road crossing and navigating obstacles more difficult: *“I have even walked into people you know, not that I didn’t see them, but I just didn’t realise they were there”* (Participant 11, male, 50 years).

For some participants there was a need to change where they shopped post traumatic brain injury however it was not clear from the interviews whether this was due to challenges faced in accessing the grocery stores or brain injury fatigue (which is common after severe injury). Participant 8, (female, 35 years) explained: *“It is easier for me to now just have everything in the one spot rather than have to go here and go there to other places and just do it all in the one hit and be done with it”*

Generation and Use of a List

Shopping lists were discussed in detail by many participants with reference to their use both prior to and after brain injury, with the step often occurring prior to leaving the house. *“...prior to coming into hospital, I would have a list on my phone, and I would tick things off as I get it, hopefully I have got everything and done it properly”* (Participant 3, male, 34 years).

Participant 12 (male, 25 years) saw no differences pre- and post-brain injury in how he remembered shopping items, *“the same way I complete it now, a list I go into the shops, follow the list and get my shopping and go home”*.

Although some participants did not use any organisational strategies prior to their brain injury: *“No never, I never walked around with a list”* (Participant 6, male, 71 years); *“I just went into the shops and grabbed anything, no list”* (Participant 12, male, 25 years). Others saw no need for a list even after their brain injury: *“No strategies, I don’t believe in strategies, I am a boring person, when they [carers] ask me to make a list I say, “let’s go”* (Participant 4, male, 24 years).

And some participants described needing to rely on organisational strategies such as a list more since their brain injury: *“I think for people like me in my situation is plan the list better, not the first thing that comes to your head, maybe think, vegies are the first thing in the supermarket that’s where you walk in”* (Participant 2, male, 34 years).

Cognitive changes following brain injury, such as planning, memory, concentration and idea generation were described by most participants as frustrating and causing difficulties within shopping, especially the step of generating and using a list. *“It means I have to look at what’s in there [cupboard] because I don’t want to double up on something, it’s like this whole scenario I have to go through... thinking... that’s what’s difficult, it’s very much the thinking of stuff, thinking of what to put on the list”* (Participant 5, male, 56 years).

For those who did use lists, there was variability and flexibility in how lists were used, with some describing deviating from the list once at the supermarket. *“I had a list of what I needed but I didn’t stick to it, I would generally pick up whatever was marked down or on special or go with the flow a little bit”* (Participant 8, female, 35 years).

Having to commence using a list after brain injury for grocery shopping was a source of irritation for some, along with the frustration of the cognitive demands of generating the list. This can be seen in the explanation of Participant 5 (male, 56 years); *“No, I don’t enjoy it [shopping]...because I have to make a list, and I struggle making the list, and then I have to take a pen and tick the stuff off, like today I didn’t have...time to make the list, right but I should have made it last night, but I worked hard yesterday so I didn’t really have the time to make the list last night..”*.

It became clear that the social context and participants’ role within the grocery shopping task also influenced who was responsible for writing the list and whether this step was described as an individual or shared activity: *“Usually my wife will [write the list] but we do discuss what we would like for the week so it’s both of us”* (Participant 14, male, 39 years). *“We share it because I will either go shopping with mum or shopping with my support worker with a list that mum and I have gone through and created together”* (Participant 8, Female, 35 years).

Demonstrating insight into changes in ability post-injury, some participants described reliance on family to support the process of developing and using a list (rather than as shared activity): *“...and the best way for me, and this is part of my brain injury, is I do make the list...and I then need to show the list to my wife and for her to go “yeh that’s fine” or “no I don’t want that”... because I have often done the list and stuffed it up and then I cop it and that’s the problem with the injury...I’m just not my old self”* (Participant 5, male, 56 years).

Locating and Searching for Items

Once at the supermarket, walking around the aisles and searching for items was another key step described by all the participants. There was variation in how this occurred, which at times appeared to be influenced by whether grocery shopping was perceived as a chore or enjoyable task. The temporal context (i.e., participants' experience of the time taken to locate items) was another influencing factor. For some participants, there was the need to locate items and complete the task of grocery shopping quickly: "...*just get in there and get it done that was the attitude I always had.*" (Participant 1, male, 41 years). Others described finding enjoyment in grocery shopping: "*I like to browse and spend a bit of time in there [supermarket] and if I see anything I like, I buy it*" (Participant 6, male, 71 years).

Participant 8 (female, 35 years) described how the temporal context was influenced by who she was shopping with: "... *when I shop with mum or dad, I need to be quick and precise whereas when I shop with the carer, she is quite happy to peruse things with me*".

Amongst participants there were differences in grocery shopping environments and the associated predictability or variation within the physical shopping environment that influenced this step. Some participants reported completing grocery shopping at one store (supermarket only) whereas others went to multiple stores for their groceries: "*We used to go to the market, so fruit and veg was pretty easy and meat all that stuff was pretty sorted out...any other groceries like milk and all that sort of stuff we would have to go to Woolworths or Coles*" (Participant 5, male, 56 years).

The physical layout of the store, similarities or differences in the layout between a familiar store and the grocery store used during rehabilitation, and the impact of the cognitive and visual demands on the shopping task, specifically locating items, were all discussed. For instance, participants explained that the common layout amongst supermarkets assisted them to identify and

select items “...all supermarkets are laid out vegies, then bread a little bit further and then milk” (Participant 2, male, 34 years).

Others described differences between grocery store layouts that led to less predictability of where to locate items: “...although I went to Coles [while in hospital] and did a shop a couple of times, the Coles is totally different to the shops that I am used to, or they are setup different so where you go to normally...to say get your cereal, would be in a different position...” (Participant 13, male, 43 years).

Cognitive and visual brain injury related impairments were the main changes that participants described as impacting this step within grocery shopping. “ I notice that my concentration is not what it used to be and it can get distracted quite easily... it [brain injury] can have an effect because even when I shop I look around I go hmm, not “where am I”, but what aisle am I in...? ” (Participant 11, male, 50 years).

One participant also described the impact of memory lapses in grocery shopping performance: “It makes me angry why I forgot those things, I need it, I need it right now, I need to cook so without it I can’t cook” (Participant 4, male, 24 years).

Participant 2 (male, 34 years) described the impact of their cognitive impairment on locating items and his engagement within therapy to address grocery shopping: “ I walked past them [signs] so many times looking for biscuits and the therapist is like “you walked past it about five aisles back there” and I’m like man...it’s the second time I’ve gone grocery shopping with her and the same thing happened again, I was just not paying attention to them [signs]...it is a lot more difficult now to concentrate on the task at hand and it is a little bit frustrating”.

Visual and perceptual changes such as inattention also impacted participants whilst walking around the aisles trying to locate items: “sometimes with people walking past...I have even walked

into people you know, not purposely, it's just I have done it and I have gone, "oh sorry...not that I didn't see them, but I just didn't realise they were there" (Participant 11, male, 50 years).

Selecting Items

Within this step, participants described how selecting items (including choosing the brand, size, packaging type and amount) was influenced by personal preferences as well as the impact of cognitive and visual changes post traumatic brain injury. Participants described how their preferences guided selection of grocery items. Preference around brands and the quality of the item influenced how participants selected items. *"There are certain things that are branded that we would buy because we prefer those but usually, we look at price and see what is cheaper that day and probably buy those"* (Participant 3, male, 34 years).

Post-brain injury participants described cognitive and visual changes impacted their ability to select items. *"I got a bit lost trying to pick up a few things [at the supermarket] because I think he [therapist] told me to go and pick something up and I tried to...I think I picked up the wrong thing"* (Participant 11, male, 50 years). *"I have to focus it [vision], I have to focus otherwise I ask my friend or the shop people, can you help me with these things"* (Participant 4, male, 24 years).

Budgeting and Paying for Items

The value of items, budgets and paying for items appeared to have greater importance for many participants following their traumatic brain injury. Price and value for money was mentioned frequently by participants post-brain injury; *"I would generally pick up whatever was marked down or on special or go with the flow a little bit"* (Participant 8, female, 35 years). Discussion included people's preferences and need for an allocated budget for groceries. Changes to employment as well as household income, and a dependency on others to manage money post-brain injury altered how some managed the costs of groceries and ultimately how they participated in grocery shopping. Setting a budget, however, was not necessarily a new thing for participants, with many

acknowledging that they had to stay within a budget prior to their traumatic brain injury: “...we [housemates] used to do it [shopping] together...I live with another three, so we go together, like on a Saturday we go shopping together \$50 each and we go with a bit of a list of what we need” (Participant 9, male, 29 years).

Following traumatic brain injury, using a budget, or adhering to a budget, was emphasised within the interviews. *[grocery shopping] will be budgeted because I have been unemployed since the incident, because I am self-employed, so I have had no income for the past two months, so I am going to be on a very strict budget*” (Participant 2, male, 34 years).

For some participants, the post-injury changes to financial control meant others set a grocery shopping budget: “...they [State Trustees] look after my finances, so they um make a budget for me they manage my everything” (Participant 4, male, 24 years). In terms of paying for items at the grocery store, Participant 5 (male, 56 years) discussed how difficulties with memory impacted on this step: “...go in there give them the money that you took with you or give them the card and um you, you have then got to remember your password which I have had problems with and that is brain injury that has done that to me”.

Rehabilitation for Shopping

While all participants had received occupational therapy to address grocery shopping goals, there was significant variation in participants’ views and perceptions of what constituted *rehabilitation*. Not all participants perceived that rehabilitation had supported their return to grocery shopping, with some participants describing rehabilitation as physical exercises or pen and paper tasks. “Nothing really, there has been no real rehab [targeted at shopping], I haven’t done any weights or push ups or anything like that” (Participant 1, male, 41 years).

Although all participants described returning or planning to return to grocery shopping, this was not seen as one of their rehabilitation goals “My goals were about swimming and about doing

other things like getting back into some volunteer work and losing weight and all that sort of thing” (Participant 8, female, 35 years).

In contrast, others discussed the importance of specific intervention targeting grocery shopping as part of rehabilitation, describing specific grocery shopping sessions with an occupational therapist, and training they received to learn specific strategies. *“She [therapist] was good... she sort of gave me the key, you know, just look for the signs...”* (Participant 2, male, 34 years). These strategies, either taught during rehabilitation or gained independently or with the help of family, appeared to be valued by participants not only for the potential for them to achieve the task, but as a component of improving and obtaining feedback that they are improving *“I just want to try and memorise where everything is before I start searching for it”* (Participant 3, male, 34 years). *“...the best way for me, and this is part of my brain injury, is I need to make the list...and I then need to show the list to my wife and for her to go yeh that’s fine”* (Participant 5, male, 56 years).

One participant reflected that initially he did not see the importance of intervention to address grocery shopping but as he started to gain an understanding of his injury, this reshaped his view on his rehabilitation experience: *“I look back now...and I didn’t realise that it was really obvious I needed it [previously]. I didn’t realise it took me ages to work out how bad I was, I took me probably 3-4 months when I was out of hospital for me to come clean with myself”* (Participant 5, male, 56 years)

The varied views of rehabilitation may have been connected to the context for each individual. For some participants in the inpatient setting there appeared to be a belief that life would return to normal or that they would need to return home to figure out what was possible. *“You have to go home to do a lot of different things, you won’t know until you actually get there and do it...”* (Participant 10, male, 52 years).

Discussion

This study provides important insights into how grocery shopping is completed by people with moderate to severe traumatic brain injury and shares their experience of rehabilitation delivered to support this occupation. Together, findings support that there is a standard set of steps to grocery shopping, while still acknowledging the individualised nature of the activity. While participants' descriptions of the steps within grocery shopping were consistent with the American Occupational Therapy Practice Framework definition, they also discussed in detail getting to the grocery store (both pre-injury and changes as a result of their brain injury). Therefore, clinicians should consider the close link between these two instrumental activities of daily living and how participation restrictions in community access may influence and shape performance in grocery shopping.

Occupational therapists have a foundational understanding of how to tailor activities to both personal and environmental factors (Mackenzie et al., 2011) and this skill is critical in grocery shopping. The current study showed variability amongst participants across each step of grocery shopping, including whether it was completed as a whole or only certain steps. So as to maintain an individualised and person-centred approach, the occupational therapy process must align with and consider multiple aspects relating to the person beyond the task level. This includes considering a person's preferences, motivations, goals, needs, lifestyle, abilities, and deficits as well as the environment in which the occupation will be performed (Higgs, 2008). Findings, therefore, highlight the importance of understanding how and where adults shopped for groceries prior to their brain injury so as to better understand the person-centred occupation of grocery shopping post-brain injury.

As well as understanding pre-brain injury shopping habits, an occupational therapy rehabilitation program should consider cognitive and visual brain injury impairments. Instrumental activities of daily living, such as grocery shopping, have higher cognitive demands than basic

occupations and therefore are more likely to be impacted post traumatic brain injury (Toglia & Foster, 2021). Consistent with current literature, participants in this study also highlighted that cognitive and visual impairments, rather than physical, more significantly impacted on their shopping performance (Bottari et al., 2014; Canty et al., 2014; Khan et al., 2003; Mackenzie et al., 2011; Rand et al., 2007; Warren, 2009). Warren (2009) investigated the limitations caused by brain injury visual deficits and found difficulties with orientation and navigation around the store, locating items, reading labels and using payment machines. Virtual reality research suggests that it is more challenging to identify specials and remember shopping items (prospective memory) after brain injury (Canty et al. 2014; Kinsella et al. 2009). Supporting these findings, the participants described the impact of their cognitive and visual impairments on each step within the grocery shopping process.

In an observational study of shopping performance, Bottari et al. (2014) found that being able to recognise the need to use appropriate strategies, as well as matching environmental demands to capabilities, improved shopping independence. Variation or consistency within the physical grocery shopping environment was raised by participants in this study, as one factor that impacted on the cognitive demands of the task. To guide the clinical reasoning process for occupational therapists, it is important to understand a person's previous shopping environment and cognitive profile (Bottari et al., 2014; Higgs, 2008). Fleming et al. (2014) explored the impact of environmental barriers on community integration for people with traumatic brain injury and found that exploring and assessing barriers prior to discharge and having appropriate follow up in the community can improve community integration.

Impaired self-awareness of brain injury related impairments and the functional impact is common after brain injury, particularly within the early stages of recovery but may improve over time but some have persisting problems (Hart et al., 2009; Ownsworth et al., 2010). It is a common pattern that people may display poorer awareness within activities with higher cognitive and social

demands compared with activities with higher physical demands (Fleming et al., 2006). Turner et al. (2007) highlighted the importance of understanding discrepancies between pre-discharge expectations and realities of community living with traumatic brain injury. Some participants in this study also revealed their expectations to return to grocery shopping without difficulty while still inpatients, whilst others were able to describe using strategies or attendant carers to support grocery shopping, even early in their recovery. A therapist's ability to reflect on their client's awareness is critical when planning rehabilitation interventions (Higgs, 2008). Bottari et al., (2011) acknowledge that the ability to complete functional assessment, such as grocery shopping, within the discharge environment may support building awareness into changes in functional performance and support discussions regarding strategy use and readiness for discharge from the hospital setting. The role of self-awareness highlighted by this study's findings raises an important consideration regarding the optimal timing of grocery shopping rehabilitation, as well as whether engagement in part or whole task grocery shopping may be more or less appropriate at different stages of rehabilitation.

Another important finding of this study was the variation in perceptions from participants about what rehabilitation is and how occupations such as grocery shopping fit within a person's rehabilitation. Although participants described the need to rely on strategies, such as use of a list, there was limited discussion around how therapy supported strategy identification and resumption of grocery shopping. Bottari et al. (2014) found that participants with better outcomes used a greater number of strategies, with external strategies most frequently used. Given engagement in occupation is not always clearly understood by clients, clearly articulating and voicing occupational therapy reasoning and interventions to others, including clients and families, can assist clients to understand how this contributes to rehabilitation (Mackenzie et al., 2011).

Limitations

This study interviewed people with moderate to severe brain injury with all interviews

conducted in English and thus people from non-English speaking backgrounds and people with significant communication impairment were excluded from this study. Findings may not have addressed key issues for these cohorts. Future research should be undertaken to better understand people's experience after stroke and hypoxic brain injury, in addition to those with mild brain injury. There was an underrepresentation of females within the sample, but this is not atypical given a high prevalence of males with traumatic brain injury (Australian Institute of Health and Welfare, 2007). This study investigates rehabilitation for grocery shopping from the perspective of the client but of equal importance is for further research to understand rehabilitation to support grocery shopping from the occupational therapist's viewpoint to provide a means of triangulation and increase reliability of data.

Clinical Recommendations and Conclusion

This study explored the views of people with moderate to severe traumatic brain injury on how they complete grocery shopping, and the rehabilitation undertaken to support participation. The following are important clinical implications from these interviews. Firstly, I concluded that grocery shopping is a complex, multi-stepped activity which is considered to be important by those living with moderate to severe traumatic brain injury. Secondly, as per the American Occupational Therapy Practice Framework occupational therapists should consider the individualised nature of both the pre and post traumatic brain injury preferences for grocery shopping, as well as brain injury impairments, prior to working with a client to address this occupation. Finally, careful consideration of the environment in which grocery shopping assessment and intervention is completed is key, with higher visual and cognitive demands arising from an unfamiliar environments. Taken together, these findings may assist occupational therapists working with adults after severe brain injury to plan and provide tailored rehabilitation for addressing grocery shopping performance gaps.

Chapter 5: A Cohort Study of Shopping-Related Performance Gaps and Rehabilitation After Traumatic Brain Injury.

Together *Chapter 3* and *Chapter 4* presented qualitative insights of grocery shopping held by people living with moderate-severe traumatic brain injury. In *Chapter 5*, the dependency levels of a cohort of inpatients were assessed at admission to rehabilitation, at discharge from rehabilitation and again at 12-months post-brain injury (for those who were community living) so as to understand recovery of grocery shopping skills over time. The rehabilitation interventions provided to each of these inpatients was also determined through a file audit, so as to classify what therapies are provided (and their intensity) to address grocery shopping goals during inpatient rehabilitation. Finally, correlations between assessed brain injury impairments at 12-months were correlated with the assessment of shopping dependency and the amount of attendant care provided to support shopping. Together this chapter provides key data to quantitatively understand grocery shopping performance after traumatic brain injury.

