Occupation Based Intervention in Hand Injury Rehabilitation: A Malaysian Perspective

Thesis submitted by

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DECLARATION ON ETHICS

This research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council (NHMRC) National Statement on Ethical Conduct in Human Research, 2007. The proposed research study received human research ethics approval from the JCU Human Research Ethics Committee.

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ABSTRACT

Occupation refers to what people do for productive living, which includes Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), work, rest and sleep, leisure, play, education and social participation. Occupational therapy views occupation as both a healing agent and a goal to be accomplished by clients. This view is based on evidence that occupation promotes mental and physical health. Maintaining occupations as a core intervention in hand rehabilitation is challenging in Malaysia. Contextual factors such as the dominance of the medical model and organisational culture within the context of practice contribute to these challenges. Furthermore, there is no conclusive definition in the literature, nor consensus on what constitutes Occupation Based Intervention (OBI). The uniqueness of the Malaysian culture, which permits the clients to take a 'sick role', also makes it difficult to transfer western concepts of occupational therapy and OBI into practice.

The aim of this study was to explore OBI in hand injury rehabilitation from a Malaysian perspective. A mixed methods approach using an exploratory sequential design was employed and conducted in three phases. Mixed methods research offers a 'completeness' to the issues studied and allows the development and expansion of research and evidence for OBI. The following research questions were formulated: (1) what is the consensus definition of OBI from a Malaysian perspective; (2) how do Malaysian occupational therapists perceive and describe their experiences providing OBI for clients with hand injuries; and (3) what is the effectiveness of combining OBI and TE in comparison to TE alone in the rehabilitation of clients with hand injuries. The research process sought a consensus definition of OBI from the perspectives of Malaysian occupational therapists in Phase One. The study was expanded further in Phase Two

to describe the experience of occupational therapists applying the OBI based on the definition from Phase One. Results from Phase Two were used to develop an OBI intervention protocol, and the effectiveness of this protocol was tested in Phase Three. The mixed methods research used pragmatism as its philosophical approach and allowed the issues to be investigated using both qualitative and qualitative methods dependent upon the research question and objectives.

A three round Delphi study was conducted in Phase One to achieve a consensus definition of OBI from a Malaysian occupational therapist's perspective. The participants were fifteen occupational therapy practitioners and educators who had more than five years' of experience practising occupational therapy. Findings from this study confirmed the notion of OBI as a means and as an end. *Occupation as a means* referred to occupations and purposeful tasks as healing agents while *occupation as an end* referred to occupation as the goal to be attained by the clients. The client-centred approach, top-down approach, and gradable and modifiable interventions were the basic elements of OBI. Conceptual frameworks such as the Model of Human Occupation (MOHO), Canadian Model of Occupational Performance (CMOP) and the theories of *occupation as a means and as an end* guided the Malaysian occupational therapists in their practise with OBI. It was found that although *occupation as a means and end* have different purposes, the ultimate goal is the same, which is to enable the client to engage in daily occupation regardless of their limitations and disabilities. Other forms of intervention such as preparatory and purposeful methods were also suggested to be incorporated to achieve the ultimate goal.

In Phase Two, an Interpretative Phenomenological Analysis (IPA) was used to describe the experiences of occupational therapists using OBI in hand injury rehabilitation. Sixteen occupational therapists who were working and had more than five years' of experience in hand rehabilitation were interviewed individually. Five superordinate themes emerged, namely: 'Occupation as a means', 'Occupation as an end', 'Benefit of OBI', 'Challenges of OBI' and 'Making OBI a reality'. *Occupation as a means and as an end* can be merged together in a single therapy session when occupation acts as the healing agent and the goal is to be accomplished by the clients. Occupational therapists described OBI as having double benefits in a single therapy session, it represents the identity of occupational therapy, provides enjoyable rehabilitation experience, improves client's satisfaction and is a cost effective intervention. However, practising OBI in hand injury rehabilitation is challenging for the therapists due to logistical issues, contextual factors, therapist and client factors, and the credibility of occupation as an intervention modality. Participants suggested that practising OBI in hand rehabilitation would be enhanced through education and information, training of occupation therapists and consideration of client's occupational profile before providing the intervention. An OBI intervention protocol was developed from Phase Two by extracting occupations and purposeful tasks that were most frequently used by occupational therapists in Malaysia, and were perceived to have rich therapeutic benefits to the clients.

The effectiveness of the intervention protocol was examined in Phase Three using a Randomised Controlled Trial (RCT) study. The purpose of the study was to examine the efficacy of the combination of OBI and therapeutic exercise (TE) versus TE alone in the rehabilitation of adult clients with hand injuries. Forty-six clients who had experienced bone, tendon and nerve injuries

to the hand, wrist and forearm consented to participate in the study. They were randomly allocated into two groups; OBI+TE and TE. Forty participants, twenty in each group completed overall procedures for the study. Following six weeks of intervention, significant differences were found for the total active motion (TAM, $p=0.04$), neuropathic pain ($p<0.001$), Canadian Occupational Performance Measure (COPM) performance ($p=0.03$) and COPM satisfaction ($p=0.05$) in favour of OBI+TE group. At the follow-up, significant differences were found for the Disability of Arm, Shoulder and Hand (DASH) score ($p=0.02$), TAM ($p=0.01$), neuropathic pain ($p=0.02$), COPM performance ($p=<0.001$) and COPM satisfaction ($p=<0.001$) in favour of OBI+TE group. The linear mixed model was used to examine the effect of the intervention with the presence of confounding factors such as duration of injury, gender, injured hand, age, cause of injury, number of digits affected, occupation and type of injuries. Although the duration of injury and gender were found to influence the effect of the intervention, the OBI+TE group showed better improvements in all outcome measures as compared to the TE group.

In conclusion, when framed by the sequential exploratory mixed methods design, this study was insightful as it provided better understanding and increased evidence about OBI in hand injury rehabilitation in Malaysia. The definition of OBI from Phase One allowed the term to be used more consistently in practice and education. Importantly, this study suggests potential solutions to overcome the challenges in practising OBI. This study provided empirical evidence regarding the effectiveness of OBI to support occupational therapy practice in hand injury rehabilitation. Translation of the study outcomes into practice provided better treatment effects for the clients. By encouraging the occupational therapists to use OBI with their clients, this indirectly assists them to reinforce their professional identity within occupational therapy in Malaysia.

Keywords

Occupational Therapy, Occupation, Hand Therapy, Mixed Methods Research, Hand Injuries

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LIST OF ABBREVIATIONS

ADLs	Activities of Daily Living
CMOP	Canadian Model of Occupational Performance
CMOP-E	Canadian Model of Occupational Performance and Engagement
COPM	Canadian Occupational Performance Measure
DASH	Disability of Arm, Shoulder and Hand
EHP	Ecology of Human Performance
HBHT	Home-Based Hand Therapy
HREC	Human Research Ethics Committee
IADLs	Instrumental Activities of Daily Living
ICF	International Classification of Functioning, Health and Disability
IPA	Interpretative Phenomenological Analysis
JHFT	Jebsen Hand Function Test
KLGH	Kuala Lumpur General Hospital
MBI	Modified Barthel Index
MOH	Ministry of Health Malaysia
MOHO	Model of Human Occupation
MOTA	Malaysian Occupational Therapy Association
MREC	Medical Research and Ethics Committee
OA	Occupational Adaptation
OBI	Occupation Based Intervention
OTIPM	Occupational Therapy Intervention Process Model
PAMs	Physical Agent Modalities

QoL	Quality of Life
RCT	Randomised Controlled Trial
ROM	Range of Motion
SHT	Supervised Hand Therapy
SOP	Standard Operating Procedure
TAM	Total Active Motion
TE	Therapeutic Exercise

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter provides a background about the occupational therapy, prevalence of hand injury and hand therapy practice in Malaysia that led to the exploration of Occupation Based Intervention (OBI) in hand injury rehabilitation. The research aim, questions, scope and significance are also discussed in this chapter. Finally, this chapter provides an overall layout of the thesis.

1.1 Occupational therapy in Malaysia

Malaysia is located in Southeast Asia with a total population of 29,240,000 in 2012 (World Health Organization, 2014). Consisting of 13 states and 3 federal territories (Figure 1.1), Malaysia is separated by the South China Sea into two regions: Peninsular Malaysia and East Malaysia (Malaysia Borneo). Malaysia is classified as an upper-middle class country with US$16,270 gross national income per capita (World Health Organization, 2014). The economy was initially generated from agriculture and mining sectors, until manufacturing was introduced during the industrialisation era in the 1990s (Ang & McKibbin, 2007). These sectors remained the main contributors to the income and economy of Malaysia. Malaysia has a stable political system and democratically elected government with multi-ethnic groups such as Malay, Chinese, Indian and indigenous (Bajau, Bidayuh, Iban, Kadazan-dusun, Melanau, Murut, Orang Asli and Orang Ulu).

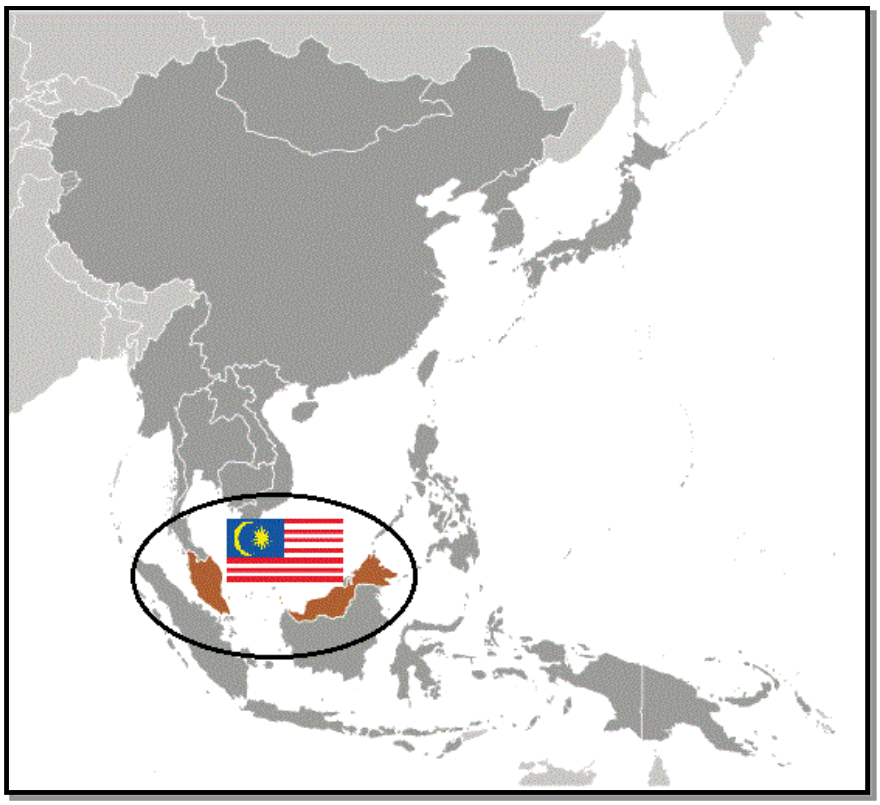

Figure 1.1. Map of Malaysia showing Peninsular and Borneo Malaysia.

Generally, health status in Malaysia is relatively good with lower total health expenditure compared to the regional average health expenditure in the Western Pacific Region. Life expectancy at birth for both sexes has increased to 74 in 2012, but is still below the average of the Western Pacific Region (World Health Organization, 2012b). In 2007, infant and under-five mortality rates were 6.3 and 8.1 per 1000 live births, respectively (World Health Organization, 2014). The country's mortality rates were relatively higher than the rates of more prosperous countries in the Western Pacific Region such as Singapore and Australia, which have a higher gross national income (World Health Organization, 2012a, 2012c). Under the Ninth Malaysian Plan, Malaysia emphasises a health promotion and healthcare provision that is equitable, effective, efficient, affordable, environmentally adaptable and technologically appropriate (World Health Organization, 2014). Ministry of Health Malaysia (MOH) is responsible for achieving the objectives of the Ninth Malaysian Plan that includes

an improvement in rehabilitation services in Malaysia. Previously, occupational therapy and physiotherapy were the only health professions that provided rehabilitation services to clients before rehabilitation medicine was developed in Malaysia in 2004 (Han & Bang, 2007). After the establishment of rehabilitation medicine, the occupational therapy profession was no longer independent, but was merged with physiotherapy and rehabilitation medicine under the rehabilitation department in most hospitals under the MOH.

Occupational therapy was developed in western countries such as the United States of America (USA) and the United Kingdom (UK) based on the idea that engagement in occupation promotes and restores physical and emotional health (Trombly, 1995). Given occupational therapy was developed in western countries, knowledge and practice from the countries such as United States (USA) and United Kingdom (UK) are mostly adopted in Malaysia. Occupation is defined as everyday life activities that have purpose and meaning, acknowledged by those who engage, and occur over time in the people context. The area of occupation includes Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), rest and sleep, education, work, play, leisure and social participation (American Occupational Therapy Association, 2014).

Occupational therapy was established in Malaysia in 1958 (Malaysian Occupational Therapy Association, 2010). Barbara Tyldesley, a British occupational therapist initiated an occupational therapy service at a leprosy centre in Sungai Buloh, Selangor. Her position was then replaced by Mrs. Aisyah binti Yunus in 1960, who was the first Malaysian occupational therapist and had trained in the UK. Until the first occupational therapy school was established in 1984, most of the earlier occupational therapists were trained overseas in

Australia, the UK and New Zealand. Currently, there are four public and three private institutions offering occupational therapy courses in Malaysia (Table 1.1).

Table 1.1. Public and private institutions offering occupational therapy courses in Malaysia.

Type of Institution	**Name of Institution**	**Course offered (date first offered)**
Public	College of Allied Health Sciences Sungai Buloh (formerly known as College of Occupational Therapy Kuala Lumpur)	Diploma Occupational Therapy (1984)
	Universiti Teknologi Mara (UiTM)	Diploma Occupational Therapy (1996) BSc. Hons Occupational Therapy (2005)
	National University of Malaysia	BSc. Hons Occupational Therapy (2005)
	College of Allied Health Sciences Johor Bahru	Diploma Occupational Therapy (2010)
Private	Kuala Lumpur Metropolitan University	Diploma Occupational Therapy (2005)
	ASIA Metropolitan University (formerly known as Masterskill Global College)	Diploma Occupational Therapy (2007) BSc. Hons Occupational Therapy (2010)
	Islamic College of Science and Technology (KIST)	Diploma Occupational Therapy (2009)
	Perdana University	BSc. Hons Occupational Therapy (2014)

The Malaysian Occupational Therapy Association (MOTA) was formed by Malaysian occupational therapists in 1969 (Malaysian Occupational Therapy Association, 2010). The aim of the association is to promote and support the development of the occupational therapy

profession through education, research and professional development activities. A code of ethics was developed by MOTA to ensure Malaysian occupational therapists discharge their duties and services in a professional and ethical manner regardless of the individual's position, situation and condition in society. MOTA has been a full member of the World Federation of Occupational Therapists since 1990, and two occupational therapy courses (Diploma Occupational Therapy – College of Allied Health Sciences Sungai Buloh and Bachelor of Science (Honours) Occupational Therapy – Universiti Teknologi Mara-) were accredited by the World Federation of Occupational Therapists in 1992 and 2007, respectively (Malaysian Occupational Therapy Association, 2010).

The main source of occupational therapy services for the Malaysian population is accessible through public hospitals and clinics spread across Malaysia. In 2011, there were approximately 663 occupational therapists working at the public hospitals and clinics under the MOH (Ministry of Health Malaysia, 2012). In 2010, there were 21 occupational therapists working in the Department of Welfare Malaysia, and 213 occupational therapists working in non-government centres (Malaysian Occupational Therapy Association, 2010). However, the most affordable place to receive occupational therapy treatment is at public hospitals and clinics as the government provides subsidies for healthcare. For instance, the clients pay 5.00 Malaysian Ringgit (AUD $1.80) for a visit to an out-patient occupational therapy clinic, and if they cannot afford to pay, an application can be made to the welfare department for free treatment (Jaafar, Mohd Noh, Abdul Mutalib, Othman, & Healy, 2013).

Given most of Malaysian occupational therapists were employed in public hospitals and clinics, using occupation in practice is challenging due to the dominance of the medical model in the Malaysia healthcare system. The medical or biomedical model views an

individual as a grouping of subsystems rather than as a unified whole and focuses on curing the biological aspects of the individual's body, without taking into consideration the individual's psychological and social status (Engel, 1980). The reductionist approach of the medical model, which focuses on eliminating symptoms and reducing impairments, has led Malaysian occupational therapists to adopt the component-driven approach for practice. Component-driven or component-focused practice is characterised by the reduction of treatment goals to underlying structures of disease (Gray, 1998). The occupational performance issue is often neglected when the occupational therapist places more attention on remediating disease and body functions (Toth-Fejel, Toth-Fejel, & Hedricks, 1998). The biopsychosocial model such as the International Classification of Functioning, Health and Disability (ICF) is still relatively new and not well adopted in Malaysian healthcare practice. The development of rehabilitation medicine in Malaysia helps to expose this model to health professionals.

Occupation based practice represents the identity of occupational therapy, and was developed based on the idea that occupation is a domain of human life and can be a therapeutic tool (Keilhofner, 2009). All occupational therapists struggle with their identity and with inadequate public and professional recognition as a result of using component-driven practice and abandonment of occupation as a core of occupational therapy (Fisher, 2003; Gray, 1998). The Malaysian occupational therapy profession is confronting similar challenges. Many people, including healthcare providers, have little idea about the actual role and what kind of services occupational therapists can offer to clients (AlHeresh & Nikopoulos, 2011). Occupational therapy practice is often mistaken to be similar to physiotherapy, especially in acute care. Role overlaps and duplication of skills between the occupational therapist and

physical therapist has been reported in the literature (Booth & Hewison, 2002; Brown & Greenwood, 1999; Conner-Kerr, Wittman, & Muzzarelli, 1998; Golledge, 1998b).

1.2 Prevalence and the impact of hand injury

Hand injuries are common in developing countries such as Malaysia due to recent increases in industrialisation and motorisation. The hand is an important body part for the execution of day to day activities such as self-care, work and leisure activities. Hands are also more susceptible to injuries compared to most other parts of the body. The prevalence of hand injuries in Malaysia has not been well documented due to less emphasis on research and evidence-based practice in the MOH. More than one-quarter of work-related injuries reported to the Malaysian Social Security Organisation for compensation involved the upper limb (Social Security Organisation, 2012). This trend remained consistent from 2009 to 2012, where the majority of upper limb injuries involved the finger, hand, wrist and forearm (Social Security Organisation, 2009, 2012).

In the industrial sector, the majority of hand injuries involved fingers, with lacerations as the most common type of accident (Abdullah, Jaafar, Das, & Sapuan, 2009). People aged between 25 and 35 years were commonly involved because they were highly likely to be employed in construction or manufacturing industries. Hand injuries among children in Malaysia were mainly due to domestic injuries (48%), followed by motor vehicle accidents (19%) and injuries during school (15%) and leisure activities (12%) (Shalimar et al., 2007). In Malaysia, the custom is for domestic chores to be carried out on the floor. Sharp tools such as knives, scissors and mixers are often left behind, resulting in injuries. During the festive season, a common cause of hand injuries is from the use of firecrackers (Isa & Moe, 1991).

Given hands are needed for most daily living tasks, individuals may be especially disadvantaged by hand injuries. Following a hand injury, individuals do not just have impairments such as loss of motor, sensory and autonomic functions of the hand but also may experience long term functional impacts. For instance, with the majority of hand injuries individuals still experience pain and stiffness for up to four years after the injury (Bell, Gray, & Kingston, 2011).

People with hand injuries may experience various difficulties in daily occupations, depending on the level of severity. Most people with unilateral hand injuries report that everyday occupations like washing, dressing, cooking and cleaning became more complex and challenging to perform (Fitzpatrick, 2007; Kingston, Tanner, & Gray, 2010). Engagement in leisure and work are most affected after injury (Bell et al., 2011). Quitting and changing hobbies has been experienced by individuals (Poerbodipoero, Steultjens, van der Beek, & Dekker, 2007), but most absent themselves from work for various lengths of time depending on the severity and complexity of their injury (Rosberg & Dahlin, 2004). Additionally, hand injuries are often accompanied by psychological issues such as anxiety, depression, frustration and post-traumatic stress disorder (Bamford & Walker, 2010; Bear-Lehman & Poole, 2011; Chan & Spencer, 2004; Jaquet et al., 2002; Schier & Chan, 2006). In some cases, hand injuries have caused individuals to change their roles as a parent, spouse or worker (Fitzpatrick, 2007; Schier & Chan, 2006).

1.3 Hand therapy practice in Malaysia

Hand therapy or rehabilitation following hand injury is aimed at restoring the function of the injured hand and to prevent permanent disability. Hand therapy is defined as a rehabilitation science that merges occupational therapy and physiotherapy theories and practices in

combination with intensive knowledge of upper extremity structures, functions and activities (Hand Therapy Certification Commission, 2012). Fitzpatrick and Presnell (2004) assert that the definition of hand therapy does not apparently constitute the concept of hand therapy but, rather, the integration of concepts by occupational therapists and physiotherapists who are practising in this area. A hand therapist is often said to be an occupational therapist or physiotherapist who specialises in upper limb rehabilitation, which includes the hand, wrist, elbow and shoulder girdle.

To be a hand therapist in the USA, occupational therapists or physiotherapists must be credentialed by the Hand Therapy Certification Commission (Hand Therapy Certification Commission, 2012). Once occupational therapists or physiotherapists fulfil the eligible criteria such as having at least five years of clinical experience (equal to 4000 hours of direct practice in hand rehabilitation), and have successfully passed a comprehensive hand therapy certification exam, they are entitled to be called hand therapists. Internationally, eighty-six percent of hand therapists are occupational therapists, thirteen percent are physiotherapists and one percent are both occupational therapists and physiotherapists (Dimick et al., 2009).

Since the 1940s, hand therapy has been recognised as one of the sub-specialities within occupational therapy (Bear-Lehman & Flinn-Wagner, 1988). Occupational therapists claim to adopt a holistic approach to patient care, which not only aims to remediate physical dysfunctions but also to optimise the client's response to these dysfunctions. In addition to optimising hand function, hand therapy also evaluates and assists the clients to readjust their lives after the injury (Helm & Dickerson, 1995). In Malaysia, clients with hand injuries are normally referred by their treating physicians to both an occupational therapist and physiotherapist for hand rehabilitation. However, there are occasions when clients have not

been referred for occupational therapy due to physicians in Malaysia being unsure and confused about the roles of occupational therapy in hand rehabilitation. Instead, the clients are often referred to occupational therapy for orthotic fabrication as this is the commonly known treatment modality to be provided by the Occupational Therapy Unit. Occupational therapists in the USA and Malaysia however also provide the client with preparatory methods (e.g. physical agent modalities (PAMs), aids, adaptations and exercises) to prepare the client for successful occupational performance (American Occupational Therapy Association, 2014).

Most Malaysian occupational therapists are required to gain experience in all areas before they can focus on specific areas such as hand therapy. However, due to the bureaucratic culture within the MOH, this decision is often made by the unit's head. Bureaucratic culture is characterised by formalisation, rules, standard operating procedures (SOPs) and hierarchical position (Rashid, Sambasivan, & Johari, 2003). As an employee and through personal encounter, the investigator has seen that these characteristics also apply to the MOH where the staff must follow organisational rules and SOPs when implementing their job scope. Decision making is solely made by the supervisory staff, while junior staff are required to follow the decisions made due to the hierarchical system within the bureaucratic culture.

1.4 The need for research

The current investigator is a Malaysian occupational therapist who is interested in hand rehabilitation. He was working in a tertiary hospital in north east Malaysia before deciding to enrol in a Doctor of Philosophy program at James Cook University in 2011. He received many referrals from physicians for hand rehabilitation, and most of the clients had sustained

hand injuries. When practising in hand rehabilitation, the investigator noticed many occupational therapists, including himself, did not use occupation as a treatment modality, or as the main outcome of occupational therapy intervention. The investigator observed that using PAMs, exercises and other non-purposeful remedial activities might have caused the profession to lose its unique identity. Since the initial development of occupational therapy, the profession has been based on a holistic point of view (Meyer, 1977). An individual is viewed as a complete and unified whole rather than a series of parts or subsystem to be managed, and every individual must be given opportunities to engage in his or her meaningful occupation. Engagement in occupation promotes health and wellbeing, and allows the individual to achieve a maximum level of independence (Hussey, Sabonis-Chafee, & O'Brien, 2007; Meyer, 1977).

Occupation as a core intervention was often neglected, whereby the intervention mainly focused on eliminating symptoms and impairments following hand injuries. One of the reasons for this focus was the dominance of the medical model in hand therapy practice (Dale et al., 2002). The investigator felt more frustrated when people often perceived occupational therapy to be similar to physiotherapy. The situation became more serious when some Occupational Therapy Units under the MOH hospitals were no longer allowed to use PAMs such as paraffin bath treatment and Transcutaneous Electrical Nerve Stimulation because these modalities overlapped with interventions being carried out in physiotherapy units.

The investigator believed that a gap existed in practice that contributed to the professional identity crisis in Malaysia. This gap in practice was thought to emerge due to Malaysian occupational therapists neglecting the use of occupation as an intervention medium and not focusing on engaging the clients in their meaningful occupations. The investigator believed it

was worth using occupation as the intervention medium, as well as the goal to be accomplished by the clients. Anecdotal evidence found that clients were more satisfied when the investigator adopted occupations in hand therapy practice because the intervention became more individualised, client-centred and goal-directed. More time was spent on getting to know the clients, and to explore what were the meaningful occupations in the clients' lives. The investigator believed that preparatory methods could be used when needed, but they should be clearly articulated with the client's occupational goals. The practice became more holistic when the occupational therapist centred on occupation even though some technical and mechanistic modalities were used (Slaymaker, 1986). The investigator noticed that this intervention created a good therapeutic relationship with the clients, where the occupational therapist becomes a collaborator and a friend in a professional manner (Peloquin, 1993).

Given the professional identity crisis and the dominance of the medical model within hand therapy practice in Malaysia, the investigator believes that the solution is to return to the roots and fundamentals of occupational therapy through the use of OBI. OBI is encouraged to be used in hand rehabilitation for a balanced practice between the medical and psychosocial approaches (Amini, 2008). The values of the intervention appear to be closely related to the biopsychosocial model such as ICF (World Health Organization, 2001). The intervention could easily lead occupational therapists to view a client from holistic perspectives. The need for a holistic approach in hand therapy has been addressed in the literature where the therapist is required to look at more than just an injury of the upper extremity (Schier & Chan, 2006). However, using OBI is challenging for many occupational therapists because it is poorly defined in the occupational therapy literature (Colaianni, 2011; Price & Miner, 2007). Lack

of agreement about what constitutes OBI might be due to the complex nature of 'occupation', which is based on individual meaning and interest (Gray, 1998; Price & Miner, 2007).

There are several definitions of OBI in occupational therapy literature. OBI is defined as a means and as an end (Colaianni & Provident, 2010; Fisher, 2013; Gray, 1998; Pierce, 2003; Trombly, 1995). *Occupation as an end* refers to occupation as the goal to be accomplished by the client, while *occupation as a means* refers to occupation as a healing agent (Trombly, 1995). Another perspective is that OBI includes all forms of therapeutic interventions such as preparatory and purposeful methods as long as the goal is occupational performance (Earley & Shannon, 2006). Price and Miner (2007) however, believe that OBI is not just the forms of the intervention, but it is the therapeutic process where the occupational therapist and the client co-create the meaning of the therapy. Given there is no consensus of OBI in the literature, it is no surprise that research investigating the effectiveness of OBI is lacking (Colaianni, 2011). Many occupational therapists agreed that OBI benefits hand therapy clients, but they claimed only adopting such intervention for half of their clients (Colaianni & Provident, 2010).

1.5 Research aim and questions

The aim of this study was to investigate OBI in hand injury rehabilitation from a Malaysian perspective. This study was intended to encourage more Malaysian occupational therapists to adopt OBI in practice, which indirectly may help to solve the professional identity crisis of occupational therapists in Malaysia. The first study (Phase One) objective was to achieve a consensus definition of OBI among the occupational therapy practitioners and educators in Malaysia. Using the consensus definition from the first study, the second objective (Phase Two) was to describe the occupational therapists' experiences providing OBI to clients with

hand injuries. A protocol was developed from the findings of the second study, and the third objective (Phase Three) was to examine the effectiveness of a combination of OBI and Therapeutic Exercise (TE) in comparison to TE alone for the rehabilitation of hand injuries.

The following research questions were formulated:

1. What is the consensus definition of OBI from the perspective of the Malaysian occupational therapists?
2. How do Malaysian occupational therapists perceive and describe their experience providing OBI for clients with hand injuries?
3. What is the effectiveness of combining OBI and TE in comparison to TE alone in the rehabilitation of adult clients with hand injuries?

1.6 Rationale for the methodology

A mixed methods research design using an exploratory sequential design was used to investigate the identified problem (Creswell & Clark, 2011). The exploratory sequential design is described to begin with qualitative studies in the first phase, followed by quantitative studies in subsequent phases. Creswell and Plano Clark (2011) state that this design is often used to develop and test a new instrument or intervention. Initially, the investigator developed the idea to examine the effectiveness of OBI in comparison to the standard exercise program in the rehabilitation due to limited 'gold standard' evidence. However, there was no consensus definition of OBI and there were limited studies that had explored how occupational therapists had applied OBI on clients with hand injuries. The investigator was required to address these issues first, so that the findings could be used to inform the intended study (Creswell & Clark, 2011). Detailed methodology of this research will be discussed in Chapter Three.

This study was divided into three phases: Phase One was a Delphi study to achieve a consensus definition of OBI among occupational therapy practitioners and educators in Malaysia. The findings of the Delphi study was used to inform the subsequent study (Interpretative Phenomenological Analysis (IPA); Phase Two), which was used to describe the experiences of Malaysian occupational therapists using OBI in hand injury rehabilitation. Finally, the results from Phase Two were utilised to develop an OBI protocol for Phase Three, which was to investigate the effectiveness of a combination of OBI and TE in comparison to TE alone in the rehabilitation of adult clients with hand injuries.

1.7 Research scope

The Delphi study in Phase One was completed to achieve a consensus definition of OBI among the Malaysian occupational therapy practitioners and educators who have broad clinical experiences and were considered experts in the occupational therapy field. This study was based in hospitals under the MOH. As such, it did not explore how novice and private occupational therapists defined and perceived OBI.

The IPA in Phase Two described the Malaysian occupational therapists' experience of applying OBI in the MOH hospitals. The participants were occupational therapists who had broad experience in the rehabilitation of clients with hand injuries. As such, this study did not describe the experience of occupational therapists applying OBI with other types of hand problems, nor described the experience of occupational therapists applying OBI in private hospitals and non-government organisation centres.

The Randomised Controlled Trial (RCT) in Phase Three aimed to examine the effectiveness of a combination of OBI and TE in comparison to TE alone in the rehabilitation of adult clients with bone, tendon and nerve injury to the hand, wrist and forearm. As such, this study did not cover the effectiveness of OBI in the rehabilitation of clients with shoulder, elbow, repetitive strain and burn injury.

Generally, the studies in this thesis were to explore and gain an understanding of OBI in hand injury rehabilitation. All the studies were conducted under the MOH facilities, which have similar environmental and organisational cultures. The issues addressed in this thesis were based on a Malaysian occupational therapy practice context. As such, this study did not cover the issues of OBI in other countries. However, the outcomes of this study may be applicable to occupational therapy practice in other countries, particularly those which encounter similar challenges as found in Malaysia.

1.8 Significance of research

This was the first research to explore OBI in hand injury rehabilitation from the perspective of Malaysian occupational therapists. Outcomes of this research have major significance for both occupational therapy and hand rehabilitation towards enhancing knowledge and practice. Firstly, this research provides a clear and concise definition of OBI so that it can be consistently used in clinical practice and education. Secondly, since the study was conducted in the Malaysia context, the findings and implications of this research will contribute to the improvement of occupational therapy and hand therapy practice. This research aims to identify barriers, if any, whilst adopting OBI in the Malaysia context, which hints for potential solution to these issues.

Thirdly, this study provides a descriptive experience and example of how OBI is translated into practice. Some suggestions were recommended by the Malaysian occupational therapists to make OBI a reality in hand injury rehabilitation practice. Finally, this research provides evidence on the efficacy of OBI for clients with hand injuries, which added to the existing body of knowledge in the literature. OBI has the potential to be integrated into hand injury rehabilitation in addition to a standard treatment program. This research provides a starting point for Malaysian occupational therapists to be more occupation based practitioners, which indirectly helps to solve the identity issues of the occupational therapy profession in Malaysia. It is envisaged that evidence from this research will change current hand therapy practice and encourage more occupational therapists to integrate OBI in hand rehabilitation.

1.9 Thesis overview

There are seven chapters in this thesis. The first two chapters provide a background of this research and literature relevant to the topic. Detailed methodology and rationale for the methodology used in this thesis is described in Chapter Three. This thesis contains three primary studies, which are presented in Chapters Four, Five and Six. Finally, Chapter Seven presents a critical discussion of findings from the three primary studies. Detailed outlines for each chapter are shown in Table 1.2. The next chapter will discuss the existing body of knowledge relevant to the topic and address the gaps in the literature that reinforce the needs and significance of studies.

Table 1.2. Details of each chapter in the thesis.

Chapter	Title and Outline
1	**Introduction**
	This chapter outlines the background and the need for the research. The research aim, objectives, questions, scope and its significance are clearly discussed.
2	**Literature review**
	This chapter discusses the existing body of knowledge relevant to the research topic and addresses the gaps in the literature that reinforce the needs and significances of the studies.
3	**Working framework**
	This chapter discusses a working framework that was used in the research process. A brief introduction to mixed methods research and rationale of using the mixed methods research are discussed.
4	**A consensus definition of occupation based intervention**
	This chapter presents the detailed methods and results of Phase One, seeking a consensus definition of OBI from the perspective of Malaysian occupational therapists.
5	**Occupation based intervention in hand injury rehabilitation**
	This chapter presents the methods and results of Phase Two; exploring the experiences of Malaysian occupational therapists using OBI in hand injury rehabilitation.
6	**The efficacy of occupation based intervention for clients with hand injuries**
	This chapter presents the methods and results on the effectiveness of OBI in hand injury rehabilitation (Phase Three). This chapter also describes the process of extracting findings from Phase Two to design an OBI protocol for clients with hand injuries.
7	**Discussion and Conclusion**
	This chapter presents a general discussion, integrating all of the findings from Phase One to Phase Three. The conclusion and recommendations for practice and future research are addressed at the end of this chapter

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses a critical review and evaluation of relevant literature on the (1) evolving nature of the occupational therapy profession; (2) development of Occupation Based Intervention (OBI) in occupational therapy practice; (3) application of OBI in occupational therapy practice; (4) advantages of OBI in various populations and settings; and (5) application of OBI in hand rehabilitation. Finally, this chapter will point out the gaps in the literature suggesting the need for further research.

A literature search was conducted from September 2011 to December 2014 in the following databases; MEDLINE, CINANL, Scopus, OTDBASE, OTseeker, Cochrane library, REHABDATA, PsycINFO, PROQuest Health & Medical complete and Google scholar. The keywords such as 'Occupations', 'Occupation based', 'Occupational therapy', 'Hand therapy', 'Hand rehabilitation' and 'Hand injuries' were used to select the relevant articles for a narrative review. The search terms were used according to Medical Subject Headings. Relevant articles from electronic databases, scanning the reference list of articles, books and book chapters were then critically evaluated and analysed to examine existing evidence in relation to OBI and its application in hand injury rehabilitation.

2.2 The evolving nature of occupational therapy

The emergence of occupational therapy can be classified into pre-paradigm, paradigm of occupation, mechanistic paradigm and contemporary paradigm (Keilhofner, 2009). A paradigm is defined as a collective consensus pertaining to the most basic principle of a profession (Duncan, 2011). The occupational therapy paradigm provides a fundamental idea to occupational

therapists to help them understand what they should do in practice such as the main concerns, values, and beliefs of the profession (Keilhofner, 2009). A paradigm helps the occupational therapist to retain and maintain the scope, fundamentals, concept and identity of the profession (Crepeau, Boyt Schell, & Cohn, 2009).

2.2.1 Pre-paradigm: Moral treatment, art and craft

The pre-paradigm of occupational therapy is associated with the moral treatment that was used to treat mentally ill patients in the USA and Western European countries such as Scotland, England, France and Italy during the late 19th century (Hussey et al., 2007; Peloquin, 1989). The moral treatment utilises 'occupations' such as work, physical exercise, music, agriculture, sewing and farming to divert a patient's mind and promote better mental health (Gordon, 2009). However, the moral treatment demised because of the need for more scientific inquiry into medicine. For instance, mental illness was perceived to be caused by a brain lesion, not due to environmental causes such as industrialisation and urbanisation (Peloquin, 1989). Thus, treatment should be focused to treat the underlying internal factors rather than external factors. The internal factors refer to neuromotor, intrapsychic systems and musculoskeletal, while the external factors refer to context and environment where the individual live in (Keilhofner, 2009).

Additionally, occupational therapy practice was also influenced by the art and craft movement in Britain to promote healthier mind and body through 'therapeutic occupations' (Horghagen, Josephsson, & Alsaker, 2007). The art and craft movement was led by John Ruskin and William Morris who opposed the fabrication of items using machines, but believed using one's hands was healthier as it allowed the individual to connect with their work, both mentally and physically

(Quirago, 1995). In addition, the art and craft movement were assumed to improve mental and physical health through exercise and satisfaction that was gained when the individuals produced useful end products using one's own hands (Barker Schwartz, 2013).

2.2.2 Paradigm of occupation: Establishment of occupational therapy

The term 'occupational therapy' was initially used by Barton at a hospital conference in 1914 (Breines, 1987). An early definition of occupational therapy was '*the science of instructing and encouraging the sick in such labours as will involve those energies and activities producing a beneficial therapeutic effect'* (Reed & Sanderson, 1999, p. 3). According to word by word definition, 'occupation' means being occupied or engaged in something, and 'therapy' means treatment or intervention of disease (Reed & Sanderson, 1999). Thus, occupational therapy means treatment that engages or employs people in occupations to promote mental and physical wellbeing. However, this was the conventional definition of occupational therapy. At present, the generally accepted and approved definition of occupational therapy in the USA is '*therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of enhancing or enabling participation in roles, habits, routines, and rituals in home, school, workplace, community, and other settings*' (American Occupational Therapy Association, 2014, p. s44). The role of occupational therapists is to help the client who has physical, mental and cognitive disabilities achieve the highest level of independence by developing, restoring or improving their abilities to engage in meaningful occupations (Hussey et al., 2007).

Occupational therapy was initially established in the USA at the first organisation meeting called the National Society for the Promotion of Occupational Therapy which was held on March 15th,

1917 (Hussey et al., 2007). The meeting was attended by a small number of people from various professional backgrounds such as psychiatry, medicine, nursing, rehabilitation, art and craft, education, and architecture. Namely, they included George Barton, William Dunton, Eleanor Clark Slagle, Susan Cox Johnson, Thomas Kidner and Isabel Newton. The aims of the meeting were to study and advance therapeutic occupation for invalids and the disabled, to encourage occupational therapy research, to gather news of development in occupational therapy and to promote cooperation between occupational therapy societies and rehabilitation agencies (American Occupational Therapy Association, 2009).

The beginning of occupational therapy practice was based on the paradigm of occupation. Meyer (1977) defines occupation as anything that is free, pleasant and profitable. Occupation included recreation and everything that creates enjoyment as the leading principle. Occupational therapists continued to apply the concept of moral treatment and art and craft with people who were chronically ill and disabled persons (Keilhofner, 2009; Levine, 1987; Reed & Sanderson, 1999). Meyer (1977) believed that every individual has the right to be given opportunities to engage in occupations, which are important to promote mental and physical wellbeing. Similarly as in the era of moral treatment, and the art and craft movement, occupations were used as therapeutic tools for regenerating the loss of function in people who were chronically ill and disabled (Keilhofner, 2009).

2.2.3 Mechanistic paradigm: Reductionist approach

World War I and II were the periods when occupational therapists started to be involved in physical rehabilitation, which contributed to the further growth of the occupational therapy

profession (Gutman, 1995; Hussey et al., 2007; Peters, 2011). During these wars, the demands for occupational therapists were higher because the injured soldiers needed to be rehabilitated so that they could return to military duty or be employed as civilian workers (Hussey et al., 2007). At that time, occupations such as arts and crafts remained the core treatment modalities used by the occupational therapists to rehabilitate injured soldiers.

However after the wars, occupational therapy became more closely coupled and influenced by the medical model, which threatened the holistic philosophy of occupational therapy (Hussey et al., 2007; Lohman & Peyton, 1997). The medical model, also known as the biomedical model, became more prominent in healthcare. This model views an individual as a grouping of subsystems rather than a unified whole (Engel, 1980). The reductionist approach of the medical model focuses on treating the biological aspects of the individual's body and illness, but does not consider the individual's social environment and the impact of illness. Due to the pressure from medicine, the mechanistic or biomechanical paradigm that was derived from a reductionist approach of the medical model was developed to suit the practice. The mechanistic paradigm assumes that functional performance depends on the integrity of inner systems (musculoskeletal, neuromotor and psychological); abnormal or interruption of inner systems can cause incapacity; and functional performance can be improved by restoring and compensating the deficits of inner systems (Keilhofner, 2009).

The shift to the mechanistic paradigm was also associated with the epidemic of tuberculosis and poliomyelitis, and the development of new equipment (Hussey et al., 2007; Keilhofner, 2009). Other than using arts and crafts in practice, occupational therapists began to involve vocational

rehabilitation for people with tuberculosis. Later, new treatment modalities such as orthotics, prostheses, physical exercises and neuromotor techniques were used for the rehabilitation of poliomyelitis (Hussey et al., 2007; Reed & Sanderson, 1999). Occupational therapists received special training to use new equipment such as splints, wheelchairs, prosthetics and orthotics in practice.

2.2.4 The contemporary paradigm: Return to the root of occupation

It was argued that the identity of occupational therapy was lost when the occupational therapist started to adopt the mechanistic paradigm into their practice by focusing more on remedial aspects such as using specific modalities, developing areas of specialisation and neglecting the use of occupation as the therapeutic treatment medium (Hussey et al., 2007; Whiteford, Townsend, & Hocking, 2000). It was subsequently claimed that the original idea of occupational therapy, which was to build morale, regenerate habits and stimulate interest, was shifted to reductionist practice, and focused on alleviating symptoms and eliminating impairments (Keilhofner, 2009). Thus, few urged occupational therapists to return to the root of occupation and reject the reductionism practice (Hussey et al., 2007). The period when the occupation was figuratively lost in occupational therapy practice was classified as a dark age in occupational therapy's history, and the process of returning to the concept and fundamentals of occupation was called the renaissance of occupational therapy (Whiteford et al., 2000).

The contemporary paradigm was developed for supporting the occupational therapists to return to the root of occupation during the renaissance time. By the 1970s, many occupational therapy models emerged such as *Human development through occupation*; *Temporal adaptation*; *Model*

of human occupation; *Clinical reasoning*; *Client-centred practice*; and *Occupational form and occupational performance* (Reed & Sanderson, 1999). A model, in this case, is perceived to be derived from a paradigm, defines and delineates scope areas and concerns of the profession, and articulates the professional belief and knowledge (Crepeau et al., 2009). Later, many more models were developed to maintain occupation as the core intervention in occupational therapy practice. Currently, the most widely used contemporary occupation based or occupation focused models include Ecology of Human Performance (EHP); Model of Human Occupation (MOHO); Occupational Adaptation (OA); and Person-Environment-Occupational Performance (PEOP) (Lee, 2010).

In 1989, occupational science, which is seen as basic science research on human occupation, emerged to support the use of occupation in practice (Yerxa, 1990). Clark and colleagues (1991, p. 300) define occupational science as '*the systematic study of the human as an occupational being*'. Other than to support and enhance occupational therapy practice, the purpose of occupational science is to produce knowledge about the form, function and meaning of human occupation (Zemke & Clark, 1996). Occupational science is also intended to help justify the significance of occupational therapy to health and to differentiate occupational therapy from other disciplines (Yerxa, 1990). The *Journal of Occupational Science* was established by the Australian Society of Occupational Scientists in 1993 to disseminate the evidence, particularly around the form, function, performance and meaning of occupation to populations, communities, groups of people and individuals.

The growth and development of occupational therapy was also supported through increasing publications due to the need for evidence to support practice (Holm, 2000; Hussey et al., 2007). Many occupational therapy journals, books, trade and magazine journals, newsletters, conference proceedings and videos were published. The first occupational therapy journal was the *American Journal of Occupational Therapy* (began its publication in 1947), formerly known as *Archive Occupational Therapy* in 1922 and *Occupational Therapy and Rehabilitation* in 1925 (Reed & Sanderson, 1999). Later, more occupational therapy journals were established, such as the *Canadian Journal of Occupational Therapy* (1970), *Australian Journal of Occupational Therapy* (1973), *Occupational Therapy in Mental Health* (1980), *Physical and Occupational Therapy in Geriatrics* (1980), *Physical and Occupational Therapy in Pediatrics* (1980), *Occupational Therapy Journal of Research: Occupation, Participation and Health* (1981), *British Journal of Occupational Therapy* (1982), *Occupational Therapy in Health Care* (1984), *Scandinavian Journal of Occupational Therapy* (1991), *Occupational Therapy International* (1991), *Israel Journal of Occupational Therapy* (1991), *Journal of Occupational Science* (1993), *Occupational Therapy Now* (1999), *Hong Kong Journal of Occupational Therapy* (2001) and *New Zealand Journal of Occupational Therapy* (2002). All of these journals are peer-reviewed by experts in the occupational therapy area.

2.3 Definition of occupation

Occupation is a complex concept or construct and requires a basic science to further explore its attributes. Occupational therapy had not yet reached consensus about its scientific foundation, nor found a coherent knowledge base to support practice (Yerxa, 1990). Given such notions, occupational science movement was developed within the occupational therapy profession since

the late 1980s to support the practice of occupational therapy. Occupation is central to the person and it is based on individual meaning (American Occupational Therapy Association, 2014; Gray, 1998; Trombly, 1995; Yerxa, 1990). For example, earning money to serve family is meaningful and important for a father, but not for a seven year old child. Priorities in occupations are different between individuals (American Occupational Therapy Association, 2014). For instance, a mother may consider meal preparation, home management and grocery shopping are important to her. On the other hand, a student may acknowledge that being able to study, and achieve a good grade in an examination are important to him or her. Occupation requires an individual to interact within contexts, occurs in a stream of time and can be a simple diversion from inactivity (Yerxa, 1990). Occupation also can be shared by a number of individuals with the same goal (American Occupational Therapy Association, 2014). Given the complexity of occupation, occupational science was established by Mary Reilly and her graduate students at the University of Southern California because they believed that the concept of occupation needed to be examined further (Yerxa, 1990). In fact, the definition of occupation is still evolving and many occupational therapy scholars are still working on it.

Occupation has been defined in many ways by occupational therapy scholars. The current definitions of occupation cover broader and wider aspects of occupation than the one that was described by Meyer (1977), which was anything that is free, pleasant and profitable, including recreational activities. According to Law and colleagues (1997), occupation is anything that people do to occupy themselves, which can be named, organised, and meaningful to the individual or culture. Occupation is also described as meaningful activities that people engage in their daily lives, which involve mental abilities and skills, and may or may not involve physical demand (Hanijosa, 1997). Crepeau (2003) describes occupation as activities that meet human

needs, have a meaning to the individual, provide a structural living, and reflect the cultural context. Recently, the definition of occupation has been enriched as '*all the things that people want, need, or have to do whether of a physical, mental, social, sexual, political, or spiritual nature and is inclusive of sleep and rest*' (Wilcock & Towsend, 2014, p. 542). These definitions are consistent, where occupation is day to day activities that are meaningful and relevant to the individual or culture within the time context; past, present and future. Occupation can be categorised into Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), work, education, rest and sleep, leisure, play, and social participation (American Occupational Therapy Association, 2014).

2.3.1 Occupation vs. purposeful activity vs. non-purposeful activity

Occupational therapists often use the term 'occupation' and 'activity' interchangeably in their communication (Golledge, 1998a). For example, Trombly (1995) equates occupation with purposeful activity. However, it has been argued that these terms actually have different meanings. Pierce (2001b) untangles these terms and states that occupation is a personal construct and non-repeatable experience within the individual's unique context, whereas activity is a common and culturally shared idea about an individual's actions. For instance, cooking is an occupation when it occurs once and is a non-repeatable experience for the individual. When the individual is asked about what he/she cooked for breakfast, the individual may describe what he/she cooked, the process and sequence of cooking, what time the breakfast was prepared, the cooking tools he/she used, the kitchen environment, and what was the taste, smell and texture of the foods. However, cooking is an activity when the individual just has a general idea such as

how to cook, what should be prepared and how to present the food. One does not need to experience cooking to have the general shared idea about it (Pierce, 2001b).

The activity however, can be purposeful and non-purposeful. Purposeful activity is defined as selected activities that can be used to enhance occupational engagement (American Occupational Therapy Association, 2008). The major difference between occupation and activity is the context, purpose and meaning. Occupation is meaningful, purposeful and occurs in the client's unique context, whereas purposeful activity can occur within the clinic setting where the client can practise the targeted occupation (Golledge, 1998a; Gray, 1998). Purposeful activity has the purposefulness element in the activity, but sometimes may not be meaningful to the client (Golledge, 1998a; Trombly, 1995). For instance, participating in origami is meaningful and purposeful to clients who have an interest in the activity, but it is not meaningful for those who have never engaged and experienced origami before. Although it is not meaningful to the client, the purposeful activity acts as a therapeutic agent/medium to prepare the patient for occupational engagement (American Occupational Therapy Association, 2008; Golledge, 1998a; Trombly, 1995). In contrast, a non-purposeful activity does not have any meaning nor relevance to the client (Golledge, 1998a), e.g. remedial activities that occupational therapists use with hand injury clients such as using a paraffin bath and *theraputty* to exercise the stiff joints.

Therefore, occupational therapists need to be able to differentiate 'occupation' and 'activity' in their practice, and use the terms consistently in their communication to avoid confusion. Having clear definitions of these terms contributes to the clarity of occupational therapy discourse and the authenticity of occupational therapy (Golledge, 1998a; Pierce, 2001b). It is suggested that the profession concentrate and focus on occupation as a core intervention in practice (Gray, 1998;

Hanijosa, 1997; Pierce, 2001b; Trombly, 1995). Purposeful activity is encouraged to be used as a means to support occupational engagement (Hanijosa, 1997; Trombly, 1995), and non-purposeful activities should be minimised to ensure the survival, recognition and identity of the occupational therapy profession (Golledge, 1998a; Gray, 1998; Pierce, 2001b).

2.4 Occupation based intervention in occupational therapy practice

Maintaining occupation as a core intervention of occupational therapy can be upheld through the use of OBI. The unique adoption of occupation in practice helps to distinguish occupational therapy from other professions as the strong intrinsic professional identity of occupational therapy centred on the core construct of occupation (Chisholm, Dolhi, & Schreiber, 2000; Yerxa, 1990). Since the beginning, the profession believes that engagement in occupations and purposeful activities supports and encourages individual participation in life situations (Hussey et al., 2007). At present, the philosophy and scope of occupational therapy are broader. Occupational therapists may use occupation for health promotion, remediation, health maintenance, injury prevention, compensation and adaptation (Bilics et al., 2004). These areas are now the core of occupational therapy practice, education, research and advocacy to promote individual, community and population health.

2.4.1 Defining the scope of occupation based intervention

Given the complexity of occupation and inconsistent use of the term ‘occupation’ and ‘activity’ in occupational therapy, it is not surprising that a consensus definition of OBI is absent in the literature (Price & Miner, 2009). OBI has been described in many ways by occupational therapy scholars. One perspective is that OBI is both *as a means and as an end* (Goldstein-Lohman,

Kratz, & Pierce, 2003; Gray, 1998; Trombly, 1995; Ward, Mitchell, & Price, 2007). *Occupation as an end* refers to occupation as a goal to be attained by the client (Trombly, 1995). However, Gray (1998) believes *occupation as an end* is not just limited to the occupational performance goal to be achieved by the client, but rather as an ultimate goal of occupational therapy interventions. *Occupation as a means* uses occupation as a therapeutic agent to reduce impairments (Trombly, 1995). Trombly's (1995) description of *occupation as a means* is equivalent to purposeful activity, where the clients engage in the selected activities to restore performance skills or components' deficits for occupational engagement (American Occupational Therapy Association, 2008). In contrast, Gray (1998) believes that *occupation as a means* goes beyond using simple and repetitive activity, and is a medium to practise targeted occupation intervention that intentionally uses the client's occupation to alter the relevant performance skills.

Another perspective is that OBI includes all forms of therapeutic interventions such as preparatory and purposeful methods as long as the goal is occupational performance (Earley & Shannon, 2006). These intervention forms are also called a treatment continuum (Early, 2013). Preparatory methods (e.g. splinting, exercises, assistive devices, physical agent modalities (PAMs)) and purposeful activities (e.g. practise tying a shoe, practise how to prepare a meal, practise how to use an assistive device for occupational performance) are used to prepare the clients, and strengthen their performance skills for occupational engagement (American Occupational Therapy Association, 2008). Occupational therapists are not necessarily following a strict step by step progression of the treatment continuum as these steps can be overlapped and may occur simultaneously (Early, 2013). This treatment approach is called a 'bottom-up'

approach where occupational therapists focus on the components' deficits, which is believed to ultimately result in successful occupational performance (Trombly, 1993; Weinstock-Zlotonick & Hinojosa, 2004).

Price and Miner (2007) however, believe that OBI is not just the forms of the intervention, but it is the therapeutic process where the occupational therapist and the client co-create the meaning of the therapy. They described OBI using 'therapeutic use of self', where the occupational therapist uses his or her perception, judgement, insight and personality as part of the therapeutic process (American Occupational Therapy Association, 2014; Holmqvist, Holmefur, & Ivarsson, 2013). The intervention has an element of 'doing' and 'becoming', where the occupational therapist engages the clients to do their occupation and enables them to move towards their occupational goals (Wilcock, 1998). The therapeutic process was also described to be maneuvered by numerous therapeutic intervention forms and the therapeutic relationship that develops between the clients and occupational therapist (Price & Miner, 2007).

As the clients' needs and context are different across practice areas, putting occupation into practice can be varied and challenging for some occupational therapists. The incongruent definitions in the literature were due to the complexity of OBI where the occupational therapists tried to integrate the concept of occupation in several ways to suit practice context (Price & Miner, 2007). The terminology used for OBI is also inconsistent in the literature. Recently, Fisher (2013) described the differences between these terms: occupation centred, occupation focused and occupation based practice. Occupation centred refers to placing or putting the occupation at the centre of occupational therapy practice, which can be achieved through using

occupation focused and occupation based practices. Occupation focused is similar to the description of *occupation as an end* by Trombly (1995), while occupation based is similar to the description of *occupation as a means* by Gray (1998) and Trombly (1995).

2.4.2 Associated elements to occupation based intervention

Several elements were found to be associated with OBI in the literature. OBI has been described to be connected with client-centred practice, the context and environment, and the top-down approach. Application of OBI in occupational therapy practice was described to be guided by the occupation based models.

Client-centred practice

Occupation has purpose and meaning to the individual. Occupational therapists are encouraged to obtain a summary of a client's occupational profile that includes occupational history and experiences, daily living patterns, interests, values and needs in order to know what is important and meaningful to the client (American Occupational Therapy Association, 2014). It will help the occupational therapists to design an intervention that can meet the client's goals and needs. Pierce (2001a) described OBI to precisely target and address the client's occupational performance goal where it is collaboratively developed between the client and occupational therapist. OBI also must appeal to the clients where the therapeutic occupation used has restorative and pleasurable benefits. Thus, client-centred practice is often utilised when adopting OBI in practice (Schindler, 2010).

Client-centred practice in occupational therapy is defined as '*a partnership between the client and therapist that empowers the client to engage in functional performance and fulfil his or her occupational roles in a variety of environments*' (Sumsion, 2000). The clients are empowered to make a decision about their occupational needs (Law, Baptiste, & Mills, 1995), which are given priority and placed at the centre of assessment, intervention and evaluation (Sumsion, 2000). The World Federation of Occupational Therapists has declared that the occupational therapy profession, which was developed from humanist philosophy, embraces the client-centred approach. The client-centred and occupation based approaches are considered the 'best practice' in occupational therapy in addition to evidence-based practice (Mulligan, White, & Arthanat, 2014).

Context and environment

OBI is described to be provided in the client's usual context. Pierce (2001a) named the term as intactness in which therapeutic occupation occurs in the temporal, spatial and sociocultural context of the client. Temporal context refers to the duration and rhythm of activity, time, history and life stage, while sociocultural context refers to beliefs, customs, standard behaviours and expectations from the society of which a client is a member (American Occupational Therapy Association, 2014). Spatial context includes the position and arrangement of tools, objects, adaptive devices and architectural environment (American Occupational Therapy Association, 2014; Pierce, 2001a).

Occupational therapy scholars have encouraged occupational therapists to provide OBI in the client's usual context for several reasons. Firstly, implementing OBI in the environment where

the client lives allows occupational therapists to inspect the challenges and potential barriers that restrict the client from successful occupational performance (Pierce, 2001a; Toth-Fejel et al., 1998). Secondly, training and learning that is decontextualised, especially conducted in the clinic, is not always easily transferred into the client's daily living activities. Thirdly, in areas where the medical model is dominant, the focus on treatment concentrates on reducing impairments and improving body functions, yet other factors such as personal and environmental can often be neglected. Furthermore, there is an increase in the belief that applying treatment on body functions and impairments does not necessarily improve the impairment and enable the clients to successfully perform the occupation in their unique context. For instance, reducing spasticity on the affected side of clients with stroke does not automatically improve the client's ability to perform daily living activities (McCluskey, Lannin, & Schurr, 2010). Therefore, considering the client's environment will assist occupational therapists to design OBI that is more effective and suit the environmental challenges of the clients.

Top-down approach

Occupational therapists use either a bottom-up or top-down approach with evaluation and intervention. The bottom-up approach focuses on assessing and treating components' deficits or performance skills, which are assumed to be fundamental for occupational performance and functioning (Trombly, 1993). For instance, performance skills such as strength, balance, range of motion (ROM) and coordination are often attended by the occupational therapist, before the occupational performance training within the client's context. This approach focuses primarily on the body functions and structures (impairments) component of International Classification of Functioning, Health and Disability (ICF) (World Health Organization, 2013). An area of practice

that is dominated by the medical model such as the acute rehabilitation setting tends to force occupational therapists to adopt the bottom-up approach in evaluation and treatment (Wilding & Whiteford, 2007). Standardised and objective assessments are used to measure changes in performance skills such as Jamar Dynamometer to asses grip strength and Semmes-Weinstein Monofilament to assess light and deep sensibility (Weinstock-Zlotonick & Hinojosa, 2004).

The top-down approach however, focuses on occupational engagement in the client's context by obtaining the clients' roles and what is meaningful to them (Trombly, 1993). Foundational factors such as performance skills or components' deficits are considered later in the top-down approach (Weinstock-Zlotonick & Hinojosa, 2004). For example, occupational therapists start with the evaluation and treatment on occupational performance areas such as ADLs, IADLs, rest and sleep, education, work, play, leisure and social participation. This approach primarily emphasises the activity limitations and participation restrictions, but neglects the body function and underlying structure components of ICF (World Health Organization, 2013). Performance skills or components' deficits that restrict the client from successful occupational performance are remediated using therapeutic occupations as healing agents (Trombly, 1993). Using the top-down approach in practice improves the client's satisfaction in the occupational therapy service (Weinstock-Zlotonick & Hinojosa, 2004). However, there is a shortage of valid and reliable tools to measure occupation as it is complex and difficult to quantify (Gray, 1998; Wilding & Whiteford, 2007).

The top-down approach has been associated with OBI. Occupational therapists are suggested to use the top-down approach in evaluation and treatment because it directly targets occupational

performance as an end goal of intervention (Gray, 1998; Trombly, 1995). The bottom-up approach however, is discouraged to be used in practice as some occupational therapists fail to connect foundational factors (performance skills or components' deficits) with occupational performance (Weinstock-Zlotonick & Hinojosa, 2004). Furthermore, when too much attention is put on evaluating and assessing components' deficits or performance skills, occupational therapists may overlook and fail to address occupational performance issues. It is suggested that occupational therapists understand the client before choosing either to use the bottom-up or top-down approach (Weinstock-Zlotonick & Hinojosa, 2004). The bottom-up approach would be better to use if the client's major concern is health status, but if their major concern is participation and engagement in daily living activities, the top-down approach would be more appropriate. Therefore, occupational therapists need to be more client-centred and discuss with their client before setting the treatment goal.

Occupation based models

Several occupational therapy models support and guide the occupational therapist to use OBI in practice. These models include the Canadian Model of Occupational Performance and Engagement (CMOP-E), Model of Human Occupation (MOHO), Person-Environment-Occupational Performance (PEOP), Occupational Adaptation (OA), Ecology of Human Performance (EHP) and Occupational Therapy Intervention Process Model (OTIPM) (Ashby & Chandler, 2010; Leclair, 2010; Lee, 2010; Parnell & Wilding, 2010). These models were frequently used and taught in practice and educational programs in countries such as the USA, Australia, Canada and the UK (Ashby & Chandler, 2010; Lee, 2010). However, there is no published study from Malaysia, which reports the use of these models in practice and education.

The theories and major concepts of the occupation based models that are associated with OBI are shown in Table 2.1.

CMOP-E is a revised version of the CMOP that was first published in 2007 (Polatajko, Townsend, & Craik, 2007). This model not only emphasises occupational performance, but also encompasses the occupational engagement of individuals. The concept of CMOP-E was contrasted with the use of diversion activities and therapeutic occupations as a healing agent, yet it was conceptualised to enable the individuals to choose, organise and perform useful and meaningful occupations in their context and environment. CMOP-E proposes occupational therapists should be enablement and client-centred practitioners. However, little research has been carried out to support the usefulness of CMOP-E in occupational therapy practice (Sumsion, Tischler-Draper, & Heinicke, 2011). Evidence on the application of CMOP-E in different cultures other than Canada is still required.

MOHO was developed in the 1970s during the renaissance of occupational therapy in which occupational therapy scholars, such as Gary Keilhofner, called for therapists to return to the root of occupation (Keilhofner, 2009). The model was first published in the *American Journal of Occupational Therapy* (Kielhofner & Burke, 1980). Being the first model that explains the concept of human occupation, a significant body of evidence to support MOHO in practice was subsequently published. A review study reported that 20 MOHO-based assessments were developed and MOHO has been applied to clients with numerous conditions such as mental illness, stroke, AIDS/HIV, Alzheimer's and adolescents in juvenile facilities (Lee, 2010). Although MOHO was developed in the western context, it was successfully applied in the

eastern context despite the cultural differential. For instance, MOHO provides a framework for assisting clients and their family members to better understand their real life situations and be active members in the rehabilitation process (Liu & Ng, 2008).

PEOP was developed by Christiansen and Baum in 1985 and was first published in 1991 in a book: *Occupational therapy: Overcoming human performance deficits* (Christiansen & Baum, 1991). The model emphasises occupational performance and participation that requires the occupational therapists to use a top-down client-centred approach to determine what is important to clients and identify any factor that restricts their participation in daily occupations (work, personal care, home maintenance, sleep and recreation or leisure) (Baum & Christiansen, 2005). PEOP provides no specific guidelines or intervention techniques to support practice, but it has been applied to clients with strokes, Alzheimer's, multiple sclerosis and older adults (Lee, 2010). PEOP assists the occupational therapists to identify factors that influence occupational performance and dimensions of occupation; integrate fundamental concepts and philosophy of occupational therapy within a framework; and provide a clear method on how to view and study human occupation and behaviour (Baum & Christiansen, 2005). Recently, PEOP has been proposed to guide the development of research and intervention to improve health literacy (health outcomes and health disparities) (Smith & Hudson, 2012).

Table 2.1. The focus and major concepts of occupation based models.

Model	Author/s (Year Published)	Focus of Model	Major Concept
Canadian Model Occupational Performance and Engagement (CMOP-E)	Polatajko, Townsend and Craik (2007)	CMOP-E focuses on individual's performance and engagement in occupation through a dynamic interaction between the individual, occupation and environment. CMOP-E assumes that: (1) all humans are occupational beings; (2) occupation has therapeutic potential; (3) occupation influences health and wellbeing; (4) occupation structures human life and organises time; (5) occupation gives meaning to an individual's life; and (6) occupation is varied among individuals.	CMOP-E conceptualises occupation (self-care, productivity and leisure) as a bridge that connects individual and environment. The individual was portrayed to have three performance components (cognitive, physical and affective) with spirituality at the centre. The individual and occupation are embedded within the environment (physical, institutional, cultural and social), which indicate every individual has his or her own unique context.
Model of Human Occupation (MOHO)	Keilhofner and Burke (1980)	MOHO focuses on individuals' participation and adaptation in daily occupations. MOHO believes that: (1) external environment and individual's characteristics are connected together into a dynamic whole; (2) occupations are influenced by the individual's characteristics and external environment; and (3) engagement in occupation	MOHO conceptualises individuals' participation in occupation is influenced by their inner characteristics: (1) volition refers to motivation to engage in occupation (personal causation, values and interest); (2) habituation refers to roles and routines; (3) performance capacity refers to the ability for occupational performance

		may change and maintain the individual's inner characteristic such as capacities, motives and patterns of performance.	(physical and mental abilities); and (4) environment that includes physical, social, cultural and economic within the individual context.
Person-Environment-Occupational Performance (PEOP)	Christiansen and Baum (1991)	PEOP focuses on individual's occupational performance and participation that can be described through an interaction of the individual with the environment, which either supports or restricts the individual from participating in activities, tasks, roles, organisation or community. PEOP assumes occupational competence can be achieved if the intervention provided allows the individual to experience or participate in tasks or activities that have meaning and value.	PEOP conceptualises that the individual's need have four elements for occupational performance and participation: (1) occupation (what people do or need to do in their lives); (2) performance (actual act of doing the occupation); (3) person (psychological, neurobehavioral, physiological, cognitive and spiritual); and (4) environment (built, natural, cultural, societal factors, social and socio-economic).
Occupational Adaptation (OA)	Schkade and Schultz (1992)	OA focuses on the adaptation process of the individual with environment when occupational challenges are faced. The model assumes a normative relationship between occupational performance and human adaptation.	OA conceptualises three fundamental elements to successful OA: (1) person (sensorimotor, cognitive and psychosocial); (2) occupational environment (a context where occupation takes place- physical, social and cultural); and (3) interaction (occupational challenges,

			occupational role expectations and occupational response).
Ecology of Human Performance (EHP)	Dunn, Brown and McGuigan (1994)	EHP focuses on the interaction between the person and environment, which influences human behaviour and occupational performance. EHP believes that occupation cannot be understood without considering the environment and context where the occupation takes place.	EHP conceptualises the interrelatedness of four major constructs: (1) person (values, interest, experiences, sensorimotor, cognitive and psychosocial skills); (2) task (personal and environmental variables influence the selection of the task); (3) context (physical, temporal, social and cultural elements); and (4) human performance (the outcome of the interaction between person, context and task).
Occupational Therapy Intervention Process Model (OTIPM)	Fisher (1998)	OTIPM focuses adaptive occupation for the purpose of compensation, and therapeutic occupation as a remediation agent. OTIPM believes that occupational performance occurs in a transaction between the person and environment as the person executes a task. Adaptive occupation and consultation are believed to be provided during day one of the rehabilitation because the remediation process is time consuming.	OTIPM conceptualises that the occupational therapist must focus on occupation as a therapeutic tool, which explicitly ties with the philosophy foundations of the profession. It can be done according to these phases: (1) evaluation and goal-setting phase; (2) intervention phase; and (3) re-evaluation phase.

OA is based on the idea that occupational adaptation can be achieved through occupation (Schkade & Schultz, 1992). The model was developed in 1985 by Schkade and Schultz, and was primarily published in 1992 (Schultz, 2009). OA emphasises the creation of the therapeutic environment, the use of occupational tasks, and the significance of relative mastery (Schultz & Schkade, 1992). This model has been applied to various health conditions and situations, which includes adults and children with mental health problems, homeless people, persons with carpal tunnel syndrome, elderly workers, forensics psychiatry and community-dwelling elderly (Lee, 2010). An OA-based assessment model was developed, namely the Relative Mastery Measurement Scale , whose reliability and validity have been established (George, Schkade, & Ishee, 2004). In the area where biomechanical or component-driven practice is prominent such as hand therapy, OA guides the practice to be more holistic, client-centred and occupation based despite cost containment and the effect of specialisation (Jack & Estes, 2010). Application of the OA model has also improved client's satisfaction and outcome efficiency when compared to the biomechanical or component-driven approach (Jackson & Schkade, 2001).

EHP was categorised under the ecological models in occupational therapy together with the PEOP model as both models emphasise the importance of the environment to achieve successful occupational performance (Brown, 2009). The model was developed by occupational therapy faculty members at the University of Kansas due to a lack of attention on the complexities of the environment that affect human performance (Dunn et al., 1994). EHP was primarily published in the *American Journal of Occupational Therapy* in 1994. Several studies were conducted in relation to the application of EHP with different populations such as children, families, adult

workers and adult clients with stroke (Lee, 2010). However, most of the studies were descriptive and more evidence on the effectiveness of intervention strategies in the EHP is needed. Dunn and colleagues (1994) outlined five EHP intervention strategies for successful occupational performance: (1) restoring and establishing an individual's skills and abilities; (2) changing or altering the individual's environment and context; (3) adapting the task demands and contextual components; (4) preventing any maladaptive performance in context; and (5) creating the environmental climate that stimulates adaptable and successful occupational performance in the individual's unique context.

OTIPM is a model that guides occupational therapists to implement top-down, client-centred and occupation based approaches (Fisher, 2009). The model was primarily published in the *American Journal of Occupational Therapy* (Fisher, 1998). There is increasing evidence of the usefulness and effectiveness of OTIPM in various settings. OTIPM has been applied with different populations such as adult clients with acquired traumatic brain injury (Lindén, Lexell, & Larsson Lund, 2011; Simmons & Griswold, 2010), people with severe psychiatric problems (Lindström, Hariz, & Bernspång, 2012; Lindström, Sjöström, & Lindberg, 2013), elderly people (Fisher, Atler, & Potts, 2007; Larsson, Nilsson, & Larsson Lund, 2013) and people with a learning disability (Kottorp, Hällgren, Bernspång, & Fisher, 2003). The effectiveness of the model was examined in a small study, which found the interventions that were based on OTIPM improved ADLs, motor skills and accomplished outcome goals of frail community living older adults (Fisher et al., 2007). Adoption of OTIPM in practice resulted in a sustainable achievement, and facilitated occupational therapists towards evidence-based, occupation focused and client-centred intervention (Sirkka, Zingmark, & Larsson-Lund, 2014). Two studies reported OTIPM helped

guide occupational therapists and rehabilitation professionals in selecting appropriate assistive devices for their clients (Friederich, Bernd, & De Witte, 2010; Lindén et al., 2011). Two assessments connected to OTIPM namely Assessment of Motor Process Skills and Evaluation of Social Interaction were developed. The reliability and validity of both assessments were established (Fisher, 2009).

2.5 Application of occupation based intervention in occupational therapy practice

The extent of OBI applied in Malaysia is unknown due to the absence of published research or conference presentations in this area. A study that was conducted in New Hampshire, USA found that occupational therapists highly value OBI, but in day to day practice they place a major emphasis on evaluation and treatment of performance skills and body functions rather than on the client's occupational engagement and performance (Mulligan et al., 2014). Findings of the study also reported that occupational therapists did not routinely consider the client's natural context and environment when providing OBI. In hand rehabilitation, occupational therapists provided 61–90% of treatment on body functions (active ROM, progressive resistive exercise and *theraputty*) to their clients, while OBI was only used for 41–51% of their clients (Colaianni & Provident, 2010). Although occupational therapists claimed that they placed strong emphasis on functional outcomes (Daniëls, Winding, & Borell, 2002), a retrospective study to examine the type of intervention and intervention strategies provided by occupational therapists found that preparatory methods to remediate body functions were used more than OBI in stroke rehabilitation (Latham et al., 2005; Smallfield & Karges, 2009).