Due to the advances in acute medical and surgical care, the numbers of people living with moderate to severe traumatic brain injury continues to increase, resulting in life-long impairments impacting on functional performance of everyday activities (Centres for Disease Control and Prevention, 2018). Impairments after traumatic brain injury commonly include cognitive (changes to attention, memory, planning, problem solving, initiation, awareness, and fatigue), behavioural and emotional changes (irritability, impulsivity, disinhibition, depression, anxiety), sensory changes (visual and perceptual changes), communication (aphasia, poor turn taking, word finding difficulties) and motor changes (reduced strength, endurance, spasticity and coordination) (American Occupational Therapy Association, 2016; Ponsford et al., 2013). It is well documented that after sustaining a moderate to severe traumatic brain injury people struggle to return to community living and continue to have ongoing difficulty with complex occupations (Colantano et al., 2004; Ponsford et al., 2008). Grocery shopping is an instrumental activity of daily living which is tied to a number of life roles and is essential for community living for most people, however the way in which an individual's impairments might impact on participation in grocery shopping is not well understood. In addition to impairments, the changes to the types of occupations and roles that people engage in, as well as potential changes to living situations and a greater reliance of family or external services for support (Fleming et al., 1997; Turner et al., 2007), are all likely to impact on grocery shopping participation after traumatic brain injury.

Therefore, occupational therapists play an important role in supporting people after traumatic brain injury to participate in community-living activities. Using a range of different client- and occupation-based approaches to maximise each person's functional performance with consideration of personal, occupational and environmental factors (American Occupational Therapy Association, 2016; Radomski et al., 2016), the goal is to allow each client to participate in meaningful activity to their own personal capacity, whether this is independently, completing with others as a joint occupation or with assistance. Consequently, an occupational therapy

intervention goal related to community living may vary in terms of what participation looks like in the occupation of grocery shopping.

There have been several systematic reviews investigating occupational interventions after traumatic brain injury. Each show that community-based rehabilitation approaches may be effective in improving occupational performance and highlight the importance of occupational therapists within rehabilitation (Kim et al., 2010; Powell et al., 2016). While rehabilitation and occupational therapy has been shown to improve community participation (in more general terms), there is limited research that specifically investigates the occupation of grocery shopping. There are also gaps in our understanding of the specific strategies used by occupational therapists to support grocery shopping performance. Therefore, the aim of this study was to (1) to investigate whether grocery shopping is routinely specified as a goal by people with moderate to severe traumatic brain injury; (2) to describe the occupational therapy rehabilitation provided to support grocery shopping during inpatient rehabilitation and (3) to describe the relationship between shopping independence, traumatic brain injury impairments and associated support costs at 12-months post-injury.

Method

Design

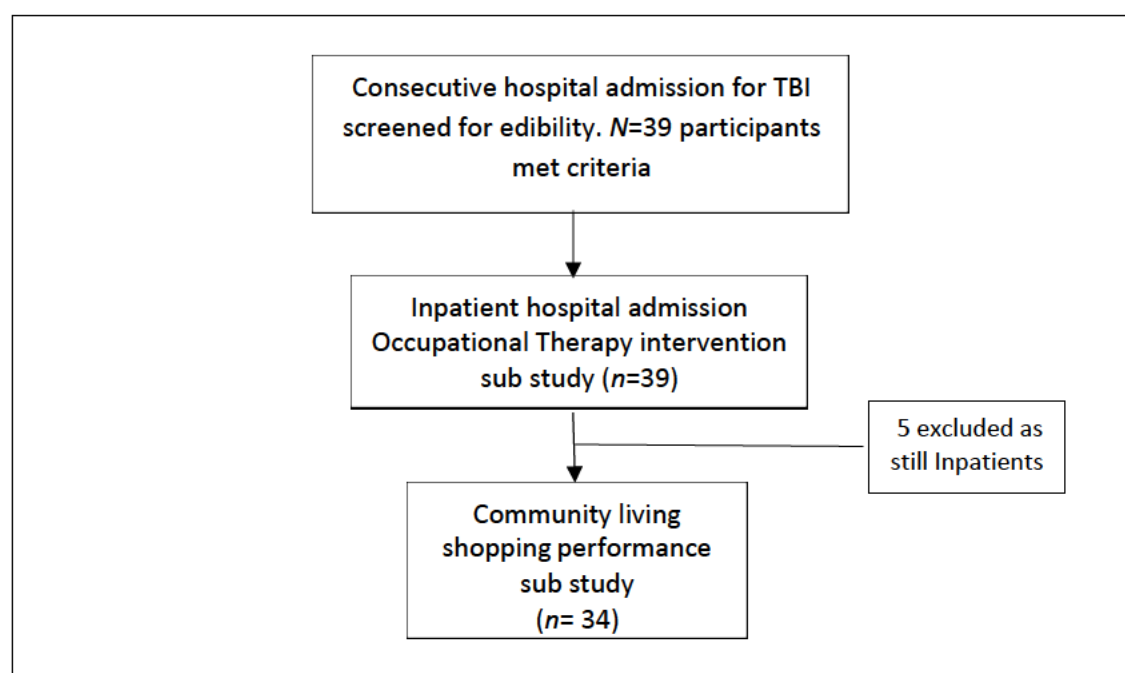
A cohort study of grocery shopping performance by adults living with moderate to severe traumatic brain injury was conducted. All clinical data were collected prospectively at 12 months post-brain injury to address aim 3, and rehabilitation files were audited retrospectively to address study aims 1 and 2. Outcome measures were collected at admission and discharge from rehabilitation, and at 12 months post-injury and were completed by an occupational therapist to ensure consistency in scoring. Ethical approval was obtained prior to commencement [Alfred Health Human Research Ethics Committee, approval numbers 543/15, 164/21] (Appendix E). All participants provided written, informed consent to the 12-month assessments; a waiver of consent was approved to audit rehabilitation files.

Participants

Consecutive hospital data for people who were admitted with a traumatic brain injury to a specialised brain injury inpatient rehabilitation service over a two-year period were screened for eligibility. All participants had either moderate or severe traumatic brain injury, as classified by length of post traumatic amnesia, had received multidisciplinary inpatient rehabilitation (with some also accessing the site's Transitional Living Service following inpatient rehabilitation), and had a documented grocery shopping-related goal (patient-stated or therapist-documented goals were both accepted). A total of 39 people met eligibility criteria. File audits were completed for these participants to determine the rehabilitation interventions that had been provided to address grocery shopping. At 12 months, there were four people who remained inpatients (i.e., still receiving hospital care) therefore they were excluded from the analysis to address aim 3, grocery shopping performance in the community (refer to Figure 5.1).

Figure 5.1

Study Process



Setting

All participants were recruited from a specialised acquired brain injury service in Melbourne, Australia. Inpatient rehabilitation within this setting includes a 40-bed inpatient ward as well as a 4-bed transitional living service, although not all patients move through the transitional service prior to community discharge. The service is staffed by a multidisciplinary allied health team, including occupational therapists.

Outcome Measures

General demographic information was collected including each participant's age, sex, pre-and post-injury living arrangement, severity of traumatic brain injury and length of hospital admission. Severity of traumatic brain injury was classified based on duration of post traumatic amnesia as measured by the Westmead Post Traumatic Amnesia Scale which was administered routinely by ward occupational therapists.

To synthesise the details of rehabilitation provided, an audit tool was developed based on the American Occupational Therapy Practice Framework. One occupational therapist researcher (LDL) reviewed medical record files and recorded the types and frequency of occupational therapy assessments and interventions that participants engaged in within the inpatient setting which were documented as targeting grocery shopping goals. Given the study's cohort had lengthy inpatient rehabilitation hospital admissions, the audit tool covered grocery shopping specific intervention, as well as other general areas of occupational therapy intervention throughout the admission. General occupational therapy intervention was captured as it was hypothesised that there may be some areas of intervention that were precursors to commencing grocery shopping intervention (i.e., basic occupations) or other important occupations that can be closely linked with other occupations such as meal preparation and money management. Therefore, Table 5.1 describes these general occupations other than grocery shopping that were addressed within the inpatient setting and occupational therapy impairment-based intervention where occupational therapist had set a goal related to future grocery shopping participation. Table 5.2 provides information regarding the

specific steps and intervention strategies used by occupational therapists at the time of addressing grocery shopping within the inpatient setting. The frequency of occupational therapy intervention was also classified. To provide a rating of the intensity of interventions provided, the Rehabilitation Complexity Scale therapy intensity rating scale was applied to each intervention component (1= low, less than daily; 2= moderate, daily intervention; 3= high, daily intervention with additional assistant or group sessions; 4= very high, very intensive with two trained therapists) (Turner-Stokes et al., 2012).

Independence in functional activities was assessed using the Functional Autonomy Measurement System (SMAF) (Herbert et al., 2001). The SMAF comprises items covering activities of daily living, mobility, communication, mental functions, and instrumental activities of daily living. Scoring produces both a disability score and a handicap score, where the handicap score measures the gap between a person's disability and the resources in place to overcome the difficulties performing the activity (Herbert et al., 2001). Given the aims of this study were to investigate participant's grocery shopping performance, only the disability score of the grocery shopping item (part of the instrumental activities of daily living subscale) was used to assess grocery shopping performance for all participants. The shopping disability score is rated using a 5-point ability scale from zero (full independence) to 3 (does not shop).

The Mayo-Portland Adaptability Inventory (MPAI-4) was selected to measure traumatic brain injury-related impairments, as the assessment tool covers a range of common impairments that people may experience post traumatic brain injury including physical, cognitive, emotional, behavioural, and social deficits (Malec et al., 2003). The Mayo Portland Adaptability Inventory (MPAI-4) has three subscales (ability, adjustment, and participation) and a total of 29 items. The 'Ability' subscale includes 12 items covering sensory, motor and cognitive abilities; specific individual items from this subscale were used to measure traumatic brain injury-related impairments, including impaired self-awareness, memory, attention/concentration, verbal communication, non-verbal communication, use of hands, funds of information, mobility, novel

problem solving, irritability/anger/aggression, inappropriate social interactions, and vision. MPAI-4 items are rated on a 5-point scale ranging from 0 (normal function) to 4 (severe limitations). The MPAI-4 was administered at 12-months post-injury. The SMAF and MPAI-4 are both valid and reliable assessment tools with established psychometric properties (Hebert et al., 2001; Malec et al., 2003). The MPAI-4 was designed specifically for use with people with an acquired brain injury whereas the SMAF was designed for use with people with a range of disabilities including brain injury (Hebert et al., 2001; Malec et al., 2003).

In addition to clinical measures, we recorded the type and frequency of grocery shopping support (paid and unpaid) at 12 months post-injury using a time use diary. The diary was filled in by the participant and their carers to capture a week of hours of grocery shopping support. Diaries were then audited to classify activities and care as grocery shopping-related for this study.

Data Analysis

Descriptive analyses were conducted to summarise participant demographics as well as the goals set (aim 1) and occupational therapy grocery shopping and general rehabilitation intervention components (aim 2). Categorical outcomes were summarised as frequency and percentages, and continuous outcomes were represented using medians (and interquartile range) and mean (and standard deviation). Correlations between admission, discharge and 12-month ratings of grocery shopping autonomy as rated on the Functional Autonomy Measurement System (SMAF) were first analysed to identify whether a predictive relationship between admission or discharge performance and 12-month performance existed (aim 3). As no statistically significant relationship was found, correlations between predictors and community grocery shopping performance were conducted on only the 12-month post-traumatic brain injury data. Correlation between predictors (MPAI-4 item scores) and 12-month shopping dependency (SMAF grocery shopping item) was conducted to identify predictors. Regression coefficients (95% CI) were determined for each predictor using univariate analysis. Significant predictors were entered into the multiple regression ($p < 0.05$). An

equation to predict 12-month shopping autonomy was developed from the coefficients (B) of the significant predictors from the multiple regression analysis ($p < 0.05$). Both coefficients and their 95% confidence intervals were reported in line with recommendations by Schober et al. (2018). Statistical computer software (IBM SPSS 28 Statistics Package) was used to perform analyses (Appendix E).

Results

Demographics

The average age of participants was 42 years (SD 17.717), and more than half of the sample were male (62%). All participants were classified as either having a moderate, severe or very severe brain injury as per duration of post traumatic amnesia. The severity of traumatic brain injury was also reflected in participants' length of stay within the inpatient unit with an average length of stay of 130 days. In terms of educational status, a portion of participants had not completed school (30.43%), some did not state their educational status (13.5%) with the remaining participants having finished school or another qualification (ie. tafe, higher degree) (56.07). A change in living arrangement during their hospital admission occurred for 14 of the participants, with 6 (43%) changing from living with family to living with others, and 4 (29%) changing from living alone to living with others. When considering the social environment and supports at discharge, most commonly (16, 43%) people lived in a private residence (owned) and most participants were single (49%). See Table 1 for demographics of participants in this study.

Table 5.1*Characteristics of Participants*

Characteristic		N=39
Sex	Number of males (%)	23 (62)
Age at admission	Mean (SD)	41.89 (17.72)
	Median (IQR)	42.00
Time post injury at admission	Mean (SD)	47.43 (57.484)
	Median	30
Length of inpatient admission (days)	Mean (SD)	130 (127.578)
	Median	88
	Interquartile range (25-75%)	40-175
GCS	Mean (SD)	7.95 (4.163)
	Median	8.00
Cause of TBI, <i>n</i> (%)	Fall/Other	15 (40.5)
	Motor Vehicle accident	11 (29.7)
	Pedestrian	10 (27)
	Cyclist	3 (8)
	Motor bike accident	2 (5.4)
Education, <i>n</i> (%)	Did not complete school	12 (30.4)
	Completed school	8 (21.6)
	Completed University/TAFE	8 (21.6)
	Not stated	5 (13.5)
	Still at school/university	3 (8.1)

Characteristic	N=39	
	Completed Post Graduate studies	1 (2.7)
Relationship (at discharge)	Single	18 (49)
	Married/Defacto	9 (24)
	Divorced/Separated	4 (11)
	Not Stated	5 (13)
	Widow/Widower	1 (3)
Living arrangement (admission)	Lives with family	21(56.7)
	Lives alone	9 (24.3)
	Lives with others	6 (16.2)
	Homeless	1 (2.7)
Living arrangement (discharge)	Lives with family	17 (45.9)
	Lives alone	5 (13.51)
	Lives with others	15 (40.5)
	Homeless	0 (0)
Change in living arrangement from admission to discharge	Total	14 (37.8)
	Living with family to others	6 (42.8)
	Living alone to others	4 (28.57)
	Living with other to family	2 (14.2)
	Living with others to alone	1 (7.1)
	Homeless to living with family	1 (7.1)
Accommodation (discharge)	Private residence (owned)	16 (43.2)
	Short term crisis/transitional living	9 (24.3)

Characteristic		N=39
	Private residence (rental)	6 (16.2)
	Supported accommodation	3 (8.1)
	Private residence (public housing)	1 (2.7)
	Independent living in residential care	1 (2.7)
Grocery shopping support (minutes per week)		
Paid support	Mean (SD)	14.42
		(36.120)
Unpaid support	Mean (SD)	10.34
		(32.347)
MPAI-4 (12 months)		
Total score	Mean (SD)	32.54
		(20.702)
MPAI-4 ability subscale	Mean (SD)	11.32
		(8.951)
MPAI-4 adjustment subscale	Mean (SD)	14.24
		(8.646)
MPAI-4 participation subscale	Mean (SD)	11.62
		(7.686)
SMAF		
Total disability score	Mean (SD)	-12.311
		(14.972)
Total handicap score	Mean (SD)	-7.608

Characteristic		N=39
		(13.752)
Self-care disability sub score	Mean (SD)	-0.946 (2.7558)
Mobility disability sub score	Mean (SD)	-1.203 (3.1457)
Communication disability sub score	Mean (SD)	-0.59 (0.865)
Cognition disability sub score	Mean (SD)	-2.7 (2.471)
IADL disability sub score	Mean (SD)	-6.86 (7.853)
	Median (IQR)	42.00
Time post injury at admission	Mean (SD)	47.43 (57.484)
	Median	30

Occupational Therapy Assessment and Interventions

The second aim of this study was to investigate what occupational therapy interventions to support grocery shopping look like within the inpatient setting. All participants recruited to this study needed to have engaged in some form of grocery shopping assessment or intervention at any point during their inpatient admission. Results from the medical record showed that grocery shopping was a self-articulated rehabilitation goal by 15 of the participants (38%). For the remaining 24 participants (62%) grocery shopping was identified as a goal or intervention skill area by their treating occupational therapist. While no standardised assessment of grocery shopping skills was completed, all participants had been assessed on the SMAF which includes a specific

shopping item and also received a non-standardised observational grocery shopping assessment by

their occupational therapist during the inpatient admission. Some participants, 2 (5%) had the opportunity to engage in grocery shopping in their familiar store as part of their rehabilitation, with the remainder of participants completing grocery shopping in the vicinity of the hospital (and thus, in an unfamiliar store environment).

Table 5.2 shows the types of general occupations and specific types of occupational therapy interventions that participants engaged in during their inpatient rehabilitation and the intensity of the interventions according to the Rehabilitation Complexity Scale Score. Table 5.3 shows the specific grocery shopping subcomponents, linking occupations and particular interventions that participants engaged in during their inpatient rehabilitation to support either the patient or therapist identified shopping goal.