2.5.1 Barriers to adopting occupation based intervention

Given occupational therapists used more impairment-based treatment in practice, there are several challenges to practise OBI. One of the challenges is the dominance of the medical model in healthcare practice. The mechanistic paradigm that was developed to support the medical model had diverted the construct idea of the profession, which is to concentrate on occupation as a health-restoring measure, to merely focus on remediation of impairments (related to the musculoskeletal, neuromotor and intrapsychic system) (Keilhofner, 2009). As the medical model mainly focused on curing disease by reducing impairments and eliminating symptoms, practising in the medical model oriented facilities led to the component-driven practice where the performance skills became the main goal of the intervention (Gray, 1998). Furthermore, it is difficult to incorporate health, wellness and functions within the medical paradigm of care (Baum & Baptise, 2002). Occupational therapists found it was difficult to fit occupations such as play, cooking, craft, self-care routine and pleasurable activities within the medical model dominated settings because it is not scientific enough to address the issues related to clients' medical conditions (Pierce, 2001a). As a result, occupational therapists might have tended to neglect the use of occupations in practice, which may have indirectly contributed to the profession struggling with its professional identity (Gray, 1998).

Lack of facilities is another issue in applying OBI in clinical practice. A study conducted by Stack and Barker (2011) found that occupational therapy students would eagerly translate OBI in the practice settings, but the environmental factors prevent them from doing that. Limited space and the availability of equipment and sources are the main issues highlighted by occupational therapists for the use of OBI (Chisholm et al., 2000). As the settings are built in the medical model facilities, most of the available equipment is focused on remediating impairments

and symptoms. Pragmatically, occupational therapists often use what is typically available in the department or clinic setting (Gray, 1998). Equipping a simulated setting that is suitable for OBI requires additional funding from the organisation. However, not all organisations could provide enough funding meaning the equipment and supplies are lacking in the practice setting (Chisholm et al., 2000).

Time is also a factor that influences the occupational therapists to use OBI. Literature indicates that OBI is described as more complicated than impairment-based treatment and consumes much more time to be implemented (Goldstein-Lohman et al., 2003; Stack & Barker, 2011). Occupational therapists also agree that they could do more for the clients, but addressing the client's occupation needs takes more time resulting in another client not receiving an intervention in a timely manner (Stack & Barker, 2011). Furthermore, the occupational therapists who are practising in an acute setting, such as in hand injury rehabilitation are expected to provide impairment-based treatment instead of OBI. Given the high caseload volumes and the role expectations in the clinical practice setting, occupational therapists tend to see time as a major obstacle to using OBI (Colaianni & Provident, 2010; Stack & Barker, 2011).

The issue of reimbursement is also a barrier to using OBI. For instance, occupational therapists in the USA reported that OBI was not covered by insurance companies and documenting the intervention for billing purposes was difficult (Colaianni & Provident, 2010). Rogers (2007) describes that billing for OBI is not straightforward, and the occupational therapists have to explain to the insurance companies why they have provided the clients with the interventions. As a result, there is a lack of opportunity for the occupational therapists to explore the client's

occupational performance problems and to identify the barriers to successful occupational performance within the client's context (Toth-Fejel et al., 1998).

Another challenge to OBI in the literature was the client and occupational therapist factors. Occupational therapists reported that providing OBI is challenging because the client does not understand the unique role of occupational therapy and the outcome of the intervention (Chisholm et al., 2000). Providing OBI requires the occupational therapist to have a strong knowledge about the concept of occupational performance, which is associated with the environment, space, occupational forms and objects. However, it was reported that the occupational therapists have much less understanding about the environmental concept of objects, spaces and occupational forms, which contributes to the challenge of using OBI (Lee, Taylor, Kielhofner, & Fisher, 2008). Additionally, occupational therapists often minimise the value and power of occupation in rehabilitating the clients (Chisholm et al., 2000). They claimed that occupation cannot meet the clients' goals, was unnecessary and too complicated for the clients (Colaianni & Provident, 2010).

2.6 Advantages of occupation based intervention

The studies on the benefits of OBI so far are based on the idea that engagement in occupation affects and influences human health. This has been the major idea and foundation of the occupational therapy profession since it was first developed. Occupational therapists believe that there is a positive connection between occupation, health and wellbeing (Law, Steinwender, & Leclair, 1998). The emergence of occupational science as a discipline is primarily to support occupational therapy through study and research regarding how occupation improves and affects

human lives (Pierce, 2014; Yerxa, 1990). Thus, evidence and published studies related to occupation and health are increasing in occupational therapy literature.

2.6.1 Occupation influences health and wellbeing

Occupation influences the individuals' health when they engage in their important and meaningful occupations. Occupation was claimed as a health agent because it provides '*choice, meaning, purpose, balance, challenge, freedom, creativity, growth, opportunity, the capacity to change or cope with environment, satisfaction for mental, physical and social needs as well as stimulating and enjoyable work and leisure*' (Wilcock, 2005, p. 8). It is believed within the occupational therapy profession that human health can be improved if the individual is given an opportunity to experience and develop the skills through engagement in occupation (Hammell, 2008; Yerxa, 1998). This was one of the fundamental beliefs of occupational therapy when the profession was initially developed (Meyer, 1977). Engagement in occupation is influenced by several mediating factors such as perceived control, intrinsic motivation and a balance between task challenge and individuals' skills. Other than these mediating factors, successful occupational engagement is dependent on the relationship between the individual, occupation and the environment (Law et al., 1998). More importantly, it was assumed that health is improved when the individuals' have a balance in what they are doing (self-care, productivity and leisure) (Piškur, Kinebanian, & Josephsson, 2002).

Engagement in occupation that has meaning and importance to individuals also affects their wellbeing. There is a distinction between health and wellbeing. Wellbeing is beyond health, and it is the ultimate goal of occupational therapy. In contrast, health only permits the individuals to

perform their daily living tasks and not necessarily provides them with the life meaning, which is essential for wellbeing. Christiansen and colleagues (1999) stated that those who rated their personal projects (occupations) higher were also perceived to have higher wellbeing. Wellbeing is closely linked to the individuals' ability to perform occupation satisfactorily, and has a feeling of accomplishment (Piškur et al., 2002). Engagement in occupation creates a sense of happiness, which contributes to human wellbeing. Commonly, individuals experience happiness through engagement in leisure, rest, selfless activity, self-care and spiritual activities (Wilcock, 1998). Happiness is not only from what the individuals do, but it is also related with whom they do the occupation. Occupation facilitates social relationships with family members, friends and the community when a number of individuals share similar occupations at the same time (Piškur et al., 2002). The term 'co-occupation' is currently used in occupational therapy to describe two or more individuals sharing the same occupation.

On the other hand, occupation represents an individual's personal identity, which is shaped through what people are 'doing' and 'being' (Christiansen, 1999; Wilcock, 1998). The meaning of occupation however, is shaped by the individual's personal identity, as well as societal and cultural values, beliefs and attitudes (Doble & Santha, 2008). A study that was conducted to explore the correlation of occupation and subjective wellbeing found a stronger association between personal identity and wellbeing, which indicates occupation provides a platform for individuals to express themselves (Christiansen et al., 1999). Therefore, it is postulated that engagement in meaningful and important occupation is actually a main contributing factor to human health and wellbeing. Therefore, occupational therapists should be more client-centred,

allowing the clients to choose and engage in their meaningful occupation to improve quality and satisfaction in life (Doble & Santha, 2008).

2.6.2 Benefits of occupation based intervention from therapists' perspective

Several studies have investigated the benefits of OBI from the perspective of occupational therapists in different areas of practice. A qualitative study with 22 paediatric occupational therapists found that OBI was perceived to be more pleasant, rewarding and effective due to the fact that OBI is individualised and easily generalised to everyday life. Those who were practising in hand rehabilitation perceived that OBI facilitates meaningful therapeutic experiences (e.g. improving client's motivation, compliance and satisfaction); functional activity (e.g. focusing on occupational goals, increasing compliance to home therapy program, facilitating the use of weak and injured muscles and directing the occupational therapist to use occupation based assessments); and holism (e.g. considering the client's psychological issues, in line with the fundamental basis of occupational therapy and an individualised treatment) (Colaianni, 2011; Colaianni & Provident, 2010).

Practising OBI makes occupational therapy authentic, and illuminates the real purpose of occupational therapy to those inside and outside of the profession (Burke, 2001; Colaianni, 2011). OBI expresses professional identity because the occupational therapy profession was developed based on the idea that occupation promotes physical and mental wellbeing (Estes & Pierce, 2012). Fisher (2013) claimed that practising an occupation based approach sends a strong message to other multidisciplinary members that the profession emphasises the importance of

occupation and meaningful doing as central to occupational therapy practice. This benefit of OBI motivates the occupational therapists to continuously apply and use it in practice.

2.6.3 Effectiveness of occupation based intervention in different populations

The effectiveness of OBI has been examined on different populations and settings. The evidence on the effectiveness of OBI is increasing, but it is still difficult to conclude that OBI is effective due to limited gold-standard evidence in the literature. One possible reason is due to the complex attributes of occupation (Gray, 1998; Price & Miner, 2007), which is based on individual meaning that makes it difficult for occupational therapists to standardise the treatment protocol for studies like Randomised Controlled Trials (RCT). In the current study, published studies that were directly focused on occupation either using occupation to improve body functions or occupation engagement as the goal of intervention were reviewed. Interventions that used occupation as a means and as an end were considered OBI. The studies were grouped into five categories: stroke, geriatric, mental health, traumatic brain injury and other physical conditions. However, this is a superficial review as the central theme of the thesis was to investigate OBI in hand injury rehabilitation, but it does provide an overview on the effectiveness of OBI in different populations and health conditions.

Stroke rehabilitation

Several studies examined the effectiveness of OBI in the rehabilitation of clients with stroke. A recent RCT comparing OBI that focus on occupational engagement and impairment-based treatment found that both treatments are effective in improving self-care, health-related quality of life (QoL) and physical function (Tomori et al., 2014). The group that received OBI had a

small effect sample size compared to the impairment-based treatment group in general health and role emotional of SF-36 (health-related QoL), which indicates OBI works better in improving QoL of clients. Similarly a study that compared OBI (based on MOHO) with conventional occupational therapy treatment found that the OBI group significantly improved in QoL and ADLs performance (Shinohara, Yamada, Kobayashi, & Forsyth, 2012). OBI as a means to remediate physical functions was found to improve voluntary movements (Hermann et al., 2010; Roberts, Vegher, Gilewski, Bender, & Riggs, 2005) and upper extremity function (Earley, Herlache, & Skelton, 2010; Page et al., 2009) of affected body parts following a stroke. A study with three clients who had mobility problems after a stroke found that OBI based on the OA model improved the clients' skills in their environment and context (Johnson & Schkade, 2001).

Geriatric rehabilitation

There is a large amount of evidence on the effectiveness of OBI in older adults. Two systematic reviews found moderate to strong evidence that supports the effectiveness of OBI in improving and maintaining occupational performance of older adults (Arbesman & Mosley, 2012; Orellano, Colón, & Arbesman, 2012). For instance, OBI that focus on occupational engagement is effective for improvements in ADLs, motor skills, self-care functioning, and outcome goals set by the older adults (Fisher et al., 2007; Landa-Gonzalez & Molnar, 2012). OBI that focus on occupational engagement was also found to improve self-esteem, health, physical function and QoL of the frail elderly (Clark et al., 1997; Landa-Gonzalez & Molnar, 2012). OBI is also preferable to rote exercise among elderly people. For example, a study that compared the occupational tasks with rote exercise found that there were a significant number of elderly nursing home residents who chose the occupational tasks over rote exercise because it is more

fun and simulates the real occupation (Zimmer-Branum & Nelson, 1995). A recent published study found that OBI that focus on occupational engagement for well elderly people helped to minimise the decline in leisure and ADLs engagement in well elderly people (Zingmark, Fisher, Rocklöv, & Nilsson, 2014).

Mental health rehabilitation

Several studies have examined the effectiveness of OBI in the clients with mental health problems. Two systematic reviews on OBI that focused on performance and participation in occupation found moderate to strong evidence existed to support the effectiveness of OBI in improving QoL, skills for life, and participation in daily living activities (Arbesman & Logsdon, 2011; Gibson, DÂ¿Amico, Jaffe, & Arbesman, 2011). For instance, OBI that focus on occupational engagement has positive effects on the ability to perform ADLs (Kottorp et al., 2003) and control of illness (Legault & Rebeiro, 2001). Improvements in satisfaction of occupational performance, occupational performance, and subjective wellbeing were found in those who participated in an occupation based mental health program (Rebeiro, Day, Semeniuk, O'Brien, & Wilson, 2001; Schindler, 2010). A recent published study that focused on engagement in meaningful daily occupations found that people with severe psychiatric disability had improvement in motor and processing skills for ADLs, social interaction skills, self-attainment goals and satisfaction with daily occupation (Lindström et al., 2013). Reductions in psychological problems, symptoms and severity of mental index were also reported in the study.

Traumatic brain injury rehabilitation

A number of studies that have examined the effectiveness of OBI among clients with traumatic brain injuries were found in the literature. OBI that uses occupation embedded tasks as remediation agents (e.g. computer games, typing using a computer program) were found to be effective in promoting ROM and facilitating functional skills learning following acquired traumatic brain injury (Giuffrida, Demery, Reyes, Lebowitz, & Hanlon, 2009; Sietsema, Nelson, Mervau-Scheidel, & White, 1993). It was postulated that OBI motivates the clients to perform tasks with more enthusiasm and fun. Two studies, which examined the effects of OBI (focus on occupational engagement) in combination with everyday technology (e.g. mobile phone, computer, digital voice recorder) found clients with traumatic brain injury had improvements in self-perceived occupational performance and satisfaction with occupational performance, and were capable of doing occupational tasks independently (Larsson Lund, Lovgren-Engstrom, & Lexell, 2011; Lindén et al., 2011). Using OBI as a means to improve body function with traumatic brain injury clients was also found to facilitate and develop self-awareness, and assist the clients to achieve their self-selected goals (Doig, Kuipers, Prescott, Cornwell, & Fleming, 2014; Fleming, Lucas, & Lightbody, 2006).

Other physical conditions

A small number of studies on the effectiveness of OBI for clients with spinal cord injury and palliative conditions are present in the literature. A follow-up study after one to five years of occupation based spinal cord injury rehabilitation found that clients could adapt with disability, manage identity and actively participate in the community (Price, Stephenson, Krantz, & Ward, 2011). Another study with spinal cord injury clients reported OBI that focus on occupational engagement helped the clients to engage in their meaningful occupations, and facilitated

community integration and social participation (Ward et al., 2007). OBI for the clients with palliative conditions helped to alleviate symptoms, provide opportunities for occupational engagement, and help the clients to attain their occupational goals (Ashworth, 2014).

In summary, a large amount of evidence existed in the literature on the effectiveness of OBI, especially in geriatric, stroke, traumatic brain injury and mental health rehabilitation (Table 2.2). However, there were limited level I evidence in the literature given most of the studies conducted were based on a case study design. OBI that focuses on occupational engagement was incorporated with several strategies such as everyday technology, telerehabilitation, individualised and client-centred treatment, environmental modification and health education/discussion. However, OBI that focuses to improve body function was incorporated with several techniques such as constrained induced movement therapy, functional electrical stimulation, computer games, repetitive exercise and functional electrical stimulation. Therefore, these strategies and techniques might have the potential to be incorporated into hand injury rehabilitation.

Table 2.2 Studies that investigate the effectiveness of OBI in different populations

Stroke rehabilitation				
Authors-Level of Evidence	**Study design and aim**	**Sample**	**Results**	**Critical Evaluation/Remarks**
Tomori et al. (2014)-2b*	**Multi-centre RCT**: To compare impairment-based (basic functional exercise and simulated occupational practice) and occupation-based (real occupational practice e.g. cooking, knitting) approaches in the rehabilitation of stroke.	N=54 adult clients with stroke (Control group: n=27 and Experimental group: n=27)	No significant differences were found between the groups in any outcomes, but the experimental group had a small effect size on the short-form 36 compared to the control group.	This study had low retention of participants where only 68% completed the whole procedures for the study. It also did not include non-intervention group to determine the possibility of natural recovery of stroke, which made it difficult to conclude the effectiveness of the interventions.
Shinohara, Yamada and Kobayashi (2012)-2c*	**Outcome study (pre and post-test intervention)**: to compare the outcomes of MOHO-based intervention and conventional occupational therapy	N=36 (Control group: n=17 and Experimental group: n=19)	Following twelve weeks of interventions, the experimental group significantly improved in ADLs and quality of life (QOL-26 and SF-36)	The outcomes of the study were influenced by the duration of stroke; the experimental group had significantly shorter time from stroke than the control group.

*Level of evidence was classified according to the Oxford Centre for evidence based medicine via http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/

	intervention in the rehabilitation of stroke.		compared to the control group.	
Hermann et al. (2010)-4*	**Case study**: To examine the outcome of Telerehabilitation using functional electrical stimulation, occupation based and client-centred intervention for a client with stroke.	N=1 (A 62 years old client with the first stroke, had no active movement in affected wrist and fingers and experienced stroke > 3 months.)	The intervention was found to reduce impairment and functional limitation that were measured using Fugl-Meyer Assessment and Action Research Arm Test. Voluntary movement was increased following the intervention. The sample also expressed satisfaction in ability to perform ADLs and rated ADLs performance was better after the intervention.	This study incorporated Telerehabilitation and functional electrical stimulation with OBI. Therefore, it could not be concluded that OBI alone led to the better outcome. It is also difficult to generalise the outcome of case study design based on one sample to broader populations.
Robert et al. (2005)-2c*	**Outcome study (pre-post):** to determine whether constraining unaffected arm following a stroke would increase satisfaction and performance in life roles over a two week occupation	N= 9 individuals with > one year stroke	A significant change was found in satisfaction and performance following the intervention. The individuals' satisfaction was declined despite continued motor improvement.	This study incorporated OBI with the constraint induced movement therapy. Generalisation of the findings to larger populations might be inappropriate due to the small number of sample. The stringent

	based constraint induced movement therapy.			inclusion criterions also restricts generalisation of these findings to the stroke population as a whole.
Earley et al. (2010)-4*	**Case study**: to demonstrate how the therapeutic activities and occupation were used within a modified constraint induced movement therapy for a client with stroke.	N= A female violinist with ischaemic stroke (right hemiparesis).	The results revealed that the function of affected extremity improved after the intervention. The client reported that she returned to playing violin after the completion of therapy.	This study incorporated OBI with the modified constraint induced movement therapy. The findings of the study, which were based on one sample could not be generalised to the stroke population. The reliability and validity of assessments (Modified form of the Fugl-Meyer Evaluation, Motor Function Assessment and Arm Improvement and Movement) used for the study has not been established.
Page et al. (2009)- 4*	**Case study**: to determine the outcome of a three week occupation based electrical stimulation program on	N= A female subject exhibiting trace paretic hand and finger	The outcome of study showed that the sample exhibited reduced impairment (Fugl-Meyer Scale), decreased	This study incorporated functional electrical stimulation with repetitive occupation based activities. Although the case

	paretic limb impairment, functional limitation and ability to perform valued activities following a subacute stroke.	movement.	functional limitation (Action Research Arm Test) and increased ability and speed in performing valued activities (Arm Motor Ability Test).	study presented a specific detailed data, but the finding could not be generalised to any given population. Additionally, the improvements in the outcomes might be also associated with the nature recovery of stroke.
Johnson & Schkade (2001)- 4*	**Case study**: to examine the effect of occupational adaptation approach on mobility with individuals who have suffered from a stroke.	N= 3 individuals with stroke who had been diagnosed as ischaemic or haemorrhagic CVA and were able to live at home with or without assistance.	Following a four weeks intervention program (focus on adaptation through: occupational readiness and occupational activities), all the participants showed improvement in mobility skills.	This study incorporated occupational readiness with occupational activities. Occupational readiness was aimed to change participants' components in preparation for occupational activities. Although the outcomes were consistent between the cases, it could not be generalised to stroke population as a whole.
Geriatric rehabilitation				
Authors	**Study design and aim**	**Sample**	**Results**	**Critical Evaluation/Remarks**
Arbesman &	**Systematic review**: to	N=28 studies; 24	This study found moderate	Although the search terms were

Mosley (2012)-3*	examine the effectiveness of occupation based and activity based health maintenance and management interventions for community dwelling older adults.	level 1, 3 level 2, and 1 level 3.	evidence that health education programs (based on OBI) reduce pain, increase participation in physical activities and improve activities of daily living function. Moderate evidence was also found for the self-management program (based on OBI) result in a decrease pain and disability.	discussed, the inclusion criteria for the reviewed studies was not mentioned by the authors. This systematic review involved a variety of conditions, interventions and settings. Therefore, the conclusion should be made with caution.
Orellano et al., (2012)-3*	**Systematic review**: to examine the effectiveness of activity based and occupation based intervention on community-dwelling older adults' performance of IADLs.	N= 38 studies; 31 level 1, 3 level 2, 3 level 3, and 1 level 4.	The results indicated that client-centred and occupation based can be effective in improving and maintaining IADLs performance. Moderate evidence was found for functional task exercise program and simulated IADLs intervention.	This systematic review incorporated all types of studies. Thus, conclusion should be made with caution given the clients live in a variety of settings, have a variety of functional limitations and have received variety of interventions.
Fisher et al., (2007)-2c*	**Outcome research**: to examine the effectiveness of	N= 8 older adults living in the	The result showed that short-term and home based	Although the study incorporated qualitative results to support

	short-term, home-based occupational therapy guided by occupation based model (Occupational Therapy Intervention Process Model) for improving activities of daily living.	community at an assisted living residence.	occupational therapy (OBI) improved 77% ADLs performance goals of frail, community living older adults.	quantitative results, the sample size was relatively small. The absent of a control group in this study made it difficult to conclude the intervention was the main factor that contributed to the outcomes.
Landa-Gonzalez & Molnar (2012)-2c*	**Outcome research (pre- and post-test)**: to examine the effectiveness of occupation-based versus enabling/preparatory interventions on self-care, perceived performance, satisfaction, self-efficacy, and role function.	N= 29 older Hispanic females with arthritis (OBI group: n=10, E/P group: n=10, control group: n=9)	The results showed there were no statistically significant differences for task specific functioning and self-efficacy between the groups. However, the OBI group had higher scores for activities of daily living functioning and self-efficacy than the control group.	Statistical significant differences were not achieved for all outcome measures despite the intervention group had better results. There was a bias in recruiting the participants and the sample size was relatively small.
Clark et al. (1997)-1b*	**RCT**: to evaluate the effectiveness of occupational therapy service (OBI) for the independent living older adults.	N=361 older adults (OT/OBI group: n=122, Social group: n=120 and None	Occupational therapy service (OBI) was found for the quality of interaction scale on functional status questionnaire, life	This study provided strong evidence about the effectiveness of OBI in older adults living independently in the community. However, the results may not

		intervention group: n=119)	satisfaction, physical functions, role limitation attributable to health problem, vitality, social functioning, role limitation attributable to emotional problem and general mental health.	generalise to older adults in different living situations or different socioeconomic status.
Zimmerer-Branum & Nelson (1995)-2c*	**Outcome research**: to examine the preferences of elderly nursing home residents when presented with an occupation embedded exercise versus a rote exercise.	N= 52 elderly nursing home resident.	A significant difference was found in the choice either to participate in rote exercise or occupation embedded exercise. The elderly nursing home residents tended to choose the occupation embedded exercise than rote exercise.	The occupation embedded exercise selected in this study was dunking a basketball. It might be an occupation for few participants, but not for those who never engaged or have interest in playing basketball.
Zingmark et al. (2014)- 1b*	**RCT**: to examine three different occupation based interventions for well older people.	N=177 well older people living in the community (Control group: n=46,	The results revealed that all groups showed a decline in leisure engagement and ADLs over time. However, the individualised group and	This study indicated that individualised and discussion group provided better results than the activity group. However, the effect sizes were

		individualised group: n=41, Activity group: n=49 and Discussion group: n=41)	discussion group were somewhat effective in minimising the reduction of leisure engagement and ADLs performance at both 3 and 12 months after the intervention.	small. Additional, the participants, evaluators and interventionists were not blinded to the study. The results might not be generalised to larger populations due to gender differences between participants and non-participants.
Mental health rehabilitation				
Authors	**Study design and aim**	**Sample**	**Results**	**Critical Evaluation /Remarks**
Arbesman & Logsdon (2011)- 3*	**Systematic review**: to evaluate the effectiveness of occupational therapy intervention (OBI) related paid and unpaid employment and education for the clients with severe mental illness.	N= 46 studies; 37 level 1, 5 level 2 and 4 level 3.	The results indicated that strong evidence existed for the effectiveness of supported employment program and was even stronger when it combined with cognitive and social skills training. A limited but positive evidence was found for the effectiveness IADLs interventions that targeted specific homemaking	This systematic review incorporated all types of studies regardless of study designs, intervention types and mental health conditions. Therefore, the conclusion should be made with caution given the studies were not homogeneity.

			occupations and supported parenting.	
Gibson et al. (2011)- 3*	**Systematic review**: to evaluate the effectiveness of occupational therapy intervention (OBI) focusing on community integration and normative life role for the clients with severe mental illness.	N= 52 studies; 31 level 1, 13 level 2 and 8 level 3.	A moderate to strong evidence was found for social skills training, life skills and IADLs retraining. The evidence for client-centred and increased intensity/duration of treatment was limited, but showed positive results.	This systematic review did not discuss how the studies were appraised and graded. Given the inclusion criteria was broad, a variety type of study was included in this systematic review. Therefore, conclusion should me made with caution given the studies have a variety of evaluations, interventions, settings and conditions.
Kottorp et al. (2003)- 4*	**Case series**: to evaluate the outcomes of a specified Occupational therapy intervention (OBI) that was guided by Occupational Therapy Intervention Process Model (OTIPM).	N= 3 women with moderate mental retardation.	All participants showed improvements, but patterns of changes were different between the participants and the outcome variables. The only outcome variable that improved in all participants was the ability to do ADLs.	Restorative and adaptive strategies were used to implement OBI that focused on improvement in ADLs performance. This study was based on three participants, which limits generalisation of results to larger populations. Furthermore, the improvement

				on the outcome measures might be associated with repeated measures, where the participants became familiar with the test/measurements.
Legault & Rebeiro (2001)- 4*	**Case study**: to describe the experience of participating in an occupation based mental health for a client with chronic schizophrenia.	N= A male client with chronic schizophrenia.	The client reported a better control of illness, a sense of self-worth and hopeful optimism following the intervention.	The data was mainly from a qualitative interview. This case study did not use any reliable and valid tools to support the qualitative results. Findings of this study could not be generalised to larger schizophrenia populations.
Rebeiro et al. (2001)	**Mixed methods design**: to evaluate whether occupation based mental health improved participants' quality of life and to ascertain whether participation in occupation based mental health reduced the need for more traditional	N=38 clients with a variety of mental health conditions.	Quantitative results indicated that participants perceived an improvement in their quality of life and wellbeing. It was supported by minimal use of crisis service and hospitalisation, and improved in socioeconomic status. Qualitative results revealed	Although this study combined both qualitative and quantitative approaches, the results were based on the participants' perception after receiving OBI mental program. The sample size was relative small and generalisation the findings could not be done to other settings.

	and costly methods care.		that OBI for mental health helped to meet participants' being, belonging, and becoming needs.	
Schindler (2010) -2c*	**Outcome study (pre- and post-test)**: to evaluate the effectiveness of a client-centred, occupation based occupational therapy intervention for the client with psychiatric diagnosis.	N=38 college students and community member who have been diagnosed with psychiatric disorders.	The results revealed that the occupation based and client-centred occupational therapy intervention increased client scores on satisfaction and performance of occupational performance goals (measured by COPM).	The major limitation of this study was lack of a control group to compare the outcomes of intervention. COPM was the only outcome measure used in the study, which is based self-report scale. Thus, the outcome might be associated with the satisfaction to service provided rather than actual improvement in occupational performance goals.
Lindstrom et al. (2013) -2c*	**Outcome study (pre- and post-test)**: to assess the effectiveness of occupation centred intervention on ADLs ability and health factors for clients with	N= 17 clients with severe psychiatric disability.	The results showed that occupation centred intervention integrated with sheltered/supported housing helped people with severe psychiatric disability gained	The intervention length was not standardised between the clients. It was individualised ranged from 2 to 17 months. This might be an explanation the better outcomes of study. Furthermore,

	psychiatric disorders.		in meaningful daily occupations.	there was lack of a control group to compare the outcomes between those who received and not received the intervention.
Traumatic injury rehabilitation				
Authors	**Study design and aim**	**Sample**	**Results**	**Critical Evaluation/Remarks**
Giuffrida et al. (2009)-2c*	**Outcome study (pre- and post-test)**: to compare the effectiveness of random versus blocked practice in performing occupation based tasks.	N= 6 right handed male clients with traumatic brain injury (Random practice group: n=3 and Blocked practice group: n=3)	The results showed that both groups significantly improved in performance during skill acquisition and maintained this performance. However, it was found that the random practice group was better in transferring learning skills to another task when compared to the block practice group.	This study provided an evidence about two available approaches in retraining the client with traumatic brain injury. The randomly structured practice allowed the clients to improve everyday skills. However, the sample size of this study was relatively small. Therefore, the results could not be generalised to larger populations.
Sietsema et al. (1993) – 2c*	**Outcome study (counterbalanced design)**: to compare occupation embedded intervention versus rote arm reach	N= 20 clients with traumatic brain injury who exhibited mild to moderate	Occupation embedded exercise (games) promoted more range of motion than rote exercise. It motivated clients to enhance	This study used computer games as an OBI task. The computer games however, might not be meaningful for all the clients in the study. Therefore, it was not

	exercise in the client with traumatic brain injury.	spasticity in the upper extremity.	performance, promoted enthusiasm and increased attention of the clients.	an occupation for certain clients. Additionally, the evaluators were not blinded to the study, which might influence the better outcomes of occupation embedded intervention.
Larsson Lund et al. (2011)	**Qualitative design**: to highlight the experience of receiving occupation based intervention incorporated with everyday technology to promote occupation performance for the clients with traumatic brain injury.	N= 10 clients with acquired brain injury.	The clients with traumatic brain injury reported that they mastered their lives in a better way after using everyday technology. They were capable of doing occupational tasks independently and were aware that everyday technology became reliable compensatory strategies in life.	This qualitative study was too descriptive, which was based on individuals' perception and experience. Thus the results of qualitative study could not be generalised to the whole population.
Linden et al. (2011) - 4[*]	**Case study**: to investigate how individualised occupation based intervention with everyday technology can compensate	N= 10 men and women with acquired brain injury.	The results showed that occupational performance was decreased, but the satisfaction with the occupational performance	This study used everyday technology to promote occupational performance among the client with traumatic brain injury. Findings of this

	for perceived difficulties with daily living tasks following an acquired brain injury.		increased with the use of every technology. All participants achieved their goals in learning familiar and new everyday technology.	study could not be generalised to larger populations due to the small sample size. COPM, which is a self-report scale was used as a main outcome measure in this study. Therefore, the improvement might be associated with placebo effect.
Doig et al. (2014) –2c*	**Outcome study (pre- and post-test)**: to examine the effect of participation in OBI on development of self-awareness after a traumatic brain injury.	N= 8 participants with traumatic brain injury.	A large reduction was found in the mean of Mayo-Portland adaptability index after 12 weeks intervention. It indicated that participant improved in self-awareness after the intervention.	This study used descriptive analysis as the sample size was small. Thus, findings could not be generalised to everyone with impaired self-awareness. This study did not use valid and reliable measurements.
Fleming et al. (2006) –2c*	**Outcome study (pre- and post-test)**: to investigate the effect of an occupation based intervention on self-awareness and emotional status for the people with acquired brain injury.	N= 4 male clients with impaired self-awareness following acquired traumatic brain injury.	The result indicated that the use of individualised occupation based intervention facilitated self-awareness in the clients with acquired brain injury.	The small sample size restricted to generalise the findings of this study to larger populations. Additionally, confounding factor such as anxiety was found to influence the improvement in self-awareness. The absent of a

				control group also made it difficult to conclude that the intervention was the factor contributed to the better outcomes.
Other physical conditions				
Authors	**Study design and aim**	**Sample**	**Results**	**Critical Evaluation/Remarks**
Price et al., (2011)	**Qualitative design**: to examine the life satisfaction, occupational engagement and social participation of individuals living in the community following a spinal cord injury.	N= 11 individuals with 1 to 5 years after spinal cord injury. The individuals had been provided with OBI by their therapists.	The results revealed that participants went through an adaptive process using many strategies; manage identity, participate in the community and being socially.	This study was conducted retrospectively, which may have influenced the participants' recall of the therapy process. Member checking was done with a volunteer participant only, which might influence the trustworthiness of study. These qualitative findings could not be transferable to whole spinal cord injury population, given the participants were self-selected and were from one of the western states in the US.

Ward et al., (2007)	**Qualitative design**: to determine the most helpful OBI in achieving outcomes and to explore the social and occupational participation in three individuals with spinal cord injury.	N= 3 individuals with spinal cord injury that were treated by occupation based practitioners (occupational therapist)	Participant reported that OBI helped them to engage in their meaningful occupation, facilitated community integration and social participation.	This study did not provide information on evaluation, treatment implementation and selection of goal by the participants. Member checking was not done, which could affect trustworthiness of findings. In addition, this qualitative study could not be generalised to larger populations.
Ashworth (2014)-4[*]	**Case study**: to illustrate how OBI (personally meaningful occupational participation) can better support an acute model of palliative care practice.	N= 3 individuals with palliative condition.	The results indicated that OBI helped to alleviate symptoms, provide opportunities for occupational engagement and helped the participant to attain their occupational goals.	This was a descriptive study without using valid and reliable assessments. Selection of participants was not described, and the result could not be generalised to larger populations.

2.7 Occupation based intervention in hand rehabilitation

2.7.1 History of occupational therapy involvement in hand therapy

Since the 1940s, hand therapy has been recognised as one of the specialities within occupational therapy. Occupational therapists use a holistic approach to patient care, which not only aims to remediate physical dysfunctions but also to optimise the client's response to these dysfunctions (Bear-Lehman & Flinn-Wagner, 1988). As explained in section 2.2, occupational therapy was only provided to people with mental illness when the profession was initially developed. World War II was the time occupational therapy became involved in the rehabilitation of the upper extremity and hand (Melvin, 1985). During World War II, a high number of injured soldiers with upper extremity injuries survived, which led to the development of hand surgery and rehabilitation as an area of specialisation (Melvin, 1985). Occupational therapy played an important role in the rehabilitation of the injured hand by providing suitable intervention based on the client's needs, focusing on the restoration of function of injured hands (Dillingham, 2002).

The epidemic of poliomyelitis in the mid-20th century led to the development of hand surgery and rehabilitation (Melvin, 1985). Due to the need for hand rehabilitation after surgery, occupational therapy was required to restore the upper extremity and hand function. The need for occupational therapy services was increased during this period as the survival rates of poliomyelitis were higher due to the improvements in medical technologies and services (Cohen & Reed, 1995). Poliomyelitis resulted in the reduction of an individual's functional level, and occupational therapists played an important role to provide suitable assistive and orthotic devices

for the upper limb, educate in energy conservation and work simplifications, and help the clients to adapt and live with the disease (Young, 1989).

Another major event that contributed to the involvement of occupational therapy in hand and upper extremity rehabilitation was the introduction of the moldable splint, orthotics and therapeutic aids during the 1960s (Hussey et al., 2007; Melvin, 1985). The development of these rehabilitation devices created a platform for a new specialty in the occupational therapy profession, and increased the demand for occupational therapy services from multidisciplinary members. The advancement in hand surgery techniques such as joint replacement surgery and microsurgery led many occupational therapists to choose this area as a speciality. Three events that affirm the rapid growth of hand therapy as a specialty area in the 1970s were: (1) the founding of the American Society of Hand Therapy; (2) the formation of the *American Journal of Hand Surgery*; and (3) the establishment of the annual national conference on hand rehabilitation (Melvin, 1985).

2.7.2 Integration of occupation based intervention in hand rehabilitation

OBI is challenging for many occupational therapists because hand therapy continues to be dominated by the medical model (Colaianni & Provident, 2010). The evaluation of occupational dysfunctions may be overlooked by the occupational therapist when the medical model is dominant in hand therapy (Amini, 2008; Fisher, 2003). As a result, the intervention concentrates on remediating impairments (body functions and structures) because the therapist assumes occupational dysfunctions will be regained once the impairments are eliminated (Fisher, 2003; Mulligan et al., 2014). The client can be easily frustrated and fearful as a result of an inability to

live their lives to the fullest, if the occupational therapists only focuses on impairments and does not facilitate functional activities and occupational performance in hand therapy (Amini, 2008).

Many occupational therapists agree that OBI benefits hand therapy clients, but they have been found to use intervention with only half of their clients (Colaianni & Provident, 2010). OBI was used for 21% to 30% of their treatment time, and the rest was used to do impairment-based treatment. OBI was challenging for the occupational therapists in hand injury rehabilitation due to: (1) logistic issues (time, space, supplies and variation of human occupation); (2) reimbursement issues (insurance coverage, documentation); (3) lack of credibility of OBI among the occupational therapists, clients and other health professionals; and (4) limitations imposed by certain hand therapy protocols (Colaianni & Provident, 2010). Despite the challenges of using OBI in hand rehabilitation, occupational therapists are encouraged to work towards a balanced practice between the medical and psychosocial models, which is in line with the ICF (World Health Organization, 2001). OBI incorporates both the biomechanical and occupation based approach for hand therapy clients (Amini, 2008). The intervention leads the occupational therapist to view a health condition from a holistic perspective, rather than just focus on disease and impairments in the rehabilitation of clients with hand problems.

2.7.3 The ICF model in hand rehabilitation

The ICF was initially published in 2001, which aimed to provide a scientific basis to understand and study health, establish a common language in describing health, allow comparison of healthcare data across countries, and provide a systematic coding scheme for health information systems (World Health Organization, 2001). There are two parts of the ICF: (1) functioning and

disability (body functions and body structures; and activities and participation); and (2) contextual factors (environmental and personal factors). Body functions and structures refer to impairments, while the activities and participation refer to the execution of tasks and the involvement of an individual in life situations. Environmental (e.g. physical, social and attitudinal) and personal (e.g. ethnicity, gender, social and educational background, age, race) factors refer to the context of how individuals live their lives. ICF conceptualises that the individual's level of functioning depends on a dynamic interaction between the health condition and contextual factors (Figure 2.1) (World Health Organization, 2013).

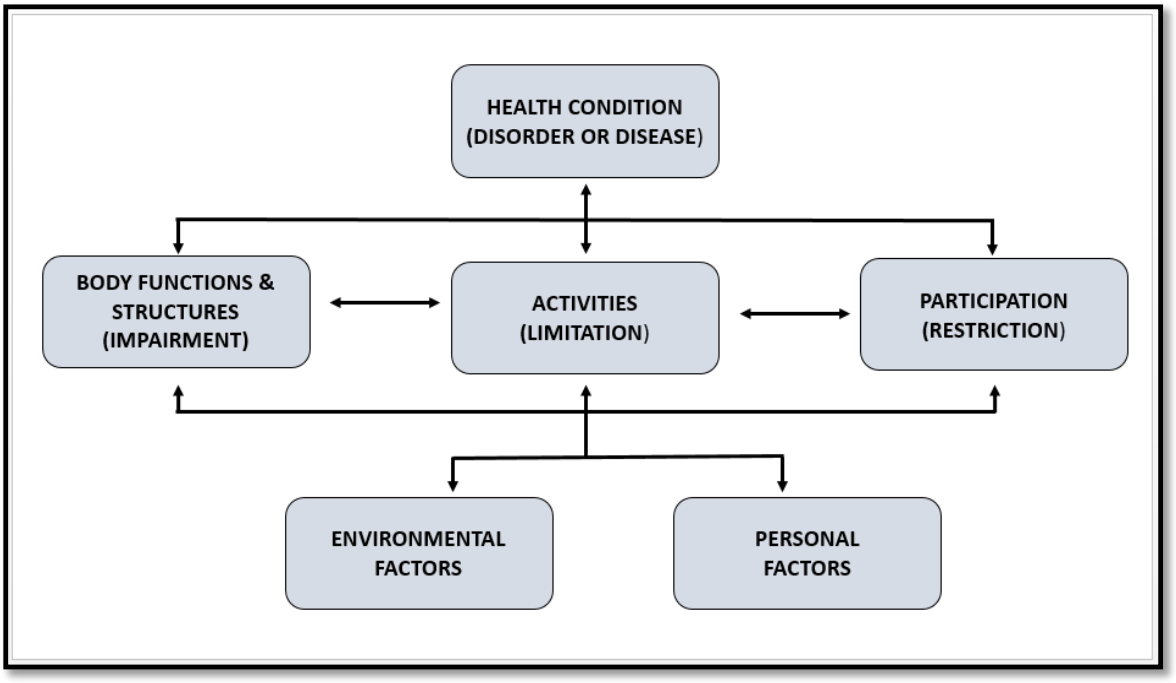

Figure 2.1. The interaction of components in the ICF model (World Health Organization, 2001).

2.7.4 The connection of ICF with occupation based models

The ICF is closely connected to some occupation therapy models. The concept of 'participation' in the ICF has been a major focus of the occupational therapy profession since the development of the profession. The definition of participation in the ICF is similar to the assumption in occupational therapy with regard to how occupation affects an individual's health and wellbeing (Hemmingsson & Jonsson, 2005). Occupational therapy believes that the environment affects and influences human participation and performance. The environment and context are conceptualised as one of the core constructs in most occupation based models (Christiansen & Baum, 1991; Dunn et al., 1994; Fisher, 1998; Kielhofner & Burke, 1980; Polatajko et al., 2007; Schkade & Schultz, 1992). Similarly, the conceptualisation of ICF emphasises that disability and functioning are not solely a consequence of a health condition, but are also influenced by environmental factors such as the physical environment, facilities in the society, attitudes and legislation (Dahl, 2002). Both the ICF and occupation based models consider the environment and context where people with a disability live, when planning or providing the intervention (Rosenbaum & Stewart, 2004).

The ICF is a scientific framework to understand and study health from holistic perspectives. It transformed the healthcare delivery from a disease orientated focus to a health orientated, which takes into consideration the individual's life situation and environmental factors (Hemmingsson & Jonsson, 2005). However, certain concepts of occupational therapy models were found to not be covered in the ICF. For instance, the habituation subsystem in the MOHO, which is very important for successful occupational functioning and mastery in daily living activities (Stamm, Cieza, Machold, Smolen, & Stucki, 2006). The ICF also does not take into account the subjective experience regarding participation, and does not capture different kinds of participation in a

single person's individual life situation. Therefore, occupational therapists are recommended to use their conceptual models in addition to ICF to overcome these limitations (Stamm et al., 2006).

2.7.5 Effectiveness of occupation based intervention in hand rehabilitation

There is a limited number of studies on the effectiveness of OBI in the clients with hand problems either using *occupation as a means* to remediate hand function or directly focusing on occupational performance (Table 2.2). Most of the studies were low quality and provided limited gold standard evidence. A single case study that engaged a client with cubital tunnel syndrome in a valued occupation (sewing activities) significantly improved grip strength and eliminated awkward movement patterns (Toth-Fejel et al., 1998). The Experience Sampling Method that equipped a client with an electronic pager, wrist terminal and a booklet of questionnaires was used to record hand usage, remind the client to avoid any abnormal movement patterns, and detect any daily occupation that was missed in the client's daily routine. Furthermore, a study involving adult clients with hand injuries found purposeful activities that mimic ADLs were effective in improving overall hand function, compared with Therapeutic Exercises (TE) (Guzelkucuk, Duman, Taskaynatan, & Dincer, 2007). Grip strength, pinch strength, Jebsen-Taylor Hand Function Test (JHFT), finger-pulp distal palmar crease, total active movement, range of opposition, range of abduction and Disability of Arm, Shoulder and Hand (DASH) were significantly improved in the group that received ADLs' mimic activities. Using OBI as a means to promote upper extremity function to a client with shoulder capsulitis increased range and quality of motion, alleviated pain and enhanced occupational performance (Earley & Shannon, 2006).

Table 2.3. Studies that investigate the effectiveness and benefits of OBI for the clients with a variety of hand conditions.

Author – Level of evidence	Study design and aim	Sample	Results	Critical Evaluation/ Remarks
Guzelkucuk et al. (2007) –1b*	**RCT**: To compare the effectiveness of ADLs' mimic activities with traditionally used therapeutic exercise in the management of injured hands.	N=36 adult clients with hand injuries (control group: n=16, experimental group: n=20)	The experimental group significantly improved in all parameters compared to the control group: grip strength, pinch strength, finger pulp-distal palmar crease distance, total active movement, range of opposition, range of abduction, JHFT and DASH.	This study was not blinded to participants, assessors and those who provided the intervention. Power analysis was not conducted before the intervention, and the results might be influenced by the confounding factors.
Toth-fejel et al. (1998) – 4*	**Individual case study**: To describe the outcome of occupation-centred practice in hand rehabilitation using the experience sampling method.	N=1 (40 year old woman diagnosed with cubital tunnel syndrome)	Engaging the client in meaningful occupation (sewing) using Experience Sampling Method improved active ROM, sensory processing, grip strength and quality of movement patterns.	This study relied on an individual case study, and the results could not be generalised to a wider population. It also was influenced by the subjective feeling of the researcher.

*Level of evidence was classified according to the Oxford Centre for evidence based medicine via http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/

Earley and Shannon (2006) – 4*	**Individual case study**: To describe a case report using OBI through the framework of occupation as a means.	N=1 (53 year old woman diagnosed with primary shoulder adhesive capsulitis)	OBI that was provided in a timely manner alleviated pain, increased quality and ROM, and enhanced occupational performance.	As this study is an individual case study design, the results could not be generalised to other clients with the same condition.
Omar, Hegazy and Mokashi (2012) –1b*	**RCT**: To investigate the influence of purposeful play activity versus rote exercise in children with burned hands.	N= 30 children with superficial and deep fascial, and full-thickness hand burn (control group: n=15, experimental: n=15)	The purposeful activities based on play and games are more effective in reducing pain, improving hand movements and function than the rote exercise.	The limitation of this study was that the sample size is small, which might affect the reliability of treatment effect. It also used the JHFT, which is not a culturally sensitive instrument to measure hand function accurately.
Jarus, Shavit and Ratzon (2000) –2c*	**Outcomes study**: To compare the influence of computer-aided treatment based on game versus traditional brush machine treatment used for rehabilitation in clients with wrist fracture.	N=47 adult clients with traumatic wrist fracture (control group: n=24, experimental group: n=23)	No significant differences were found between the groups when looking at ROM, grip strength and edema. However, those who participated in the experimental group perceived the treatment more interesting than those who participated in the control group.	This study did not measure the clients' ability to perform daily living activities and there was no follow-up after the intervention.

King (1993) – 1c*	**Outcomes study**: To determine the use of computer games versus traditionally used exercises (non-purposeful activities) to improve grip and pinch strength in hand rehabilitation.	N=146 hand therapy clients (cross over design: first group n=80, second group: n=66)	The purposeful activities based on computer games significantly increased the number of repetitions during hand therapy compared to non-purposeful activities.	This study included all hand therapy clients without considering the condition of the clients. As this study involves repetition of activities, it is unsuitable for the clients with cumulative trauma disorders.
Wilson, Roden, Taylor and Marston (2008) –1c*	**Pilot controlled trial**: To measure the effectiveness of origami versus conventionally used exercise to improve the overall hand function among clients with hand injuries.	N=14 out-patient hand therapy clients with traumatic hand injuries (control group: n=7, experimental group: n=7)	No significant differences were found in the JHFT sub-tests between the groups. However, the intervention group had a greater JHFT total score than the control group. Qualitative data indicates that the clients perceived the origami session as being more enjoyable and beneficial.	As this study is a pilot controlled trial, the sample size was relatively small. It also was not randomised and blinded. Furthermore, there was inequality of injury duration between the groups at the baseline.

Play or leisure activity such as games and origami were suggested to speed up the recovery process of injured and burned hands (Jarus et al., 2000; King, 1993; Omar et al., 2012). The play activity was compared with rote exercises in the rehabilitation of children with burned hands and found the play activity to be more effective in reducing pain, and improved hand function and total active ROM (Omar et al., 2012). A computer-aided treatment based game (experimental) versus traditional brush treatment (control) for clients with traumatic fractures found no significant difference in ROM, edema and grip strength between the experimental and control group (Jarus et al., 2000). However, the participants in the experimental group perceived that the treatment was more attractive and engaging. Similarly, a study with a larger sample size found that using computer games as purposeful activities could increase the number of activity repetitions in comparison to non-purposeful activities (King, 1993). A pilot controlled trial, which examined the effectiveness of origami, found the experimental group had greater improvements in hand function compared to the control group, although the comparison was not statistically significant due to the study design and small sample size (Wilson et al., 2008).

Given only seven studies have been conducted to investigate the effectiveness of OBI in hand rehabilitation, more research on this topic is needed. Two studies were RCTs, two were outcomes research, two were individual case studies, and one was a pilot controlled trial. None of the studies directly focused on occupational performance as a goal or the outcome of the intervention. This might be due to samples from the studies being limited to unilateral hand injury only, which does not have a major impact on the individuals' ability to perform daily living activities. Kingston and colleagues (2010) reported those with bilateral injuries have a huge impact on day to day activities, especially to work and productivity. All the reviewed

studies focused on using occupation as an agent to improve hand function following hand injuries. However, most of the studies did not use the clients' meaningful occupations. Instead, the studies used play activities, origami, purposeful activities and computer games. For example, origami might be a meaningful occupation to those who have experience in origami, but might not be meaningful to those who have no interest in the occupation. Therefore, there is a need for a study that uses clients' meaningful occupations as a healing agent to improve body function and reduce impairment. It is important to note that two RCT studies incorporated elements of constraint induced movement therapy whereby the participants were encouraged to use the injured hand during the intervention. The intervention in the RCT studies compared OBI with a standard exercise program in hand rehabilitation. Intervention length ranged from 3-6 weeks, and the intensity of treatment ranged from 1-5 sessions per week.

2.8 Contemporary hand therapy practice

Currently, hand therapy practice has moved towards a holistic approach. The development of ICF by the World Health Organisation impacted greatly on healthcare delivery, as well as hand therapy practice. The ICF is advocated to be used in practice and education because it provides a standard language and conceptual basis for defining and measuring disability and functioning, and improves inter-professional collaboration (World Health Organization, 2013). Although ICF does not directly mention the role of occupations (Case-Smith, 2003), the components in the ICF such as activity and participation, and personal and environmental factors have long been emphasised in most occupation based models (Stamm et al., 2006). The role of occupational therapists is increasingly important as they are the experts in assessing activity limitations and

participation restrictions, as well as in providing interventions to assist the clients for successful occupational performance (Gray, 1998).

Furthermore, priority has been given in the development of assessments and tools that directly assess activity and participation because valid and reliable tools for body functions and structures are readily available in hand therapy practice (Van de Ven-Stevens, Munneke, Terwee, Spauwen, & van der Linde, 2009). For instance, goniometers and dynamometers that are reliable and valid to measure ROM and grip strength are widely used in hand therapy practice. However, there are only a few assessment tools to assess activity and participation for hand clients. Intervention and documentation in hand therapy also has shifted from the biomechanical to the occupation based approach as it facilitates adaptation, improves motivation and provides evidence of the client's functional progress (Jack & Estes, 2010). Given these changes, occupational therapists are encouraged to move away from component-driven practice, and start to incorporate a holistic approach and fundamental belief of the profession in hand rehabilitation practice (Amini, 2008; Chan & Spencer, 2004; Dale et al., 2002; Fitzpatrick & Presnell, 2004). Therefore, evidence is required to demonstrate the efficacy of OBI in contemporary hand therapy practice to reflect the significant role played by occupational therapists.

2.9 Summary

This literature review initially discusses the evolving nature of the profession from pre-paradigm to the contemporary paradigm of occupational therapy. The influence of the medical model and biomechanical approach that led to the renaissance of occupational therapy is also discussed. The definition of occupation, and how it is different with purposeful and non-purposeful activities is

critically discussed as a basic foundation for this research. The literature review further discusses the inconsistent definition, associated elements of OBI, application and advantages of adopting OBI in various settings. The final part of this literature review describes the existing literature relating to OBI in hand rehabilitation, which forms the major focus of this research project.

Identified gaps in the literature suggest the need for further research. These include the inconsistent definition of OBI that contributes to the difficulty in applying OBI in practice. Secondly, there is limited research on how OBI is applied by occupational therapists in hand rehabilitation, particularly for the clients with hand injuries. And thirdly, there is inconclusive evidence on the effectiveness of OBI in hand rehabilitation. Most of the studies that were accessed in the current literature were of low quality and provided limited gold standard evidence. Therefore, the first objective of this research was to achieve a consensus definition of OBI from the perspective of Malaysian occupational therapists. The second objective was to describe the experience of occupational therapists providing OBI in hand injury rehabilitation. The third objective was to investigate the effectiveness of OBI in the rehabilitation of clients with hand injuries. This research was not guided by a specific occupational based model, instead it used an exploratory sequential mixed methods design as a working framework to explore the issues. The next chapter will describe the details of the research process and rationale of using the exploratory sequential mixed methods research design as the working framework to achieve the research objectives.

CHAPTER 3

WORKING FRAMEWORK

3.1 Introduction

This chapter presents a working framework to explore Occupation Based Intervention (OBI) in hand injury rehabilitation. An exploratory sequential mixed methods design was employed as a framework to investigate the topic. The rationale and justification of using the mixed methods design is discussed in this chapter.

3.2 Mixed methods research design

Mixed methods research is a combination of approaches, philosophies and research design orientations (Creswell & Clark, 2011). It is defined as research, where data is collected, analysed and integrated together in the findings, and inferences drawn from both quantitative and qualitative methods in a program of inquiry or single study (Tashakkori & Creswell, 2007). Mixed methods research is described as a jigsaw puzzle and is complete when the pieces are placed together to make a final product (Bazeley & Kemp, 2012). The mixed methods approach can be distinguished by two types of data, qualitative and quantitative, which are collected and analysed together, and then integrated within a single research. The mixed methods research is still evolving, yet many scholars are working towards defining such research (Johnson, Onwuegbuzie, & Turner, 2007; Tashakkori & Creswell, 2007, 2008).

The popularity of the mixed methods research is increasing, and many scholars have employed this design in various disciplines. Diverse disciplines such as sociology, education, management, architecture and health sciences have expertise and interest in using the mixed methods approach (Tashakkori & Creswell, 2008). For instance, Clarke (2003) conducted a study to better understand the experience of stroke survivors, which began with a quantitative data collection

followed by a qualitative data collection. The findings of the quantitative component confirmed the patterns and correlates of wellbeing following a stroke, and the findings of the qualitative component further explained the observed pattern in the quantitative component.

The pragmatism paradigm of the mixed methods research offers a flexible way to answer a research question from a broader perspective. Pragmatism '*emphasises the connection between epistemological concerns about the nature of the knowledge that we produce and the technical concerns about the methods that we use to generate that knowledge*' (Morgan, 2007, p. 73). Researchers such as Morgan (2007) believe that merely using a better way to answer research questions is not enough to create major change in a certain field, however combining qualitative and quantitative approaches allows the researchers a new way to understand the topic studied. It is generally agreed that the combination of approaches allows one approach to compensate the weakness of another approach, and provides a solution to answer a research question that cannot be answered quantitatively or qualitatively (Creswell & Clark, 2011; Heyvaert, Hannes, Maes, & Onghena, 2013). The mixed methods research is popular among researchers due to the practicality and flexibility of the design, whereby researchers are allowed to employ any method to answer their research questions (Dures, Rumsey, Morris, & Gleeson, 2011; Morgan, 2007; Tashakkori & Creswell, 2008).

In health sciences, the mixed methods research has been employed in areas such as public health, nursing, health promotion, health informatics, health services research, medical research and allied health sciences such as occupational therapy and physiotherapy (O'Cathain, 2009). A study that was conducted to investigate sampling design in social and health sciences found that 121

mixed methods research were conducted in these fields (Collins, Onwuegbuzie, & Jiao, 2007). Recently, a study that analysed proposals and reports funded by a research commissioner of health science research in England revealed that 18% of the studies were classified as mixed methods research (O'Cathain, Murphy, & Nicholl, 2007). In health sciences, mixed methods research is used because it provides comprehensiveness to understand the complexity of health, healthcare intervention and the context of study (O'Cathain et al., 2007). Previously, healthcare research was dominated by the quantitative approach while the qualitative approach was labelled as 'poor science'. A quiet revolution of mixed methods research over the years has provided a platform for health science scholars to investigate the complex issues that remained unanswered by using a single quantitative or qualitative approach (O'Cathain, 2009).

Creswell and Plano Clark (2011) outline the strengths of the mixed methods design as being: (i) flexibility to use different designs to address a set of interconnected research questions; (ii) publications can be made from a single study; and (iii) appropriate for program evaluation and development. Despite the benefits, the mixed methods research has some challenges and might be used inappropriately. For instance, a poor design of the mixed methods research might generate more contradictions than a stronger conclusion to the issue studied (Dures et al., 2011). Drawing an inference from the qualitative and quantitative components is also the challenge of the mixed methods research. Many researchers who employ mixed methods usually make the inference according to their cultural context, which may lead to a different interpretation from investigators in different contexts (Onwuegbuzie, 2007; Teddlie & Tashakkori, 2010). Logistic issues such as time, effort and resources are also challenges in implementing mixed methods research (Creswell & Clark, 2011). For instance, more time is often required to do a study with

an exploratory sequential design because the first study informs the subsequent studies, and usually involves multiple approaches and analysis. The unpredictability of subsequent designs and number of participants involved is also a challenge to mixed methods research, where the ethical approvals need to be obtained separately (Evans, Coon, & Ume, 2011).

3.3 An exploratory sequential mixed methods design as a working framework

The idea to explore OBI in hand rehabilitation came from when the investigator, who is a Malaysian occupational therapist realised that the way occupational therapists were practising hand rehabilitation did not embrace the unique concept and identity of the profession. Usually, when the client comes to the unit for hand rehabilitation, the intervention focuses on eliminating symptoms and reducing impairments using component-driven practice or a reductionist approach. It is not surprising that rote exercises and Physical Agent Modalities (PAMs) are often the main treatment modalities in hand therapy practice. Occupation is often neglected by the occupational therapist in hand rehabilitation, although it has been reported in the literature that hand injuries have a great impact on an individual's ability to perform day to day activities (Bamford & Walker, 2010; Fitzpatrick, 2007; Kingston et al., 2010).

One of the reasons occupational therapists do not use occupation in hand rehabilitation is because there is limited evidence to support the effectiveness of using occupation with hand clients (Colaianni & Provident, 2010). Initially, the investigator was only interested in determining the effectiveness of OBI for the client with hand injuries to provide evidence to support practice. However, when an extensive literature review was completed, it was found that there was an inconclusive definition, and lack of consensus on what constitutes OBI (Price &

Miner, 2007). There was also uncertainty as to how occupational therapists apply and integrate OBI in hand rehabilitation. Therefore, the investigator was required to address these issues first, so that the findings could be used to inform the intended study.

Creswell and Plano Clark (2011) identify six major mixed methods designs namely: (i) the convergent parallel design; (ii) the explanatory sequential design; (iii) the exploratory sequential design; (iv) the embedded design; (v) the transformative design; and (vi) the multiphase design. Framed by the exploratory sequential mixed methods design, the aim of the current study was to investigate OBI in hand injury rehabilitation. This research contributed to the enrichment of evidence about OBI in hand injury rehabilitation (Figure 3.1).

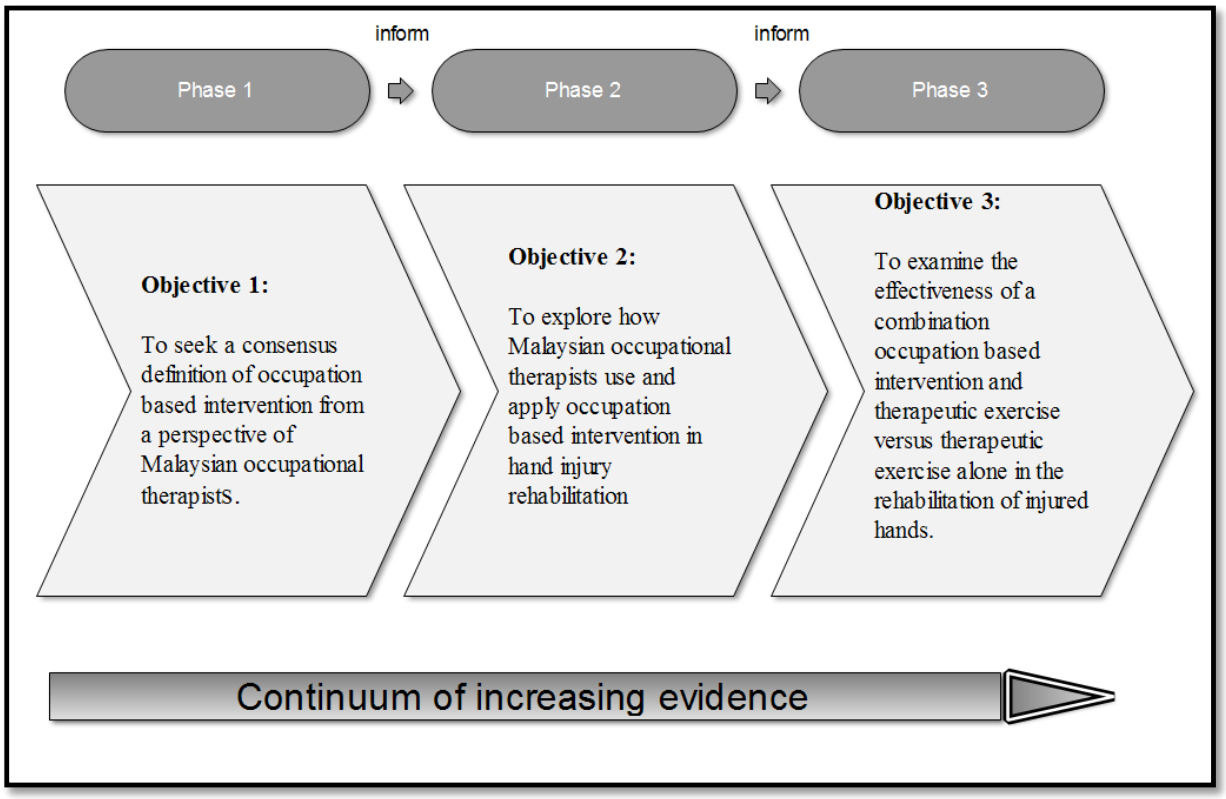

Figure 3.1. A continuum of increasing evidence in understanding of OBI in hand rehabilitation.

The research was divided into three phases. Each phase has different research questions and used different research approaches. The research process was carried out sequentially whereby the results from Phase One helped to inform the subsequent phases (Figure 3.2). The exploratory sequential mixed methods design, also known as sequential mixed model design (Tashakkori & Teddlie, 2010), allows the investigator to explore the topic through a sequence of connected quantitative and qualitative studies (Creswell & Clark, 2011).

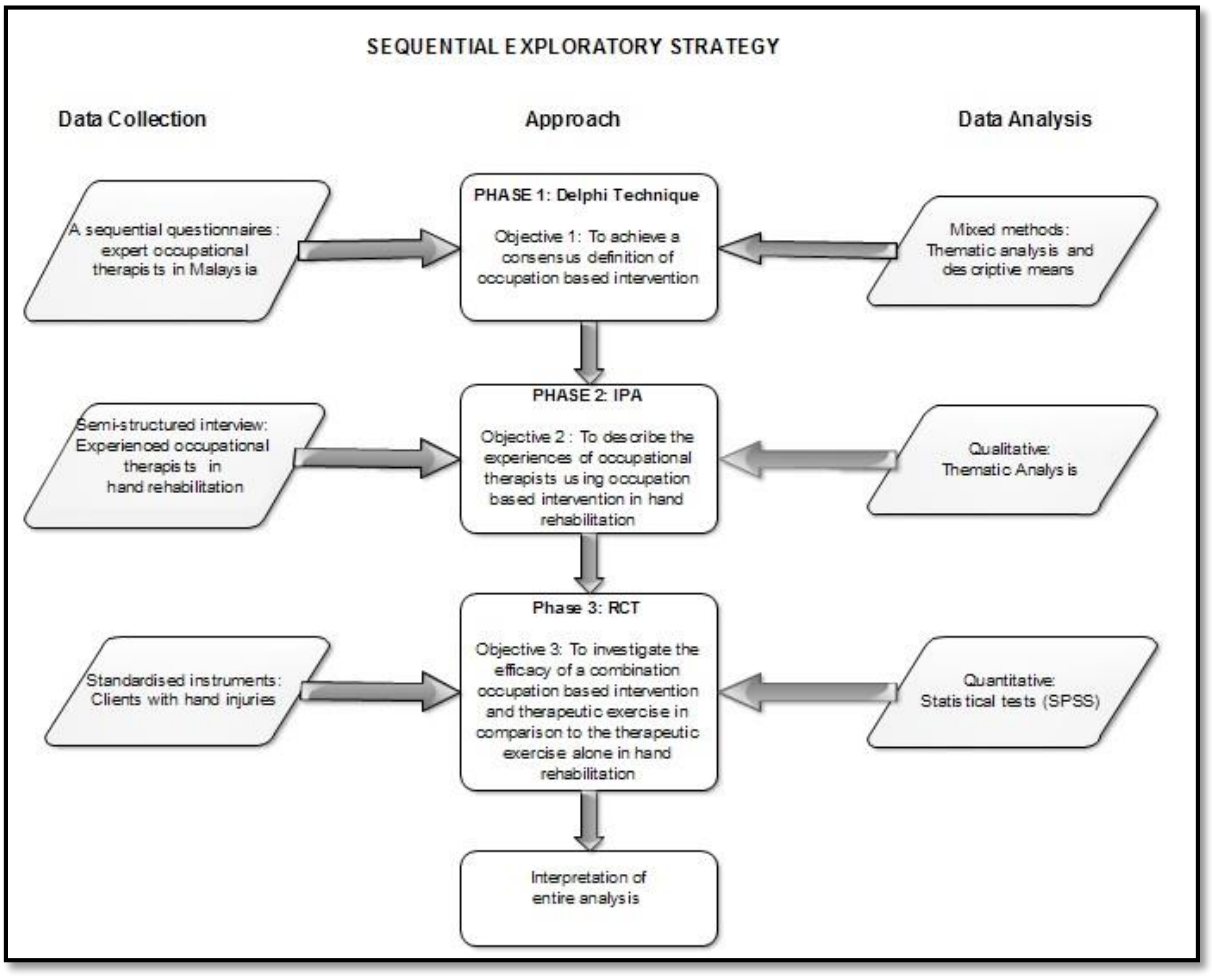

Figure 3.2. An exploratory sequential mixed methods design highlighting the data collection methods, approaches and data analysis.

3.4 Rationale for using exploratory sequential mixed methods design

The rationale for using a sequential exploratory mixed methods research design was due to pragmatism. Pragmatism became an umbrella foundation of this design (Table 3.1), where each phase has different philosophical assumptions, research questions, study approaches, data types and data analysis (Creswell & Clark, 2011). The practicality of mixed methods research fits well with this study as it allows the investigator to use suitable approaches to answer the research questions (Bryman, 2006; Dures et al., 2011; Morgan, 2007; Onwuegbuzie & Leech, 2004). The Delphi technique in Phase One uses the forecasting communication development as the philosophy's assumption (Ono & Wedemeyer, 1994). Constructivism and postpositivism were used in the IPA (Phase Two) and RCT (Phase Three) studies, respectively.

Additionally, the sequential exploratory mixed methods design was used because this approach offers a development and expansion of the topic (Greene, Caracelli, & Graham, 1989). The results from the Delphi study helped to develop and inform the subsequent methods, which were to further explore how occupational therapists apply OBI in hand rehabilitation using qualitative inquiry. It is important to understand how occupational therapists deliver OBI in the practice context in Malaysia. This qualitative study helped to design an intervention program that was tested in Phase Three, which aimed to examine the effectiveness of a combination of OBI and Therapeutic Exercise (TE) versus TE alone in the rehabilitation of injured hands. The study was expanded sequentially from Phase One to Phase Three to obtain a more comprehensive account of OBI in hand rehabilitation (Bryman, 2006; Greene et al., 1989).

Table 3.1. Feature characteristics of exploratory sequential mixed methods design in understanding OBI in hand injury rehabilitation.

Characteristics	**Phase One**	**Phase Two**	**Phase Three**
Philosophical Assumption		*Pragmatism paradigm*	
	Forecasting communication	Constructivism	Postpositivism
Research questions	What is the consensus definition of OBI?	How does an occupational therapist apply the definition of OBI in hand injury rehabilitation?	What is the effectiveness of OBI in the rehabilitation of client with hand injuries?
Study approach	Mixed methods: Delphi technique	Qualitative: IPA	Quantitative: RCT
Data type	Sequential questionnaire: Round 1:Open-ended Round 2: Closed-ended Round 3: Closed-ended	Individual semi-structured interview	Standardised outcome measures in hand rehabilitation
Analysis	Thematic analysis and descriptive analysis	Thematic analysis	Statistical tests

The exploratory sequential mixed methods research was also used as the framework of this research because it helps to confirm and discover hypotheses (Bryman, 2006). Phase Two helped the investigator to generate the hypothesis, which was tested in Phase Three. It was hypothesised the group who received the combination of OBI and TE (intervention group) would show significant differences in all outcome measures compared to the group that received TE alone (control group).

3.5 Integration of findings

The findings from these studies were integrated and merged together in the discussion (Chapter Seven). Results from each phase were used to develop inferences about OBI in hand injury rehabilitation. Inference is defined as integrated results obtained from the qualitative and quantitative strands (Tashakkori & Teddlie, 2008). Initial research questions were used to map the idea in integrating the results from each phase. There are some techniques that can be used to develop inferences from the findings. Firstly, a corroboration technique can be used when studies of different phases share common findings and support each other (Clark, Garrett, & Leslie-Pelecky, 2010). Bazeley and Kemp (2012) refer to this technique as 'linking' where the findings are combined together to develop a complete picture to understand the topic studied. Secondly, the divergent techniques can be used to explain and highlight the contradiction of findings from different phases. Thirdly, a transformation technique can be used when qualitative data is being quantised (Bazeley & Kemp, 2012). For example, OBI tasks that usually use by the participants in phase two were quantised using frequency count (n=no of participants used the OBI tasks). This is common in the sequential design when a single data changes form several times to develop the research questions or to support the findings (Teddlie & Tashakkori, 2009).

3.6 Conclusion

The exploratory sequential mixed methods design was employed towards examining the effectiveness of a combination OBI and TE versus TE alone in the rehabilitation of adult clients with hand injuries. Research was initiated with the Delphi technique (Phase One) and IPA (Phase Two) to define OBI and describe the experience of using OBI in hand injury rehabilitation. Following the exploratory studies (Phase One and Two), an intervention program was designed by quantised the qualitative data of Phase Two, and the effectiveness of the intervention program

was tested in Phase Three. The mixed methods design was employed because it offers a complete and comprehensive account of the topic. The pragmatism of the exploratory sequential mixed methods research design allowed the investigator to answer a set of connected questions sequentially using multiple approaches. The design permitted development and expansion of a better understanding of OBI in hand injury rehabilitation. The next chapter will present the detailed methodology and the results of the Delphi study, which was to seek a consensus definition of OBI from the perspective of Malaysian occupational therapists.

CHAPTER 4

A CONSENSUS DEFINITION OF OCCUPATION BASED INTERVENTION

4.1 Introduction

This chapter presents the detailed methodology and results for Phase One. Descriptions and definitions for Occupation Based Intervention (OBI) vary in the literature. OBI is assumed to be based on occupation and is seen as a means and as an end. OBI also includes all levels of interventions in occupational therapy as long as the goal is occupational performance. OBI can also be described as a therapeutic process that emerges during the therapy session. Given the literature does not offer a conclusive definition of OBI nor of what constitutes OBI, the aim of Phase One was to seek a consensus definition of OBI from the perspective of Malaysian occupational therapists using a Delphi technique. The rationale of the design, sampling technique, data collection procedures and analysis is discussed in this chapter. The results will be presented and discussed before making a conclusion.

4.2 Methodology

4.2.1 Study design

The Delphi technique formed the basis of this exploratory study (Figure 4.1), which aimed to achieve a consensus definition of what constitutes OBI. The Delphi technique is defined as '*a technique used to achieve consensus through using a forecasting process to determine, predict and explore group attitudes, needs and priorities*' (Keeney, Hasson, & McKenna, 2001). It is a mixed methods research technique that usually collects qualitative data in the first round and quantitative data in subsequent rounds (Keeney, Hasson, & McKenna, 2006). The Delphi technique is characterised by using expert panels, maintaining anonymity and continuing through an iterative process until consensus is achieved (Keeney et al., 2001). This technique has been chosen for this study because it is appropriate for when there is a lack of evidence in the existing literature, and where potential experts are spread over a wide

geographical location (Jones & Hunter, 1995). Ethical issues were appropriately considered and addressed throughout this study. Ethical approvals to conduct the study were obtained from the Economic Planning Unit Malaysia (UPE: 40/200/19/2865—Appendix F1), Institute for Public Health Malaysia (NMRR-12-53-10918—Appendix F2.2), and Human Research Ethic Committee of James Cook University (H4559—Appendix F2.3).