Table 5.2

General Occupational Therapy Intervention (building blocks related to future grocery shopping) within the Inpatient Setting

N= 39					
Area of intervention	Rehabilitation Complexity Scale Score				
	Very high (4)	High (3)	Moderate (2)	Low (1)	Total
Related occupations					
Meal preparation	0 (0%)	3 (7.7%)	15 (38%)	18 (46%)	36 (92%)
Community access	0 (0%)	0 (0%)	11(28%)	22 (56.4%)	33 (84.6%)
Self-care	2 (5%)	5(12.8%)	11(28%)	11(28%)	29 (74%)
Routine	1 (2.5%)	4 (10%)	7 (17.9%)	11(28%)	23 (58.9%)
Domestic tasks	0 (0%)	1 (2.5%)	8 (20.5%)	12 (30.7%)	21 (53.8%)
Money management	0 (0%)	0 (0%)	3 (7.7%)	15(38%)	18 (46%)

N= 39					
Area of intervention	Rehabilitation Complexity Scale Score				
Return to work	0 (0%)	0 (0%)	0 (0%)	11(28%)	11 (28%)
Medication management	0 (0%)	0 (0%)	1 (2.5%)	8 (20.5%)	9 (23%)
Impairment rehabilitation, where occupational therapist had set a goal related to future grocery shopping participation					
Cognitive rehabilitation	1 (2.5%)	2 (5%)	15 (38%)	13 (33%)	31 (79.4%)
Meal preparation group	0 (0%)	0 (0%)	5 (12.8%)	18 (46%)	23 (58.9)
Upper limb intervention (individual therapy sessions)	1 (2.5%)	2 (5%)	4 (10%)	7 (17.9%)	14 (35.8%)
Upper limb intervention (group)	0 (0%)	0 (0%)	5(12.8%)	8 (20.5%)	13 (33%)
Behavioural intervention	1 (2.5%)	0 (0%)	6 (15%)	4 (10%)	11 (28%)
Social skills group	0 (0%)	0 (0%)	0 (0%)	7 (17.9%)	7 (17.9%)
Visual perceptual intervention	0 (0%)	0 (0%)	1 (2.5%)	5(12.8%)	6 (15%)
Individual social skills intervention	0 (0%)	0 (0%)	3 (7.7%)	2 (5%)	5 (12.8%)
Computer use	0 (0%)	0 (0%)	0 (0%)	2 (5%)	2 (5%)

Table 5.3

Occupational Therapy Interventions provided within the occupation of grocery shopping during the Inpatient stay (N=39)

Area of intervention	Rehabilitation Complexity Scale				
	n (%)				
	Very high	High (3)	Moderate	Low (1)	Total
	(4)		(2)		
Community access (i.e., walking to/from grocery store)	0 (0%)	1 (2.5%)	10 (25.6%)	14 (35.8%)	25 (64%)
Cognitive rehabilitation intervention (i.e., during grocery shopping task)	0 (0%)	0 (0%)	8 (20.5%)	13 (33.3%)	21 (53.8%)
Education to patient (i.e., regarding level of function and strategies within grocery shopping task)	0 (0%)	5 (12.8%)	4 (10%)	10 (25.6%)	19 (48.7%)
External memory aid retraining (ie. use of a shopping list, diary)	0 (0%)	1 (2.5%)	6 (15%)	12 (30.7%)	19 (48.7%)

	Very high (4)	High (3)	Moderate (2)	Low (1)	Total
Money handling (Ie. paying for items at the grocery store)	0 (0%)	0 (0%)	5 (12.8%)	13 (33.3%)	18 (46%)
Education to family (ie. regarding level of function and strategies within grocery shopping task)	0 (0%)	3 (7.7%)	4 (10%)	7 (17.9%)	14 (35.8%)
Planning route to grocery store	0 (0%)	1 (2.5%)	3 (7.7%)	8 (20.5%)	12 (30.7%)
Upper limb intervention targeting specific grocery shopping goal	0 (0%)	2 (5%)	3 (7.7%)	4 (10%)	9 (23%)
Visual scanning retraining (Ie. walking to/from the grocery store, scanning store shelves to locate items)	0 (0%)	0 (0%)	2 (5%)	6 (15%)	8 (20.5%)
Developing a weekly meal plan for grocery shopping	0 (0%)	0 (0%)	3 (7.7%)	5 (12.8%)	8 (20.5%)

	Very high (4)	High (3)	Moderate (2)	Low (1)	Total
Communication/ social skills retraining within grocery shopping task	0 (0%)	0 (0%)	2 (5%)	6 (15%)	7 (17.9%)
Advocacy for paid supports to assist with grocery shopping	0 (0%)	0 (0%)	3 (7.7%)	4 (10%)	7 (17.9%)
Education to supports (Ie. regarding level of function and strategies within grocery shopping task	0 (0%)	0 (0%)	1 (2.5%)	4 (10%)	5 (12.8%)
Sensory interventions (ie. modification to grocery shopping task)	0 (0%)	0 (0%)	1 (2.5%)	4 (10%)	5 (12.8%)
Budgeting (ie. developing a budget for grocery shopping items)	0 (0%)	0 (0%)	0 (0%)	4 (10%)	4 (10%)

Mobility aid practice in the context of grocery shopping	0 (0%)	0 (0%)	1 (2.5%)	2 (5%)	3 (7.6%)
Manual/power wheelchair assessment training in the context of grocery shopping	0 (0%)	0 (0%)	0 (0%)	2 (5%)	2 (5%)
Computer use in the context of online shopping	0 (0%)	0 (0%)	0 (0%)	1 (2.5%)	1 (2.5%)

Within the inpatient general ward setting most occupational therapy general interventions were undertaken at a moderate or low intensity, as rated using the Rehabilitation Complexity Scale. The most common occupations that were addressed alongside grocery shopping were meal preparation (92%) and community access (84.6%). Cognitive rehabilitation was the most common type of intervention undertaken (79.4%). When looking at specific intervention targeting grocery shopping the most common components or types of intervention included community access (64%), external memory aid retraining (48.7%), cognitive rehabilitation (53.8%), and education to patient (48.7%).

There were seven participants who were also admitted to the Transitional Living Service as part of their inpatient admission. Within this residential rehabilitation service 100% of participants engaged in community access retraining associated with grocery shopping, and 85.7% of participants practised money handling within a grocery shopping task and developing a meal plan. The most common type of intervention was external memory aid training (85.7%) which included use of lists to remember grocery shopping items and use of an organisational aid to remember

scheduled grocery shopping time. Other occupations that were practiced alongside grocery shopping within the transitional living service were meal preparation (100%) and domestic tasks (100%).

Shopping autonomy following traumatic brain injury, from admission to rehabilitation to 12-12 months post-brain injury.

On admission to inpatient rehabilitation 32 participants (82%) were scored as ‘dependent on others’, 3 (7%) experienced ‘moderate difficulty’. There was variability in the change experienced in grocery shopping performance during the study (see Figure 5.2). From discharge to the 12-month point there were 4 participants who remained independent with grocery shopping. There were 9 participants who consistently needed assistance with grocery shopping, scoring either -3 or -2 at both time points on the SMAF. Of importance was that 11 of the participants improved in grocery shopping performance from being dependent or needing assistance to managing independently. Some participants ($n=2$) regressed in function as scored as independent/supervision on discharge from rehabilitation and then scored as needing supervision or assistance at 12 months, suggesting that the post-discharge environment and living situation may have influenced grocery shopping performance beyond rehabilitation.

Figure 5.2

Shopping Performance at 12-months Relative to Performance at Admission and Discharge to Rehabilitation, $n=35$.

		12-month shopping performance (n)		
		<i>Dependent</i>	<i>Supervised</i>	<i>Independent</i>
Admission shopping performance	<i>Dependent</i>	12	5	18
	<i>Supervised</i>	0	0	0
	<i>Independent</i>	0	0	0
Discharge shopping performance	<i>Dependent</i>	9	2	11
	<i>Supervised</i>	2	2	3
	<i>Independent</i>	1	1	4

Correlations between hospital admission, discharge and 12-month ratings of grocery shopping impairment on the SMAF suggest no statistically significant correlations between grocery shopping independence at admission and 12-months post-injury (Rho 0.28, 95% CI -0.07 to 0.57, $p=.104$). Similarly, there were no significant correlations between discharge and 12-months (Rho 0.17, 95% CI -0.12 to 1.0, $p=.158$), suggesting the clinical challenges faced in predicting those who will and who will not be independent post-discharge.

Prediction of shopping autonomy at 12-months post-brain injury

Univariate analysis revealed that for those that were community living ($n=35$) at 12-months post-traumatic brain injury, there were a number of predictors (MPAI-4 skills) all significantly related to grocery shopping performance ($p\leq.05$). Correlation coefficients (95% CI) of the relationship between all predictors (MPAI-4 items) and grocery shopping autonomy, and their level of significance, are presented in Table 5.4.

Table 5.4

Strength and significance of the correlations between predictors and shopping autonomy from univariate analysis, reported as rho (p).

Predictors (12-month item scores on MPAI-4)	Relationship with 12-month shopping autonomy
Mobility	.754 (<.001)
Use of hands	.395 (.019)
Vision	.301 (.079)
Audition	.085 (.627)
Dizziness	.299 (.081)
Motor Speech	.390 (.020)
Verbal Communication	.480 (.004)
Nonverbal Communication	.560 (<.001)

Predictors (12-month item scores on MPAI-4)	Relationship with 12-month shopping autonomy
Attention/Concentration	.454 (.006)
Memory	.401 (.017)
Fund of Information	.566 (<.001)
Novel Problem Solving	.683 (<.001)
Visuospatial	.538 (<.001)
Anxiety	.155 (.375)
Depression	.336 (.048)
Irritability/Aggression	.290 (.091)
Pain	.493 (.003)
Fatigue	.337 (.047)
Inappropriate Social Interactions	.390 (.021)
Impaired Self-awareness	.564 (<.001)
Initiation	.378 (.025)

When the significant predictors were entered into multiple linear regression, the regression coefficient for the model was 0.629. Table 5.5 presents the regression coefficients of the predictors in the model, the prediction equation, and the accuracy of prediction of the model best able to predict grocery shopping autonomy.

Table 5.5

Mean (95% CI) regression coefficients (B) of predictors, prediction equation from the multivariate analysis (n=35).

Regression coefficients of predictors		
Constant = .198 (-.445 to .842)		
Mobility = .464 (.108 to .821)		
Use of hands = -.330 (-.685 to .024)		
Verbal communication = -.012 (-.553 to .529)		
Non-verbal communication = .329 (-.171 to .828)		
Motor Speech = -.059 (-.578 to .460)		
Attention / concentration = -.058 (-.456 to .340)		
Memory = .102 (-.312 to .515)		
Fund of information = .338 (-.062 to .739)		
Novel Problem-solving = .030 (-.604 to .664)		
Visuospatial = -.035 (-.598 to .529)		
Depression = -.056 (-.382 to .269)		
Fatigue = -.100 (-.465 to .258)		
Inappropriate social interactions = .064 (-.446 to .575)		
Impaired self-awareness = .054 (-.446 to .575)		
Initiation = .148 (-.523 to .226)		
Managing money = .249 (-.154 to .651)		
R Square		
R	R square	Adjusted R Square
0.907	.823	.667

Relationship between impairments and hours of attendant care to support grocery shopping at 12-months

To understand the impact of grocery shopping dependency, the correlations between hours of grocery shopping support (paid and unpaid) and the types of traumatic brain injury-related impairments are also presented (Table 5.6). There was a strong and statistically significant correlation between hours of grocery shopping support and mobility ($\rho = 0.623$), memory ($\rho = 0.577$) and novel problem solving ($\rho = 0.617$). There was a weak relationship between hours of grocery shopping support and use of hands, vision, verbal communication, non-verbal communication, attention/concentration, fund of information, impaired self-awareness, inappropriate social interactions and irritability, anger and aggression.

Table 5.6

Shopping Performance: Correlation Between Hours of Support for Shopping Performance and Brain Injury Related Impairments as Determined by the MPAI-4, Using Spearman's rho

Brain injury related impairments	Correlation with hours of grocery shopping support (paid and unpaid), <i>Spearman's rho</i> (p-value)
Mobility	0.623 (.0001)
Novel problem solving	0.611 (.0001)
Memory	0.577 (.0001)
Fund of information	0.484 (.003)
Attention/concentration	0.411 (.014)
Verbal communication	0.281 (.101)
Impaired self-awareness	0.272 (.114)
Nonverbal communication	0.199 (.252)
Irritability, anger and aggression	0.195 (.263)
Vision	0.181 (.297)
Use of hands	0.177 (.308)
Inappropriate social interactions	0.095 (.587)

Discussion

The first aim of this study was to investigate whether people with moderate to severe traumatic brain injury routinely specify grocery shopping as a goal. This current study is the first that looked specifically at whether people with moderate to severe traumatic brain injury placed value on setting goals explicitly around the occupation of grocery shopping within the inpatient

setting. The results of this study showed that while some people living with severe traumatic brain injury do set goals during inpatient rehabilitation that relate to grocery shopping most will have a clinician identify this as an important step towards community independence. Goal setting is a core component of rehabilitation programs, providing an agreed upon direction between patient, family, and therapist (D'Cruz et al., 2016; Levack et al., 2006; Levack et al., 2009; Prescott et al., 2015). Literature acknowledges the challenges and complexities of goal setting with this population, due to the long-term nature of recovery and cognitive and communication deficits (D'Cruz et al., 2016; Prescott et al., 2019). Particularly in the early stages in the inpatient setting, people with brain injury may hold expectations that rehabilitation will enable attainment of previous function or may not see a need for rehabilitation to address certain occupations as there has been inadequate exposure to experience errors within function to understand traumatic brain injury-related changes (Fleming et al., 2012). These factors may contribute to the fact that only 39 participants (from the admitted 80 adults with traumatic brain injury) had set goals to address shopping during their rehabilitation program.

There has been a documented difference identified between inpatient and community brain injury rehabilitation practices, with community-based rehabilitation better aligned with client centred goals (Prescott et al., 2019). In accordance with previous studies investigating goal setting within inpatient brain injury rehabilitation which have shown a tendency for therapist-led goals and prioritisation of discharge planning (D'Cruz et al., 2016; Leach et al., 2010), findings from this study also suggest that 62% of participants had a therapist-set grocery shopping goal. Given the long-term nature of recovery and rehabilitation for this population of people with moderate to severe traumatic brain injury, occupational therapists need to consider, and to clearly communicate with patients, the reason for grocery shopping interventions if it was not identified as a goal by the person themselves. Prescott et al. (2019) describe a client-centred goal setting practice framework which includes the stages of 1) needs identification, 2) goal operationalisation, and 3) intervention. This framework may assist therapists in future practice to provide context with articulating how

grocery shopping can be incorporated into inpatient rehabilitation. It may be that within the initial phase of this framework that therapists explore changes in participation and engage in goal mapping to link grocery shopping to broader goals around returning home and resuming activities in the community. Given the ordinarily familiar and routine nature of grocery shopping, engagement in this activity during rehabilitation may provide an opportunity for facilitating the development of self-awareness (i.e., exposure to errors to build awareness and further clarify with the person their readiness to engage in other complex activities such as return to work).

The second aim of this study was to describe the occupational therapy intervention provided to support grocery shopping during rehabilitation. Within this study, it was found that occupational therapy intervention focused on the core skills and other overlapping occupations to support grocery shopping performance within the inpatient setting. This included addressing other occupations which overlap with grocery shopping (such as meal preparation, or community access) as well as working on whole task practice and key steps within grocery shopping (such as planning a list, handling money, and community access). For this cohort, grocery shopping rehabilitation was mainly completed in grocery stores that were within the vicinity of the hospital, and thus an unfamiliar environment. It is important to note that this study classified “familiar” as local area, but also other considerations of familiarity could include the specific stores (i.e., a single store, or a chain of stores which have a familiar layout), and frequency of grocery shopping. In studies 1 and 2 participants discussed how unfamiliar grocery shopping environments (i.e., different brand of store, different layout) increased the cognitive demands on the activity and at times resulted in errors in performance. Findings therefore indicate that therapists, where possible, should support people with moderate to severe traumatic brain injury to practice grocery shopping within familiar environments to reduce cognitive demands, maximise skill generalisation, and support occupational performance.

Results from this study also highlights how critical cognitive performance skills are to successful grocery shopping performance at 12-months post brain injury. One important finding from this study was the relationship between performance skills (for example, the person’s

cognitive performance) with grocery shopping support at 12 months. The American Occupational Therapy Practice Framework reminds us that the context (environmental factors) may also have influenced grocery-shopping performance at this timepoint. Environmental and activity characteristics such as familiarity potentially increase or reduce the cognitive demands of even a routine task (Toglia & Foster, 2021). Thus, increased cognitive demands of the complex task of grocery shopping such as sequencing multiple steps, keeping track of the task goal, monitoring and multitasking (Toglia & Foster, 2021) could potentially be reduced by simplifying the steps, modifying the environment or shopping in a familiar store so as to reduce cognitive demands. Environmental context has been outlined to impact success of learning and generalising skills, with the type and familiarity of environments influencing learning (Toglia & Foster, 2021). Studies 1 and 2 explored the views of people with moderate to severe traumatic brain injuries regarding grocery shopping, identifying differences with grocery shopping physical environments (i.e., store layout, size of grocery shop, signage) that placed increased cognitive demand and therefore may have contributed to errors within performance. Taken together, findings from this study reinforce the importance for occupational therapists to consider the grocery-shopping task in the context of the environmental demands during a person's rehabilitation program. What remains unknown is what physical environment characteristics of the grocery store (ie. whether different size stores or more familiar stores) will enable independence in grocery shopping after brain injury.

One of the key goals for rehabilitation outlined in the literature is the ability to transfer and generalise strategies to a broader range of tasks and environments, as this does not always occur automatically and requires rehabilitation efforts to support this process (Haskins et al., 2012; Toglia et al., 2010). Within this study there were four participants whose grocery shopping performance deteriorated over time, and they became more dependent. It is possible that while performance of the task of shopping may have decreased over time for four participants, such a decrease may not necessarily represent a decrease in skills (i.e., they may not have deteriorated with respect to brain injury-specific impairments). The SMAF ratings of level of independence do not explain why

grocery shopping performance may have deteriorated and therefore further research is required to understand the underlying reasons for this. A possible explanation of this finding was that the change in accommodation or living arrangement, a change in roles within the social context, or a challenge in generalising and consolidating strategies from the rehabilitation program to a new location, living arrangement, or place where expectations on participation in grocery shopping were lowered, may have influenced this. In order to support generalisation of strategies from the inpatient to community setting there is an ongoing need for individualised community-based rehabilitation that includes cognitive rehabilitation to assist with generalisation of strategies from the inpatient rehabilitation setting. Further research would be beneficial to explore how generalisation is built into rehabilitation programs to support grocery shopping performance.

Although a few participants deteriorated in their independence over time, most participants improved their performance of grocery shopping across the study period and were assessed as independent (despite being completely dependent at admission to rehabilitation). This suggests that functional independence in grocery shopping is a realistic rehabilitation goal for the majority of people with moderate to severe traumatic brain injury. It is important to note that this study determined grocery shopping performance based on level of independence but did not examine other measures such as efficiency of task completion, level of satisfaction of grocery shopping performance or strategies used within the occupation of grocery shopping. Furthermore, self- and caregiver report was used, and thus, findings from *Chapter 4* should be taken into account when considering this finding. That is, the personal meaning of participation and the continuum from participation to independence as defined more traditionally by occupational therapists will likely have influenced findings.

Recovery after moderate to severe traumatic brain injury can occur over a long period of time therefore rehabilitation often involves different phases including inpatient and community rehabilitation. Beaulieu et al. (2015) used a prospective observational cohort study to investigate occupational therapy treatment activities for people with traumatic brain injury within the hospital

setting. Their study found a pattern towards therapy activities more predominantly targeting basic occupations with only a few people engaging in more complex activities towards the end of the hospital admission. The current study found that our cohort had the opportunity to engage in more complex activities within occupational therapy, including grocery shopping as well as other occupations relevant to grocery shopping such as meal preparation and community access with a low to moderate frequency of sessions per week. Other more complex activities such as money management which overlap with grocery shopping were less commonly addressed. Studies which have investigated the contribution of brain injury rehabilitation to improvements in occupational performance have mainly focused on the community rehabilitation setting. Powell et al. (2016) found moderate evidence that a variety of multidisciplinary and interdisciplinary community-based rehabilitation approaches might be effective in improving occupational performance and participation outcomes. Kim and Colantonio (2010) undertook a systematic review looking specifically at interventions relevant to occupational therapy that may improve community integration. Their findings showed the importance of rehabilitation programs to support improvements within community integration and also the importance of occupational therapists within these rehabilitation programs, however provided little guidance to occupational therapists about the interventions, as well as when they should be provided.

This study shows that grocery shopping performance can improve over time for people with moderate to severe traumatic brain injury, and also contributes to the evidence that there is a need for tailored rehabilitation programs that extend into the community to support goals around more complex instrumental activities of daily living such as grocery shopping. Rehabilitation efforts in this area may assist with reducing long term care costs associated with instrumental activities of daily living such as grocery shopping.

Limitations

As with all research, there are limitations that should be considered when interpreting the findings from this study. There was a relatively small sample size ($n=35$) in this study. Therefore, it would be recommended that further research is completed with a larger sample size to increase the validity of results. Participants were recruited from one site therefore results of participants shopping performance and occupational therapy intervention may not be reflective of the wider population. As per the American Occupational Therapy Practice Framework the cultural context can shape participation. Results within this study reflect grocery shopping culture within Australia and therefore may not be reflective of different countries or cultures experiences of shopping for grocery items. Also, this study investigated traumatic brain injury therefore it is acknowledged that results are not able to be generalised to other brain injury conditions or those with milder injuries.

Finally, the third aim of this study aimed to understand the relationship between shopping independence, traumatic brain injury impairments and associated support at 12-months post-injury. The study also aimed to investigate whether grocery shopping is routinely specified as a goal by people with moderate to severe traumatic brain injury in addition to describing occupational therapy rehabilitation provided to support grocery shopping. An important finding from this study was the relationship between increased hours of grocery shopping support and increased severity of some specific brain injury impairments (i.e., mobility, memory, and novel problem solving). This highlights the physical demands of grocery shopping (i.e., accessing and moving around the store and transporting items) in addition to the cognitive complexity of grocery shopping (Toglia & Foster 2021). The current study also found that there was not the ability to predict grocery shopping independence at 12-months based on grocery shopping performance at either admission or discharge from rehabilitation. This suggests that grocery shopping is a complex and highly individualised occupation where performance changes unpredictably over time during the transition period from hospital to home.

Instrumental activities of daily living have been suggested to have higher cognitive

demands, and thus to take longer than basic occupations to return to pre-brain injury levels of independence (Toglia & Foster 2021). Although people are more likely to require ongoing support to participate community-based occupations such as grocery shopping, many do return to engaging in grocery shopping post moderate to severe traumatic brain injury (Finch et al., 2016; Winkler et al., 2005). In relation to the first aim of the study which was to describe the relationship between grocery shopping independence, traumatic brain injury impairments and associated support costs at 12-months post-injury, one of the main findings from the current study was that people were shown to improve in grocery shopping performance from admission to 12 months. Over half of participants reached independence by 12-months, despite living with a significant brain injury. This is similar to earlier studies which highlighted that although people are more likely to need support with instrumental activities of daily living, as opposed to basic activities of daily living, many people do return to participating in community-based occupations such as grocery shopping (Ownsworth et al., 2004; Winker et al., 2005). The current study looked specifically at grocery shopping performance whereas many studies to date have looked at general community integration. Ponsford et al. (2010) investigated longer term outcomes, including general functional status, at 2- years post traumatic brain injury for those living in both metropolitan and rural areas. In contrast to the current study, participants were recruited from a private hospital. Results indicated that there were similar patterns of grocery shopping independence; 74% of people in the metropolitan area and 76% of people in regional areas had become independent with grocery shopping by 2-years.

The current study recruited participants from the public hospital system and participants had a slightly longer average length of stay (130 days versus 108.1 days in the Ponsford study) which may indicate participants in the current study had increased severity of injury. The current study showed that although over half of the cohort improved with grocery shopping performance over the first 12 months, there were no statistically significant correlations between shopping independence at admission and 12 months indicating difficulties for therapists in predicting who may return to a

level of independence in the future.

Similar to the current study, time use diaries were used by Winkler et al. (2005) in their study of 37 community living adults with severe traumatic brain injury who were >3 years post brain injury. Interestingly they found that the traumatic brain injury group spent more time in the community engaging in shopping and leisure activities than the general population. They also found that 35% of participants had attendant care and participants also received unpaid care (mean 12.1 hours) with 8% of participants identified having difficulty with accessing the community and 19% with using public transport (a skill identified in *Chapter 4* as being closely linked with grocery shopping). In another study using time use data for 24 people with traumatic brain injury, who were at least one month post discharge, Finch et al. (2016) found that the brain injury group spent significantly more hours and had the highest satisfaction ratings for ‘shopping or going on outings’ compared with the control group. The current study provides unique findings in that not only did it look at the amount of time spent in terms of grocery shopping support, but it demonstrated that there was a correlation between hours of grocery shopping support and specific brain injury related impairments (i.e., mobility, memory and novel problem solving). Those with increased severity of mobility, memory and novel problem-solving impairments were found to need a higher number of grocery shopping support hours.

Conclusion

The current study indicates that although a portion of people were shown to improve in grocery shopping performance over the first 12 months post-injury it may be difficult for therapist to predict who will return to a level of independence given there was no statistically significant correlations between shopping independence at admission and 12 months. Findings therefore highlight the importance of supporting people to re-engage in grocery shopping following moderate to severe brain injury, and suggests that determining likelihood of future participation, even at time of discharge from rehabilitation, is challenging.

This study explored the relationship between shopping independence, traumatic brain injury

impairments and associated support costs at 12-months post-injury. Given the finding that people with brain injury can improve their grocery shopping performance over a 12-month period, a reduction in long term care costs for grocery shopping assistance may be supported with the use of community rehabilitation programs incorporating individualised cognitive rehabilitation. In addition, the study aimed to understand if grocery shopping is routinely addressed as a goal by those with moderate to severe traumatic brain injury and the occupational therapy rehabilitation provided to optimise performance within this occupation. The inpatient rehabilitation setting can be important for facilitating awareness into the need for strategies within grocery shopping as well as building skills within the building blocks of grocery shopping. Given there were brain injury related cognitive impairments that were shown to have a strong correlation with grocery shopping performance, occupational therapists should consider the familiarity of the grocery shopping task and environment and the impact this has on cognitive demands when undertaking grocery shopping tasks with people with moderate to severe traumatic brain injury.

Chapter 6: Discussion

This chapter will provide a summary of the three studies presented in *Chapters 3, 4 and 5* within this thesis and present the main findings in the context of current literature. This thesis aimed to understand how people with moderate to severe traumatic brain injury participate in grocery shopping and current occupational therapy practice within this area.

Key Findings

The descriptive and exploratory qualitative study presented in *Chapter 3* found that people with moderate to severe traumatic brain injury described grocery shopping at an occupation level as well as within a broader routine. Participants described methods for participating in grocery shopping both pre and post brain injury that were multifactorial and heavily influenced by a range of other factors such as the value and reason associated with completion of the occupation (i.e., a necessary occupation in roles such as homemaker or parent), the social context (i.e., living situation and support from family or carers), the temporal context (i.e., frequency of grocery shopping was dictated by other occupations, such as work, meal preparation, that were part of a wider routine) and the physical shopping environment (i.e., access, layout, proximity, familiarity). Additionally, it was found that moderate to severe traumatic brain injury can impact how people undertake grocery shopping. Specific changes to grocery shopping performance included the need to adapt to different ways of managing funds for grocery shopping due to reduced income or a loss of financial control, an increased need for support from others across different steps within the occupation of grocery shopping, and the need to adapt where grocery shopping was completed as a result of driving restrictions or supports (i.e., family, carers) as well as changed preferences for shopping location.

The study in *Chapter 4* used the same qualitative approach as used in *Chapter 3* and drew upon the American Occupational Therapy Practice Framework as a basis for analysing the data. The

study found that conceptually there were two additional steps within the occupation of grocery shopping that participants with traumatic brain injury considered as key outside of the American Occupational Therapy Practice Framework definition of grocery shopping. These were accessing the grocery shops and locating items. Furthermore, participants in this study described in detail the impact that brain injury related cognitive and visual (ie. sensory and perceptual) impairments have on all steps within the occupation of grocery shopping (i.e., changes with attention impacting accessing the grocery stores and locating items, errors with remembering items and relying on a list, difficulty with planning a list). The environment was discussed as an important factor with either enabling or hindering performance (i.e., social context, physical layout of the store). In addition, this study found that people had varying perceptions of rehabilitation and the role of rehabilitation in supporting participation in grocery shopping.

Finally, the longitudinal study of a cohort with rehabilitation goals related to shopping reported in *Chapter 5*, found that a large portion (84%) of participants were dependent on others for grocery shopping support on admission to rehabilitation. There was variability with progress over the 12-month period with most participants improving with shopping performance. At the 12-month point there was strong correlation between hours of grocery shopping support and mobility, memory and novel problem-solving impairments. Study 3 also investigated occupational therapy rehabilitation within the inpatient hospital setting to support grocery shopping and found that there were some people who self-identified grocery shopping as a goal but for the majority (62%) grocery shopping was identified as a goal by the treating therapist. Grocery shopping practice within the inpatient setting was mostly completed within the local hospital environment, with the most common intervention approaches including cognitive rehabilitation intervention (including external memory aid intervention) and patient education.

Comparison of Findings to Previous Research

The findings reported in *Chapter 3* demonstrate that adults with moderate to severe traumatic brain injury conceptualise the steps within the occupation of grocery shopping as consistent with the American Occupational Therapy Practice Framework. This study supported the definition of grocery shopping as including preparing shopping lists, selecting and purchasing items, selecting method of payment, and completing money transactions (American Occupational Therapy Association, 2020). Interestingly, accessing the grocery store was also emphasised as an important step by participants when reflecting on both pre and post traumatic brain injury grocery shopping. Therefore, when considering the American Occupational Therapy Practice Framework, the two instrumental activities of daily living (grocery shopping and community access) are closely linked. Table 6.1 compares the AOTA framework definition of grocery shopping to steps highlighted from our current study.

Table 6.1

Definition of grocery shopping

American occupational therapy practice framework definition of grocery shopping	Current studies definition of grocery shopping
1. Preparing a shopping list 2. Selecting items 3. Selecting method of payment and purchasing items 4. Transporting items	1. Getting to the grocery store 2. Preparing a shopping list 3. Locating and searching for items 4. Selecting items 5. Selecting method of payment and purchasing items 6. Transporting items

The demands of accessing the grocery store also varied depending on how many different grocery stores were visited (i.e., a market, supermarket, and specific food stores such as a fruit store or butcher) as well as the method and location for accessing the grocery store/s (i.e., walking, public transport, driving).

The qualitative research in this program of studies highlighted the impact of traumatic brain injury-related changes and medical driving restrictions on methods for accessing the store, with the need to adapt alternative transportation methods or a need to rely on social supports. Although accessing the grocery store is not included within the American Occupational Therapy Practice framework definition of grocery shopping, this fits well with occupational science literature which emphasises that movement from place to place and transportation options can influence behaviour as well as enable or limit occupational engagement (Christiansen & Townsend, 2009). While Bottari et al. (2014) investigated cognitive strategy use for people with traumatic brain injury within a shopping task, only the shopping-for-groceries-task was used and this did not include the specific assessment item that included the step for going to the grocery store. Findings from my research suggests the importance of adding elements of accessing the store to the assessment and rehabilitation of grocery shopping.

People living with the effects of traumatic brain injury also highlighted the impact that visual changes have on participation in the occupation of grocery shopping. These findings (outlined in *Chapter 3*) are in line with Warren (2009) whose participants, although mainly stroke, also described the impact visual changes had on accessing stores as well as performance of grocery shopping. Therefore, the findings from this thesis support these previous findings in terms of the experience of visual changes in participating in grocery shopping (both accessing the store and within store performance) and provide an important recommendation to assess for and rehabilitate visual impairments so as to enable longer term independence in instrumental activities of daily living.

Although there are consistent key steps within the occupation of grocery shopping, this research highlighted the variability and individualised nature of how people shop for groceries (both pre and post traumatic brain injury). Personal and environmental factors were found to impact on how and which components people complete from the overall task. Key occupational therapy models and frameworks, such as the Model of Human Occupation (Kielhofner, 2008) and the Person, Environment Occupation model (Law et al., 1996), all share common concepts including the individual nature of occupational performance based on personal, environmental, and occupational factors (American Occupational Therapy Association, 2020; Kielhofner, 2008; Townsend et al., 2002). The American Occupational Therapy Practice Framework, domain section, expands on the person (client factors), occupation and environment (contexts and environments) to include consideration of performance skills (motor, process and social interaction skills) and performance patterns. In addition to demonstrating the individualised nature of the occupation of grocery shopping at an occupational level within *Chapters 3 and 4*, grocery shopping was described in *Chapter 3* by people with moderate to severe traumatic brain injury as embedded within their wider routine rather than an isolated occupation. This finding was unique as previous research has addressed community-based tasks such grocery shopping as a discrete occupation (Bottari et al., 2014; Warren, 2009). Addressing grocery shopping performance so as to include other key instrumental activities of daily living which closely overlap such as access to the grocery store has the potential to improve overall performance and achieve best outcomes within this occupation.

The results from this thesis support previous research regarding the impact of brain injury related cognitive changes on performance of instrumental activities of daily living (Bottari et al., 2010; Bottari et al., 2014; Toglia & Foster, 2021; Warren, 2009). Instrumental activities of daily living, including grocery shopping, have greater cognitive demands than basic occupations, and require executive functioning skills such as “sequencing multiple steps or actions for goal completion, multitasking and the integration of cognitive processes” (Toglia & Foster, 2021, p. 5). Across all studies in this program, the relative importance of cognition and vision were

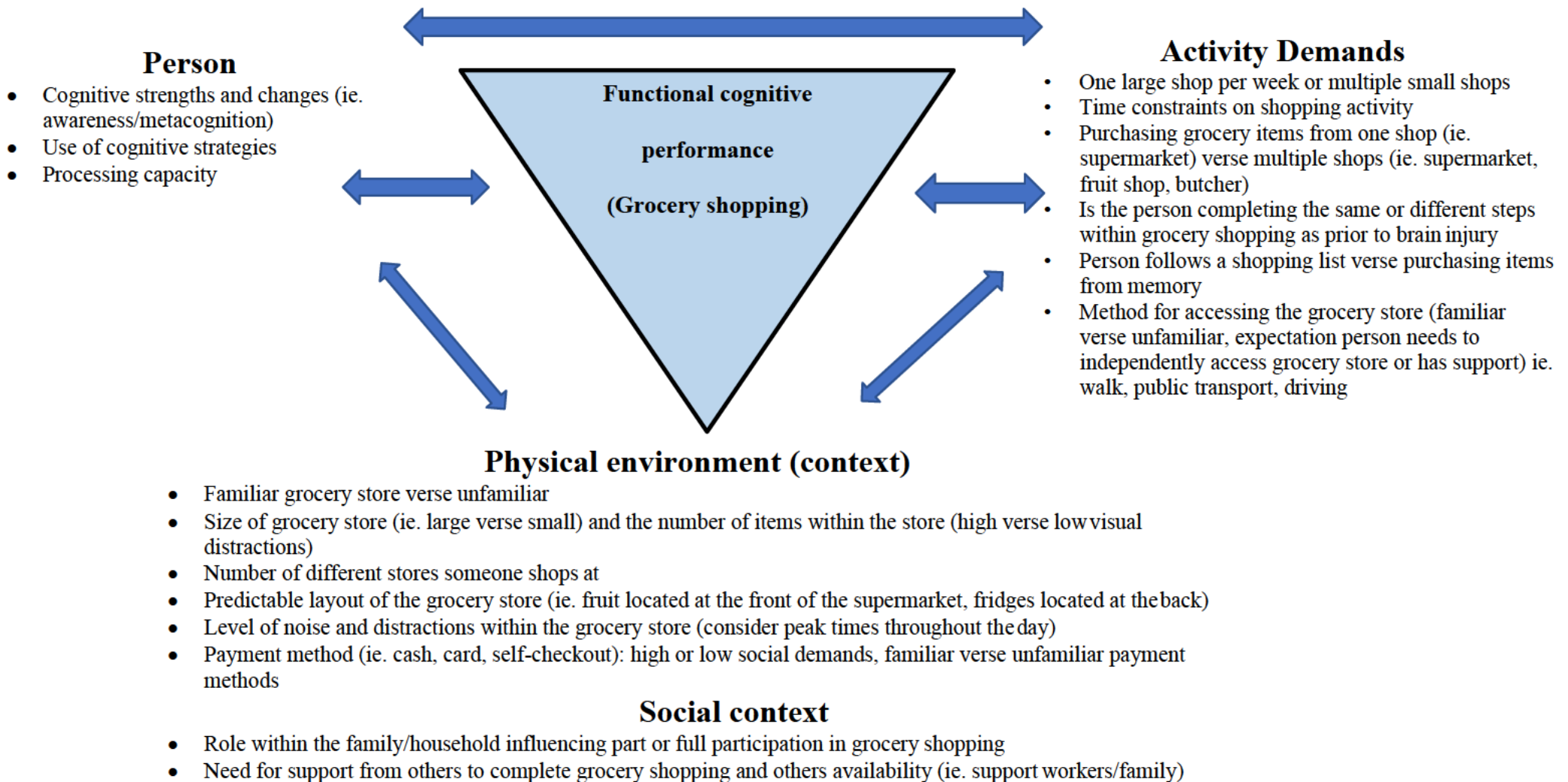
maintained. In *Chapter 3* and *4*, those living with a brain injury explored the impact of cognitive and visual changes, both on the specific steps of grocery shopping as well as with respect to lapses relating to all steps of grocery shopping (acknowledging that some steps were more impacted more than others). Of interest were that there was less focus from participants on the physical demands of grocery shopping. Given these personal insights, it was not surprising then that the most common occupational therapy intervention from the audit of rehabilitation presented in *Chapter 3* was cognitive rehabilitation (inclusive of external memory aid retraining). Given cognitive and visual impairments and the impact on grocery shopping this suggests the need for client-centred rehabilitation in both the inpatient and community settings that incorporates cognitive rehabilitation.