4.2.2 Sampling

Purposive sampling was used to select the participants for this study. For the purpose of this study, an expert is defined as an occupational therapist or occupational therapy educator holding a senior position (Kuipers & Grice, 2009) and who is nominated by peers to have pertinent expertise in occupational therapy (Jensen, Gwyer, & Shepard, 2000). Thus, the inclusion criteria were: (1) occupational therapists or occupational therapy educators who held a senior position; (2) qualified at least with a bachelor degree in occupational therapy; and (3) had at least five or more years' experience in the field of occupational therapy practice. An expert, defined by five years of occupational therapy practice was verified by previous research (Unsworth, 2001). Malaysian occupational therapists who were working outside of Malaysia were excluded from the study.

Initially, the Head of the Occupational Therapy Service and the President of the Malaysian Occupational Therapy Association (MOTA) were approached to obtain a list of occupational therapists who met the inclusion criteria. A simple survey was prepared, inviting occupational therapists from various backgrounds to nominate expert occupational therapists and occupational therapy educators in Malaysia. The compiled list consisted of 52 eligible occupational therapists and occupational therapy educators. In mid-June 2012, an invitation letter was sent to all eligible participants, and 15 consented to participate in the study.

4.2.3 Data collection and analysis procedure

Data was collected using a sequential questionnaire. Three rounds of Delphi technique were employed to achieve a consensus definition and to determine what constitutes an OBI in Malaysia (Figure 4.1). Prior to data collection, the questionnaire for each round was pilot-tested and revised to reduce ambiguity and to improve the clarity of each question/statement. Two occupational therapists were invited to answer and comment on the first, second and third round of questionnaires. A time frame of four weeks was given for every round to allow participants sufficient time to complete the questionnaire. One week before the due date an email was sent to each participant reminding them to complete the questionnaire. All three rounds of Delphi were conducted online using a Google form application. This application provided a platform to collect online responses in a spreadsheet format.

Delphi round one

In early July 2012, the link of the first round survey was emailed to all 15 participants who consented to take part. The first round survey consisted of open-ended questions (Appendix G3.1), which acted as an idea generation strategy to formulate the definition of OBI. The questionnaire was constructed broadly, asking the experts to suggest ideas using open-ended responses (Keeney et al., 2001). The questionnaire was then analysed qualitatively using the simplified versions of Colaizzi's thematic analysis (Creswell, 2007). The responses were thematically grouped under a limited number of categories and statements were developed under these categories to form the questionnaire for the second round of inquiry (Jones & Hunter, 1995). Parallel coding and development of the statement were done by the

investigator and primary advisor to reduce potential bias in interpreting the response by a single analyst.

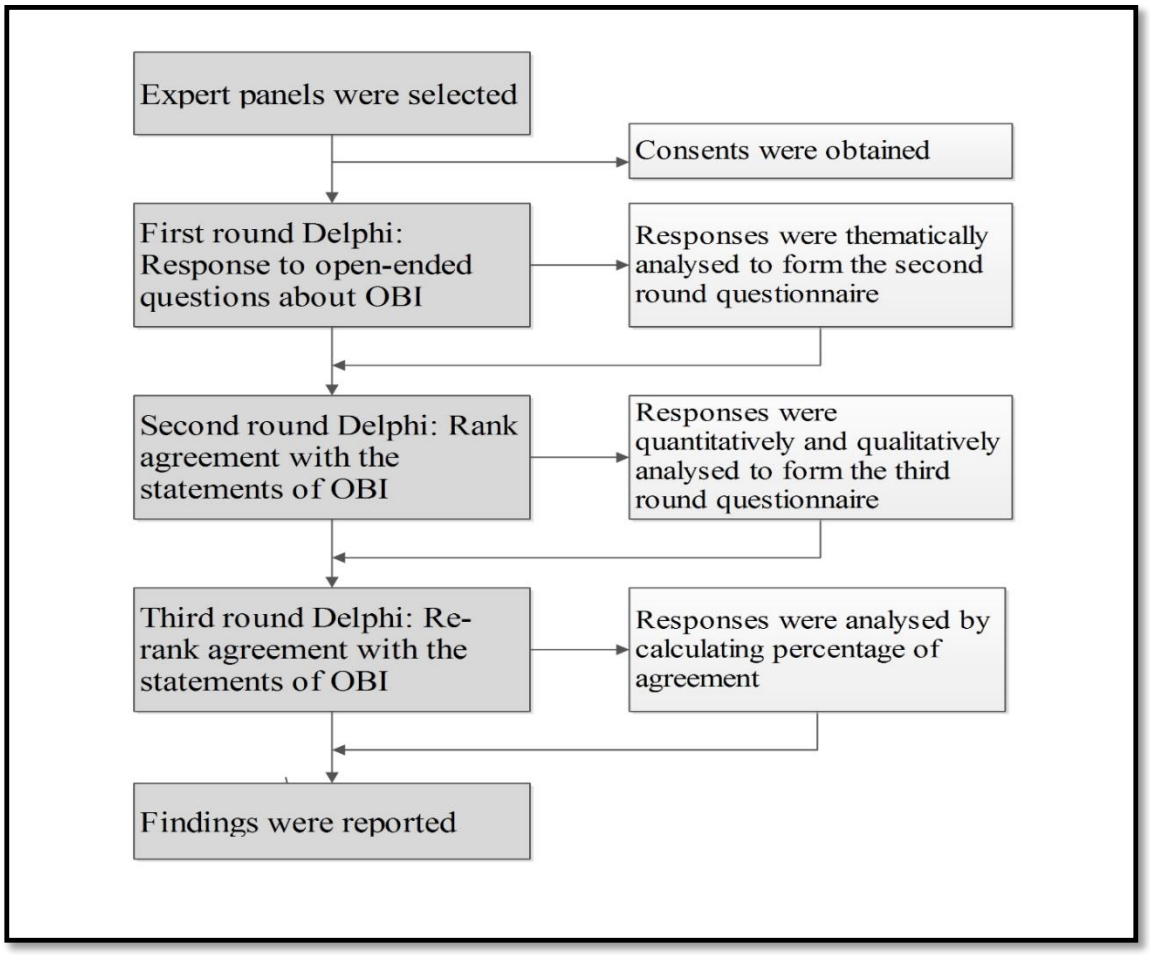

Figure 4.1. The Delphi process.

Delphi round two

For the second round questionnaire (Appendix G3.2), the survey link was sent to the same participants at the end of August 2012. The participants were asked to rank their agreement on the statements about OBI using a four point Likert-type scale ranging from: (1) strongly disagree, (2) disagree; (3) agree; and (4) strongly agree (Mullersdorf & Ivarsson, 2011). Additionally, comment boxes were provided for participants to comment on the statements or

to add new information. The responses in the second round were analysed quantitatively using the percentage of agreement.

Statistical Package for Social Sciences (SPSS) version 22.0 for Windows was used to calculate the percentage of agreement for each statement. The level of consensus set in this study was ≥ 70% as recommended by Sumsion (1998), which meant more than two-thirds of the participants must agree with each statement in each Delphi round (Keeney et al., 2006; Mullersdorf & Ivarsson, 2011). For the Delphi study there is no universally accepted level of agreement, with some studies accepting a majority from 51% to 80% (Hasson, Keeney, & McKenna, 2000). The level of agreement needs to reflect the importance of the outcome. If the participants made a comment on the statements, the comment was synthesised and rephrased to enhance the clarity of statements for the third round Delphi questionnaire. Similarly, the additional information from participants was analysed and synthesised, and if appropriate, contributed to the development of a new statement in the third round Delphi.

Delphi round three

In the third round questionnaire (Appendix G3.3), participants were asked to rank the agreement again, but were limited to either agree or disagree with the statements to achieve the final consensus. In addition, participants were supplied with the analysis of the second round questionnaire to help them re-rank the agreement about the statements. A comment box was also provided at the end of the questionnaire. The questionnaire was completed in early November 2012.

4.3 Results

All fifteen participants completed all three rounds of the survey. All of the participants had more than five years' experience in clinical practice, including seven participants who were occupational therapy educators. Ten of them qualified with a Bachelor Degree, three with a Master's Degree and two with a Doctor of Philosophy. Detailed descriptions of participants are shown in Table 4.1.

Table 4.1. Descriptions of participants (n=15).

Gender	
Male	6 (40%)
Female	9 (60%)
Age group	
21–30 years old	3 (20%)
31–40 years old	3 (20%)
41–50 years old	9 (60%)
Professional qualification	
Bachelor degree (BSc)	10 (66.7%)
Master's degree (MSc)	3 (20%)
Doctor of Philosophy (PhD)	2 (13.3%)
Position	
Occupational therapist	8 (53.3%)
Occupational therapy educator	7 (46.7%)
Clinical experience	
5–9 years	6 (40%)
10–14 years	4 (26.7%)
15–19 years	1 (6.7%)
20–24 years	4 (26.7%)

4.3.1 Delphi round one

The responses from the participants were varied. Some responses were very brief whilst others were more detailed. Three categories emerged from the analysis of the first round questionnaire, namely the definition, the characteristics of OBI and challenges of OBI. Three statements were developed under the definition category (Table 4.2). Eight sub-categories emerged under the characteristics category consisting of thirty-six statements. Five sub-categories emerged under the challenges category consisting of forty-two statements for the second round questionnaire.

4.3.2 Delphi round two

In the second round, all three statements under the definition category, twenty-seven statements under the characteristics categories, and eighteen statements under the challenges categories achieved the pre-set consensus level (Table 4.2). One of the participants believed that Statement number 23 was a double-barrelled statement whereby *occupation as a means and as an ends* should be separated into two statements in round 3. Statement number 23 was therefore removed in round 3 and was substituted by Statements number 24 and 25. Another participant made a comment on Statement number 78. The word 'Ministry of Health Malaysia' was changed to 'Malaysian Occupational Therapy Association' because the participant said it is the role of the association to provide the guideline about OBI. Additionally, three participants added new information, which led to the development of three new statements (Statements 34, 48 and 60). Forty statements did not achieve the consensus level in round two; six under the characteristic categories and thirty-four under the challenges categories. However, the statements had not been revised as none of the participants made further comments or suggestions for improvement.

Table 4.2. Level of consensus for each statement based on 15 participants.

No. Statement	% of consensus		
	[‡]R2	[§]R3	Net Change between R2 & R3
Category 1: Definition of occupation based intervention			
1. An intervention on occupational performance that is meaningful, matches the client's goal and takes place within the client's actual context/environment.	100	100	0
2. An intervention that includes all levels of interventions such as preparatory and purposeful methods, as long as the end goal is occupational performance.	80.0	80.0	0
3. An intervention that consciously uses the client's occupations and purposeful activities as a healing agent or treatment medium.	86.7	86.7	0
Category 2: Characteristics of occupation based intervention			
Sub-category 1: The client-centred intervention			
4. Matching the client's goals.	100	100	0
5. Specifically focused on the occupation that the client aims and desires to do.	100	100	0
6. Depending on client's own priorities in their occupations.	100	100	0
7. Identified as meaningful to the client.	100	100	0
Sub-category 2: The intervention forms			
8. Using the client's daily occupations as the treatment medium.	86.0	93.3	+1
9. Implementing treatment on occupations that have been identified problematic to the client.	100	100	0
10. Preparatory and purposeful methods are used to achieve occupational performance goal.	60.0	73.3	+2
11. Using tasks that can generate income.	20.0	26.7	+1
12. Using materials related to the client's occupation.	60.0	93.3	+5
13. Using a task that has an end product.	73.3	73.3	0
14. Using simulated occupations.	80.0	80.0	0

[‡] R2 – Round 2
[§] R3 - Round 3

Sub-category 3: The outcome of intervention			
15. To promote, restore and maintain occupational performance.	100	100	0
16. To facilitate engagement in occupation within the client's real context.	100	100	0
17. To engage clients in their occupational roles.	100	100	0
18. To enable the client to achieve their optimum level of functioning.	86.7	86.7	0
19. To remediate dysfunctional components by using the client's daily occupation.	93.3	86.7	-1
Sub-category 4: The operational framework			
20. The Social Model.	53.3	46.7	-1
21. The Model of Human Occupation.	100	100	0
22. The Canadian Model of Occupational Performance.	100	100	0
23. The concept of occupation as therapy: *Occupation as a means and as an end*.	83.3	-	0
24. The concept of occupation as therapy: *Occupation as means*.	-	100	0
25. The concept of occupation as therapy: *Occupation as an end*.	-	100	0
Sub-category 5: The evaluation and assessment			
26. Using top-down approach.	80.0	86.7	+1
27. Using the occupational profile to identify the client's meaningful occupations.	100	100	0
28. Requiring occupational therapists to know what motivates people to engage in occupations.	100	86.7	-2
29. Requiring client's ability to describe their occupations, habits and roles.	100	93.3	-1
30. Using client-centred assessment to address the client's needs and problems.	100	100	0
Sub-category 6: The gradable and modifiable intervention			
31. Can be graded to suit the level of capability of the client.	100	100	0
32. Can be modified to suit client's capabilities.	100	100	0
Sub-category 7: The contextual factors			
33. Occur in the client's context such as the physical environment, cultural and social support.	83.3	83.3	0
34. Occur after the use of preparatory and adjunctive methods, moving toward the end goal, which is	-	40.0	0

occupational performance.**			
Sub-category 8: The occupation based practice			
35. Should not be the main treatment in an acute setting.	46.7	40.0	-1
36. Occupation based intervention is core to occupational therapy intervention.	60.0	93.3	+5
37. Occupation based intervention represents the identity of occupational therapy.	80.0	86.7	+1
38. Can differentiate between the roles of occupational therapists and physiotherapists.	100	86.7	-2
39. Occupation is infused or incorporated across the assessment, intervention and outcome phases.	93.3	93.3	0
Category 3: Challenges of occupation based intervention			
Sub-category 1: The client factors			
40. The client does not value 'independence' in daily living.	46.7	60.0	+2
41. The client is not really bothered about the outcome of intervention.	33.3	40.0	+1
42. The client is more impressed and motivated by sophisticated and advanced equipment.	86.7	80.0	-1
43. The client is not interested in carrying out occupation based intervention.	60.0	53.3	-1
44. The client is not motivated to do the occupation based intervention.	60.0	66.7	+1
45. The client does not understand the purpose of the occupation based intervention.	80.0	73.3	-1
46. The client's understanding of the recovery process e.g. the client is not ready to engage in occupations until they gain maximal level of strength, and is fully recovered.	100	100	0
47. It is difficult to obtain the cooperation of client when practising occupation based intervention.	40.0	53.3	+2
Sub-category 2: The occupational therapist factors			
48. Occupational therapists rarely use a client-centred approach in practice.**	-	73.3	0
49. Skill and knowledge in applying a client-centred approach is lacking among occupational therapists.	66.7	93.3	+4
50. Occupational therapists lack the creativity skills to practise occupation based intervention.	93.3	93.3	0
51. Skill in grading activities is lacking among occupational therapists.	80.0	80.0	-

** New statement added in round 3

52. Basic skills in activity analysis are lacking among occupational therapists.	60.7	73.3	+2
53. Occupational therapists are not able to link preparatory/adjunctive methods to occupational performance.	60.0	53.3	-1
54. Occupational therapist rarely uses occupation based assessment in daily clinical practice.	66.7	93.3	+4
55. Occupational therapists have limited knowledge and understanding about occupation based intervention.	86.7	73.3	-2
56. Occupational therapists are not sufficiently well prepared and well trained to practise occupation based intervention.	73.3	80.0	+1
57. Occupational therapists have negative attitudes toward occupation based intervention.	53.3	40.0	-2
58. Occupational therapists underestimate the value and power of occupation	53.3	53.3	0
Sub-category 3: The contextual factors			
59. The Malaysian cultural value of relying on family members to serve the sick client is a challenge to occupation based intervention.	86.7	93.3	+1
60. Bureaucracy and power differential in Malaysia Healthcare System e.g. occupational therapists have to follow doctor's orders.**	-	100	0
61. The dominance of the medical model in healthcare delivery makes it difficult to practice occupation based intervention.	80.0	93.3	+2
62. Lack of awareness about the role of the occupational therapist by other professionals limits referral for occupation based intervention.	86.7	93.3	+1
63. Multidisciplinary members always perceive that movement and strength are essential requirements for function.	93.3	93.3	0
64. Multidisciplinary members do not understand the purpose of occupation based intervention.	80.0	80.0	0
65. Lack of cooperation from other multidisciplinary members makes it difficult to practise occupation based intervention.	46.6	73.3	+4
66. Practising occupation based intervention makes occupational therapy services less significant than other multidisciplinary professionals.	20.0	13.3	-1
67. Occupational therapy will not be competitive or useful in modern healthcare if practitioners only using occupation	20.0	26.7	+1

based intervention.			
Sub-category 4: Occupation as treatment modality			
68. Occupation based intervention is less useful and meaningful to the client.	26.7	26.7	0
69. Limited evidence on the efficacy of occupation based intervention.	60.0	86.7	+4
70. Occupation based intervention is less practical in an acute care setting.	66.6	80.0	+2
71. Occupation based intervention is outdated if used for a long period of time.	33.3	20.0	-2
72. Occupation based intervention is less attractive.	46.7	33.3	-2
73. Providing good, observable and measurable outcomes in the domain of occupation is difficult.	73.3	73.3	0
74. Balancing the use of occupation based intervention and preparatory methods in practice is difficult.	53.3	60.0	+1
Sub-category 5: Logistic issues			
75. Documenting and reporting occupation based intervention is difficult.	53.3	46.7	-1
76. Practising occupation based intervention consumes a lot of time.	66.7	80.0	+2
77. Practising occupation based intervention is difficult due to time constraints and heavy workloads.	86.7	73.3	-2
78. Lack of specific guidelines offered by the Malaysian Occupational Therapy Association (MOTA) on occupation based intervention.††	86.6	80.0	+1
79. Providing a similar context and environment in which the client's occupations take place is challenging.	100	100	0
80. The department is not set up for practising occupation based intervention.	86.7	86.7	0
81. Appropriate equipment and sources for practicing occupation based intervention are lacking.	86.7	86.7	0
82. Practising occupation based intervention demands more space.	60.0	33.3	+4
83. No occupation based assessment is available to be used in the department.	40.0	53.3	+2

†† Statement rephrased

4.3.3 Delphi round three

In round three, the consensus level of the three statements under the definition category remained the same. Three statements under the characteristics category finally achieved consensus (Statement numbers 10, 12, and 36) and in addition, two new statements were developed based on Statement number 23 in round two. Under the challenges categories, nine more statements (Statement numbers 48, 49, 52, 54, 60, 65, 69, 70 and 76) achieved the pre-set consensus level including two new statements that were developed in the second round. As a result, fifty-eight statements achieved the pre-set consensus level; thirty-one statements under the characteristics categories and twenty-seven statements under the challenges categories. One participant made changes in the Statement numbers 8, 11, 19, 20, 26, 29, 35, 37, 41, 42, 43, 44, 45, 53, 56, 59, 62, 66, 67, 74, 75 and 78, while two participants made changes to Statement numbers 10, 28, 38, 52, 40, 47, 52, 55, 57, 61, 70, 71, 72, 76, 77, and 83 (Table 4.2) . Four participants made changes to the Statement numbers 10, 15, 26, 30, 48, 49, 54, 65, 69, and 82. For Statement numbers 12 and 36, 5 of the participants modified their score. Four statements under the characteristics categories and seventeen statements under the challenges categories did not achieve consensus in round three.

4.4 Discussion of findings

4.4.1 Definition and essential elements of occupation based intervention

This study was designed to achieve a consensus definition and to explore the elements of OBI from the perspective of Malaysian occupational therapists. The purpose was to enable definition consistency amongst practitioners and academics both in practice and also in education. A clear

definition of OBI is also important for further research, and for those who are planning to conduct systematic reviews and quantitative studies. The results from this study showed a common consensus (100%) was reached for the definition of OBI as '*an intervention on occupational performance that is meaningful, matches the client's goal and takes place within the client's actual context*'. This definition supports *occupation as an ends* (Trombly, 1995). The formulation of the definition also supports the Conceptual Tools for Building Occupation based Practice developed by Pierce (2001a), which are characterised by occupational appeal, intactness and accuracy. In the formulated definition 'meaningful to the client' is similar to occupational appeal, 'matches the client's goal' and is related to occupational accuracy and providing the intervention within the client's context as 'occupational intactness' (Pierce, 1998).

A strong consensus (86.7%) was indicated for the '*occupation based intervention that consciously uses the client's occupation and purposeful activity as the healing agent or treatment medium*'. Trombly (1995) and Gray (1998) refer to this as *occupation as a means*. The difference between Trombly's (1995) and Gray's (Gray, 1998) descriptions relate to the definition of occupation. Trombly (1995) describes *occupation as a means* to use purposeful activities whilst Gray (1998) describes *occupation as a means* to use the client's occupation to improve performance skills. The results of this study support both assertions, that the purposeful activity and the client's occupations can be used to remediate client abilities and impairments. As one of the participants stated *'We can use pure occupation or simulated occupation to treat the client's impairments. And this is the best way to maximise the use of occupation in practice'* (Participant 9). Therefore, the simulated occupation is referred to as purposeful activity such as

practise tying shoe laces or buttoning a shirt in the clinic (American Occupational Therapy Association, 2008).

Interestingly, a high consensus (80.0 %) was also achieved for the definition of OBI to include the use of different types of intervention forms such as preparatory and purposeful methods as long as the end goal of intervention is occupational performance. Not all of the occupational therapists are necessarily following a strict step by step progression of the treatment continuum as these steps may overlap and occur simultaneously (Early, 2013). However, when using the adjunctive, enabling and purposeful methods, it is believed that occupational therapists must be able to link the techniques with the client's occupational performance. Balancing the use of these techniques and OBI in practice is postulated to produce a better outcome (Goldstein-Lohman et al., 2003). As reported in the literature, the preparatory methods, such as adjunctive and enabling methods, are used to prepare the client for occupational performance (American Occupational Therapy Association, 2014; Early, 2013).

As three definitions of OBI reached consensus, we have combined these statements to present a clear view of what constitutes OBI: OBI is '*an intervention on occupational performance that matches the client's goal, is identified as meaningful and is done within the client's context, where the occupational therapist can also use the client's occupations and purposeful activities as a treatment medium or healing agent'*. It is also commonly agreed that preparatory and purposeful methods can be incorporated into the OBI to prepare the client for occupational performance.

4.4.2 Other elements of occupation based intervention

In this study, other elements related to OBI were identified. Firstly, there was a general agreement among the participants that OBI embraces the client-centred approach where it should be matched, focused and prioritised to the client's goal, and be meaningful to the client. Participant 3 said: *'According to my knowledge, occupation based intervention is about providing an intervention based on the type of occupational performances that is much needed by the clients in terms of personal care, work or leisure.'* In realising the client's goals and needs, the client-centred approach is used to guide the occupational therapist to work in partnership with the clients. Occupational therapists continued using this approach in practice because they found it to be effective and to match the fundamental values and beliefs of the occupational therapy profession where the client has the right to make a choice and engage in the satisfying occupation (Law & Baptiste, 2002).

Secondly, conceptual frameworks that guide the occupational therapists in using OBI in practice refer to the models, theories and approaches that inspired occupational therapists to put occupation central to the intervention. Participants in this study stated that the conceptual frameworks that lead them to OBI included the Social Model, the Model of Human Occupation (MOHO), the Canadian Model of Occupational Performance (CMOP) and the theories of *occupation as a means and as an end*. In contrast, a study in the USA found that occupational therapists use conceptual frameworks that incorporate elements such as: (1) participation in occupation; (2) removing barriers to occupational performance; (3) solving problems with the client; (4) occupational story making; (5) occupation as a means; (6) intactness; and (7) facilitating social integration in the community in guiding them to OBI (Ward et al., 2007). In

this study only five conceptual frameworks were identified by the participants. One explanation for this finding is that occupational therapists in Malaysia generally rely on the knowledge they learnt during their pre-service training to guide them in practice. However, the Social Model did not achieve the pre-set consensus level because of the dominance of the medical model in Malaysia healthcare. One participant explained:

> *It is challenging to practise occupation based intervention in the medical model dominant healthcare delivery system in Malaysia. The bureaucratic culture and powerful position of consultants in organisations make it more difficult* (Participant 2).

Evaluation and assessment are other elements related to OBI that direct the occupational therapists to use the intervention in practice. The results in this study support previous literature that a top-down assessment leads the occupational therapists to use OBI (Goldstein-Lohman et al., 2003; Gray, 1998). The top-down assessment begins with obtaining client occupational history, and is followed by evaluation of occupational performance areas and components (Trombly, 1993). Additionally, the participants agreed that an occupational profile should be completed to understand the occupational history, daily living patterns, interests, values and needs of the client. The occupational profile is used to identify clients problems and priorities in occupational performances (American Occupational Therapy Association, 2014). In addressing the issue of occupational performance problems, participants agreed it requires the occupational therapist to know what motivates the client and for the client to describe their occupational history and daily living patterns (Chisholm, Dolhi, & Schreiber, 2004). This study supports the literature that the client-centred assessment, such as the Canadian Occupational Performance

Measure (COPM), is an important tool in identifying the client's needs, problems and priorities in occupational performances (American Occupational Therapy Association, 2014; Amini, 2008; Schindler, 2010).

This study also reinforces the idea that the ultimate goal of OBI is to enable the client to perform daily occupations within their context regardless of their disabilities and limitations (American Occupational Therapy Association, 2014; Goldstein-Lohman et al., 2003). Various intervention forms such as preparatory methods, purposeful activities, simulated occupations and the client's occupations can be used to achieve this goal. As one of the participants stated: '*We cannot just use occupations to achieve the goal, but to be consciously able to link the preparatory and purposeful methods to occupational performance'* (Participant 2). However, no consensus was reached on using the task that can generate income to the clients, an issue raised by one participant in the study. It may be unusual to other participants who do not practise this way. Participant 9 further maintained:

> *It includes the tasks that can generate income (financial outcome) to the patients. I worked with psychiatric patients for many years, and I personally think the sheltered workshop that I did with my patient is part of occupation based intervention. Although, it is just simple packaging and sorting things, it provided some income to my patients.*

Other elements of OBI that achieved consensus agreement were that occupations are gradable and modifiable to suit the client's abilities and limitations. When providing the intervention to the client, the occupational therapist must consider the client's current abilities and capacities so

that the intervention has a prospect for success (Chisholm et al., 2004; Trombly, 1995). Finally, this study found that participants agreed that OBI is a core treatment and represents the unique identity of the profession (Gray, 1998; Trombly, 1995). This study reinforces the belief that OBI is suitable to all clients regardless of their conditions and disabilities, and putting occupations in practice makes occupational therapy unique and different from other professions.

4.4.3 Challenges of applying occupation based intervention

This study found several challenges to adopting OBI in a Malaysian context. One of the challenges came from client factors. This study supports the previous findings that the client does not understand the purpose of OBI, which contributes to the challenges of applying the intervention in a practical context (Chisholm et al., 2004; Colaianni & Provident, 2010). Furthermore, the clients also have no idea about the unique role of occupational therapy and are not aware of the effect of OBI (Chisholm et al., 2004). The client's understanding about the whole recovery process was also cited as a challenge to OBI. As stated by Participant 11: '*The problem is the clients have no idea when they could engage in their daily occupations. They believe that movement and strengths are the most essential requirement for function. They stopped all their daily occupation until their conditions are fully recovered'.* Another challenge from the clients was they were more impressed and motivated by sophisticated and advanced equipment. In contrast, OBI tends only to use materials related to the client's daily occupation. One of the participants stated:

> *Occupation based intervention is less attractive, resulting in low interest and poor motivation from the clients. Some patients are more impressed and motivated with*

sophisticated and high technology equipment, which is rarely used in occupation based intervention' (Participant 1).

Challenges to OBI also came from the occupational therapist themselves (occupational therapy factors). Participants described that they were not trained or well prepared for OBI. In fact, they have limited knowledge and understanding about OBI. Occupational therapists who used impairment-based treatment usually were influenced by previous training and clinical experience (Goldstein-Lohman et al., 2003). They also agreed that skills in grading and analysing activities, which is an important aspect in providing OBI are lacking among themselves. The participants perceived that they lacked the creativity skills needed to implement OBI. The results support the statement that the credibility of occupational therapists is the challenge to OBI (Colaianni & Provident, 2010).

Providing OBI requires the occupational therapist to know the client's occupation, motivation and life situation (Baum, 2000). This can only be achieved through the use of a client-centred approach and working partnership with the clients (Baum & Baptise, 2002; Chisholm et al., 2000). However, the majority of participants admitted that Malaysian occupational therapists rarely use the client-centred approach in practice, which is a challenge to OBI. The perceived challenge was related to the skills and knowledge lacking in applying the client-centred approach among the occupational therapist. Additionally, most of the participants admitted that they rarely use occupation based assessment in practice. Therefore, the intervention is not focused on settling the client's occupational performance needs.

This study also identified a few contextual factors that restrict occupational therapists to provide OBI. Firstly was the Malaysian cultural value, where the family members feel obligated to help the clients in their daily occupations. Participant 15 stated that: *'The client normally comes to the clinic with their family members or maids. When I teach the clients how to dress or feed themselves, the maids or family members would said "Don't worry, I will do it for him/her". That's the challenge I often face'*. It has been reported that families of Asian clients tend to be overinvolved, that they might even take over the client's responsibilities and make decisions on behalf of the client (Nilchaikovit, Hill, & Holland, 1993). A second factor was the healthcare system and government policy in Malaysia (Chisholm et al., 2000). The participants said that the medically oriented healthcare services and the bureaucratic culture within Malaysia hospitals were challenges to OBI. The ultimate treatment goal is to cure the impairments without considering other issues and the occupational therapist is obligated to follow the doctor's instructions as they are higher in the health professional hierarchy in Malaysia.

Another issue for OBI within medical oriented facilities was the health professional view about the diagnosis. For instance, Participant 11 stated that: *'The multidisciplinary members always perceive movement and strength are the main requirement for function'*. Other elements such as the client's ability to perform daily occupations and how the client's context affects occupational performance are often neglected. Furthermore, lack of awareness about the role of occupational therapists by other professionals was perceived as the challenge to OBI as it limits the referrals for the interventions. Most of the participants stated that when they try to use OBI in practice, other multidisciplinary professionals do not give full cooperation because they do not understand the purpose of OBI (Chisholm et al., 2004; Colaianni & Provident, 2010).

The credibility of occupation as a treatment modality was also perceived by the participants as a challenge to OBI. They asserted that there is limited evidence on the efficacy of OBI to support their practice (Colaianni & Provident, 2010). Furthermore, occupational therapists think that certain OBI is not practical for the acute setting. Participant 7 said: '*One of my clients eagerly wanted to play golf again following an ulna radius fracture. I could not train the patient to play in the department. It is not practical in my clinical setting*'. In addition, occupations as the ultimate goal are difficult to achieve and complex to measure (Coster, 2008). It could be explained by the following statement:

> *I think providing good, observable and measurable outcomes in the domain of occupation is challenging. Sometimes, I have no idea how to do it* (Participant 6).

Logistic issues also influence the capability of occupational therapists to provide OBI. Time and workload were reported as challenges to implementing the interventions (Colaianni & Provident, 2010; Stack & Barker, 2011). The participants claimed that practising OBI consumes much time, but they do not have time for that because of a high volume of caseloads per day. Guidelines about OBI from the MOTA was also not available for occupational therapists to make proper referrals. Logistic issues such as resources, equipment and environmental context were also reported as the barriers to OBI (Chisholm et al., 2004; Colaianni & Provident, 2010; Goldstein-Lohman et al., 2003). The majority of participants agreed that appropriate resources and equipment are lacking and the occupational therapy department is not set up for OBI. The

available resources and equipment are mainly for impairment-based treatment. Additionally, one of the participants stated:

> *Because the department is not built for occupation based intervention, it is difficult for me to provide the treatment environment similar to context where the client's occupation take place* (Participant 10).

4.4.4 Implications for practice

The findings of this study hint at potential solutions to the challenges of applying OBI in the Malaysian practice context. The credibility of occupation as a treatment modality can be resolved by research (Colaianni & Provident, 2010). More research on the efficacy of occupation both as a means and as an end should be implemented to support occupational therapy practice. Logistic issues such as time constraints, high workload, limited equipment and resources and the environmental restrictions can be addressed through reflection practice (Rogers, 2007). The occupational therapists have to reflect back on how they could improve their practice and be more occupation based by using the challenges as an opportunity to improve practice. Time and client appointments may be properly scheduled to allow enough time for OBI. If the resources or materials for OBI are not available in the department, the occupational therapists can ask the clients to bring it to the clinic during the appointment session (Chisholm et al., 2004). Otherwise, occupational therapist may try to do interventions in the client's context such as at home, the workplace or playground. When the intervention treatment is delivered in the client context, occupational therapists will have an opportunity to spot any environmental barriers to

occupational performance and the clients are not required to transfer the skills they learned in the clinic to their context (Pierce, 2001a).

Education for the clients and caregivers may help to enhance their understanding about OBI and the whole rehabilitation process. Better explanation must be given about how OBI can improve their health and wellness. Issues related to lack of knowledge and skills among the occupational therapists can be tackled by providing training and education about OBI and a client-centred approach to occupational therapists. Seminars, workshops, direct clinical training, mentoring and other continuous education may encourage occupational therapists to use OBI in practice. Occupational therapists should adopt occupations and purposeful activities as a core treatment and limit the use of remediation activities. This could avoid duplication of skills between other health professionals and emphasise the unique identity of occupational therapy (Golledge, 1998b). The dominance of the medical model and the organisational policy in the Malaysian healthcare system may not be easily changed, but occupational therapists can circulate the message about the services they provide through education and promotion to other multidisciplinary professionals. Occupational therapists need to make others understand about their role so that it can improve cooperation from other health professionals and increase referral numbers for OBI. These are a few suggestions for how to make occupation based practice happen in a Malaysian practice context.

4.5 Limitations and recommendations

One limitation of this study was that due to the anonymity of the Delphi technique, further exploration of some issues was restricted. Furthermore, the Delphi technique may lead to

conformity rather than consensus, as the participants were supplied with the analysis of the second round questionnaire. Participants might have tended to follow the majority, with the 'lonely voice' not heard, for instance in Statement number 11 (using tasks that can generate income). Additionally, the sampling bias in the Delphi technique, where the researcher sets a certain criteria instead of randomly selecting the participants might also affect the findings of this study (Keeney at al., 2006). Those who consented are also more likely to be interested in the topic, which could affect the results obtained. Only occupational therapists under the MOH were nominated by peers as experts because they were the majority in practice. Therefore, the findings might not reflect the challenges faced by occupational therapists in non-government settings and private practice. Despite the limitations, these findings represent the first study exploring Malaysian occupational therapists' views regarding OBI using the Delphi technique.

Further research could explore to what extent the occupational therapists actually use OBI in practice, where the occupational therapist is required to follow directions from the referring medical doctors. Further qualitative research could examine occupational therapists' experience of using OBI in acute care settings. For example, is the occupational therapist actually practising it, or are they just preaching it? This is reinforced by Participant 11 who stated: '*In Malaysia, the occupation based intervention may be well mentioned but the practice may not be as widely used as we wanted it to be'*. Implementing OBI in acute care settings might be challenging, as acute care continues to be dominated by the medical model, and the organisational culture within the Malaysian healthcare system is dominated by bureaucracy and power.

4.6 Conclusion

This study contributes to the body of knowledge for understanding how occupational therapists view OBI with regard to sociocultural aspects, healthcare policy systems and the current practice trends in Malaysia. At this stage, three definitions of OBI achieved a consensus level to provide a clear description about OBI. This study adds to the understanding of occupational therapists' views about OBI in Malaysia, and can now provide some clarity to the terminology and definitions consistently used in practice and education. Although this study is from a Malaysian perspective, some of the findings may be generalised to other countries.

The consensus definition confirmed that OBI is both a means and an end. Importantly, using occupation alone in practice is not enough. Occupational therapists and educators suggest that OBI should be incorporated with other forms of intervention such as preparatory and purposeful methods to achieve the occupational outcomes. The occupational therapist needs to be creative to incorporate and balance the use of preparatory and purposeful methods in practice. This may assist in confirming the unique professional identity of occupational therapists, particularly in Malaysia. The consensus definition of OBI in this study provides an opportunity for occupational therapists to apply a common understanding about OBI in practice and education. The outcome of this study helps occupational therapists to revise or strengthen the current practice policy to place occupations at their centre of practice. The next chapter will describe detailed methodology and results of an Interpretative Phenomenological Analysis (IPA) study, which was explored by applying the definition from the results of this study.