One of the core concepts within the occupational therapy profession is the knowledge of the impact of adapting and optimising environments to support occupational performance (Hartman-Maeir et al., 2009). Environment is the context in which occupation takes place and can include the physical environment, the social, cultural, economic, political and temporal contexts (Christiansen & Townsend, 2010; Kielfhofner, 2008; Townsend et al., 2002). Different environments or places also have different behavioural and social expectations (environmental press) which are important to consider when understanding occupational performance (Christiansen et al., 2010). The qualitative insights summarised in *Chapters 3* and *4* emphasised that participants' experiences of the social and physical aspects of the environment shaped their participation in grocery shopping. Familiarity with the physical layout of a grocery store and available social supports to assist with elements of grocery shopping such as transportation, planning or writing lists, and/or locating items were all identified as enablers for grocery shopping performance. This research adds to current evidence by describing occupational therapy interventions within the inpatient setting to support grocery shopping and found that the majority of occupational therapy rehabilitation in the inpatient setting was completed in an unfamiliar grocery shopping environment. Slight variations in the activity or environment can influence the cognitive and visual demands and therefore impact functional performance (Toglia & Foster, 2021). The process section of the American Occupational

Therapy Practice framework looks at the three steps (evaluation, intervention and outcomes) involved within the occupational therapy procedure. One limitation of using this lens is that the specific detail of how occupation, person and environmental factors are manipulated from a cognitive perspective is not captured within this framework. The Dynamic Interactional Model of Cognition (Toglia & Foster, 2021) may prove beneficial for understanding this aspect. The Dynamic Interactional Model of Cognition looks to the relation between the person, activity demands and environment so as to maximise cognitive functional performance. Figure 6.1 applies the findings reported in this thesis about grocery shopping to the Dynamic Interactional Model of Cognition, thereby providing a detailed theoretical framework for occupational therapists to ensure they consider all aspects which may influence a client's performance when targeting this occupation in therapy. The findings presented in *Chapter 5* highlighted the environmental factors that occupational therapy intervention incorporated, for example familiar versus unfamiliar store environments. Further research would be helpful to understand how occupational therapists grade not only the activity, but also the environmental demands, to maximise grocery shopping performance. Hence, the findings of this research raise questions about where and how intervention to support grocery shopping should occur given the high prevalence of cognitive and visual impairment amongst this population.

Figure 6.1

The Dynamic Interactional Model of Cognition applied to grocery shopping. (Image adapted from Toglia & Foster, 2021)



Strengths And Limitations

This research has several strengths, including use of a multiple method research design to understand how people with moderate to severe traumatic brain injury partake in grocery shopping and rehabilitation approaches to support participation. The first two studies used maximum variation purposive sampling to select participants in both the inpatient and community settings who were actively participating in, or previously participated in, rehabilitation to address grocery shopping to gain a range of perspectives. The qualitative data analysis used double coding of more than 10% of interviews to increase rigor and emergent themes were discussed between all four members of the research team in order to reach consensus and reduce any potential bias.

In terms of limitations, this research focused on people with moderate to severe traumatic brain injury and therefore results are unable to be generalised to those with milder traumatic brain injury or the stroke and hypoxic brain injury populations. Study 1 and 2 used in depth interviews therefore people with severe communication impairment were unable to be included meaning their perspective was not captured. There was an underrepresentation of females within the sample, but this is not atypical within traumatic brain injury rehabilitation where there is a high prevalence of males with traumatic brain injury (Australian Institute of Health and Welfare, 2007). Another limitation was the smaller sample size within study 3 ($n=39$), therefore reducing the statistical power.

Clinical Implications

Adults with moderate to severe traumatic brain injury placed value on the occupation of grocery shopping as it can be directly linked to an individuals' role within the household and for some, to enjoyment from a leisure or social perspective. How people accessed the grocery stores was identified as an important element and therefore an important consideration for occupational therapists to consider performance issues or restrictions within community access will likely have flow on effects to grocery shopping performance, therefore reviewing these two instrumental activities of daily living in combination. The program of research also identified

that there is variability in how people with moderate to severe traumatic brain injury complete the activity of grocery shopping, which is linked with a person's wider routine, personal factors (i.e., brain injury related impairments), the social context and environment.

Rehabilitation should involve a partnership with the person with traumatic brain injury that focuses on real life occupational performance problems people experience with the goal being to maximise people's independence or engagement in meaningful occupations within their own environment (Wilson, 2000; Wilson, 2002). Therefore, the core principles of the occupational therapy profession emphasise supporting people with traumatic brain injury to understand their occupational performance issues in grocery shopping and to implement strategies to maximise performance (Toglia & Foster, 2021; Wilson, 2000; Wilson, 2002).

Implications For Future Research

This research took an exploratory approach to understanding grocery shopping from the perspective of individuals with traumatic brain injury and also used an audit tool to review medical files for current occupational therapy practices rather than applying a one of the available standardised grocery shopping assessments such as the IADL profile or the test of grocery shopping skills (Bottari et al., 2010; Brown et al., 2009). One of the findings from the current research was that occupational therapist's main method for assessing grocery shopping was non-standardised functional assessment. Given there are a range of standardised grocery shopping assessments available for patients with neurological conditions further research would be helpful to further review and critique available standardised grocery shopping assessments for the traumatic brain injury population given the importance of standardised assessments to assist clinicians with consistency of assessing performance issues and therefore targeting intervention accordingly. This research highlighted the link between environment and cognitive changes on grocery shopping performance. The majority of occupational therapy grocery shopping intervention within *Chapter 5* occurred within a supermarket environment. Given that across both qualitative studies, the participants discussed completing grocery shopping across a variety of store environments (market,

supermarket, as well as small speciality stores such as a butcher, deli, fruit store), future research may include environmental audits of a range of grocery shopping environments to understand the different environmental demands across a range of stores and environments. Furthermore, it would be helpful to further investigate the way that occupational therapists adapt and grade occupational, person and environmental factors within the occupation of grocery shopping in addition to understanding strategies that are used to promote independence in grocery shopping. Finally, data from these studies were collected prior to the COVID pandemic.

This program of research showed that prior to the COVID pandemic there appeared to be a preference for instore grocery shopping. Further research would be helpful to understand if methods for grocery shopping have changed (for both general population and those with traumatic brain injury) as a result of the pandemic and stay-at-home orders.

Conclusion

The aim of this program of research was to understand how people with moderate to severe traumatic brain injury complete grocery shopping and how current occupation therapy rehabilitation supports people to resume participation in this occupation. This chapter provided a discussion on the main findings of this research including clinical implications and strengths and limitations of the research design. Findings show that grocery shopping is situated within a person's wider routine and that there is wide variability in the way that people complete grocery shopping both pre and post traumatic brain injury. Personal factors, the environment, and social contexts impact grocery shopping participation. This research has also demonstrated that cognitive changes are predictive of shopping related support at 12 months post-injury. During rehabilitation, people with traumatic brain injury can improve their level of independence within grocery shopping, therefore it is important that people receive ongoing rehabilitation addressing the occupation of shopping within the inpatient and community settings. Such rehabilitation should be individualised and incorporate consideration of the elements of the person, occupation and environment so as to maximise participation and independence in grocery shopping.

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Appendix A

- The Alfred ethics committee certificate of approval
- Certificate of approval of amendments
- La Trobe ethics committee certificate of approval



ETHICS COMMITTEE CERTIFICATE OF APPROVAL

This is to certify that

Project No: 598/19

Project Title: Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury

Principal Researcher: A/Professor Natasha Lannin

Protocol Version 2.0 dated: 15-Oct-2019

Participant Information and Consent Form Version 3.0 dated: 25-Oct-2019

*was considered by the Ethics Committee on **24-Oct-2019**, meets the requirements of the National Statement on Ethical Conduct in Human Research (2007) and was **APPROVED** on **13-Nov-2019***

It is the Principal Researcher's responsibility to ensure that all researchers associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Secretary of the Ethics Committee, via amendment or progress report, of

- Any significant change to the project and the reason for that change, including an indication of ethical implications (if any);
- Serious adverse effects on participants and the action taken to address those effects;
- Any other unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Researcher to continue in that role, or any other change in research personnel involved in the project;
- Any expiry of the insurance coverage provided with respect to sponsored clinical trials and proof of re-insurance;
- A delay of more than 12 months in the commencement of the project; and,
- Termination or closure of the project.

Additionally, the Principal Researcher is required to submit

- A Progress Report on the anniversary of approval and on completion of the project.

The Ethics Committee may conduct an audit at any time.

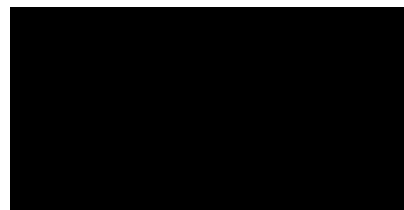
All research subject to the Alfred Hospital Ethics Committee review must be conducted in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The Alfred Hospital Ethics Committee is a properly constituted Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research (2007).

SPECIAL CONDITIONS

None

SIGNED:



**Professor John J. McNeil
Chair, Ethics Committee**

Please quote project number and title in all correspondence



Ethics Committee

Certificate of Approval of Amendments

This is to certify that amendments to

Project: **598/19 Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury**

Principal Researcher: **Professor Natasha Lannin**

Amendment:

Amendment to Protocol and PICF; Addition of carer/significant other/family member/support worker PICF; Changes to research personnel - Appointment of Danielle Sansonetti

Attachments:

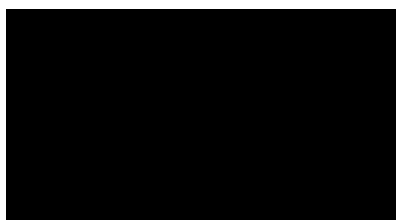
Protocol version **2.1** dated **27-Feb-2020**

PICF version **4.0** dated **8-Mar-2020**

PICF (family member/significant other/support worker) version **1.0** dated **8-Mar-2020**

have been approved in accordance with your amendment application dated **5-Feb-2020** on the understanding that you observe the National Statement on Ethical Conduct in Human Research.

It is now your responsibility to ensure that all people associated with this particular research project are made aware of what has actually been approved and any caveats specified in correspondence with the Ethics Committee. Any further change to the application which is likely to have a significant impact on the ethical considerations of this project will require approval from the Ethics Committee.



Professor John J. McNeil
Chair, Ethics Committee

Date: 23-Mar-2020

All research subject to Alfred Hospital Ethics Committee review must be conducted in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The Alfred Ethics Committee is a properly constituted Human Research Ethics Committee operating in accordance with the National Statement on Ethical Conduct in Human Research (2007).

Research Office

To	Natasha Lannin
From	University Human Ethics Committee
Reference Number	598/19
Project title	Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury
Subject	Externally Approved Project
Date	4 December 2019

The externally approved project submitted above was reviewed and **noted** by the University Human Ethics Committee Chair.

If this project is a multicentre project you must forward a copy of this letter to all Investigators at other sites for their records.

Please note that all requirements and conditions of the original ethical approval for this project still apply.

Should you require any further information, please contact the Human Research Ethics Team on:
T: +61 3 9479 1443 | E: humanethics@latrobe.edu.au.

La Trobe University wishes you every continued success in your research.

Warm regards,

David Finlay
Chair, University Human Ethics Committee

Appendix B

- PICF for Chapter 3 and 4

Participant Information Sheet/Consent Form

Non-Interventional Study - Adult providing own consent
Alfred Health

Title	Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury
Project Number	598/19
Project Sponsor	Alfred Health
Coordinating Principal Investigator/ Principal Investigator	Professor Natasha Lannin, Alfred Health
Associate Investigator(s)	Professor Jennifer Fleming, The University of Queensland Ms Laura De Lacy, La Trobe University and Alfred Health Ms Danielle Sansonetti, Alfred Health
Location	Caulfield Hospital

Part 1 What does my participation involve?

You are invited to take part in this research project, titled; "Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury". This is because you currently participate in rehabilitation within the Caulfield Hospital Acquired Brain Injury Service.

This Participant Information Sheet/Consent Form tells you about the research project. It explains the processes involved with taking part. Knowing what is involved will help you decide if you want to take part in this research.

Please read this information carefully. Ask questions about anything that you don't understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative or friend.

Participation in this research is voluntary. If you do not wish to take part, you do not have to. You will receive the best possible care whether or not you take part. If you decide to take part in this research, you will be asked to sign the consent section.

By signing the consent form you are telling us that you:

- Understand what you have read
- Consent to take part in the research project
- Consent to the use of your personal and health information as described

You will be given a copy of this Participant Information and Consent Form to keep.

What is the purpose of this research?

Grocery shopping is an important task that includes being able to make a shopping list, select items and make pay for items. Following a brain injury people experience physical and cognitive changes which can make community-based tasks such as grocery shopping difficult. Therefore, Occupational Therapists often work with people following brain injury to regain independence within grocery shopping tasks. The aim of this study is to understand the importance of participation in grocery shopping and if how people complete this task changes following a brain injury. The results of this research will be used by the researcher Laura De Lacy to obtain a Master of Research degree.

What does participation in this research involve?

You will be asked to be involved in a focus group or interview with other clients within the Acquired Brain Injury Service. This interview or focus group will take approximately 60-90 minutes and will explore your experience of participating in rehabilitation interventions to assist you to resume partaking in grocery shopping activities. You may also ask a family member, friend or therapist to support you within the individual or group interview. The interview or focus group will be audio recorded and then transcribed and coded to pull out key themes by the research investigator. It will not be possible to identify you or anyone in the focus group/interview from this transcription.

Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. Your decision whether to take part or not to take part, will not affect your routine treatment, your relationship with those treating you or your relationship with Alfred Health. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage. If you do decide to take part, you will be given this Participant Information and Consent form to sign and you will be given a copy to keep.

What are the possible benefits of taking part?

Possible benefits may include contributing to a greater understanding of the importance of targeting intervention towards community-based tasks such as grocery shopping when working with patients with an Acquired Brain Injury.

What are the possible risks and disadvantages of taking part?

This research does not involve any possible risks or disadvantages. As the participant you will be required to participate in a focus group interview. During this focus group or interview you will be asked to discuss how your brain injury may impact on how and why you complete grocery shopping. If this causes any distress or discomfort a member of the research team will support you in a sensitive manner and provide the opportunity to debrief. The research team member will also link you in with the appropriate support available through your rehabilitation team (including the social worker and clinical psychologist).

What if I withdraw from this research project?

You may withdraw from this project at any time without affecting your relationship with Alfred Health. You should be aware that data collected by the sponsor up to the time you withdraw will form part of the research project results. If you do not want them to do this, you must tell them when you join the research project.

What happens when the research project ends?

At your request a summary of the results can be posted to you once the study has been completed.

What will happen to information about me?

Information about you will be obtained from your health records held at Alfred Health for the purpose of this research. By signing the consent form, you agree to the research team accessing health records.

The focus group or interview will be conducted at Caulfield Hospital. The focus group or interview will be audio-recorded and then transcribed by the Associate Investigator within two weeks of the focus group or interview being conducted. The audio recording will then be deleted. All information obtained in connection with this research project that can identify you will remain confidential and will only be used for the purpose of this research project and future research related to this project. This information will be stored in the locked Research Office at Caulfield Hospital. Electronic data will be stored in a secure, password protected folder which only the research team will have access to.

The results will be published and/or presented in talks (such as at conferences) and in reports (such as in Mrs DeLacy's thesis and medical journal articles). Participant quotes may be included in publications and/or presentations, however it will not be possible to identify you or any other participants from these quotes (we will not name anyone, nor will we allow information that could identify you in any way to be discussed). Your information will be coded and will only be identifiable to the researchers.

Once the project is finished, we will store the interview documents and any of our notes that we take as well as your demographic information in a sealed storage box for a period of seven years. This will be stored at Alfred Health and is in accordance with Alfred Health protocols for storage of research data.

Who has reviewed the research project?

All research in Australia involving humans is reviewed by an independent subgroup of people called a Human Research Ethics Committee (HREC). The ethical aspects of this research project have been approved by the Alfred Hospital Ethics Committee. This project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007). This statement has been developed to protect the interests of people who agree to participate in human research studies.

Further information and who to contact

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact

Clinical contact person

Name	Natasha Lannin
Position	Professor of Occupational Therapy
Telephone	94796745
Email	n.lannin@alfred.org.au

For matters relating to research at the site at which you are participating, the details of the local site complaints person are below. Please quote the following project number: 598/19

HREC Office/Complaints contact person

Position	Complaints Officer, Office of Ethics and Research Governance Office, Alfred Health
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Telephone	(03) 9076 3619
Email	research@alfred.org.au

Consent Form - *Adult providing own consent*

Title Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury

Project Number 598/19

Project Sponsor Alfred Health

Coordinating Principal Investigator/ Principal Investigator Professor Natasha Lannin, Alfred Health

Associate Investigator(s) Professor Jennifer Fleming, The University of Queensland
Ms Laura De Lacy, La Trobe University and Alfred Health
Ms Danielle Sansonetti, Alfred Health

Location Caulfield Hospital

Consent Agreement

I have read the Participant Information Sheet.

I understand the purposes, procedures and risks of the research described in the project.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project as described and understand that I am free to withdraw at any time during the project without affecting my future health care.

I understand that I will be given a signed copy of this document to keep.

☐

I would like to receive a summary of the research results when available

Declaration by Participant – for participants who have read the information

Name of Participant (please print) _____

Signature _____ Date _____

Declaration by Study Doctor/Senior Researcher[†]

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Study Doctor/
Senior Researcher[†] (please print) _____

Signature _____ Date _____

[†] A senior member of the research team must provide the explanation of, and information concerning, the research project.
Note: All parties signing the consent section must date their own signature. All research participants at Alfred Health must be eligible for Medicare.

Appendix

Form for Withdrawal of Participation - *Adult providing own consent*

Title Preferences for grocery shopping: a qualitative study of adults living with an acquired brain injury

Project Number 598/19

Project Sponsor Alfred Health

Coordinating Principal Investigator/ Principal Investigator Professor Natasha Lannin, Alfred Health

Associate Investigator(s) Professor Jennifer Fleming, The University of Queensland
Ms Laura De Lacy, La Trobe University and Alfred Health
Ms Danielle Sansonetti, Alfred Health

Location Caulfield Hospital

Declaration by Participant

I wish to withdraw from participation in the above research project and understand that such withdrawal will not affect my routine treatment, my relationship with those treating me or my relationship with Alfred Health.

Name of Participant (please print) _____

Signature _____ Date _____

In the event that the participant's decision to withdraw is communicated verbally, the Study Doctor/Senior Researcher will need to provide a description of the circumstances below.

Declaration by Study Doctor/Senior Researcher[†]

I have given a verbal explanation of the implications of withdrawal from the research project and I believe that the participant has understood that explanation.

Name of Study Doctor/
Senior Researcher[†] (please print) _____

Signature _____ Date _____

[†] A senior member of the research team must provide the explanation of and information concerning withdrawal from the research project.

Note: All parties signing the consent section must date their own signature

Appendix C

- Codebook for Chapters 3 and 4

Appendix C

Qualitative studies 1 and 2 Occupational therapy practice framework codebook

The American Occupational Therapy Practice Framework is an official document of the American Occupational Therapy Association, which is intended for use by clinicians (both Occupational Therapists and other health care professionals), researchers, educators, students, and consumers to provide a summary of interrelated constructs that describe

Construct 1: Domain

Component	Definition	Guidance	Sample quotes
Occupations			
Driving and community mobility (IADL)	Planning and moving around the community	<u>Appropriate coding to this construct:</u> Discussion around driving, public transport use, walking in the community, using taxis, riding a bike. This may be in the context of accessing the grocery shops or walking around in the grocery store. _	“Paying attention to things is a lot harder now, even just walking along the street seems to be a bit harder but I am constantly reviewing the street, not knowing if a car is coming off the street into a driveway” (Participant 2, pg 3) “Where I used to be, cars coming out of driveways, I was worried about, now its people coming off the street that don’t pay attention to the footpath...so that is going to be a lot harder to get used to since the injury because I don’t have the attention span that I used to” (Participant 2, pg 4) “And that’s going to change because I won’t be able to drive after my operation. I will have to go with mum and her husband when they go grocery shopping and we will just have different trolleys and go different ways” (Participant 2, pg 10). “More so with walking to the shops because viewing obstacles that are coming up or making sure cars aren’t turning , things like that, so it has sort of changed my focus a little bit with all of
		<u>Inappropriate coding to this construct:</u> Discussion	

		around moving around	that so it does make a little bit more eye straining” (Participant 2, pg 13)
		inside the grocery store as	“I might have to think about maybe getting a taxi [to the shops] because I am not allowed to
		this would be coded under	drive yet so maybe a taxi or an uber I guess trying to time it when my wife is at home so we
		grocery shopping..	don’t have to go through that because I think it would be more time wasting” (Participant 3, pg 5)
Financial management (IADL)	Planning and using finances with long term and short- term goals	<u>Appropriate coding to this construct component:</u> Discussion around budget for grocery shopping. <u>Inappropriate coding to this construct:</u> Discussion around how the participant pays for the grocery shop (ie. using a card, cash) as this would go under grocery shopping.	“That’s generally when my pay was organized through clients and that, so they pay on a Tuesday and then it has a couple of days to clear. So, then I can go grocery shopping and actually buy food” (Participant 2, pg 8). “It [grocery shop] will also be budgeted as well cause I have been unemployed since the incident because I am self-employed so I have had no income for the past two months so I am going to be on a very strict budget but I have got savings but that will dry up very quickly” (Participant 2, pg 11). “I am thinking about the 50-80 dollars and that’s going to have to be my fizzy drinks as well as soda...but that is going to have to be everything, but meat I will not have to pay for because mum gets free meat from the butcher so meat I don’t have to pay for” (Participant 2, pg 11-12). “No, I have chosen that, I asked mum got 40 dollars and that’s all I took with me because she has got control of some of my money” (Participant 2, pg 12). “No, no budget, I guess depending on what we buy kind of pays out on what we pay but we don’t have a budget, it’s just what we eat” (Participant 3, pg 2). “I think for us like it is about what we need for the day and how it fits even if it’s something that

we need we will buy it, we don't really shop to try and save money" (Participant 3, pg 7).

Shopping (specifically grocery shopping) (IADL)	Preparing shopping lists, selecting, purchasing, and transporting items, selecting method of payment and related use of electronic devices such as a computer or phone	<u>Appropriate coding to this construct:</u> Discussion around method of completing grocery shopping and specific steps of grocery shopping including purchasing groceries, paying for items, use of a memory strategy such as a list to remember items for purchase. Discussion around value placed on the occupation of grocery shopping	"Nah I would just wing it, I would walk around until I found what I was looking for, grab it and go and that's what I was doing over the road [in rehabilitation]" (Participant 1, pg 2). "Nah I just got chips, sausages and chops, I just know what I wanted for lunch and dinner, yeh just the whole week" (Participant 1, pg 2). "It was easy [grocery shopping], just get in there and get it done, that was the attitude I always had, it's always been like that just get in there and get it done" (Participant 1, pg 2). "I would go past aisle after aisle after aisle, looking for the aisle that I am going past, I hated grocery shopping with a passion" (Participant 2, pg 1). "I used to just go in there and for some reason I would only go grocery shopping when I was hungry and I would come out with hundreds of dollars more than I needed to" (Participant 2, pg 1). "Usually, I would sort of make my choice of what I was going to have for dinner about lunchtime so on my home from work I would go to the grocery store, and I am a big meat eater so it was straight to the deli and buy as much meat as possible" (Participant 2 pg 2). "And we went to the grocery store, but I think one thing I have always struggled with is trying to find the signs that are in the aisles, one that actually matches, like supermarkets aren't laid out logically, like you will have sugar next to the coffee, instead of sugar next to the flour and baking products, it is not logical" (Participant 2, pg 2). "And so, writing a list does not always work for that situation because I don't get to the herb
		<u>Inappropriate coding to this construct:</u> Discussion around other types of shopping outside of	

groceries (ie. Shopping for clothes, books, car etc.)	section and go oh, that's nice, I remember that I like that, it changes, everything changes on the spot. Oh, it's very flexible and especially if I go to the confectionary aisle (laughs) I will easily
Discussion around a budget for groceries (this would go in financial management), discussion around other occupations such as meal preparation/food items, community access, paying for items without a clear link to grocery shopping.	spend about \$80 in the confectionary aisle" (Participant 2, pg 5). "So just think where they [items] might be and if you are getting milk that is always at the back end of the supermarket and plan the list better, because we are all human and we sort of read a list, so that number one is at the top and maybe just plan better, that's all I can do better, it's about planning, because my planning was pretty piss poor, I will admit it because I actually forgot I was going shopping today and I wrote the list two seconds before I walked out the door so there was planning and that is all my fault because I actually forgot because I have been so tired lately" (Participant 2, pg 17). "And extra because I walked down another aisle I wasn't even meant to be in and was like I actually wanted that, it wasn't on the list, but I am getting that, oh look I have got enough money, oh good" (Participant 2, pg 17) "Prior to coming into hospital, I would have a list on my phone, and I would tick things off as I get it, um hopefully I have got everything and done properly" (Participant 3, pg 1) "I would say that we buy 85-95% of the things we would buy we would buy from Coles but there are little delicacy house areas that we would buy from like cheese that aren't at Coles and meat as well we would go to our butcher" (Participant 3, pg 2) "I suppose the milk, the cereals, bread, I guess some meat as well we would buy weekly, I suppose ice creams and things like that we go through those regularly, pretty quickly"

(Participant 3, pg 2)

“No, we haven’t we have always gone to the shop to get what we need because we want to be able to see what we buy so like groceries um vegies we prefer to actually check” (Participant 3, pg 5)

Leisure	Non-obligatory activity that is intrinsically motivated and engaged in during discretionary time, that is obligatory such as work, self-care or sleep	<u>Appropriate coding to this construct:</u> Person refers to grocery shopping as an enjoyable activity they complete within their spare time_ <u>Inappropriate coding to this construct:</u> Person refers to other leisure interests that are not related to grocery shopping_	“I would probably say a Saturday and Sunday. Yep, it’s my free time and I just go there [supermarket] for a mosey and go when I have got extra money this week, I’ll buy that” (Participant 2, pg 7) “Yeh [supermarket] is a filler of time sort of thing” (Participant 2, pg 8)
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Client factors			
Values	Acquired beliefs and commitments, derived from culture, about what is good,	<u>Appropriate coding to this construct component:</u> Discussion around thoughts	“Yeh it was easy [grocery shopping], just get in there and get it done, that was the attitude I always had, it’s always been like that just get in there and get it done” (Participant 1, pg 2) “Shopping is shopping, sometimes you have just got to do it to eat” (Participant 1, pg 7)

right and important to do. (pg S46)	on the importance of grocery shopping <u>Inappropriate coding to this</u> <u>construct component:</u> Discussion regarding other values/beliefs that are not related to grocery shopping.
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Beliefs and spirituality	The way individuals seek and express meaning and purpose and the way they experience their connectedness to the moment, to self, to others, to nature and to the significant or sacred (pg S45)	<u>Appropriate coding to this</u> <u>construct component:</u> Discussion around a specific belief in terms of grocery shopping._ <u>Inappropriate coding to this</u> <u>construct component:</u> Discussion around thoughts on the importance of grocery shopping (this would be coded under values)._	No quotes found for this area
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Body structures	Anatomical parts of the body such as organs, limbs and their components. (pg S41).	<u>Appropriate coding to this construct:</u> Person may discuss changes specifically to body parts post brain injury such as arms, legs, eyes. <u>Inappropriate coding to this construct:</u> Discussion around body functions without reference to a particular physical body part such as cognitive changes (ie. memory, concentration, problem solving), visual changes (ie. reduced visual fields, blurred vision), motivation, emotions, physical changes (ie. strength, sensation) these would be coded under	“Essentially my eyes aren’t as good so I get a bit fuzzy at times so I get a bit dizzy, I can’t walk around as much as I would like to” (Participant 3, pg 4) “I can’t do that as much and my knees because they are both, I am using crutches so it’s more difficult to move around I suppose (Participant 3, pg 4)
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specific body function
categories.

Body functions

Mental functions (Body functions)	Includes affective, cognitive and perceptual (ie. Memory, attention, perceptual, awareness of one's identity and body, regulation of emotions, energy levels, motivation, impulse control, appetite)	<u>Appropriate coding to this construct component:</u> Discussion about particular cognitive or perceptual difficulties (ie. attention, memory, initiation) that impact grocery shopping participation_ <u>Inappropriate coding to this construct component:</u> Discussion regarding specific body part (ie. brain/eyes) without reference to particular cognitive or perceptual	“It’s the second time I have gone grocery shopping with the OT and same thing happened again I was just not paying attention to them [signs]” (Participant 2,pg 3) “It is a simple thing I just tend to go right by me and it is a lot more difficult now to concentrate on the task at hand [grocery shopping] and it is a little bit frustrating” (Participant 2,pg 3) “Where I used to be, cars coming out of driveways, I was worried about, now its people coming off the street that don’t pay attention to the footpath...so that is going to be a lot harder to get used to since the injury because I don’t have the attention span that I used to” (Participant 2, pg 4) “Vision not so much with the grocery shopping it’s more the attention span” (Participant 2, pg 12) “Even just going to Coles today, I felt I could just go back into bed, it’s just exhausting. It’s just I don’t know I just feel exhausted, like I am drained, like my body just can’t do the things that it used to” (Participant 2, pg 13). “So just think where they [items] might be and if you are getting milk that is always the back end of the supermarket and plan the list better, because we are all human and we sort of read a list, so that number one is at the top and maybe just plan better, that’s all I can do better, it’s about
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		impairments. Reference to specific body parts would be coded underbody structures._	planning, because my planning was pretty piss poor, I will admit it because I actually forgot I was going shopping today and I wrote the list two seconds before I walked out the door so there was planning and that is all my fault because I actually forgot because I have been so tired lately” (Participant 2, pg 17). “ I suppose I tend to be slower with making decisions and walking around and I suppose I am checking things to make sure I have got the right idea before I go back” (Participant 3, pg 3) “I suppose memory, remembering things a bit more, or trying to describe a certain item [grocery item] because I can’t remember what it is called, someone may be able to pick up what I am trying to say that’s one of the biggest ones I have noticed that I can’t remember” (Participant 3, pg 4)
Sensory functions (Body functions)	Includes visual, hearing, taste, smell, pain, vestibular functions.	<u>Appropriate coding to this construct:</u> Discussion includes reference to changes with vision, hearing, pain etc that impact on grocery shopping task (including accessing the grocery shops and within the grocery store). <u>Inappropriate coding to this</u>	“More so with walking to the shops because viewing obstacles that are coming up or making sure cars aren’t turning, things like that, so it has sort of changed my focus a little bit with all of that so it does make a little bit more eye straining” (Participant 2, pg 13).

		<u>construct:</u> Discussion about body parts (ie. eyes, ears) but no reference to specific sensory functions (ie. visual changes, changes with hearing, pain etc)._	
Neuromusculoskeletal functions (Body functions)	Includes muscle function, gait patters, reflexes, joint stability.	<u>Appropriate coding to this construct:</u> Discussion about the persons mobility/gait, strength <u>Inappropriate coding to this construct:</u> Discussion about a particular body part such as legs or feet without reference to body functions (ie. mobility, strength).	“I suppose I tend to be slower with making decisions and walking around “ (Participant 3, pg 3) “ I can’t do that as much and my knees because they are both, I am using crutches so it’s more difficult to move around I suppose” (Participant 3, pg 4)
Cardiovascular, hematological, immunological and respiratory system	Includes physical endurance, aerobic capacity, stamina and fatigability, maintenance of	<u>Appropriate coding to this construct</u> <u>Inappropriate coding to this</u>	No quotes found for this category

functions (Body functions)	blood pressure	<u>construct:</u> Discussion regarding reduced strength or mobility but no reference to physical endurance (this would be coded under neuromusculoskeletal functions)_	
Voice and Speech functions (Body functions)	Includes voice and speech functions	<u>Appropriate coding to this construct:</u> Discussion about changes with voice or speech post brain injury._ <u>Inappropriate coding to this construct:</u>	No quotes found for this category
Performance skills			
Motor skills	Observed as the person interacts with and moves task objects and self around the task environment	<u>Appropriate coding to this construct:</u> Discussion includes reference to how the person moves about the grocery store or interacts with objects (ie. trolley,	“Um I would say so because usually I would just push the um trolley around and that is really it um or I would grab a few things I would remember but she usually does most of the grabbing and thing like that” (Participant 3, pg 1) “Um getting it in the trolley, putting it on the conveyor belt, it’s just difficult to gauge the different, the distance using things” (Participant 8, pg 5)

		grocery items, other customers). <u>Inappropriate coding to this construct:</u> Discussion about mobility without reference to the occupation of grocery shopping.	
Process skills	Observed as a person (selects, interacts with and uses task tools and materials (2) carries out individual actions and steps (3) modifies performance when problems are encountered	<u>Appropriate coding to this construct:</u> <u>Inappropriate coding to this construct:</u>	
Social interaction skills	Observed during the ongoing stream of a social exchange pg s43	<u>Appropriate coding to this construct:</u> Discussion includes communication or reference to a social exchange with other	“ I enjoyed doing it [grocery shopping] as well as having to do it because I like the social aspect of it because every time I would go up to the cashier they would start talking to me and asking me questions about what I was buying so I think they sort of felt that they could ask me questions and they would know I would answer” (Participant 8, pg 4)

customers, staff at the
grocery store, family or
supports_
Inappropriate coding to this
construct: No reference to
social interaction or social
skills

Performance patterns

Habits	Acquired tendencies and automatic behavior to respond and perform in certain consistent ways in familiar environments or situations specific (ie. Automatically puts car keys away, spontaneously looks both ways before crossing the street, always turns the stove burner off before	<u>Appropriate coding to this construct:</u> Discussion refers to automatic behaviours within grocery shopping such as automatically purchasing a certain item, looking both ways before crossing road/carpark when walking to the grocery store._ <u>Inappropriate coding to this</u>	“ So I go there and the herbs and spices aisle and get all of them, but meat is always the first thing I get because it depends what I am going to use to flavor it” (Participant 2, pg 5)
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removing a pot)

construct: Discussion refers to a wider routine (ie. more of a sequence of steps within the grocery shopping task, reference to where grocery shopping fits within a person's wider routine) this would be coded under routines._

Routines	Patterns of behavior that are observable, regular and repetitive and that provide structure for daily life (ie. Following a sequence of steps) (pg S45).	<u>Appropriate coding to this construct:</u> Discussion refers to a wider routine (ie. more of a sequence of steps within the grocery shopping task, reference to where grocery shopping fits within a person's wider routine) this would be coded under routines. <u>Inappropriate coding to this</u>	“Usually a Thursday was my normal shopping day and then that way I would prepare for Friday as well on the Thursday because I would have my son on the Friday to the Monday morning and so that way I could try and have all of his food so that when he came, he goes dad I don’t eat that” (Participant 2, pg 1) “Usually yeh I would sort of make my choice of what I was going to have for dinner about lunchtime so on my home from work I would go to the grocery store and I am a big meat eater so it was straight to the deli and buy as much meat as possible” (Participant 2 pg 2). “That’s generally when my pay was organized through clients and that, so they pay on a Tuesday and then it has a couple of days to clear. So, then I can go grocery shopping and actually buy food” (Participant 2, pg 8) “Usually [complete the grocery shop] um a Saturday or a Sunday just before the weekend,
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<u>construct</u>: Discussion refers to automatic behaviours within grocery shopping such as automatically purchasing a certain item, looking both ways before crossing road/carpark when walking to the grocery store as this would be coded under habits.	before the weekday starts so we can prepare for that week” (Participant 3, pg1). “Usually [shop]once a week yeh just buy enough for that week” (Participant 3, pg 2) “Definitely weekends [complete grocery shopping] because during the week it’s too difficult to do” (Participant 3, pg 4)
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Rituals	Sets of symbolic actions with spiritual, cultural or social meaning contributing to the client’s identify and reinforcing values and beliefs (pg S45)	<u>Appropriate coding to this construct:</u> <u>Inappropriate coding to this construct:</u>	No quotes found for this category
Roles	Sets of behaviors expected by society and shaped by culture and context that	<u>Appropriate coding to this construct:</u> Discussion referring to role within	“Usually, a Thursday was my normal shopping day and then that way I would prepare for Friday as well on the Thursday because I would have my son on the Friday to the Monday morning and so that way I could try and have all of his food so that when he came, he goes dad I don’t eat that

may be further conceptualized and defined by the client (pg S45)	grocery shopping task (ie. purchasing items, writing a list), linking the occupation of grocery shopping to a life role such as parent, partner, housemate	(Participant 2, pg 1) “Um my wife was [responsible for writing the shopping list], I wouldn’t have taken the responsibility of that” (Participant 3 pg 2) “Usually, I would just push the trolley around and that is really it or I would grab a few things I would remember but she [wife] usually does most of the grabbing” (Participant 3, pg 5)
<u>Inappropriate coding to this construct:</u> Discussion regarding a person’s routine without specific reference to their role (ie. husband/wife, mother/father etc)		

Contexts and environments			
Cultural (context)	Customs, beliefs, activity patterns, behavioral standards, and expectations accepted by the society of which the person is a	<u>Appropriate coding to this construct:</u> Discussion regarding standards or expectations in regards to grocery shopping from a	“ Um they cost more in this country but I don’t know, the Watty sauce just tastes so much better I don’t know if they add more sugar though, that might be why” (Participant 2 pg 1)

member. This influences	cultural perspective._
the person's identity and	
activity choices (pg S42)	<u>Inappropriate coding to this</u>
	<u>construct</u> : Discussion about
	a persons own personal
	thoughts or value placed on
	grocery shopping that has
	no reference to society (this
	would be coded under
	value instead).