CHAPTER 5

OCCUPATION BASED INTERVENTION IN HAND INJURY REHABILITATION: EXPERIENCES OF MALAYSIAN OCCUPATIONAL THERAPISTS

5.1 Introduction

This chapter discusses the experiences of occupational therapists providing Occupation Based Intervention (OBI) in the rehabilitation of clients with hand injuries. Findings from Phase One contributed to a consensus definition of OBI from the perspective of Malaysian occupational therapists where OBI was perceived both as a means and as an end. *Occupation as an end* refers to occupation that matches the client's goals, is identified as meaningful and performed within the client's context, while *occupation as a means* refers to the client's occupations and purposeful tasks as a treatment medium or healing agent. By applying these definitions, the aim of Phase Two was to describe the experiences of Malaysian occupational therapists providing OBI for their clients with hand injuries. This study provides an in-depth understanding of how OBI is delivered to the clients, and the issues of applying the intervention in hand therapy practice.

5.2 Methodology

5.2.1 Design

An Interpretative Phenomenological Analysis (IPA) approach was used for the current study. IPA is described as a dynamic process, where the researcher uses an interpretative method to understand the participant's personal world as much as possible (Smith, 1996). IPA involves a double hermeneutic, whereby both participants and researchers attempt to make sense of certain phenomenon or experiences (Smith, 2004). This approach was used to develop a thick description about the participants' experience in using OBI with clients having hand injuries (Fade, 2004). Approvals to conduct this study were obtained from the Economic Planning Unit, Malaysia (EPU 40/200/19/2865—Appendix F1), the Institute for Public Health, Malaysia (NMRR-12-53-10918—Appendix F2.2) and the Human Research Ethics

Committee of James Cook University, Australia (H4558—Appendix F3.1) in accordance with standard ethical guidelines. As per ethical guidelines for confidentiality adherence, all names within the participant quotes are pseudonyms.

5.2.2 Sampling

Purposive sampling was used to recruit occupational therapists working in hand rehabilitation, with at least five years' experience in this field. Occupational therapists with more than five years' experience in the occupational therapy field in a previous study were considered as experts (Unsworth, 2001). Occupational therapists working in academic fields were excluded as they are not directly involved in clinical practice and service provision. A list of occupational therapists who met the inclusion criteria obtained from the Head of Malaysia Occupational Therapy Service were invited to participate in the study. Subsequently, sixteen occupational therapists were identified and contacted to participate in the study. Consent was obtained from each participant before the data collection.

5.2.3 Data collection procedures and analysis

Semi-structured in-depth interviews were used because this allow the researcher to follow up interesting issues that emerge during the interview (Smith, 2004). Appointments were made with the participants for a face-to-face interview. All interviews were digitally recorded and immediately following each interview, the participant's overall responses were recorded in the researcher's reflective diary. Interviews were conducted in a quiet room at the Occupational Therapy Unit when the participants were not attending to any patients or other duties. All interviews were conducted by the investigator from December 2012 to January 2013. An interview guide (Appendix H3) was used to obtain rich and comprehensive

responses from the participants. Some questions from the interview guide were adapted from previous literature and the rest of the questions were constructed to fulfill the research objectives. The participants were asked how they apply OBI according to the concept of *occupation as a means* and *occupation as an end*. A brief explanation about *occupation as a means and an end* was given to participants if they were not familiar with the terms before the interview. Probe and prompt questions were used accordingly during the interview to enrich and reconfirm certain information from and with the participants. The interviews lasted between 45 and 120 minutes depending on the participants' responses. All interviews were transcribed verbatim and checked for accuracy with the audio recording before the analysis. All transcripts and audio recordings were stored according to the data storage policy of James Cook University and were only accessible for the purpose of this study.

Data was thematically analysed using the IPA approach as described by Smith and colleagues (2009). The first transcript was read and reread a few times to gain a deep understanding about the participant's personal view. Initial notes were made on the manuscript to identify emergent themes. Connections between the themes were searched to develop super-ordinate themes. Next interviews were then analysed and potential or shared themes across all the participants were identified to develop final super-ordinate themes and sub-ordinate themes.

5.2.4 Triangulation strategies

Member checking using a focus group discussion was conducted with four participants to verify the results of the initial analysis, and who were also asked to give comments and/or add information to clarify the issues further. All occupational therapists who participated in the study were invited to participate in the focus group discussion, however only four consented to participate due to time and budget restrictions. The comments and additional

information from the focus group discussion were then used to strengthen and refine the final themes. Triangulation of analysts was employed, where the investigator (Che Daud, AZ) and primary advisor (Yau, MK) did individual coding and then compared results to eliminate potential bias and illuminate blind spots that may arise from a single analyst (Patton, 2002). In-depth and thick descriptions were used to explain the results from the participants' context.

5.3 Results

5.3.1 Participants' details and practice setting

All sixteen occupational therapists consented to participate and were interviewed individually. They consisted of ten female and six male occupational therapists who were working in hand rehabilitation at the time of the interview. Participants were either qualified with a diploma (n=8, 50%) or bachelor degree (n=8, 50%) in occupational therapy. A diploma or bachelor degree from the Ministry of Education's accredited institutions is required for practicing occupational therapy in Malaysia. Their locations of practice are all over Malaysia, including Sabah and Sarawak (Malaysia Borneo). Participants hold different positions in the Occupational Therapy Units and have various years of experience in occupational therapy and hand therapy practice. All participants had direct contact with hand therapy clients and were working at public hospitals under the MOH. The demographic details of the participants are shown in Table 5.1.

Damia was an occupational therapist who was employed at the largest hospital in Malaysia. She had five years' experience in hand rehabilitation. At the time of the interview, she was a junior occupational therapist with 95% of her workload allocated to direct contact with hand clients every day. The other 5% was allocated for clients with stroke. She was a degree holder

in occupational therapy from one of the universities in Malaysia. Damia was quite positive about using OBI in her practice because she was trained to do it since university. She was one of the hand team members at her workplace, and was working closely with micro-hand surgeons.

Table 5.1. Participant demographic data (Age range: 30–51 years, Mean age: 40.81)

Pseudonym*	Age	Gender	Qualification	Experience in hand rehabilitation (years)	Direct contact with hand clients (% of total client load per month)
Damia	35	Female	Dip. OT	5	95
Billy	39	Male	Dip. OT	7	100
Husain	36	Male	BSc. OT	6	85
Idris	49	Male	BSc. OT	6	60
Melur	37	Female	BSc. OT	6	90
Daisy	42	Female	Dip. OT	7	100
Anita	43	Female	BSc. OT	8	90
Rosni	39	Female	Dip. OT	7	90
Melati	38	Female	BSc. OT	6	95
Bavani	45	Female	BSc. OT	7	90
Kesuma	30	Female	Dip. OT	5	100
Chan	51	Male	BSc. OT	18	90
Bolhan	38	Male	BSc. OT	6	90
Nurul	39	Female	Dip. OT	5	90

*Pseudonyms have been used to protect the anonymity of participants.

Zul	42	Male	Dip. OT	5	95
Shima	50	Female	Dip. OT	6	80

Billy was an occupational therapist at a public hospital in Sabah. He graduated from a College of Occupational Therapy under the MOH with a diploma in occupational therapy. Billy held a junior occupational therapist position and had been working as an occupational therapist for approximately ten years. When the interview was conducted, Billy had seven years' experience in hand rehabilitation. Similarly to Damia, Billy also worked closely with a hand surgeon, and the referrals usually came straight from the surgeon during the clinic or ward round. Billy had 100% direct contact with hand clients.

Husain was an occupational therapist at one of the hospitals east of the Malaysia peninsular. He was also the head occupational therapist for his unit. Husain has six years' experience in hand rehabilitation and orthopaedic rehabilitation. Husain had been interested in hand rehabilitation since he was an occupational therapy student. He graduated with a degree in occupational therapy. Referral cases for hand therapy came from the orthopaedic clinic because there was no Hand Clinic or Microsurgery Unit at the hospital. He had 85% of his workload allocated to direct contact with hand clients and another 15% with Congenital Talipes Equinovarus cases.

Idris worked at one of the public hospitals in the northern Peninsular of Malaysia. He had been an occupational therapist for approximately 17 years, and started to specialise in orthopaedic and hand rehabilitation 6 years ago. Prior to that, he was a general occupational therapist with experience in all areas. Idris held a senior position in the Occupational Therapy Unit. He had 60% of workload allocated to direct contact with hand clients and another 40%

with other orthopaedic cases. Idris started his career as an occupational therapist with a diploma from the Malaysia School of Occupational Therapy, but he continued to study for a bachelor's degree after a few years of service. Idris was positive in using OBI and had used OBI in hand rehabilitation practice.

Melur was an occupational therapist at a public hospital in the centre of Kuala Lumpur. She worked at a hand clinic with other occupational therapists. She worked closely with a microsurgeon and other multidisciplinary members at the unit. Melur had specialised in hand rehabilitation for six years. Melur had a bachelor degree in occupation therapy and held a senior position in the clinic. Melur had approximately 90% of her workload allocation for direct contact with hand clients per month.

Daisy was an occupational therapist in Malaysia Borneo, Sarawak. She graduated from the College of Occupational Therapy, and had been working as an occupational therapist since 2001. Initially, she was a general occupational therapist before she started to specialise in orthopaedic and hand rehabilitation seven years ago. Daisy worked closely with the hand specialists, and attended ward rounds and the hand clinic on a regular basis. She had 100% direct contact with the hand clients per month. She was positive about using OBI in hand rehabilitation, but rarely applied it in practice.

Anita described herself as using OBI in hand therapy practice. She was an occupational therapist at the largest hospital in Kuala Lumpur, and had been working at the hand satellite clinic with other hand specialists. Anita obtained a diploma in occupational therapy from the College of Occupational Therapy, and then completed her bachelor degree after 13 years of service. Anita had been an occupational therapist for approximately 15 years, and she had 8

years' experience in hand rehabilitation when the interview was conducted. Anita held a senior position in the hand unit. She had 90% of her workload allocated to direct contact with hand clients per month. In addition to her years' of experience in hand rehabilitation, Anita had a few months' attachment experience in hand rehabilitation in the USA.

Rosni held a senior position in an Occupational Therapy Unit and had been working in orthopaedic and hand rehabilitation for approximately seven years. Rosni graduated from the College of Occupational Therapy with a diploma. She had 90% of workload allocated to direct contact with hand therapy clients per month. Rosni admitted that she occasionally used OBI with her hand clients.

Melati started her career as an occupational therapist with a diploma from one of the universities in Malaysia. After four years working at one of the hospitals in west of Peninsular Malaysia, she continued her study to the bachelor degree level via part-time study. Melati had been working as an occupational therapist for approximately eight years when she was interviewed, with six years' experience in orthopaedic and hand rehabilitation. She worked with a hand specialist and had 95% of workload allocated to direct contact with the hand therapy clients per month. She held a junior position in the Occupational Therapy Unit when the interviewed was conducted.

Bavani was an occupational therapist at one of the hospitals in Selangor. Bavani was a senior occupational therapist with 19 years' experience in various fields of occupational therapy. She had specialised in orthopaedic and hand rehabilitation seven years ago. Bavani described using OBI as outdated, and rarely used it in practice. Bavani qualified with a bachelor degree

in occupational therapy, and had 90% of workload allocated to direct contact with hand therapy clients per month when the interviewed was conducted.

Kesuma was a junior occupational therapist with five years' experience in orthopaedic and hand rehabilitation. She graduated from the Collage of Occupational Therapy with a diploma. Kesuma worked at a hand clinic with a microsurgeon and a physiotherapist. She had 100% workload allocation of direct contact with hand therapy clients per month. Kesuma was positive about using OBI with her clients.

Chan was an occupational therapist at a university hospital in Kuala Lumpur and was an occupational therapy manager at the hospital. Chan had 25 years' experience in occupational therapy, and had been specialising in hand rehabilitation for about 18 years. He had produced his own protocol for tendon injury rehabilitation. Chan had 90% of his workload allocated to direct contact with hand therapy clients and another 10% with other orthopaedic cases. He has a diploma in occupational therapy from the College of Occupational Therapy, and a bachelor degree from a university in the UK. Chan was very positive about using occupations in hand rehabilitation.

Bolhan was an occupational therapist at a university hospital in Kuala Lumpur. Bolhan started his career as an occupational therapist with a diploma in occupation therapy and then completed a bachelor degree via part time study. He had six years' experience in hand rehabilitation and works closely with a hand surgeon professor at the university hospital. Bolhan had 90% workload allocation of direct contact with the hand therapy client per month, and most of the cases were referred from the professor. Bolhan was positive about using OBI in hand rehabilitation.

Nurul had been an occupational therapist for approximately 15 years with experience in various occupational therapy settings, including working at a disability rehabilitation centre before she settled down at a public hospital in west of Malaysia Peninsular. She graduated from a university with a diploma in occupational therapy. She held a senior occupational therapist position with 90% of her workload allocated to direct contact with hand therapy clients per month. Nurul had five years' experience in hand rehabilitation. She was quite prejudiced in using OBI because she thinks it cannot be done in an acute setting such as in hand rehabilitation.

Zul was an occupational therapist at a public hospital in south of Malaysia peninsular. He had been an occupational therapist for approximately 17 years in various settings. In 2007, he started to specialise in hand rehabilitation because he was passionate about hands. Zul qualified from the College of Occupational Therapy with a diploma. He had 95% workload allocation of direct contact with hand therapy clients per month. He described that he uses OBI in his daily hand therapy practice.

Shima was a senior occupational therapist at a hospital in east peninsular of Malaysia. She had been an occupational therapist for approximately 19 years, but had specialised in hand rehabilitation for the past 6 years. She graduated from the College of Occupational Therapy and has been working at many public hospitals in Malaysia before her current workplace. Eighty percent of her workload was allocated to direct contact with hand therapy clients every day. Shima was positive in using OBI, but only applied it to hand therapy clients occasionally.

5.3.2 Super-ordinate and sub-ordinate themes

Five super-ordinate themes emerged from the analysis, namely 'Occupation as a means', 'Occupation as an end', 'Benefit of OBI', 'Challenges of OBI', and 'Making OBI a reality' (Figure 5.1). The participants' contributions to the themes are shown in Table 5.2. All participants expressed positive experiences despite struggling to provide OBI in hand injury rehabilitation.

Super-ordinate theme one: Occupation as a means

This theme illustrates how occupational therapists use occupations and purposeful tasks as the healing agent. Four sub-ordinate themes emerged: treatment modalities, therapeutic benefits, home-based hand therapy (HBHT) and evaluation of hand function. Participants described that the modalities for *occupation as a means* can be occupations or purposeful tasks. Participants described that Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and leisure activities are often chosen as treatment modalities. Occupational therapists believed that when providing *occupation as a means*, the occupations and purposeful tasks selected should be relevant and meaningful to the clients. One of the participants said: '*I usually provide them with tasks that simulate their* [clients] *daily occupations*' [Husain]. Another participant said: '*Beware when prescribing tasks such as sewing, arts or crafts for male clients for example, it might not be relevant to them*' [Billy]. Participants described that they have to complete the client's occupational profile (e.g. occupational history and experiences, daily living patterns, values, needs and interests) to determine what is meaningful and relevant to the clients.

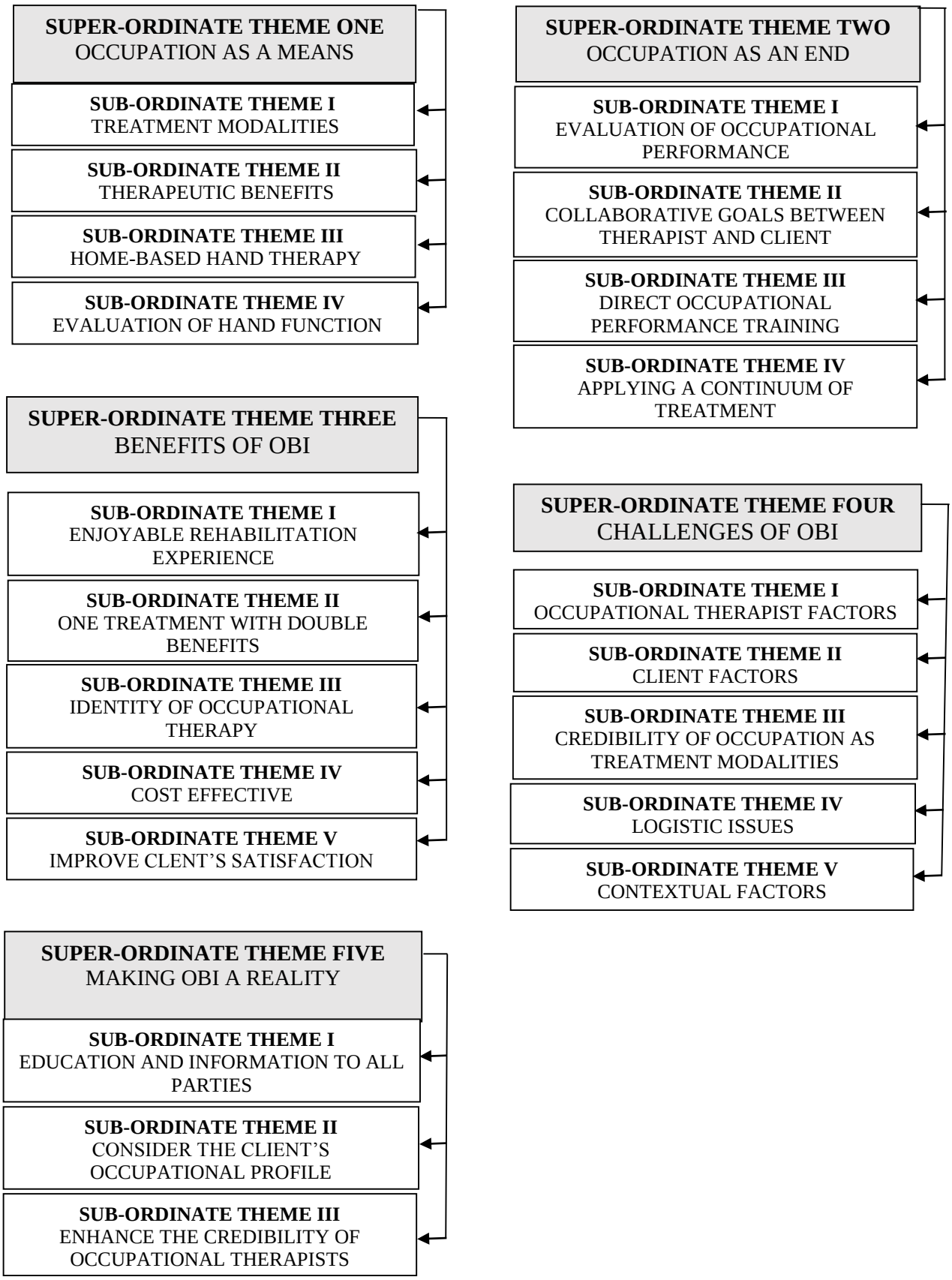

Figure 5.1. Outline of super-ordinate and sub-ordinate themes developed from interpretative phenomenological analysis.

Participants believed that before prescribing *occupation as a means* to the clients, the therapeutic benefits of occupations or purposeful tasks must be properly analysed for a better treatment outcome. They encouraged the clients to use the injured hand as much as possible when adopting *occupation as a means*. Participant Damia said: '*The reason why I encourage my clients to use the injured hand as much as possible is to avoid "learned non-use" syndrome. Learned non-use occurs when the clients lose their hand functions as a result of not using it*'. Participants suggested using challenging tasks with the clients, but with the prospect of success to avoid frustration. The tasks can be graded according to duration/time, level of difficulty, number of repetitions/sets, distance and resistance. One of the participants said: '*To avoid frustration, I would consider the client's ability when selecting the tasks'* [Melur]. Participants suggest that they use *occupation as a means* when the clients were out of the protective stage and currently not under any specific treatment protocol such as tendon or nerve repair. Participant Chan said: '*The protective stage is a phase where the injured bone, muscle, joint, nerve or tendon is immobilised for a certain time duration* [based on treatment protocol] *to promote healing and to avoid further damage to the injured structures. For example, the protective phase for an injured tendon is up to five to six weeks'*. Participant Bolhan said: '*I engage the clients to do these tasks* [occupation as a means] *when the client is in the active rehabilitation stage, which means the clients can move their hand freely and are not restricted by any treatment protocols*'.

Kesuma stated that: '*One of my clients had poor pinch grip strength after a scaphoid fracture, and I used pinching pegs tasks to improve the pinch strength. I also advised the client to continue practicing with the clothes pegs while she was doing the laundry at home*'. Other than using *occupation as a means* in the clinic, participants recommended the client to use *occupation as a means* as HBHT. Since *occupation as a means* uses clients' daily

occupations and purposeful tasks, participants described how the material and resources are available in the clients' home. Participant Chan stated that: '*I always think whatever objects or materials the client has at home. We* [occupational therapists] *can use it as a therapeutic tool*'.

In assessing clients' conditions, participants used standardised assessments such as the goniometer, dynamometer, pinch gauge and sensibility tests to identify components' dysfunction. Once dysfunctions had been identified, the occupations or purposeful tasks prescribed to the clients were mainly targeted to reduce the dysfunctions. For example, one of the participants stated that: '*After I identified the problem through standardised assessments, I will choose the occupational tasks that are rich with therapeutic benefits to improve the components' functions'* [Kesuma]. Participants highlighted that they monitor the client progression regularly to make sure the occupational tasks prescribed were suitable and benefited the clients.

Super-ordinate theme two: Occupation as an end

This super-ordinate theme describes how the occupational therapists provide *occupation as an end*. Four sub-ordinate themes emerged: evaluation of occupational performance, collaborative goals between therapist and client, direct occupational performance training and applying a continuum of treatment. Participants initiated *occupation as an end* with an assessment to identify occupational performance problems. An interview is often conducted during the first session with the client to obtain a complete occupational profile. Observations, in addition to standardised and non-standardised assessments are often used in the evaluation process. Participant Nurul stated that: '*We* [occupational therapists] *use Modified Barthel Index (MBI) as stated in the Standard Operating Procedure of Malaysian*

Occupational Therapy Service'. However, most participants described the MBI as just a screening tool, and it is not sensitive enough to detect occupational performance issues of the clients with hand injuries. They often counter-assessed the clients with the Canadian Occupational Performance Measure (COPM) or other functional assessments such as Functional Independence Measure, Disability of Arm, Shoulder and Hand (DASH) and Jebsen-Taylor Hand Function Test (JHFT). Participants highlighted that they use a top-down approach for assessing clients, where assessments begin with occupational performance issues and move down to components' dysfunctions.

Goals were set up collaboratively with the clients when the occupational performance problems were identified. Participants described that they discuss and design the intervention plan according to the client's priorities and needs. Participant Anita stated that: '*I will discuss with clients about their occupational performance problems, and then decide which problems should be intervened in the first place*'. COPM was used to identify the clients' priorities and occupational performance problems by the most participants.

Participants expressed that the main aim of *occupation as an end* is to engage the clients in meaningful occupations. They described *occupation as an end* in two ways: direct occupational performance training or using a continuum of treatment. Direct occupational performance training involved strategies such as providing aids, adaptations and environmental modifications to enable the clients to engage in their daily occupations, especially at the initial stage of injury. Participants initiated an explanation on the purpose of training and how the clients can perform the problematic occupational tasks using these strategies. If the client could not understand, they might do a demonstration and let the clients try to perform the tasks during the therapy session. Participants stated that they usually used

whatever abilities and assets that the clients have before they decided to provide assistive devices or do modifications. Participant Zul stated that: '*Providing an assistive device is the last resort when the clients really need it*'.

Another way of providing *occupation as an end* was through a continuum of treatment. Participants described that *occupation as an end* involves various intervention types in occupational therapy as long as the end goal is occupational performance. Participant Daisy stated that: '*I use various methods to prepare the clients for occupational performance*'. Participants highlighted adjunctive methods (e.g. exercises, splinting, physical agent modalities (PAMs), and sensory stimulations); enabling activities (e.g. simulated activities such as practice board, *theraputty*, fine motor activities); and purposeful tasks (e.g. practise writing and typing, meal preparation tasks, practise dressing in clinic) as the stepping stones for successful occupational performance. Implementing *occupation as an end* using this approach empowers the clients to perform their occupational tasks similar to before their injuries. This approach is often used when the clients have been trained and have mastered the direct occupational performance training.

Super-ordinate theme three: Benefit of occupation based intervention

This theme describes the perceived benefit of OBI according to the following sub-ordinate themes: an enjoyable rehabilitation experience, one treatment with double benefits, identity of occupational therapy, cost effective and improve client's satisfaction. Participants claimed that OBI provides an enjoyable rehabilitation experience to both occupational therapists and the clients as therapeutic relationships between clients and therapists are developed during the therapy session. It makes the clients feel more comfortable to share their problems and concerns. Most participants stated that OBI is more fun than doing hand exercises. A

participant stated that: '*Engaging clients in their occupational tasks either as a means or as an end is exciting rather than pressing theraputty*' [Chan]. Another participant stated that: "*When using OBI as a means with traumatic hand injury clients, it could divert the clients' attention from pain and the uneasiness of the injured hand*' [Rosni].

Most participants described OBI as a treatment with double benefits. OBI makes the clients competent in occupational performance, as well as improves the functions of the injured hand when the selected occupational tasks are meaningful to the client and inherent with the therapeutic benefits. A participant stated that: '*Using OBI is like killing two birds with one stone* [double benefits]. *It helps to improve occupational performance and the function of the injured hand*' [Billy]. All participants expressed that occupational therapists should focus on occupation because it represents the identity of occupational therapy. Idris stated that: '*Occupation is our core treatment. It represents the identity of our profession and we should integrate the occupation in hand therapy in a creative way*'.

OBI was also described to be a cost effective treatment, where it can be used in the clinic and home as therapy modalities. Participants described that OBI uses material and resources that are related to client occupations. Thus, all resources and materials are within the client context (e.g. home, workplace and school). Participant Chan stated that: '*I can open a hand therapy clinic without buying expensive equipment. I can turn the rubbish things such as rubber bands and recycle springs into therapeutic tools* ((Smile))'. Participants also described that OBI helps to improve client satisfaction when the intervention could enhance occupational performance and functions of the injured hand. Some participants expressed that their clients feel surprised with the outcome of OBI. A participant stated: '*One of my clients said: I didn't know these simple activities could make my hand better*' [Kesuma].

Super-ordinate theme four: Challenges of occupation based intervention

This theme illustrates several challenges of using OBI in hand injury rehabilitation. Five sub-ordinate themes emerged: occupational therapy factors, client factors, credibility of occupation as treatment modalities, logistic issues and contextual factors. Occupational therapist factors were identified as one of the challenges by some participants. They described they are lacking in creativity skills to implement OBI with the clients. When being asked why OBI requires creativity skills, a participant answered: '*I've got to be creative in selecting occupation as a remediation agent and I've got to analyse the therapeutic benefits of the occupation. It's complicated indeed*' [Damia]. Besides, some participants felt that their knowledge and training of OBI were lacking. Bavani stated that: '*I was trained 18 years ago and at that time, there were no occupational frameworks or models. We* [occupational therapist students] *were trained based on the medical theories*'. Another participant stated: '*We* [occupational therapists] *claimed that we are expert in providing occupation, but we didn't have much knowledge and training about it*: [Bolhan]. Participants described that the influence of colleagues was also a challenge to practise OBI. Husain stated that: '*I eagerly want to focus on occupation when I started my career, but I feel awkward when I'm the only one who practises this way*'.

Another challenge that was highlighted by the participants is the client factors. Most participants said their clients were much more concerned with the symptoms and impairments rather than functions, which distances themselves from applying OBI. Participants described they sometimes disregard the occupational performance issue when placing so much attention on reducing and eliminating impairments. Additionally, some participants worried about the clients' perception of the occupational therapy intervention. Participant Bavani stated that:

'*The clients might not have confidence with the intervention when we only use everyday occupations as therapy'*. Some participants stated the clients prefer high technology and sophisticated machines rather than everyday occupations as therapy tools. Nurul stated that: '*I think clients are more confident with the machines and equipment because they have no idea about the therapeutic benefits of occupation*'. Participants also described that their clients prefer hands-on therapy such as Range of Motion (ROM) exercise, massage and application of PAMs than actively doing occupational tasks during the therapy sessions.

The credibility of occupation as the remediation agent was also described as a challenge to OBI. When being asked about *occupation as a means*, Bolhan answered that: '*I rarely found evidence to support this practice*'. Participant Bavani stated that: '*This* [occupation as a means] *is such old school and not straightforward treatment*'. Participants also described that a strict therapy protocol such as for fracture, tendon and nerve repair restricts them from using OBI in their practice. A participant highlighted that: '*I must follow the protocol to prevent tendon or nerve rupture during the protective stage and I wouldn't allow the clients to use their hand actively. The right time to use it is when the client is in active rehabilitation phase*' [Chan].

All participants expressed that logistic issues such as time, workload, space and resources are the barriers to practising OBI. They described that time and workloads are the major factors that restrict them from using OBI with clients' hand injuries. One of the participants said that: '*Providing occupation as an end requires one to one sessions and consumes so much time. It could not be done in a group as clients may have different occupational performance problems*' [Kesuma]. Participant Melur expressed that: '*Sometimes I need to attend to more than three clients at one time. I have to maintain my statistics as urged by the top of the*

organisation'. Some participants described that their unit was not set up and equipped with appropriate facilities for OBI. Participant Kesuma stated that: '*I've no space to do ADLs training or work rehabilitation program here. This unit is just equipped with modalities to treat impairments and body functions*'. Participants also described that resources for OBI in the unit are limited to basic ADLs only. Participant Melati stated that: '*For IADLs, I don't usually train the client, but I do a purposeful task in the clinic and encourage the client to transfer the skills to home*'.

Contextual factors such as organisational culture, inadequate information of occupational therapy roles, no support from the top of the organisation and the Malaysian culture of serving 'sick clients' were also identified as challenges to practise OBI in hand injury rehabilitation. Participants described that they have to follow what referring doctors order them to do as the doctors' position was perceived to be higher than the occupational therapists. Nurul stated that: '*I've got to follow what the doctors order me to do as stated in the referral form*'. Another participant stated that: '*It's a dilemma whether to serve what the doctors ordered us to do or what occupational therapists actually should do*' [Melati]. Participants described that the referring doctors might not have any idea of what occupational therapists can offer: *'Some doctors don't know what occupational therapists can do for hand clients. As usual, they just refer for splint*' [Nurul]. In addition, participants highlighted that they have no support from the top of the organisation to implement OBI. Kesuma stated that: '*Well, they are just concerned with the number of clients that we treat. It's difficult to get budgets and new staff*'. Participants also highlighted that it was difficult to implement OBI within Malaysian culture, which allows the clients to take a sick role. Participant Bavani expressed that: '*Sometimes, they* [family members] *are over protective to the clients, they still want to help even the clients can do by themselves*'.

Super-ordinate theme five: Making occupation based intervention a reality

The last theme discusses several strategies to make OBI a reality in hand injury rehabilitation. Three sub-ordinate themes emerged: education and information to all parties, consider the clients' profile, and enhance the credibility of occupational therapists. Participants described that the most important thing is education and information to clients, caregivers, multidisciplinary professionals and all people who are involved in the rehabilitation process. Clients and caregivers must be supplied with adequate information and education about the hand condition, the purpose of OBI and how occupational therapy can help them. Husain highlighted that: '*Clients actually have no idea what occupational therapy can offer them, they only expect medications and exercises when they came to the hospital*'. Participants believed that if the information and education were provided diligently, the clients and caregivers would feel confident and more cooperative towards OBI. However, participants stressed that sufficient and clear information regarding the role of occupational therapy should be delivered to multidisciplinary professionals through some programs such as campaigns, back door promotions, and hospital presentations and conferences. Participant Idris highlighted that: '*We've got to spread what we can offer to get referrals*'.

Participants said the clients' occupational profile including roles, interests, motivations, social support, cultural values and environment must be considered. They stressed that a complete occupational profile of clients helps them to provide the appropriate treatments for the clients. Chan stated: '*Occupation as a means and as an end must be relevant and related to the clients' daily living patterns, except the clients want to explore new things such as new hobbies, jobs and roles*'. Participant Shima provided an example: '*Let's say that the client is*

an assistant at a restaurant, meal preparation training is relevant and meaningful to him. While doing the task, we should encourage him to use the injured hand as much as possible'.

Enhancing the credibility of occupational therapists is one of the strategies that was suggested by the participants. According to participants, interpersonal and creativity skills of occupational therapists should be strengthened to make OBI a reality. A participant emphasised that: '*Creativity skill is important to design OBI while interpersonal skills are important to deliver OBI*' [Chan]. Participant Idris stated that: '*Occupational therapists should be more innovative in using occupations as the therapy agent, as well as setting occupation as an outcome of intervention*'. Participants also stated that occupational therapists should be motivated, dynamic and cannot just rely on the knowledge from their pre-service training. Participants suggested that occupational therapists need to attend training, workshops and seminars to improve their knowledge and skills in applying OBI. Most participants agreed that OBI should be taught and emphasized since pre-service training to transform the current service, which is into component-driven practice. A participant stated that: '*I think OBI should be emphasised after the college or university time, the situation will be gradually changed if the occupational therapy students are trained with OBI'* [Husain]. Finally, participants suggested occupational therapists should be encouraged to do a reflective practice to evaluate the challenges and opportunities in applying OBI with clients' hand injuries. Participant Billy stated that: '*We can use the opportunity to overcome challenges and use strengths to compensate weaknesses. Reflective practice is important to overcome all barriers to practise OBI*'. They described maintaining OBI in hand therapy can be a reality if occupational therapists use these strategies and possess the mentioned criteria.

5.4 Discussion of findings

This study describes the experience of occupational therapists applying OBI according to the concept of *occupation as a means and as an end*. Generally, the occupational therapists had positive perceptions of applying OBI for clients with hand injuries. Findings from this study are consistent with evidence that *occupation as a means and as an end* can be merged together within a single therapy when the occupational tasks are provided at the same time so as to improve both occupational performance and the function of injured hands (Gray, 1998). Apart from offering the double benefits to clients, OBI is an individualised and client-centred intervention (Estes & Pierce, 2012; Pierce, 2001a). Providing *occupation as a means and as an end* must be meaningful and relevant to the individuals. A complete occupational profile such as occupational history and experiences, patterns of daily living, interests, values, and needs helps the occupational therapist to know what is meaningful and relevant to the clients (American Occupational Therapy Association, 2014). Although *occupation as a means and as an end* have different purposes, the participants generally agreed that the ultimate goal for both approaches is the same, i.e. to promote independence and enhance quality of life (QoL) of the clients.

Findings further developed the notion of *occupation as a means and as an end*. *Occupation as a means* aims to rehabilitate impaired physical function using occupational or purposeful tasks (Gray, 1998; Trombly, 1995). For the best outcome the therapeutic power of the occupational task must be analysed before it is prescribed to the client (Gray, 1998; Trombly, 1995). Although *occupation as a means* can be a simple behaviour or equal to purposeful tasks, it must be related to clients' daily occupations to motivate and help them to transfer the skills for occupational performance (Gray, 1998). Occupational therapist often used ADLs, IADLs, work and leisure tasks as the therapeutic agents. The tasks should be more challenging than what the clients currently can do for the prospect of success (Trombly,

1995). It can be graded to suit the clients' abilities to avoid frustration. The clients are encouraged to use the injured hand as much as possible when doing occupational tasks to improve hand functions and to avoid learned non-use (Earley & Shannon, 2006). *Occupation as a means* might not be done in the clinic if the materials and resources are unavailable, but it can be prescribed as a HBHT. Materials and resources for *occupation as a means* are related to clients' daily occupations. For instance, cooking requires a knife, cutting board, dishes and other items. These materials and resources are available at a client's home and can be used in the therapy program.

In contrast, *occupation as an end* aims to improve a client's occupational performance. There are two ways of implementing *occupation as an end*, either using direct occupational performance training or a continuum of treatment. Direct occupational performance training is used to help the clients to cope with restricted daily living activities at the initial stage of hand injury. Occupational therapists use whatever abilities and assets that the clients have, and suggest adaptation strategies, aids and environmental modifications to enable successful occupational performance (American Occupational Therapy Association, 2014; Trombly, 1995). This approach may work well for the clients who are maladaptive to their hand injuries. *Occupation as an end* uses a continuum of treatment such as preparatory methods (adjunctive and enabling activities) and purposeful tasks to achieve the ultimate goal, which is to fulfill clients' occupational needs (Gray, 1998). However, it is believed that occupational therapists must be able to link the treatment continuum to the occupational performance goals when using this approach (Early, 2013; Fisher, 2013). Anything that was done with the clients must be directed towards restoring and improving the clients' occupational lives (Gray, 1998). This approach may take some time to enable the clients to perform daily occupations as well as before the injuries. Due to the variation of human occupations,

providing *occupation as an end* cannot be separated with the client-centred approach, which requires the occupational therapists to know the clients' needs and priorities. Thus, occupational therapists need to work in partnership with the clients to identify occupational performance issues for interventions, as well as finding the best intervention strategies and set reliable intervention outcomes (Law & Baptiste, 2002).