Personal (context)	Features of the individual	<u>Appropriate coding:</u>	“..I am an engineer by trade so it's [grocery shopping] going to be fun and mum has put both of my cars in the backyard for me to work on so that's been really good” (Participant 2, pg 11)
	that are not part of a health condition or health status.	Information about the person's age, gender, socioeconomic and educational status. Includes membership to a group (ie. Volunteer, employee) or population (ie. Members of a society)_	

Physical (environment)	Natural and built non- human surroundings and the objects (tools, buildings, furniture and devices) in them (this also includes the sensory qualities)	<u>Appropriate coding to this construct:</u> Discussion makes reference to the physical layout of a grocery shop or specific grocery shops that people go to	“Yeh usually [brand of supermarket] because [brand of supermarket] actually sells [country] products which is awesome (Participant 2, pg 1) “And we went to the grocery store but I think one thing I have always struggled with is trying to find the signs that are in the aisles, one that actually matches, like supermarkets aren’t laid out logically, like you will have sugar next to the coffee, instead of sugar next to the flour and baking products, it is not logical” (Participant 2, pg 2) “...all supermarkets are laid out vegies, then bread a little bit further and then milk....oh hang on which way do they lay it out because pretty common the vegies are always the first thing that you go past” (Participant 2, pg 5) “I like [brand of supermarket] because [brand of supermarket] is cheap and they also have things in the middle of the supermarket that I am always like oh I need that (Laughs), I need a new tent thank you... for the specials that they have in the middle of the store. That’s the only reason, or chocolate because its cheaper there” (Participant 2, pg 7). “Um usually from most plazas, is a fruit and vegie store and they are always fresh, and they come in fresh every morning straight from the farms, they are amazing” (Participant 2, pg 8) “ I think for people like me in my situation, is plan the list better, not the first thing that comes to your head, maybe think vegies are the first thing in the supermarket, that’s where you walk in, every supermarket is like that you know [brand of supermarket] is like that and then your bread pretty much opposite confectionary, I don’t know why but every supermarket the bread seems to be on the opposite side of the aisle from the confectionary” (Participant 2, pg 17).
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“We usually go to like [brand of supermarket] for our preferred place to go, it’s really because its closest to us and we found that looking at both [brand of supermarket] and [brand of supermarket] it was probably a better location in terms of having things there it was easier for us to find things and get things quicker yeh (Participant 3, pg 1)

“I would say that we buy 85-95% of the things we would buy we would buy from [supermarket] but there are little delicacy house areas that we would buy from like cheese that aren’t quiet at [brand of supermarket] and meat as well we would go to our butcher” (Participant 3, pg 2)

Social	Presence of relationships with, and expectations of persons, groups, and populations with whom clients have contact (eg. Availability and expectations of significant individuals such as spouse, friends and caregivers)	<u>Appropriate coding to this construct:</u> Discussion may include reference to influence or involvement of family, friends or other supports on grocery shopping task.	“My dad, nah, I would go in there to get it. I am just not allowed to do it anymore [grocery shopping] I am not allowed to cross over the river where the accident was” (Participant 1, pg 1). “Nah he [dad] will take me [grocery shopping] when I want to go....nah I will just go whenever he is ready” (Participant 1, pg 2) “I will have to go with mum and her husband when they go grocery shopping and we will just have different trolleys and go different ways” (Participant 2 pg 10). “No, we share, we actually do everything, we do it at the same time [grocery shopping], we go together because neither of us actually like shopping, so we try and get it done as quickly as possible (Participant 3, pg 1)
Temporal (context)	Experience of time as shaped by engagement in occupations	<u>Appropriate coding:</u> Information about the person’s stage of life, time of day shopping occurs, the	“Yeh it was easy, just get in there and get it done [grocery shopping], that was the attitude I always had, it’s always been like that just get in there and get it done” (Participant 1, pg 2) “Usually yeh I would sort of make my choice of what I was going to have for dinner about lunchtime so on my home from work I would go to the grocery store...” (Participant 2 pg 2).

		duration, sequence and the rhythm of the grocery-shopping task and history.	“I suppose um going [grocery shopping] in the peak times so have to deal with a lot of people um I find that a bit difficult at the moment as well trying to manoeuvre so that earlier I can go the easier it will be I think” (Participant 3, pg 5)
		<u>Inappropriate coding:</u> Discussion around the day of the week shopping occurred, this would be coded in routine.	

Virtual (context)	Environment where communication occurs by means of airwaves or computers	<u>Appropriate coding to this construct:</u> Discussion regarding online grocery shopping	“I haven’t really thought about it [online grocery shopping] maybe even if you go um shopping on the websites now, we can do that now can’t we so there is that option as well” (Participant 3, pg 4) “No, we haven’t we have always gone to the shop to get what we need because we want to be able to see what we buy so like groceries, vegies we prefer to actually check” (Participant 3, pg 5)
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Construct 2: Process

Component	Definition	Guidance	Sample quotes
Evaluation	Includes the occupational profile and analysis of occupational performance. Focuses on what a client wants and	<u>Appropriate coding to this construct:</u> May	“If I thought about it I would have gone straight to the bread instead...that was the last thing that I got, so thinking about it a little bit more, so planning my list better...before I go there thinking oh hang on which way do they lay it out because it’s pretty common the vegies are always the

needs to do, what they can do and has done, identifying supports and barriers to health and participation	include reference to an occupational therapy assessment of grocery shopping or a person's self-reflection on his or her performance within grocery shopping.	first thing that you go past” (Participant 2, pg 5) “Is there anything else I can do and I think the answer is no I just have to put up with it and have the strategies in place to deal with it like the list and do all that sort of stuff ” (Participant 5, pg 20) “No, I don’t enjoy it [grocery shopping] because I have to make a list, and I struggle making the list, and then I have to take a pen and tick the stuff off, like today I didn’t have...time to make the list, right but I should have made it last night, but I worked hard yesterday so I didn’t really have the time to make the list last night..” (Participant 5, pg 18)
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Intervention	Intervention includes the process of planning, implementation and review. It involves goal setting , it directs the actions of the therapist and addresses clients current and potential situation related to engagement in occupations or activities (pg S15)	<u>Appropriate coding to this construct:</u> Reference to specific strategies or practice of	“She [Occupational Therapist] was good too, but she just sort of gave me the key, you know, just look for the signs above you and read them” (Participant 2, pg 3) “Yep um there is a few therapists that have spoken to me about the fatigue and better time management to resting before I am doing something” (Participant 2 pg 14). “The Occupational Therapist and um (Speech Pathologist) another one that mentioned maybe to manage time better and rest to prevent feeling the fatigue while you are doing it” (Participant 2,
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grocery pg 15).

shopping “Yeh learning some of the techniques [within therapy] so when you are in here [supermarket]

within the you are supervised, and you can be shown how to do it properly rather than kind of learn it

rehabilitation yourself (Participant 3, pg 8)

setting.

Inappropriate

coding to this

construct;

Reference to

an

occupational

therapy

assessment

without

discussion

regarding

opportunity

for ongoing

intervention/pr

actice or

		development of strategies.	
Outcomes	The end result of the occupational therapy process and describe what the clients can achieve through OT intervention. These can be measurable through use of outcome measures and they can also by the clients' experience and realization of the effects of the OT intervention.	<u>Appropriate coding to this construct :</u> Person discusses outcome of occupational therapy intervention to support grocery shopping (this may include success of strategies, level of function).	"I don't know if they could do anything more, they have actually done an amazing job ... but they have been actually pretty good, the staff here have been amazing" (Participant 2, pg 13)

Themes that are NOT within the framework			
Preferences	a greater liking for one alternative over another or others	<u>Appropriate coding to this construct:</u> Discussion about preference for certain grocery items, brands, preference for method of completing grocery shopping.	“There are certain things that are branded that we would buy because we prefer those but usually, we look at price and see what is cheaper that day and probably buy those” (Participant 3, male, 34 years).
Expectation	a strong belief that something will happen (ie. discussion regarding expectations of performance within grocery shopping)	<u>Appropriate coding to this construct:</u>	“ Definitely you have to go home to a lot of different things and you won’t know until you actually get there and do it right and this part I have been in the same situation before I have had a couple of car accidents so hmm there you go it all depends with what

situation you are in right and people in chairs and stuff like that they probably need it or most probably 99.9% don't need it but if they don't well good luck" (Participant 10)

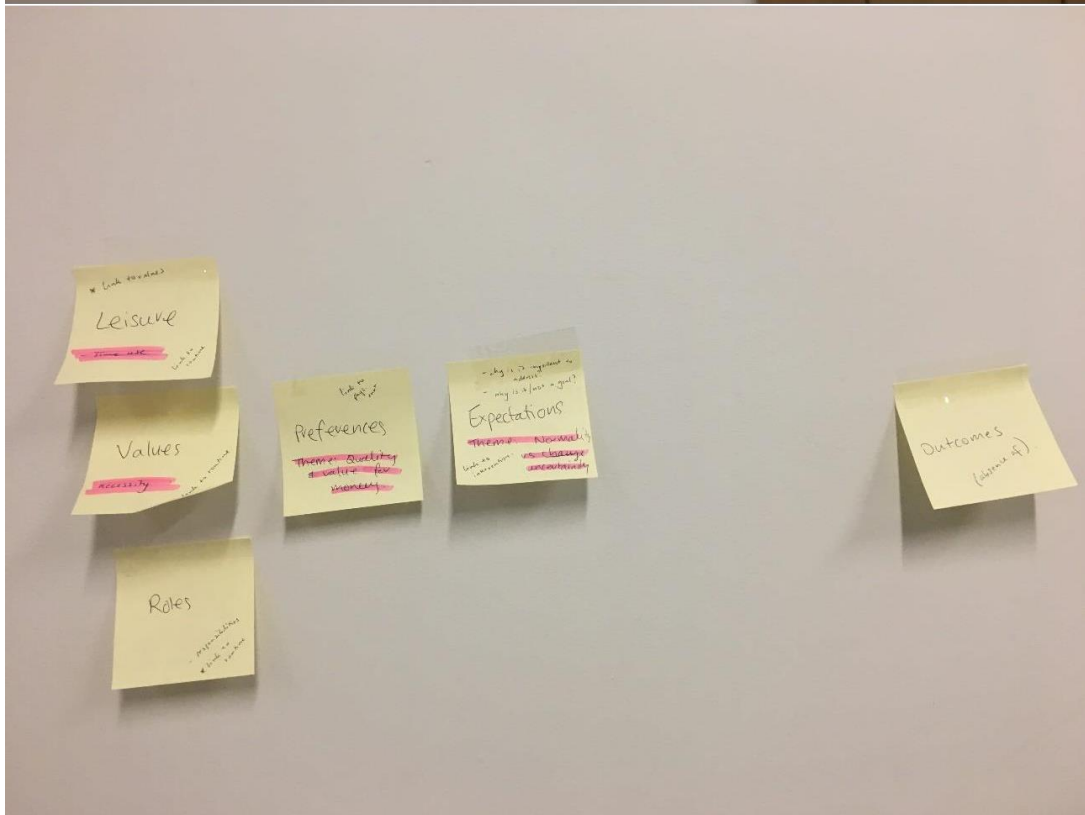
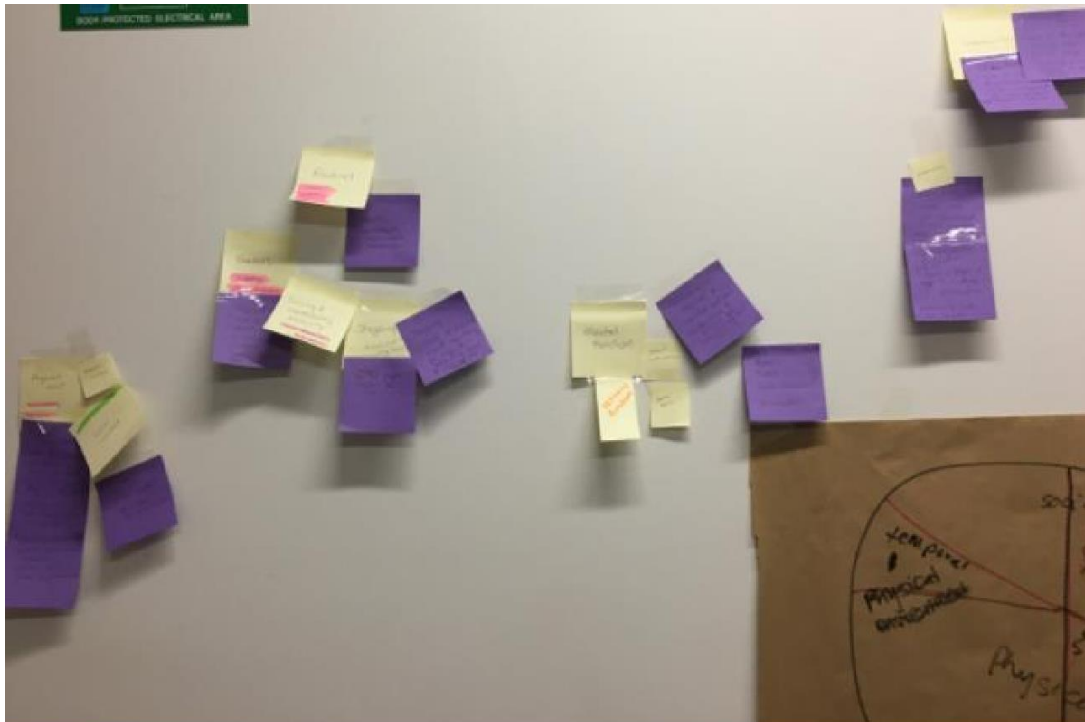
12) "I would like to be 100% confident within myself that I can perform those tasks without supervision" (Participant 14, pg 5) [referring to shopping not being a goal]

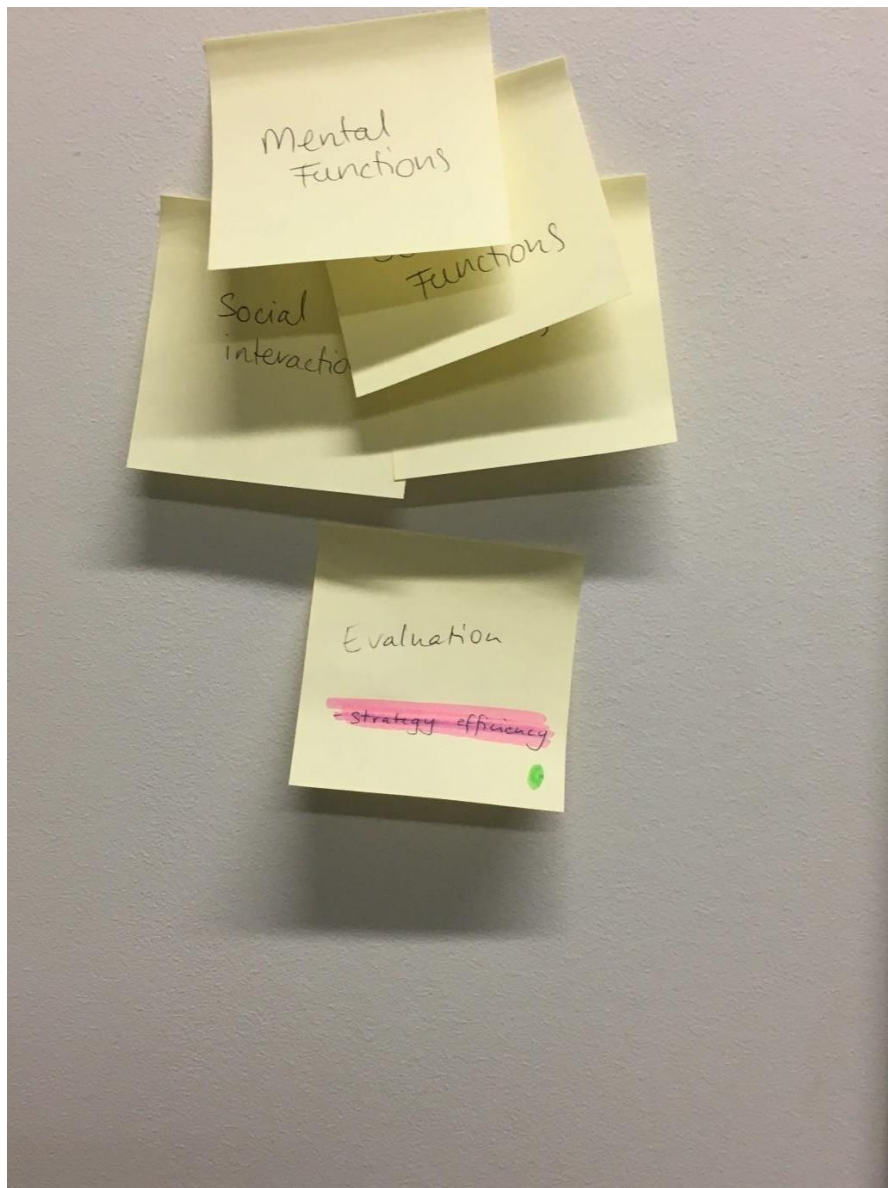
References:

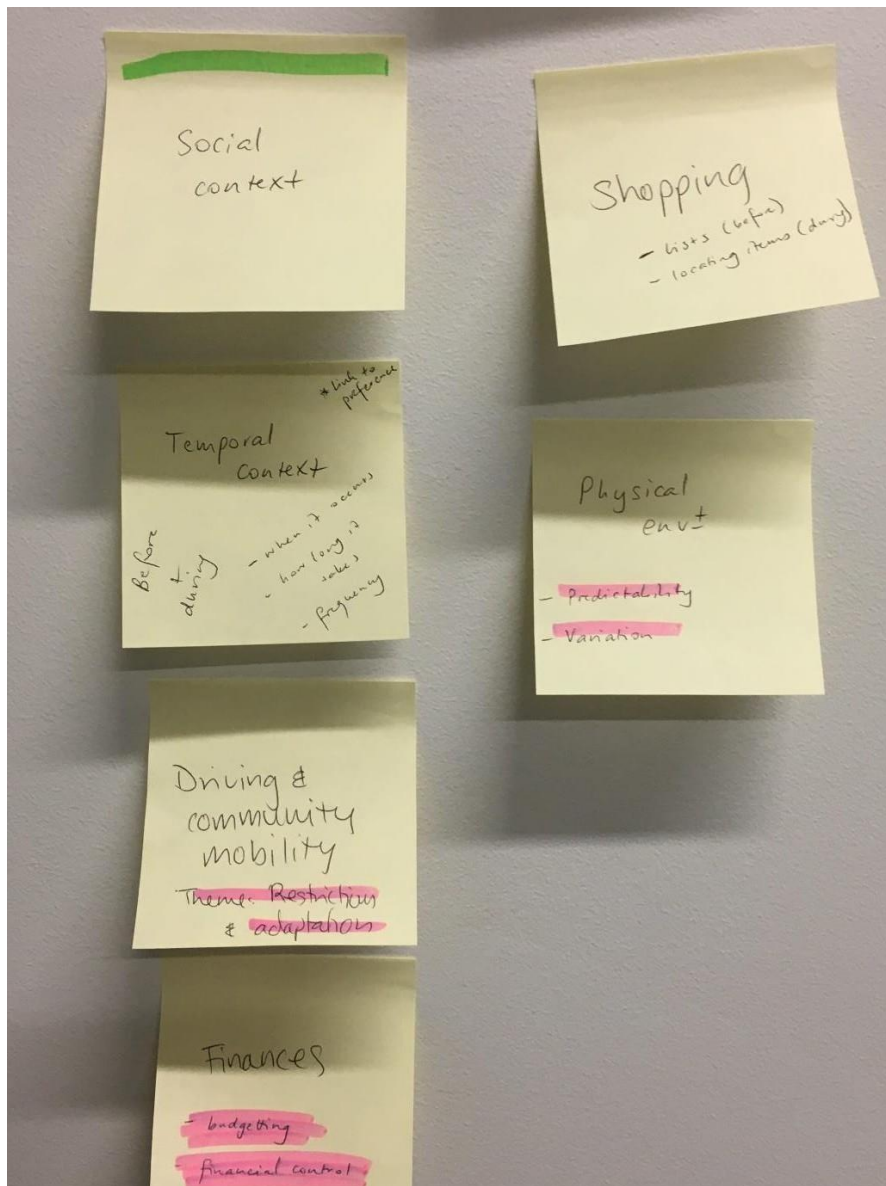
The American Occupational Therapy Association, (2017). Occupational Therapy Practice Framework: Domain and Process 3rd ed. The American Journal of Occupational Therapy (61) S1-48.

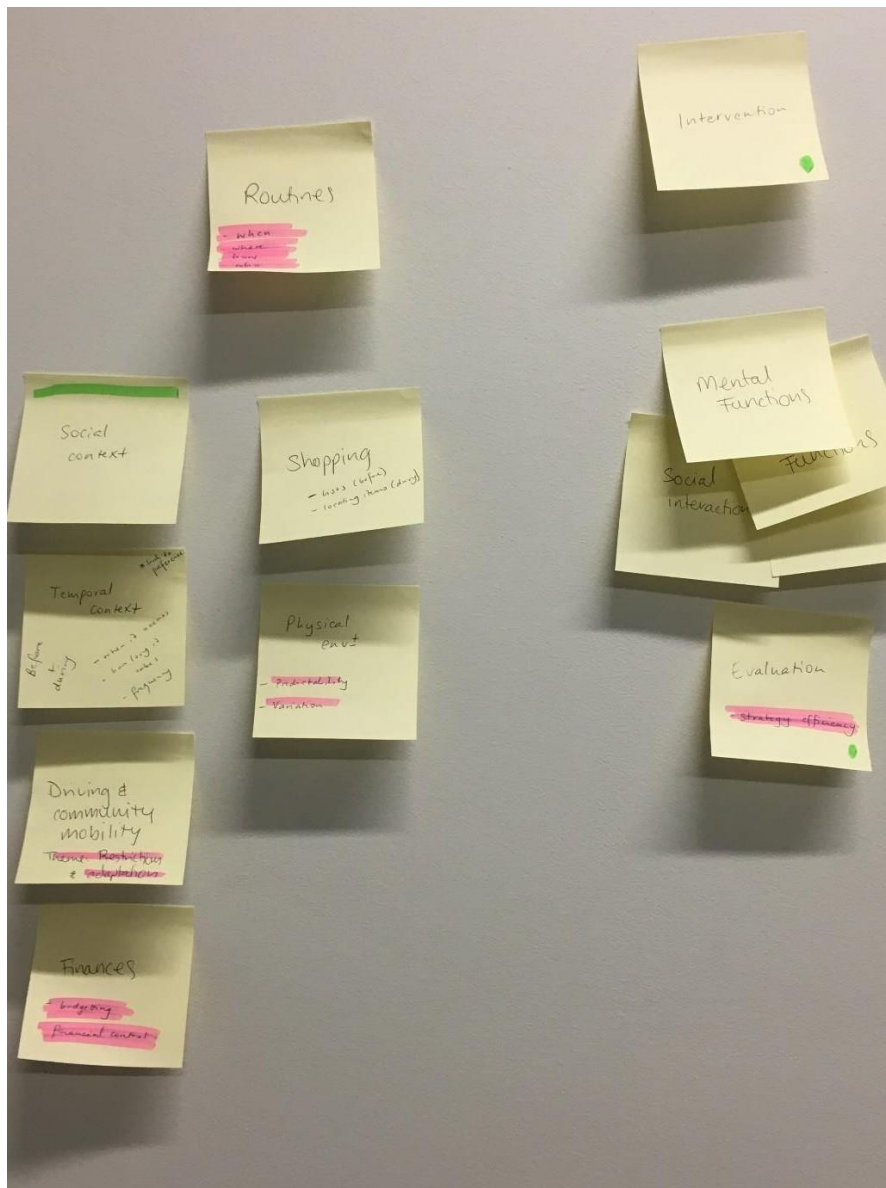
Appendix D

- Data analysis for Chapters 3 and 4









How & Why

Other: Expectations & Preferences
 ↳ engagement in intervention (OT process)
 ↳ link to physical environment
 ↳ values

Occupation

- Driving + Community mobility
- Finances - link to Roles & social context
- Shopping - Selection
- Leisure - Time use

Client factors

- Values - link to expectations
 ↳ theme: necessity

Body Functions

- map out to specific cognitive changes
- mental - acknowledgement of cognitive difficulties
- sensory - vision

Performance Skills

- Social interactions
- Motor - not a focus → link back to demographic data

Performance Patterns

- Roles
- Routines → linked: who → role, where → physical environment, when → role, how → occupation

Contexts & Environment

- Social context → availability of others/how I get to the shops
- Physical environment → theme: predictability & variation → link to mental functions
- Temporal context → link to routine

OT PROCESS

- Evaluation - goals link & expectation
- Intervention - error identification
- Outcomes - link to mental functions
- relook clear goals intervention
- renew goals for evaluation
- later support
- Social context & social function (keep repeated practice within intervention)
- cognitive strategies

ROUTINE

- ↳ diagram → Physical Social Values Preference Occupations

- Lists - relook at where this fits? preference or shopping
- ? expectation rehab

are there some that have more of an influence than others.

Personal context

Physical environment
 Preference (valuing to)

Personal context
 (employment changes)

Physical environment
 Social context

Driving (instructions) & adaptation

Physical environment
 Social context (availability of others)

Temporal context

Walking around the shops

Physical environment
 (classical) predictability & variation

Preference (quality as cost)

Budget
 (Financial Management - control)

List
 (method of generating list)

Getting to the shops
 (Driving & community mobility)

Locating & searching for items
 (Shopping)

Selecting items
 (Preference, Physical environment, Shopping)

Putting in items
 (payment slip)

Taking items to car
 (intervention)

Time pressure
 Planning & memory (lapses)

Attention
 Vision
 Walking

Attention
 Vision
 Walking

↓ processing
 Attention/Planning/Concentration (demands of) vision

↓ processing
 Vision
 Monitoring

Memory

↓ motor (carrying)

Appendix E

- The Alfred ethics committee approval for chapter 5
- La Trobe university ethics committee approval chapter 5



ETHICS COMMITTEE CERTIFICATE OF APPROVAL

This is to certify that

Project No: 543/15

Project Title: OUTCOME-ABI Study- An evaluation of outcomes of a specialist ABI unit and its impact on long- term quality of life and community participation.

Principal Researcher: A/Prof Natasha Lannin

Protocol Version 1.1 dated: 4-Nov-2015

Participant Information and Consent Form Version 1.1 dated: 2-Dec-2015

*was considered by the Ethics Committee on **26-Nov-2015**, meets the requirements of the National Statement on Ethical Conduct in Human Research (2007) and was **APPROVED** on **3-Dec-2015***

It is the Principal Researcher's responsibility to ensure that all researchers associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Secretary of the Ethics Committee, via amendment or progress report, of

- ☐ Any significant change to the project and the reason for that change, including an indication of ethical implications (if any);
- ☐ Serious adverse effects on participants and the action taken to address those effects;
- ☐ Any other unforeseen events or unexpected developments that merit notification;
- ☐ The inability of the Principal Researcher to continue in that role, or any other change in research personnel involved in the project;
- ☐ Any expiry of the insurance coverage provided with respect to sponsored clinical trials and proof of re-insurance;
- ☐ A delay of more than 12 months in the commencement of the project; and,
- ☐ Termination or closure of the project.

Additionally, the Principal Researcher is required to submit

- ☐ A Progress Report on the anniversary of approval and on completion of the project (*forms to be provided*);

The Ethics Committee may conduct an audit at any time.

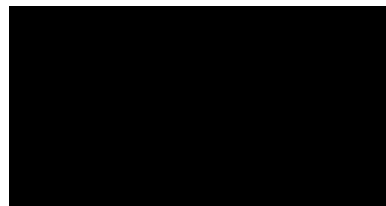
All research subject to the Alfred Hospital Ethics Committee review must be conducted in accordance with the National Statement on Ethical Conduct in Human Research (2007).

The Alfred Hospital Ethics Committee is a properly constituted Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research (2007).

SPECIAL CONDITIONS

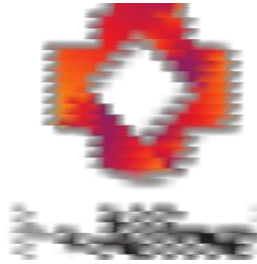
None

SIGNED:



**Professor John J. McNeil
Chair, Ethics Committee**

Please quote project number and title in all correspondence



ETHICS COMMITTEE CERTIFICATE OF APPROVAL

This is to certify that

Project No: 164/21

Project Title: Retrospective cohort study on grocery shopping independence in among adults living with moderate-severe traumatic brain injury

Principal Researcher: Natasha Lannin

*was considered for Low Risk Review and **APPROVED** on 28 May 2021*

It is the Principal Researcher's responsibility to ensure that all researchers associated with this project are aware of the conditions of approval and which documents have been approved.

The Principal Researcher is required to notify the Secretary of the Ethics Committee, via amendment or report, of

- ☐ Any significant change to the project and the reason for that change, including an indication of ethical implications (if any);
- ☐ Serious adverse effects on participants and the action taken to address those effects;
- ☐ Any other unforeseen events or unexpected developments that merit notification;
- ☐ The inability of the Principal Researcher to continue in that role, or any other change in research personnel involved in the project;
- ☐ A delay of more than 12 months in the commencement of the project; and,
- ☐ Termination or closure of the project.

Additionally, the Principal Researcher is required to submit

- ☐ A Progress Report on the anniversary of ethics approval
- ☐ A Final Report on completion of the project.

Approval covers the project as described in the application (including any modifications made prior to approval). Low Risk projects are subject to audit and ethical approval may be withdrawn if the project deviates from that proposed and approved.

SPECIAL CONDITIONS

All research projects approved by the Alfred Hospital Ethics Committee are subject to, and must be carried out in compliance with, the most recent applicable COVID-19 government and relevant institution's restrictions.

None

SIGNED:

A black and white photograph of a signature, likely of Professor John J. McNeil, written in dark ink on a light background.

**Professor John J. McNeil
Chair, Ethics Committee**

To: Natasha Lannin

From: Human Research Ethics Committee (HREC)

Date: 3/08/2021

Subject: Notification of Ethics Review Outcome - Approved

Ethics Application Number: 164/21

Ethics Application Title: A retrospective cohort study on grocery shopping independence in relation to cognitive and motor disability among adults living with moderate to severe traumatic brain injury.

Approval Period: 28/05/2021 to 28/05/2022

Approved Documents:

Application Document_Academic CV - D.Sansonetti 2020
ethics approval

Human-Ethics-Externally-Approved-or-Request-to-Transfer-Application-
last-updated-04.12.2020

Application Document_Natasha Lannin_Brief Ethics CV

Application Document_Low risk ethics

Application Document_Protocol_Shopping Rehabilitation Audit_Version
1.0_22-05-2021

Application Document_Resource Centre Declaration

Application Document_RACC-notice-to-conduct-research_Lannin&DeLacy
study 3 (1)

Application Document_resume (Quick, Michelle)

Application Document_Audit tool study 3 Version 1.0 (1)

Application Document_EMMA WILSON_resume_ethics_2021

Application Document_Talee Resume updated Jul2019

Application Document_Use-of-alfred-health-services-form (2)

I am pleased to advise you that Research Governance Authorisation has been granted for the project listed above, subject to the following conditions being met:

Conditions of Approval specific to this project

N/A

Conditions of Approval – All projects

- **Multicentre Projects:** If this project is a multicentre project you must forward a copy of this letter to all Investigators at other sites for their records.

- **Approving Ethics Committee Conditions:** Please note that all requirements and conditions of the original ethical approval for this project still apply.
- **Research Governance Approval is limited** to the research project and associated documents as outlined in the approving ethics committee letter.
- **The La Trobe Principal Investigator** will immediately report anything that might warrant review of ethical approval of the project.
- **Modifications to an Approved Project:** Any changes to the project application, project description/protocol and/or other project documents must be submitted to the approving ethics committee review and approval in accordance with the instructions outlined on the Approving Ethics Committee website. Once the Approval Ethics Committee has granted approval for modifications, the approval letter and associated documents should be submitted to La Trobe for Research Governance Authorisation.
- **Annual Report:** Please submit a copy of your annual report, using the Approving Ethics Committee template to La Trobe for Governance Authorisation.
- **Final Report or Withdrawal of Project:** At the conclusion of your project you must submit a final report within 3 months using the Approving Ethics Committee template.
- **Safety Reporting:** If a significant safety issue arises from the conduct of the project, it must be reported via the process outlined on the La Trobe Ethics, Integrity and Biosafety website.
- **Monitoring:** All projects are subject to monitoring at any time and will be monitored in accordance with the University's Research Monitoring Policy alongside the monitoring and research integrity policies and/or agreements with the Approval Ethics Committee.

Should you require any further information, please contact the Human Research Ethics Team on:

T: +61 3 9479 1443 | E: humanethics@latrobe.edu.au.

Kind regards,

Ethics, Integrity & Biosafety on behalf of
Chair, Human Research Ethics Committee (HREC)

Appendix F

- Data analysis; SPSS data chapter 6

Shopping admission and discharge (shopping disability)						
SMAF 12 months (shopping disability)						
		-3	-2	-1	0	Total
SMAF admission (shopping disability)	-3	8	4	5	15	32
	-2	0	0	0	3	3
Total		8	4	5	18	35

Shopping admission and discharge (shopping disability)			
Chi-square tests			
	Value	df	Asymptotic significance (2-sided)
Pearson chi square	3.099a	3	0.377
Likelihood ratio	4.255	3	0.235
Linear-by-linear association	2.314	1	0.128
N of valid cases	35		

Shopping discharge and SMAF at 12 months (shopping disability)						
		Dependent		Independent		
		SMAF 12 months shopping disability				
			-3	-2	-1	Independent
Shopping discharge (shopping disability)	Dependent	-3	2	0	0	2
		-2	5	2	2	9
	Independent	-1	1	1	2	3
		0.5	0	0	1	2
		Independent		0	1	0
		Total	8	4	5	18

Chi square tests			
	Value	df	Asymptotic significance (2-sided)
Pearson chi square	8.456a	12	0.749
Likelihood ratio	10.44	12	0.577
Linear-by-linear association	1.553	1	0.213

n of valid cases

35

Regression: shopping independence model built from significant correlations					
ANOVA					
	Sum of squares	df	Mean square	F	Sig.
Model	6.356	9	0.706	7.399	<.001b
Regression	2.386	25	0.095		
Residual	8.743	34			

Correlation between impairments and care support hurs for shopping at 12 mo

Model summary			
R	R square	Adjusted R square	Std. error of the estimate
1 .695a	0.483	0.394	22.959

ANOVA					
Model	Sum of squares	df	mean square	f	Sig.
1 Regression	14307.35	5	2861.47	5.429	.001b
Residual	15286.193	29	527.11		
Total	29593.543	34			