Occupation as a means and as an end tend to involve different evaluation approaches. *Occupation as a means* uses a bottom-up approach, while *occupation as an end* uses a top-down approach. Bottom-up evaluation approaches refer to an assessment that focuses on the deficits of component functions, while a top-down evaluation approach focuses on assessing role competency and meaningfulness (Trombly, 1993). For *occupation as a means*, occupational therapists use standardised assessments in hand therapy such as the goniometer, dynamometer, pinch gauge and sensibility tests to examine the components' deficits. Once the deficits are identified, occupational tasks that are rich in therapeutic benefits to remediate the component functions will be prescribed. For *occupation as an end*, occupational therapists use standardised assessments, non-standardised assessments, observations and interviews to identify occupational performance problems. Choosing sensitive and reliable tools is important because occupational performance is difficult to quantify (Chisholm et al., 2004). DASH is a widely used, reliable and valid tool to measure the functional status of the client with upper extremity problems (Wong, Fung, Chu, & Chan, 2007). It is suitable to use with the COPM to make sure the clients' occupational issues and needs are adequately addressed.

Findings of this study are consistent with the literature. Occupational therapists find it difficult to apply OBI because their units are too 'artificial' and equipped with component-

driven modalities (Colaianni & Provident, 2010; Estes & Pierce, 2012). *Occupation as a means and as an end* will be done if the materials and equipment are available in the unit, otherwise the clients will be provided with education and simulation training. The clients are then asked to transfer the skills during occupational performance to home or continue performing the occupational tasks as HBHT. Findings are consistent with the current evidence that other logistic issues such as time, workload and the clinic environment are barriers to the implementation of OBI in hand injury rehabilitation (Chisholm et al., 2004; Colaianni & Provident, 2010; Estes & Pierce, 2012; Stack & Barker, 2011). The clients who are concerned about their impairment and symptoms prefer high technology and hands-on exercise, and assume that OBI is not important, all of which remain as barriers to OBI. The clients' perception can be linked to a lack of understanding about the unique role of occupational therapy and the effect of OBI on them (Chisholm et al., 2000; Colaianni & Provident, 2010). Additionally, OBI is more difficult than component-driven intervention due to variation of human occupation (Goldstein-Lohman et al., 2003). Occupational therapists find there is limited evidence on the efficacy of OBI for clients with hand injuries, especially in using OBI as a means to improve impaired physical functions (Colaianni & Provident, 2010; Gray, 1998). The restrictions that are imposed by certain treatment protocols also limit the occupational therapist from using OBI with clients' hand injuries (Colaianni & Provident, 2010). OBI requires clients to be actively 'doing' during the therapy session and therefore may not be suitable for those who are still in the protective stage.

This Malaysian study highlights some barriers to practising OBI. The bureaucratic culture within MOH prescribes the occupational therapists to follow what the referring doctors ordered them to do because of the power and position differential. This situation relates to the doctors' understanding of roles and what occupational therapy can offer to the clients with

hand injuries. Thus, it is important for occupational therapists to communicate about the role and services provided for a successful collaborative practice with other health professionals (Suter et al., 2009). This study also highlights the Malaysian culture of serving sick clients as one of the challenges to implement OBI. Similarly with other Asian cultures, Malaysian culture permits regression and dependency when a health event happens to family members (Nilchaikovit et al., 1993).

5.5 Implication for future research and practice

The findings of this study suggest several strategies to overcome the challenges in implementing OBI. The clients, caregivers and multidisciplinary members should be provided with adequate information and education about the purpose of OBI (Colaianni & Provident, 2010). Clients will cooperate and be happy to engage in OBI if a clear explanation is given. Otherwise, the clients may think that OBI is just meaningless activities without any therapeutic purpose. Occupational therapists also need to disseminate a clear message about the purpose of OBI and their roles in hand injury rehabilitation so that other multidisciplinary members can refer the clients for OBI and other services. For example, occupational therapists may use the clients' interdisciplinary report to educate and inform other health professionals about the specific purpose of OBI and the goal of intervention (Whiteford & Wilcock, 2001). Interpersonal skills of occupational therapists also need to be improved for effective communication with the clients, caregivers and other health professionals, and to gain confidence to communicate with management of the organisation for support and encouragement.

The results of this study also suggest a need for formal and informal training to improve knowledge and skills of the occupational therapist in practising OBI. Occupational therapy

schools should update the curriculum, and equip the students with current knowledge and evidence around occupational sciences and occupational therapy models (Stack & Barker, 2011; Whiteford & Wilcock, 2001). This strategy will help to move away from component-driven to more occupation based practice in the future. Continuous professional development activities such as workshops, seminars and in-service training help the occupational therapist practitioners to update knowledge and skills in implementing and overcoming the barriers of OBI. Informal training such as coaching, mentoring and modeling may also encourage the occupational therapists to practise OBI with their clients.

This study also suggests the importance of occupational therapists to be reflective practitioners. Reflective practice helps to overcome the logistic issues such as time, workload, equipment, resources, costs and the clinic environment. Occupational therapists must be motivated, dynamic, creative and innovative in using the strengths and opportunities they have to compensate for the weaknesses in practice. For example, instead of training the clients in the clinic, occupational therapists may try to schedule a time for a home-based session to monitor and evaluate their client's ability to engage in meaningful occupations. Fisher (2013) stresses that occupational therapists must be able to reflect what they do, how they do it and what they think about their own doing to be more occupation based practitioners. It is not impossible to practise OBI even when the area is dominated by the medical model as long as the occupational therapists are willing to take up the challenges.

The need for more evidence of *occupation as a means and as an end* to support practice is highlighted in this study. More research on the effectiveness of OBI in improving impaired functions and occupational performance for the clients with hand injuries are needed. As OBI is a cost effective treatment, occupational therapists may be interested in exploring to what

extent OBI helps in reducing expensive healthcare expenditure. Future researchers also need to focus on exploring OBI in other areas because the way OBI is practised and challenged may be different. Occupational therapists should establish OBI in every area to enhance occupation based practice, which directly connects the core tenets of the profession (Pierce, 2003).

5.6 Limitation of study

One limitation of the study was that all participants were recruited from the MOH hospitals, and the finding may not reflect the experience of those who work in private and independent centres. Occupational therapy service in public hospitals is subsidised by the government, and it is not surprising that no participants in this study raised the issue of reimbursement in implementing OBI. Another shortcoming was the validation technique used to improve the trustworthiness of the study, where only four participants volunteered to participate in the focus group discussion because of time and budget restrictions. The results might be different if all participants could engage and contribute to the focus group discussion. The terms ‘occupation as a means’ and ‘occupation as an end’ were new to some participants in this study, and this lack of knowledge might restrict the participants from giving insightful comments and responses. Finally, the results of this qualitative study may not be generalisable to broader populations.

5.7 Conclusion

This study presents the experiences of occupational therapists in placing occupation at the centre of practice to maintain the unique identity and core business of the profession in the area that is dominated by the medical model. The perceived benefits, challenges and how the

occupational therapists struggle to provide OBI for the clients with hand injuries are highlighted. This study contributes some insights and understanding of how to use occupation optimally in practice through the theories of *occupation as a means and an end*. This concept suits the holistic concept of occupational therapy, where occupation can be used as the agent to reduce impairments and deficits, as well as help to improve clients' functional status and ability to engage in meaningful occupations following a disease or health event. The study also highlights the need for occupational therapists to do reflective practice; improve knowledge and skills; provide the clients, caregivers and health professionals with clear information; and conduct more research to enhance the evidence on the effectiveness of OBI. The next chapter presents the detailed methodology and results of a RCT study, which was to investigate the effectiveness of a combination of OBI and Therapeutic Exercise (TE) in comparison to TE only in the rehabilitation of adult clients with hand injuries.

Table 5.2. Participants' contribution to the themes.

Participant / Super-ordinate and sub-ordinate themes	Damia	Billy	Husain	Idris	Meluar	Daisy	Anita	Rosni	Melati	Bavani	Kesuma	Chan	Bolhan	Nurul	Zul	Shima
Occupation as a means																
-Treatment modalities	X	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
-Therapeutic benefits	X	X	X	X	X	X	-	X	X	-	X	X	X	-	X	X
-Home-based hand therapy	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X
-Evaluation of hand function	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Occupation as an end																
-Evaluation of occupational performance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-Collaborative goals between therapist and client	X	X	X	X	X	-	X	X	X	-	-	X	X	-	X	-
-Direct occupational performance training	X	X	X	X	X	-	X	X	X	-	-	X	X	-	X	-
-A continuum of treatment	-	-	X	X	-	X	X	-	X	X	X	X	X	X	-	X
Benefits of OBI																
-Enjoyable rehabilitation experience	X	X	X	X	X	X	X	-	-	-	X	X	X	-	X	X
-One treatment with double benefits	X	X	X	X	X	X	-	X	X	-	X	X	X	-	X	-
-Identity of occupational therapy	X	X	X	X	X	-	-	-	X	X	-	X	X	X	X	X
-Cost effective	-	X	-	X	-	X	X	X	X	-	X	X	X	X	-	X
-Improve client's satisfaction	X	X	X	X	X	X	-	X	-	-	X	X	-	-	X	X

Challenges of OBI																
-Occupational therapist factors	X	-	X	-	X	X	X	X	X	X	X	-	X	X	X	X
-Client factors	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	X
-Credibility of occupation as treatment modalities	X	X	-	X	-	X	X	X	X	X	X	-	X	X	-	X
-Logistic issues	X	X	X	X	X	X	X	X	X	X	X	-	X	X	X	X
-Contextual factors	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Making OBI a reality																
-Education and information to all parties	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
-Consider the client's occupational profile	X	X	X	X	X	-	X	X	X	-	-	X	X	-	X	X
-Enhance the credibility of occupational therapist	X	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X

CHAPTER 6

THE EFFICACY OF OCCUPATION BASED INTERVENTION FOR CLIENTS WITH HAND INJURIES

6.1 Introduction

This chapter discusses the methodology and findings of Phase Three. Given the uncertainty of outcomes and limited studies on the effectiveness of occupations and purposeful activities as a therapeutic agent to improve hand function in the literature, the purpose of this study was to investigate the efficacy of a combination of Occupation Based Intervention (OBI) and Therapeutic Exercise (TE) in comparison to TE alone in hand injury rehabilitation practice. It was hypothesised that the participants who received the combined treatment would improve in all outcome measures compared to the participant who received TE only. This chapter also discusses how the OBI protocol was developed from the findings of Phase Two. The results are discussed to provide recommendations for practice before a conclusion is made.

6.2 Methodology

6.2.1 Study design

A single centre, parallel groups Randomised Controlled Trial (RCT) study was conducted to investigate the efficacy of OBI+TE in comparison to the standard TE in hand rehabilitation. The RCT design was chosen because of its ability to determine whether a cause-effect relationship exists between the intervention and outcome, which allow the findings to be generalised to other samples, settings and times (Sibbald & Roland, 1998; Slade & Priebe, 2001). Blinding in the RCT study helps to prevent bias from investigators, assessors and interventionists in reporting the outcomes of study (Sibbald & Roland, 1998). The RCT is also capable of handling potential attrition, which is a threat to internal validity (Shadish, Cook, & Campbell, 2002). This study was conducted at the Kuala Lumpur General Hospital (KLGH) with

collaboration from the Hand Occupational Therapy Unit, and the Hand and Upper Limb Unit. KLGH is a tertiary referral hospital and the largest hospital under the Ministry of Health Malaysia (MOH). Approximately 60 to70 clients attend the Hand Occupational Therapy Unit for rehabilitation every working day. Permission to conduct the study was obtained from the Malaysian Economic Planning Unit (EPU: 40/200/19/2865—Appendix F1). This study was approved by the Medical Research and Ethics Committee of Ministry of Health Malaysia (NMRR-12-660-11901—Appendix F4.2) and the Human Research Ethics Committee of James Cook University, Australia (H4901—Appendix F4.3). This trial was registered with the Australian New Zealand Clinical Trial Registry (ACTRN12614000569606—Appendix K).

6.2.2 Participants

Potential participants were recruited from the hand out-patient occupational therapy clinic according to the following inclusion criteria: (1) had experienced bone, tendon or peripheral nerve injury to the hand, wrist or forearm; (2) were not on any hand therapy protocol (e.g. flexor/extensor tendon protocol, post fracture stabilisation); (3) had no communication and cognitive deficits; (4) were able to read and write either in Malay or English; and (5) had consented to take part in the study. Clients were excluded from the study if they had: (1) bilateral hand injuries; (2) brachial plexus, shoulder or elbow injury; (3) repetitive strain injury (e.g. tendinitis, carpal tunnel syndrome, de quervain syndrome); or (4) burn injury. Power analysis was calculated based on the findings from a comparable study (Guzelkucuk et al., 2007). Thirty-eight participants were required to detect a significant group difference ($p<0.05$) of 15 on the Disability of Arm, Shoulder and Hand (DASH) score with 80% power using *t*-test . Assuming a

maximum 20% drop-out rate as suggested in a recent systematic review (Steultjens et al., 2002), it followed that 46 participants were needed for the study.

6.2.3 Randomisation and blinding

A research assistant screened eligible clients, and offered them an opportunity to participate in the study. Verbal and written information about the study was given to the clients, and consent was obtained from the participants who agreed to take part. Before enrolment of the first participant, those who consented to take part in the study were randomly allocated into the intervention (OBI+TE) group and the control (TE) group using a computer generated random number table, which was prepared in advance. One large permuted-block method was used to balance the number of participants between the groups (Schulz & Grimes, 2002).

The research assistant was also responsible for allocating the participants consecutively into either the OBI+TE or TE group by using the random number table. Both participants and evaluators were blinded to the interventions. However, the occupational therapists who provided the treatment to the participants were not blinded or randomly allocated. The investigator of this thesis was responsible for the intervention treatment for the participants in the OBI+TE group, and an occupational therapist from KGLH provided the control treatment for participants in the TE group. The participants did not know which intervention they received as both groups were treated in different therapy rooms. Two qualified occupational therapists, as blinded evaluators, assessed the participants at baseline, post six weeks of supervised hand therapy (SHT) and post four weeks of home-based hand therapy (HBHT). Both evaluators were qualified with a Diploma in occupational therapy from MOH accredited institutions. The occupational therapists were

trained by the investigator to use all of the outcome measurements. Competency training and practice sessions were performed one week prior to the study.

6.2.4 Intervention protocol

Both groups received six weeks of SHT, followed by four weeks of HBHT. The OBI+TE group received 30 minutes of TE, and 30 minutes of OBI while the TE group received 60 minutes of TE in one therapy session, twice a week during the six weeks of SHT. In addition, all participants were provided with a paraffin bath treatment to prepare the injured hands for active mobilisation (Ayling & Marks, 2000). Application of a paraffin bath, followed by active mobilisation, has been found to be effective for reducing pain and joint stiffness, and improving grip function (Dellhag, Wollersjö, & Bjelle, 1992). The intervention was then followed by four weeks of HBHT, two hours per week. The participants in the OBI+TE group completed a home program based on OBI while participants in the TE group completed a home program based on TE. All participants were provided with a checklist diary to remind them to complete the program.

Therapeutic exercise group

During the six weeks of SHT, participants were only provided with TE after the application of a paraffin bath. The TEs used were range of motion (ROM) exercises (passive, active assisted and active) and strengthening activities (Guzelkucuk et al., 2007). The participants were provided with 20 minutes of these exercises: (1) passive/active assisted ROM; (2) active ROM; and (3) strengthening/resistive exercise. Passive ROM exercise was done by the occupational therapist, while active ROM and strengthening exercises were actively done by the participants using

theraputty and *digiflex*. The participants were gradually taught how to carry out the TE at home during the six weeks of SHT. They were asked to complete 40 minutes of each exercise that occurred in the SHT session in their home each week, for four weeks as part of their HBHT. TE modalities were provided to each participant for the purpose of HBHT.

Occupation based intervention and therapeutic exercise group

Development of OBI protocol: OBI protocol was developed based on the findings of Phase Two where the occupational therapists were interviewed on how they use *occupation as a means* in hand rehabilitation. The occupational therapists were asked to identify, based on their practical experience, occupations and purposeful tasks they considered effective to improve hand function. They also had to justify the therapeutic benefits of the occupations and purposeful tasks in the rehabilitation of injured hands. By listening to the digitally recorded interviews and reading the interviewees' transcripts, the investigator identified occupations and purposeful tasks that were recommended by the occupational therapists to their clients. Frequency counts of recommendations from the occupational therapists were recorded. Twenty-seven occupations and purposeful tasks were extracted from the interviews (Appendix L). Their justifications on the therapeutic benefits were coded according to the following codes: ROM, strength, fine motor coordination, bilateral integration, enjoyment and practical. For the purpose of the study, three selected OBI tasks were chosen based on the therapeutic benefits, frequency count of recommendation and practicality in hand rehabilitation (Table 6.1). Furthermore, these tasks were most commonly done by people in Malaysia in everyday life. The three OBI tasks were picking up small everyday objects, washing/wiping dishes and typing on a keyboard. To make the intervention more meaningful and relevant to the participants, they were asked to bring their

own materials/task/homework during the therapy session. *Occupation as a means* provided a platform for the client to practise targeted occupation in the clinical setting (Gray, 1998). For instance, some participants brought their homework/office work to be typed during the OBI session. Those who did not bring a task were provided with a paragraph of text to be typed. They were encouraged to use the affected hand as much as possible (Wilson et al., 2008), but to respect and avoid excessive pain (Cooper, 2007).

Table 6.1. The three most recommended OBI tasks, and perceived therapeutic benefits that were identified by 16 occupational therapists.

Occupation based intervention	**Therapeutic benefits**	**n**
1. Picking up everyday small objects	-Improve fingers' ROM [6 codes] -Improve fine motor and dexterity skills [6 codes] -Practical in clinic setting [3 codes]	6
2. Typing on a keyboard	-Improve fingers' ROM [6 codes] -Improve fine motor coordination [5 codes] -Improve finger strength [4 codes] -Practical in clinic setting [5 codes]	7
3. Wiping/washing dishes	-Increase ROM of fingers and wrist [5 codes] -Improve hand strength [3 codes] -Improve bilateral coordination of hand [4 codes] -Practical in clinic setting [1 code]	5

In contrast to the TE group, the participants in the OBI+TE group were provided with a combination of TE and OBI after the paraffin bath. The exercise program consisted of ten minutes of these exercises/activities: (1) passive/active assisted ROM; (2) active ROM; (3) strengthening/resistive; (4) picking up small everyday objects; (5) washing/wiping dishes; and

(6) typing on a keyboard. For HBHT, instead of practising the occupational tasks, the participants were asked to incorporate these tasks into their occupations for daily living. For instance, they were asked to wash/wipe dishes after a meal, type any tasks using a keyboard (homework/office work/replying to emails/chatting) and pick up everyday-used small objects that related to their day to day activities. They were required to complete 40 minutes of each OBI task in a week, for four weeks as part of their HBHT.

6.2.5 Data collection procedure

Following group allocation, participants were assessed by the evaluators. Evaluations were conducted at baseline, post six weeks of SHT and post four weeks of HBHT. The primary outcome measure used was the DASH disability symptom score, and the secondary outcome measures were: (1) Purdue pegboard dexterity test; (2) Total Active Motion (TAM); (3) grip strength; (4) pinch strength; (5) neuropathic pain; and (6) Canadian Occupational Performance Measure (COPM). The Purdue pegboard test was the first assessment performed to avoid muscle fatigue affecting the test outcomes as it involves a lot of repetition and fine motor skills (Eriksson & Lindberg, 2012). Participants were evaluated in a quiet room to avoid any distractions to the evaluation procedure. The evaluators began by obtaining the participant's details: age, sex, occupation, duration of injury, injured hand, cause of injury, type of injury and number of digits affected. Duration of injury was measured in weeks from the date of injury, and the number of digits affected was determined based on how many digits had limited motion after the injury. The test procedure sequence was standardised in every evaluation. The sequence of tests was as follows:

Purdue Pegboard Dexterity test

The Purdue pegboard test was used to measure fine and gross dexterity function (Shahar, Kizony, & Nota, 1998). The test has five subtests: Right Hand; Left Hand; Both Hands; Right+Left+Both Hands; and Assembly. Three measurements were taken for each subtest and the average was calculated. The test was conducted according to the manual booklet of *Purdue Pegboard Test Model 32020*. The validity of the Purdue pegboard test in assessing clients following traumatic hand injuries has been verified (Shahar et al., 1998). The study also found that the Purdue pegboard test was sensitive to differentiate between a healthy population and a population after hand injuries. Purdue pegboard dexterity was also reported to have good inter-rater and test-retest reliability (Buddenberg & Davis, 2000).

Total Active Motion (TAM)

TAM was measured using a finger goniometer while the wrist was in the neutral position and the forearm was pronated. Each joint of the digits and thumb was measured individually. The sum of all active flexion measurements of digit joints (metacarpophalangeal, proximal interphalangeal and distal interphalangeal) and thumb joints (metacarpophalangeal, interphalangeal) was calculated and the sum of all extension deficits of the digits and thumb subtracted from it, to compute the TAM (Omar et al., 2012; Simpson, 2005). It was reported that reliability and validity of joint range of motion evaluation depends on the evaluator's compliance to the measurement protocol (Simpson, 2005). Therefore, all measurements were conducted according to the standardised protocol suggested by Simpson (2005), and the same goniometer was used in all measurements.

Grip strength

A Jamar hand dynamometer was used to measure grip strength of the participants. The participants were instructed to sit with shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm in neutral position and wrist between 0° to 30° extension (Bellace, Healy, Besser, Byron, & Hohman, 2000; Mathiowetz, Weber, Volland, & Kashman, 1984). The grasp setting was positioned at the second level to give maximal contraction and to allow for full function of profundus, superficialis and interosseous muscles (Firrell & Crain, 1996). The test protocol was followed according to Simpson's (2005) suggestion. The dynamometer was calibrated before the test, and the same dynamometer was used throughout the study (King, 2013). Three measurements were taken from each participant and the average was calculated for the analysis. The Jamar hand dynamometer was not sensitive to detect small changes below five kilograms (Hogrel, 2015), but the reliability validity and reliability of the tool has been reported previously (Bellace et al., 2000; Mathiowetz et al., 1984). The Jamar hand dynamometer is considered the gold standard tool to measure grip strength in clinical practice (Hogrel, 2015).

Pinch strength

The participants' pinch strength was evaluated using a B&L Pinch Gauge. The position of the participant was similar to that used in measuring grip strength. Key pinch was selected to measure pinch strength because it is the strongest type of pinch and easier to test (King, 2013). Key pinch is also known as lateral pinch; it was tested when the pinch gauge was positioned between the pad of the thumb and the radial side of middle phalanx of the index finger (Mathiowetz et al., 1984). A previous study reported that hand position affected pinch strength measurement (Jansen, Simper, Stuart, & Pinkerton, 2003). Thus, measurement protocol as

suggested by Mathiowetz and colleagues (1984) was used throughout the study. The same pinch gauge was used by the evaluators (King, 2013), and test procedure followed Simpson's (2005) protocol. As for grip strength, the pinch gauge was calibrated before the test, and three trials were taken from the participants to calculate the average for the analysis. The B&L pinch gauge has been found to be more reliable and accurate in measuring pinch strength compared to the Jamar pinch gauge (Mathiowetz et al., 1984).

Neuropathic pain

Neuropathic pain following hand injury was measured using the Graphic Numerical Rating Scale, where zero indicates no pain and ten indicates the worst pain possible (Scudds, 2001; Simpson, 2005). The participants were asked to circle the number representing their level of pain on a graphic scale. This scale was used because it has face validity, is easier for raters to understand and is preferred by both adolescent and adult clients (Scudds, 2001; Stinson, Kavanagh, Yamada, Gill, & Stevens, 2006). The Graphic Numerical Rating Scale was reported to have a good validity and reliability, and it was reported to have good sensitivity, which allows generated data to be statistically analysed for audit and research purpose (Williamson & Hoggart, 2005).

Canadian Occupational Performance Measure (COPM)

COPM was used to determine the effect of the intervention on the participant's self-determined occupational performance goals (Law et al., 2001). COPM has been found to have good test-retest reliability and validity for people with physical disabilities (Cup, Wjm, Thijssen, & van Kuyk-Minis, 2003). It was reported to be more sensitive than DASH in measuring functional

outcomes following upper extremity injuries (Case-Smith, 2003). The participants were interviewed to identify the five most important occupational performance issues that impacted on their life following the hand injury. A scale of 1 to 10 was used, where 10 was the most important goal needed to be attained by the participant. Using the same scale, the participants were asked to rate the performance of the occupations and satisfaction with their performance. Both the sum of performance and satisfaction scores were divided by the number of identified problems to compute the overall score for analysis.

Disability of Arm, Shoulder and Hand (DASH)

DASH was the primary outcome measure used to assess symptoms and functional status after the hand injury (Alotaibi, 2008; Wong et al., 2007). DASH consists of 30 items: five items address the severity of the symptoms and the rest relate to the degree of difficulty in performing day to day activities such as activities of daily living (ADLs), instrumental activities of daily living (IADLs), work, leisure, sleep and social activities. An English and Malay version of DASH was used in the study according to the participants' preference. The participant was asked to complete the DASH questionnaire at the end of each evaluation session. DASH has been validated in many languages (Alotaibi, 2008), including Malay, and has been used to assess improvement in the functional status of clients with traumatic hand injuries (Wong et al., 2007). DASH was reported to have excellent reliability, but it is only sensitive for a short term period (Case-Smith, 2003). Although DASH has been translated into Malay language, the validity and reliability of the translation version was unsure since it was not published in literature.

6.2.6 Data analysis

All data were statistically analysed using the Statistical Package for Social Sciences (SPSS) version 22.0 for Windows. Tests included *t*-test, chi-square and Fisher's exact test to determine whether differences in participants' characteristics existed between groups at the baseline. Three sets of *t*-tests were also used to compare the groups at baseline, post six weeks of SHT and post four weeks of HBHT. Linear mixed models were used to further examine the effect of the intervention and to evaluate possible confounding effects that might have influenced therapeutic outcomes and to examine whether the effect of treatment varied among classes of participants. Linear mixed model was used because it has a unique ability to acknowledge both group and individual differences, and also allow covariates to be incorporated in test (Krueger & Tian, 2004). The participants' characteristics such as age, sex, duration of injury, injured hand, cause of injury, number of digits affected, occupation and type of injury were each treated as fixed effects to determine whether they influenced therapeutic outcomes, using individual subject as a random effect. The statistical significant level was set at $p < 0.05$ (two-tailed).

6.3 Results

6.3.1 Participant flow

Of the 681 hand therapy clients initially screened, 635 were excluded from the study (Figure 6.1). Of these, 628 clients did not meet the inclusion criteria, and seven declined to participate as they could not commit to the intervention schedule. The Hand Occupational Therapy Unit received referrals with a variety of conditions from Upper Limb Unit and General Orthopaedic Department. Most of the referrals received for the management of repetitive strain injury. Thus, this explains why high proportions of screened participants were excluded from this study. Forty-six volunteers gave their consent to participate in the study, and were randomly allocated to the

TE (n=23) or the OBI+TE (n=23) group. During the six weeks of SHT, one participant in the TE group discontinued the intervention because he was involved in a motor vehicle accident and one participant in the OBI+TE group was lost at follow-up and could not be contacted to reschedule the appointment. For the final evaluation after four weeks of HBHT two participants in each group did not come to the last follow-up for evaluation. This meant that 40 participants completed the whole procedure, with 20 participants in each group. Data of those participants who had dropped out and did not complete the trial protocol were excluded from the analysis. Missing data in the DASH were treated according to scoring guideline (Institute for Work and Health, 2006).

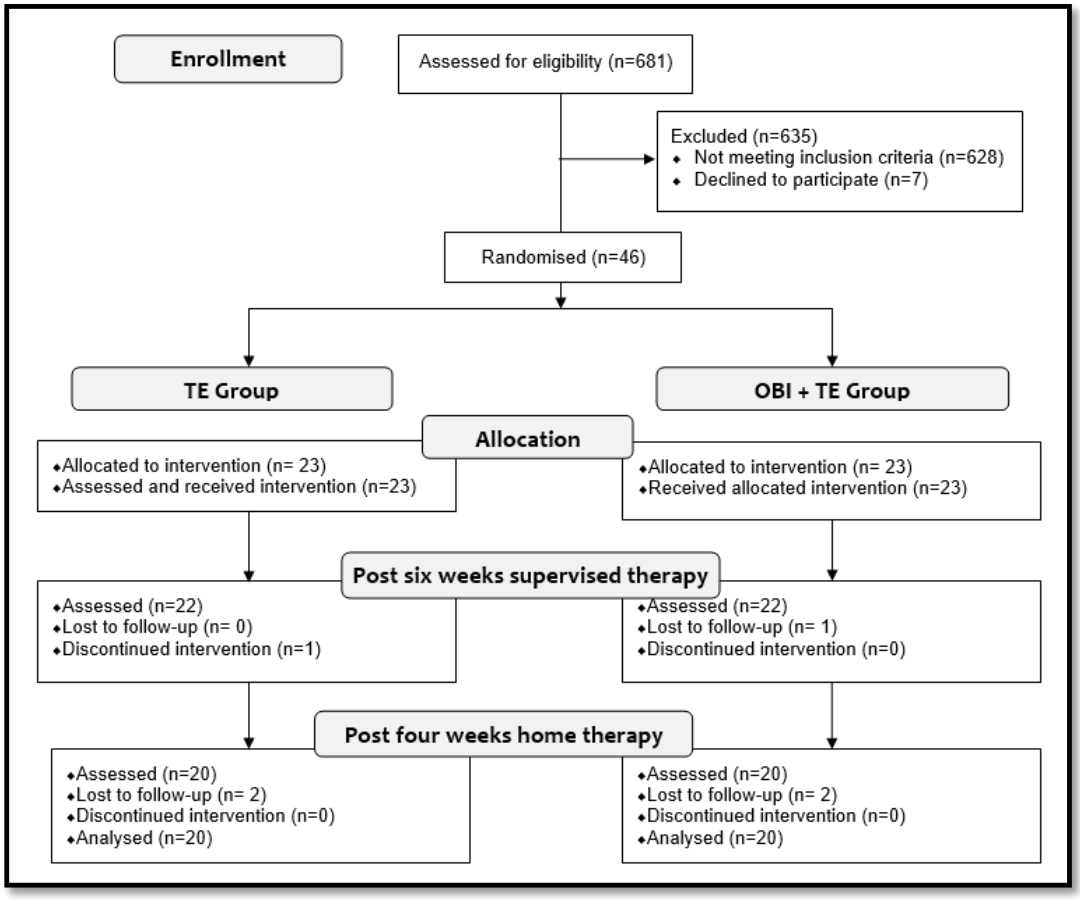

Figure 6.1 Participants' flow throughout the study.

6.3.2 Participants' characteristics and baseline evaluation

Table 6.2. Participant characteristics according to groups: OBI+TE: n= 20, TE: n=20.

Characteristic	Total	TE	OBI+TE	p-value
Age	36.20 ± 11.09	38.45 ± 12.77	33.95 ± 8.87	0.20*
Sex, no. (%)				0.28†
Men	29 (72.5%)	13 (65.0%)	16 (80.0%)	
Women	11 (27.5%)	7 (35.0%)	4 (20.0%)	
Occupation, no. (%)				0.22‡
Manual work	16 (40.0%)	8 (40.0%)	8 (40.0%)	
Office work	16 (40.0%)	8 (40.0%)	8 (40.0%)	
Housewife	3 (7.5%)	3 (15.0%)	-	
Student	5 (12.5%)	1 (5.0%)	4 (20.0%)	
Injured hand, no. (%)				0.75†
Dominant	17 (42.5%)	8 (40.0%)	9 (45.0%)	
Non-dominant	23 (57.5%)	12 (60.0%)	11 (55.0%)	
Cause of injury, no. (%)				1.0‡
Fall	10 (25.0%)	5 (25.0%)	5 (25.0%)	
Leisure/sport	3 (7.5%)	2 (10.0%)	1 (5.0%)	
Occupational/Industrial	6 (15.0%)	3 (15.0%)	3 (15.0%)	
Motor-vehicle accident	20 (50.0%)	10 (50.0%)	10 (50.0%)	
Domestic	1 (2.5%)	-	1 (5.0%)	
Type of injury, no. (%)				0.74‡
Fracture	36 (90.0%)	19 (95.0%)	17 (85.0%)	
Nerve	1 (2.5%)	-	1 (5.0%)	
Tendon	1 (2.5%)	-	1 (5.0%)	
Tendon & Nerve	2 (5.0%)	1 (5.0%)	1 (5.0)	

* *t*-test
† Chi-square test
‡ Fisher's exact test

Duration of injury (week)	9.75 ± 9.13	11.05 ± 7.40	8.45 ± 10.61	0.38*
Number of digit injury affected	3.05 ± 1.43	3.00 ± 1.56	3.10 ± 1.33	0.83*

Table 6.2 shows the two treatment groups were comparable in terms of age (p=0.20), sex (p=0.28), occupation (p=0.22), injured hand (p=0.75), cause of injury (p=1.0), type of injury (p=0.74), duration of injury (p=0.38) and number of digits affected (p=0.83). Participants were aged between 21 and 59 years. The majority of participants were male (72.5%) and were involved in manual jobs such as labourers, technicians, factory operators and mechanics. More than half of the participants had the injury in the non-dominant hand (57.5%). The main cause of hand injury was due to motor vehicle accidents involving motorcycles.

Table 6.3. Injuries according to treatment group (n=40).

Type of injuries	**TE**	**OBI+TE**	**Total**
Distal-end radius fracture	6	3	9
Ulna-radius fracture	4	3	7
Distal-end ulna fracture	-	1	1
Carpal bone fracture	2	2	4
Metacarpal bone fracture	3	2	5
Multiple digits fracture	4	6	10
Flexor tendon-nerve injury (zone v)	1	1	2
Flexor tendon injury (zone v)	-	1	1
Nerve injury (ulnar nerve)	-	1	1
Total	20	20	40

Thirty-six participants had fractures, two had tendon-nerve injury, one had nerve lesions and one had a tendon injury. Details of the types of hand injuries are shown in Table 6.3. The mean and standard deviation of injury duration and number of digits affected were 9.75 ± 9.13 and 3.05 ±

1.43, respectively. No significant difference was found between the groups at the baseline evaluation in any of the parameters (Table 6.4).

Table 6.4. Baseline measurements for the OBI+TE and TE group (n=40).

Parameter	**Baseline (Mean ± SD)**			
	Total	TE Group	OBI+TE Group	p-value[§]
DASH disability/symptom	38.79 ± 18.40	36.39 ± 19.76	41.18 ± 17.09	0.41
Total active motion	897.25 ± 181.67	897.25 ± 181.68	942.90 ± 199.50	0.45
Grip strength	9.52 ± 8.83	9.62 ± 9.79	9.41 ± 8.00	0.94
Pinch strength	2.91 ± 2.35	3.13± 2.52	2.68 ± 2.20	0.55
Neuropathic pain	3.75 ± 2.61	4.35 ± 2.74	3.15 ± 2.39	0.15
Purdue pegboard test				
Right hand	13.31 ± 2.26	13.85 ± 1.82	12.76 ± 2.56	0.13
Left Hand	11.50 ± 3.77	11.36 ± 3.88	11.64 ± 3.77	0.81
Both Hands	9.33 ± 2.90	9.76 ± 2.97	8.90 ± 2.84	0.35
Right + Left + Both Hands	33.97 ± 7.65	35.01 ± 7.47	32.92 ± 7.88	0.40
Assembly	25.37 ± 8.83	24.80 ± 10.08	25.92 ± 7.61	0.69
COPM				
Performance	5.49 ± 2.09	5.70 ± 1.79	5.29 ± 2.37	0.34
Satisfaction	5.07 ± 1.94	4.88 ± 2.27	5.25 ± 1.58	0.56

6.3.3 Efficacy of interventions

[§] *t*-test, two-tailed

Results of the outcome measures following six weeks of SHT and four weeks of HBHT can be seen in Table 6.5. There were significant differences in TAM ($p=0.04$), neuropathic pain ($p<0.001$), COPM performance ($p=0.03$) and COPM satisfaction ($p=0.05$) between the groups after six weeks of SHT. The TAM value was greater in the OBI+TE group (1167.40 ± 153.59) compared to the TE group (1060.75 ± 162.77). Participants in OBI+TE group (1.40 ± 1.79) reported less pain than the participants in the TE group (3.85 ± 1.98). Participants in the OBI+TE group were perceived to have greater COPM performance (8.75 ± 1.13) and COPM satisfaction (8.55 ± 1.23) compared to the TE Group (COPM performance = 7.56 ± 1.96 and COPM satisfaction = 7.44 ± 2.09). No significant differences were found for other parameters.

Four weeks after the HBHT, significant differences between treatment groups were found in five parameters. The DASH disability and symptom score was significantly ($p=0.02$) lower in the OBI+TE group (9.50 ± 9.14) compared to the TE group (18.64 ± 14.84). A decrease in DASH score indicated a decrease in disability and injury symptoms. TAM was significantly ($p=0.01$) higher in the OBI+TE group (1035.85 ± 179.84) compared to the TE group (1203.65 ± 133.60). Similar to the result of post six weeks of SHT, neuropathic pain was found to be significantly ($p=0.02$) less in the OBI+TE group (1.05 ± 2.01) than in the TE group (2.90 ± 2.79). COPM performance and COPM satisfaction were significantly ($p< 0.001$) higher in the OBI+TE group (COPM performance = 9.53 ± 0.64 and COPM satisfaction = 9.49 ± 0.76) compared to the TE group (COPM performance = 7.62 ± 2.03 and COPM satisfaction = 7.60 ± 2.11). No significant differences were found for other parameters.

Table 6.5. TE and OBI+TE group differences post six weeks supervised hand therapy (SHT) and four weeks home-based hand therapy (HBHT).

Parameter	**Post 6 weeks SHT (Mean ± SD)**		**P1***	**Post 4 weeks HBHT (Mean ± SD)**		**P2†**
	TE Group	**OBI+TE group**		**TE Group**	**OBI+ TE Group**	
DASH disability/symptom	21.06 ± 12.58	17.23 ± 13.28	0.35	18.64 ± 14.84	9.50 ± 9.14	0.02
Total active motion	1060.75 ± 162.77	1167.40 ± 153.59	0.04	1203.65 ± 133.60	1035.85 ± 179.84	0.01
Grip strength	19.43 ± 11.63	19.86 ± 9.05	0.90	20.29 ± 11.19	24.82 ± 9.85	0.18
Pinch strength	4.48 ± 2.13	5.08 ± 2.32	0.40	5.18 ± 2.31	5.56 ± 2.01	0.57
Neuropathic pain	3.85 ± 1.98	1.40 ± 1.79	<0.001	2.90 ± 2.79	1.05 ± 2.01	0.02
Purdue Pegboard						
Right hand	15.33 ± 1.76	15.66 ± 1.73	0.54	15.96 ± 1.84	16.26 ± 1.76	0.61
Left Hand	13.90± 2.43	14.31 ± 2.34	0.58	14.70 ± 2.19	14.99 ± 1.99	0.66
Both Hands	11.43 ± 2.11	11.45 ± 1.67	0.98	12.10 ± 1.84	12.58 ± 1.50	0.37
Right + Left + Both Hands	40.67 ± 5.81	41.60 ± 5.30	0.60	42.77 ± 5.49	43.81 ± 4.67	0.53
Assembly	33.18 ± 9.10	34.69 ± 7.11	0.56	35.53 ± 8.74	39.23 ± 6.42	0.14
COPM						
Performance	7.56 ± 1.96	8.75 ± 1.13	0.03	7.62 ± 2.03	9.53 ± 0.64	<0.001
Satisfaction	7.44 ± 2.09	8.55 ± 1.23	0.05	7.60 ± 2.11	9.49 ± 0.76	<0.001

* P1=Differences between TE and OBI+TE groups after six weeks of SHT (*t*-test, two-tailed)
† P2= Differences between TE and OBI+TE groups after 4 weeks of HBHT (*t*-test, two-tailed)

6.3.4 Examining the effect of intervention using mixed effects models

A significant effect of measurement time (M) was expected and found for all outcome measures, regardless of the intervention group, whereby participants improved in their performance as their injuries healed (Table 6.6). For example, Figure 6.2 shows the reduction of DASH score and improvement of TAM from the baseline to follow-up (post 4 weeks HBHT). Some attributes (covariates–C) can be expected to influence the outcome measures regardless of injury status. For example, TAM declined with age ($p=0.01$) and number of digits affected ($p<0.001$). Gender affected the DASH score ($p=0.02$), TAM ($p<0.001$) and COPM satisfaction ($p=002$). Duration of injury affected DASH score ($p=0.02$), TAM ($p<0.001$), neuropathic pain ($p=0.02$) and COPM satisfaction ($p=0.03$). Type of injury affected COPM satisfaction ($p=0.03$).

Table 6.6. The effects of covariates to outcome variables.
(C–Covariate, M–Measurement time, G – Group, M:C–Interaction between Measurement and Covariate, M:G– Interaction between Measurement and Group, and C:G–Interaction between Covariate and Group)

Covariate		**Outcome Variables (p-value)***				
	Effect	DASH	TAM	Neuropathic Pain	COPM Performance	COPM Satisfaction
Age	C	0.18	0.01	0.06	0.12	0.25
	M	<0.001	<0.001	<0.001	<0.001	<0.001
	M:C	0.04	0.02	0.10	<0.001	0.01
	M:G	0.05	0.01	0.58	0.02	0.18
	C:G	0.82	0.95	0.82	0.11	0.21

* Linear mixed model–Type I test

Gender	C	0.02	<0.001	0.43	0.17	0.02
	M:G	0.09	0.29	0.45	0.02	0.23
	C:G	0.01	0.66	0.23	0.20	0.06
Duration of injury	C	0.02	<0.001	0.02	0.16	0.03
	M:G	0.15	0.32	0.51	0.02	0.09
	C:G	0.19	0.61	0.49	0.04	0.03
Injured hand	C	0.75	0.16	0.90	0.22	0.71
	M:G	0.03	0.01	0.42	0.01	0.05
	C:G	0.23	0.43	0.78	0.64	0.66
Cause of injury	C	0.67	0.16	0.17	0.29	0.53
	M:G	0.03	0.01	0.39	0.01	0.04
	C:G	0.30	0.52	0.79	0.79	0.70
Number of digits affected	C	0.11	<0.001	0.24	0.07	0.09
	M:G	0.02	0.01	0.41	<0.001	0.03
	C:G	0.39	0.54	0.16	0.02	0.06
Occupation	C	0.09	0.14	0.28	0.64	0.61
	M:G	0.03	0.01	0.41	0.01	0.06
	C:G	0.09	0.68	0.60	0.78	0.77
Type of injury	C	0.16	0.15	0.88	0.12	0.03
	M:G	0.02	0.01	0.40	0.01	0.05
	C:G	0.72	0.65	0.01	0.23	0.24

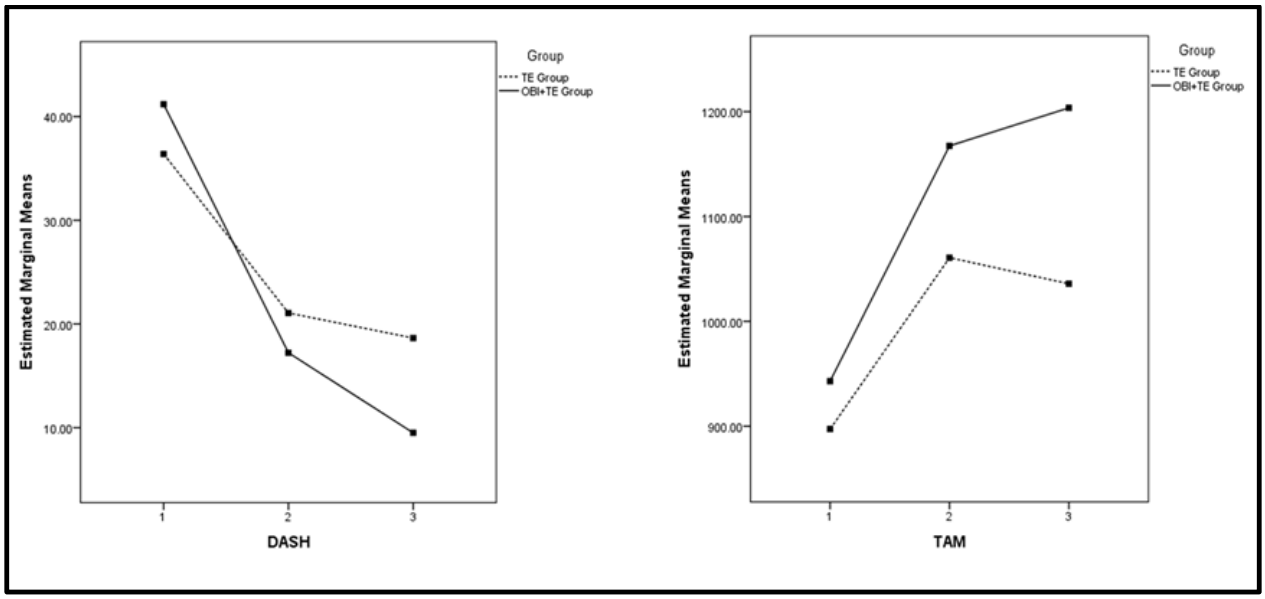

Figure 6.2 Changes in DASH and TAM scores over time: (1) Baseline measurement, (2) Post six weeks supervised hand therapy and (3) Post four weeks home-based hand therapy.

A significant interaction between measurement time and group (M:G) was expected for the five parameters where *t*-tests identified significant differences after therapy. However, interaction terms involving group and each covariate (C:G) must also be examined, as this would indicate that the covariate influenced the relative effectiveness of the two intervention types. As expected from the *t*-test results, there were significant interactions between intervention group and measurement time (M:G) for several variables, indicating that the rate of improvement differed between the two groups.

Table 6.6 indicates that improvement rates differed between groups for DASH and TAM regardless of participants' age (DASH p=0.05, TAM p=0.01), injured hand (DASH p=0.03, TAM p=0.01), cause of injury (DASH p=0.03, TAM p=0.01), number of digits affected (DASH p=0.02, TAM p=0.01), occupation (DASH p=0.03, TAM p=0.01) and type of injury (DASH

p=0.02, TAM p=0.01). Regardless of all the covariates (age p=0.02, gender p=0.03, duration of injury p=0.02, injured hand p=0.01, cause of injury p=0.01, number of digits affected p<0.001, occupation p=0.01 and type of injury p=0.01), there were significant differences between the groups for COPM performance. In addition, significant differences between the groups were also found for COPM satisfaction regardless of injured hand (p=0.05), cause of injury (p=0.04), number of digits affected (p=0.03) and type of injury (p=0.05). Each of the cases outlined above demonstrated that the extent of improvement was greater for the OBI+TE group (e.g. Figure 6.2). There is no evidence to suggest that these potential confounding covariates can account for the OBI+TE group's better performance for these outcome variables. However, with gender and duration of injury as covariates, there was no significant M:G interaction for several outcome variables, indicating that these covariates could potentially explain the better performance shown by the OBI+TE group in these cases.

Interactions between covariate and group (C:G) were identified for gender and DASH (p=0.01), gender and COPM performance (p=0.03), duration of injury and COPM performance (p=0.04), number of digits affected and COPM performance (p=0.02), and type of injury and neuropathic pain (p=0.01). These results suggest that some of the effects of interventions may vary between classes of participants. For instance, plots suggest that COPM performance declined with the number of digits affected in the TE group, but increased with the number of digits affected in the OBI+TE group (Figure 6.3).

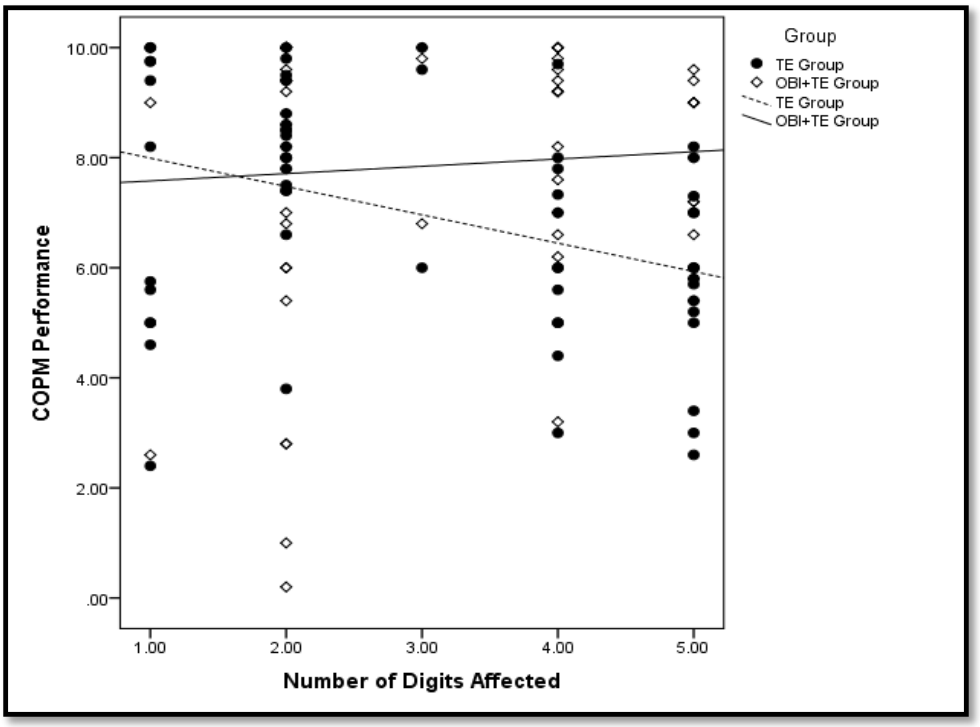

Figure 6.3. Interaction plots: COPM performance vs. number of digits affected

The age of participants affected the impact of both interventions as indicated by significant interactions between age and measurement time. Interactions between measurement time and age were found for DASH ($p=0.04$), TAM ($p=0.02$), COPM performance ($p<0.001$) and COPM satisfaction ($p=0.01$) (Table 6.6). In general, older participants did not show the same degree of improvement as younger participants. For example, the potential for improvement in TAM decreased with the participants' age. Figure 6.4 shows that although all age groups had better TAM at the second and third measurements than they had when first measured the improvement was smaller in older participants.

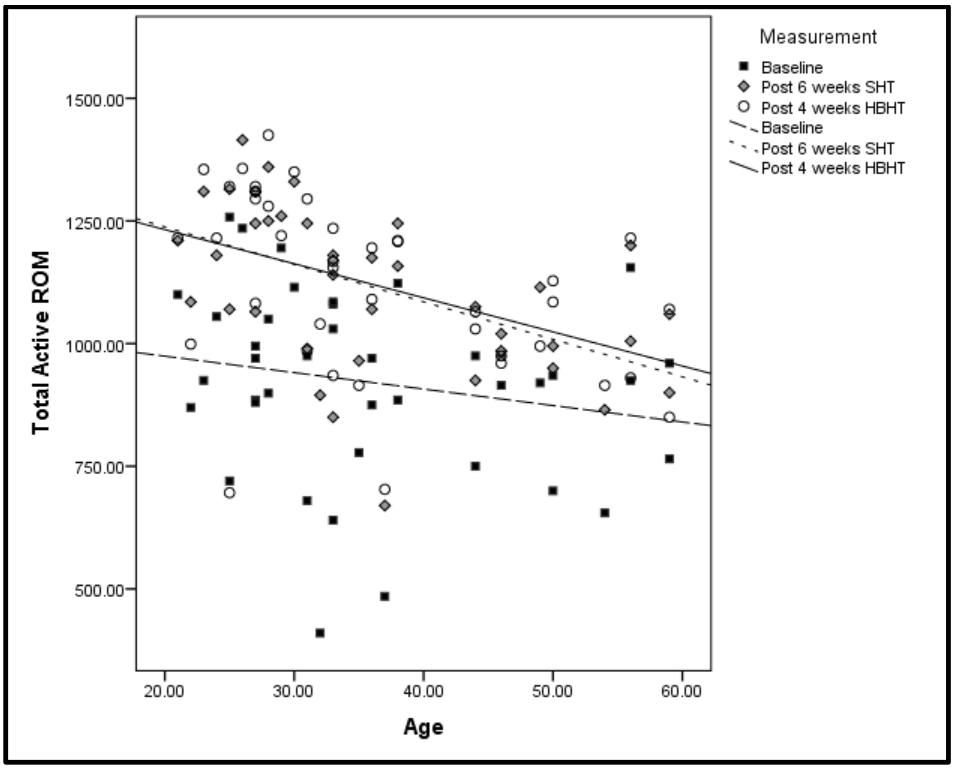

Figure 6.4. The relationship between total active motion and age across the three measurement times.

6.4 Discussion of findings

The aim of this study was to examine the effectiveness of a combination of OBI+TE in comparison to TE alone in the rehabilitation of injured hands. The findings suggest that a combination of OBI+TE produced more rapid recovery and better outcomes compared to TE alone. Although *t*-tests detected significance differences in DASH disability symptoms, TAM, neuropathic pain, COPM performance and COPM satisfaction in favour of OBI+TE group, it was necessary to determine whether this apparent advantage was not due to the presence of confounding variables. Therefore, linear mixed models were used to incorporate each potential cofounding variable in the analysis (Edwards, 2000).

These findings confirmed that the OBI+TE treatment modality worked better for improving ROM regardless of age, injured hand (dominant or non-dominant), cause of injury, number of digits affected, occupation or type of injury**.** When undertaking OBI, the participants were encouraged to use the injured hand as much as possible to perform the tasks. These challenging tasks might allow the stiff joints to move, injured tendons to glide, contracted tissues to stretch and insensitive skin to feel (Bear-Lehman & Flinn-Wagner, 1988). Additionally, OBI is a rich source of different types of movements and may require different small muscles to implement the tasks. When these tasks are performed repeatedly, stiff joints become more flexible and performance is improved.

DASH disability/symptom is used to assess improvement in functional status, as well as to assist therapists in treatment planning (Wong et al., 2007). DASH consists of 30 items: 5 items address the severity of the symptoms and the rest relate to the degree of difficulty in performing day to day activities such as ADLs, IADLs, work, leisure, sleep and social activities. Linear mixed model analysis confirmed that a reduction in the DASH score was greater in the OBI+TE group's participants compared to the TE group's participants regardless of age, injured hand, cause of injury, number of digits affected, occupation or type of injury. As well as acting as a healing agent, OBI improves the participants' skills and ability to perform day to day tasks. The skills and techniques that the participants learned in the OBI session appear to be easily transferred to other daily tasks. Therefore, not surprisingly, the participants in the OBI+TE group achieved lower scores in DASH score compared to the participants in the TE group.

Self-care, work and leisure activities were reported to be strongly beneficial following hand injuries (Bamford & Walker, 2010; Bell et al., 2011; Chan & Spencer, 2004; Fitzpatrick, 2007). Although the interventions in the study were not directly focused on regaining participants' occupational performance, participants in the OBI+TE group were found to be more satisfied and had greater occupational performance than those in the TE group. Improvement in COPM performance was better for participants in the OBI+TE group compared to the participants in the TE group regardless of age, injured hand, causes of injury, occupation or type of injury. Improvement in COPM satisfaction was also greater in the OBI+TE group's participants than the TE group's participants regardless of injured hand, cause of injury, number of digits affected or type of injury. One possible explanation is that the ability to integrate purposeful activities into their daily occupations during the HBHT may have helped participants to monitor their achievement in occupational performance (Bear-Lehman & Flinn-Wagner, 1988). Additionally, being able to perform daily occupations might allow the clients feel satisfied and more competent with performance (Trombly, 1995). OBI allowed the participant to practise the targeted occupation in the clinic and transfer the skills that they learned to the home or workplace. Therefore, satisfaction increased when participants could see improvement in their performance over time.

Although *t*-tests detected a significant difference for five out of seven outcome variables between the groups after the therapy, the linear mixed model analysis suggested that some of these differences could be affected by confounding covariates, particularly duration of injury. Although the outcome still favoured the combined OBI+TE treatment, the effects were weaker for four attributes (DASH, TAM, neuropathic pain and COPM performance) and did not achieve

statistical significance. A larger study would be needed to confirm the benefits of the combined treatment in these cases. Duration of injury and gender were the factors that had the most effect on the differences between the treatment groups. Thus, it is difficult to conclude that a combination of OBI+TE is more effective than using TE alone in the rehabilitation of injured hands.

Several covariates strongly influenced the outcome measure, regardless of the treatment group. Duration of injury affected DASH, TAM, neuropathic pain and COPM satisfaction. Gender affected the same outcome measures as duration of injury except for neuropathic pain. Consistent with the literature, this study found that ROM and dexterity decrease as the individual gets older (Carmeli, Patish, & Coleman, 2003). Hand injury rehabilitation for older individuals may require a longer time due to slower recovery times when compared to younger people. These issues are associated with the local structural changes (e.g. joint, muscles, tendon, bone, nerve, skin, blood supply and fingernails) that occur when people get older (Carmeli et al., 2003). Restoring ROM, grip strength, pinch strength, dexterity skill and occupational performance for older adults may require extra effort, time and creativity by the therapist in devising effective intervention strategies. Therefore, rehabilitation of older people with hand injuries should be given extra attention to minimise the impact of the injury and the disability.

Hand injuries in Malaysia are more common in men than women (Abdullah et al., 2009). This study further supported this as most participants were men. However, most participants in this study had injured their non-dominant hand, which is in contrast to a previous study that reported that injury to the dominant hand was more common (Abdullah et al., 2009). Previous studies and

reports in Malaysia have focused on hand injuries due to work-related and industrial accidents (Abdullah et al., 2009; Social Security Organisation, 2009, 2012), however the main cause of hand injuries among the participants in this study was motor vehicle accidents. These findings suggest the need for further studies to examine the current patterns of hand injuries, particularly when considering prevention as the main goal.

OBI includes both purposeful activities and occupation as a means to remediate hand impairments (Gray, 1998; Trombly, 1995). The selected OBI tasks were picking up small everyday objects, washing/wiping dishes and typing using keyboards. These tasks were classified as purposeful activities when participants undertake them in the occupational therapy clinic during SHT, but as occupations when they were integrated into daily life during the HBHT. Each of these three activities is a common domestic task and accessible in Malaysian homes and workplaces. Modern information technology requires an increasing use of computers, gadgets and other modern equipment both at work and at home. In Malaysia most people, especially the younger generation, are exposed to and are familiar with the computer. A study that was conducted among adults in a rural area found that most respondents were skilled and motivated to use computers (Ahmad, Abiddin, Badusah, & Wai, 2009). The cultural norm in Malaysia is to wash/wipe dishes after a meal, especially in families that do not have domestic assistants. In addition, performing daily living tasks involves the use of fine motor skills to handle small objects. Thus, the selected OBI tasks are believed to be meaningful and culturally relevant to the participants in the study. Although not all outcome variables showed a statistically significant difference between the treatment groups, the OBI+TE group treatment worked better compared to the TE group in the rehabilitation of injured hands. There were notable differences

in the mean scores of grip strength, pinch strength, neuropathic pain and Purdue pegboard subtests between the groups.

6.5 Limitation of study

One limitation of this study was that it did not take into consideration the severity of hand injuries, which could have directly affected the outcomes of the study. The severity of hand injury can be measured using the Modified Hand Injury Severity Score, which can also predict the ability of a client to return to work following a hand injury (Urso-Baiarda et al., 2008). Hand injuries due to fracture were the most common type of injury in this study, therefore the recovery pattern may have been different if more nerve, tendon, or combination of injuries were included in the study. Although this study used OBI tasks that were recommended by the occupational therapists specialising in hand therapy relevant to the cultural norms and common occupations of Malaysian people, these same interventions may not translate to other cultures or countries. Another limitation of this study was the inter-rater reliability between two blind evaluators was not checked. This study also did not use intent to treat analysis, which led to the risk of selection bias (Joseph, Sim, Ogollah, & Lewis, 2015).

6.6 Future research

Future studies need to consider larger sample sizes that take into consideration the most influential covariates such as gender, duration of injury and severity of hand injuries. In designing these studies, covariates should be properly controlled to ensure that intervention and control groups are well balanced at baseline. The Modified Hand Injury Severity Score can be used as a screening tool to stratify the participants for the intervention group and control group

allocations. Future research is needed to strengthen comparison of the effectiveness of three different types of treatment: (i) OBI; (ii) TE; and (iii) Combination of TE and OBI, which would assist therapists to apply the best practice methods based on gold standard evidence in the rehabilitation of adult clients with hand injuries.

6.7 Conclusion

This study undertaken in Malaysia highlights the potential integration of OBI into current hand injury rehabilitation practice. OBI may be incorporated into hand rehabilitation in addition to using physical agent modalities (PAMs) and TE. The inherent therapeutic benefits of OBI must be properly analysed to remediate specific targeted components such as ROM, strength, fine motor and others. As a caution, using OBI with clients who are still in the protective stages of rehabilitation or under a specific protocol, such as flexor tendon repair, is not encouraged as it may rupture the repaired tendon.

Besides applying the OBI in a clinical setting, OBI can be part of a hand treatment regime and used in home therapy. OBIs are accessible for clients' hand rehabilitation as materials related to clients' daily occupations are inexpensive and can be used at home. Although the aim of OBI in this study was to remediate impairments using purposeful activity and clients' occupation, OBI also provides a platform for the clients to practise and achieve performance competence in the selected occupations. In prescribing OBI to a client, therapists must know the therapeutic values and meaningfulness of the occupations to the client. For instance, when applying OBI for clients from the USA, the prescribed tasks must be meaningful and culturally relevant to these clients. The next chapter will discuss the integration of findings from Phase One (Chapter Four), Phase

Two (Chapter Five) and Phase Three (this chapter), before drawing a final conclusion for the thesis on OBI in hand injury rehabilitation.

CHAPTER 7

DISCUSSION AND CONCLUSION

7.1 Introduction

This chapter presents an integrated discussion of findings from all phases of this study. The discussion starts with the research process, a consensus definition of Occupation Based Intervention (OBI) and provision of OBI in hand injury rehabilitation. This is followed by the implication for practice and limitations of this research. Recommendations for future research are made, before drawing the final conclusion of this study. To recap, the central theme of this thesis was to explore and describe OBI in hand injury rehabilitation in Malaysia by using an exploratory sequential mixed methods design. The specific objectives of this research were:

1. To achieve a consensus definition of OBI from the perspective of Malaysian occupational therapists.
2. To describe the experiences of Malaysian occupational therapists in providing OBI for clients with hand injuries.
3. To examine the effectiveness of a combination of OBI and TE in comparison to TE alone in the rehabilitation of adult clients with hand injuries.

7.2 Research process

This research adopted an exploratory sequential mixed methods design to investigate and better understand OBI in hand injury rehabilitation. The research process began with a Delphi study to seek a consensus definition of OBI from the perspectives of Malaysian occupational therapists. Then, the consensus definition of OBI was used to explore the experience of occupational therapists applying the intervention in hand injury rehabilitation practice. The results provide a deeper understanding of how OBI was implemented in the rehabilitation of clients with hand injuries, and the results were also used to develop a treatment protocol for the OBI+TE group in

the RCT study. Finally, the RCT study was conducted to examine the effectiveness of a combination of OBI and TE versus TE alone in the rehabilitation of adult clients with hand injuries. The RCT was based on the concept of *occupation as a means*, which theorises that occupation has potential therapeutic value to improve the function of the injured hand and indirectly has an effect on the client's occupational performance. Framed by the exploratory sequential mixed methods design, it led to an increasing level of evidence regarding OBI in hand injury rehabilitation.

There were some challenges in completing this research project using the exploratory sequential mixed methods design. One of the challenges was time, where the studies were required to be conducted sequentially. The Delphi project took six months to complete data collection and analysis. Five months' duration was required to complete data collection and analysis for the IPA study. Lastly, the data collection and analysis of the RCT study took ten months to be completed. Overall, the data collection and analysis of this research project took nearly two years to complete. Another challenge was the fact that Institutional Review Board approvals were required at each phase of the study (Evans et al., 2011). Obtaining multiple approvals for the studies required much time, effort and paperwork. The most challenging part of this research project was to design an OBI protocol that was derived from qualitative findings. Occupations and purposeful tasks that were recommended by the participants in Phase Two for rehabilitation of injured hands were coded according to therapeutic benefits and quantified by frequency of recommendations. It involved a transformation of qualitative data to quantitative data. As a result, three occupations and purposeful tasks that were rich in therapeutic benefits and mostly recommended by the participants were selected as interventions in the OBI protocol.

7.3 Consensus definition of occupation based intervention from a Malaysian perspective

OBI is defined as a means and as an end in the literature (Gray, 1998; Trombly, 1995). It also is defined as an intervention that uses 'therapeutic use of self' because the occupational therapist and client co-create the meaning of the therapy (Price & Miner, 2007). Earley and Shannon (2006) believes that OBI includes all forms of therapeutic interventions such as preparatory and purposeful methods as long as the goal is occupational performance. Findings of Phase One confirmed that OBI is perceived as a means and as an end by the Malaysian occupational therapists, which is explained in this definition: '*an intervention on occupational performance that matches the client's goal, is identified as meaningful and is done within the client's context, where the occupational therapist can also use the client's occupations and purposeful activities as a treatment medium or healing agent*' (Che Daud, Yau, & Barnett, in press).

7.4 Elements of occupation based intervention

The findings in Phase Two further echo the notion that *occupation as a means and as an end* can unite in a single therapy session when the occupation is a goal to be attained and a healing agent (Gray, 1998). For instance, a client with a hand injury may be interested in using a computer as she works as a clerk in a government office. However, she has no confidence and is afraid to use the affected hand as she feels that it would cause further damage to her injured hand and induce more pain. The occupational therapist gradually engages the client in using a computer such as operating the computer mouse and keyboard using her injured hand, but has to avoid excessive pain as this is a fundamental principle of hand rehabilitation (Cooper, 2007). Engaging the client to use the computer enables the client to achieve her goal in order to be a clerk, and at the same

time helps to improve the function of her injured hand and fingers through the use of the mouse and keyboard. Although *occupation as a means and as an end* have different purposes the ultimate aim is the same, which is to enable occupational performance that is desirable, meets the client's goal, and occurs in the client's unique context (Pierce, 2001a).

The results in Phase One and Two of the study support the existing literature that OBI provides authenticity to occupational therapy (Golledge, 1998b; Pierce, 2001a), which was developed based on the belief that occupation promotes physical and mental wellbeing (Christiansen et al., 1999; Trombly, 1995; Wilcock, 1998). Using OBI in practice is believed to be able to resolve the identity crisis of the Malaysian occupational therapists as it helps to illuminate the distinction between occupational therapy and physiotherapy. It is suggested that OBI be applied and developed in all occupational therapy practice areas as it directly connects with the core tenets of the profession (Pierce, 2003). Findings in Phase One and Two also suggest that the factors to implement OBI depend on the occupational therapist's knowledge and skills; availability of time and equipment; clinic environment; and the support from colleagues, other health professionals and top management.

OBI addresses a holistic aspect of the client, which is in line with the International Classification of Functioning, Health and Disability (ICF) (World Health Organization, 2001). ICF postulates that an individual's level of functioning relies on a dynamic interaction between the health condition and contextual factors. Findings of these studies provide some evidence that OBI is connected to the ICF. Body functions and structures are addressed in *occupation as a means*, while activity limitation, participation restriction and contextual factors that limit the client's

occupational functioning are addressed in *occupation as an end*. The most common components of body function and structure that are intervened by occupational therapists in hand injury rehabilitation are neuro-musculoskeletal and sensory. Assessment tools that are often used by occupational therapists to assess body functions and structures in hand injury rehabilitation include goniometers, dynamometers, pinch gauges and Semmes-Weinstein monofilaments. Disability of Arm, Shoulder and Hand (DASH), Canadian Occupational Performance Measure (COPM), Purdue pegboard test, Jebsen Hand Function Test (JHFT), modified Barthel Index (MBI) and Functional Independence Measure are used by the occupational therapists to measure activity limitations and participation restrictions. Environmental factors (e.g. physical and social support) and personal factors (e.g. roles, interests, values, and motivation) are assessed through the interview with the clients.

Previous literature suggests that an occupational therapist needs to use top-down evaluation to be a more occupation based practitioner (Fisher, 1998; Schkade & Schultz, 1992). Findings in Phase One indicate that occupational therapists do use these top-down evaluations, but the results in Phase Two highlight occupational therapists use both evaluation approaches, either top-down or bottom-up in providing OBI. Top-down evaluation is used for *occupation as an end*, and it focuses on the evaluation of occupational engagement and performance of the clients (Trombly, 1993). In contrast, the bottom-up evaluation is used for *occupation as a means*, and it focuses on the evaluation of impairments and body functions. The difference in the evaluation approaches between *occupation as a means and as an end* can be explained by the major focus of the evaluation. Regardless of which evaluation approach is used, occupational therapists should first understand the client's needs (Weinstock-Zlotonick & Hinojosa, 2004). The bottom-up approach

could be used if health status is the client's primary concern, and the top-down approach would be used if the client is more concerned about participation and occupational engagement. Therefore, this study suggests occupational therapists enquire about their client's needs before setting the treatment goal in the rehabilitation of injured hand.

Findings in Phase One and Two clearly highlight the common belief within the profession that OBI is a client-centred intervention, which further supports the assertion in previous literature (American Occupational Therapy Association, 2014; Fisher, 2009; Kottorp et al., 2003; Pierce, 2001a; Schindler, 2010; Tomori et al., 2014; Zingmark et al., 2014). Since the beginning of the profession, occupational therapists believe that clients have the right to make a choice and engage in a satisfying occupation (Law & Baptiste, 2002; Meyer, 1977; Schindler, 2010). *Occupation as an end* focuses on attaining the client's occupational goals according to priorities in their lives. COPM is used by occupational therapists to identify the client's priority in occupational performance, and a client's occupational profile is obtained to understand the clients' occupational experience, pattern of living, roles, interests and needs. Occupational performance goals are set in partnership with clients, and both the occupational therapist and the client work collaboratively to achieve these goals. *Occupation as a means* also fits the concept of the client-centred approach where, through the occupational profile, occupational therapists are able to prescribe occupation that is meaningful and relevant to the clients as the remediation agent to improve the function of the injured hand. For example, the purposeful tasks and occupations that were used in Phase Three were just a few of the typical daily living activities of people in Malaysia. Although the purposeful tasks and occupations were not selected by the clients, they were relevant and meaningful to clients as part of daily occupations.

7.5 Provision of occupation based intervention in hand injury rehabilitation

7.5.1 Occupation as an end

Occupation as an end is the end goal of occupational therapy intervention, which is to enable successful engagement in occupational performance (Gray, 1998; Trombly, 1995). Findings in Phase One and Two further illustrate that *occupation as an end* can be delivered to the client via two approaches. Firstly, adopting direct occupational performance training with whatever availabilities and assets the clients have (Trombly, 1995). This technique is often employed by occupational therapists during the initial intervention to allow for adaptation following a hand injury. Therefore, adaptive strategies such as providing assistive devices and environmental modification may be done to enable client's participation in their daily occupations. However, the devices and modifications are the last resorts when the client really needs them, as they will incur a lot of cost (Dewey et al., 2004). The client's assets and abilities are used wisely to compensate for the loss of function following hand injuries.

Secondly, the findings in Phase One and Two support the idea of a continuum of intervention such as preparatory and purposeful methods to be incorporated to achieve the desired occupational performance (Earley & Shannon, 2006). It is believed that adopting a continuum of intervention allows the clients to perform their problematic occupation as well as before the hand injury because it initially focuses on the remediation of components' deficits. Then the intervention could move step by step towards the targeted occupational performance. Implementing *occupation as an end* using this approach however, requires the occupational therapist to be able to direct and link the intervention forms (preparatory and purposeful

methods) they used for occupational performance (Earley & Shannon, 2006). It is risky for the occupational therapists to use the second approach if they failed to connect the intervention forms with occupational performance goals (Weinstock-Zlotonick & Hinojosa, 2004). However, findings of this study could not explain how the occupational therapists link the intervention forms (preparatory and purposeful methods) with occupational performance. The proportion of intervention forms such as preparatory and purposeful methods that are utilised by occupational therapists in hand injury rehabilitation are unclear and thus suggests that further research in this area is required. Occupational therapists are advised to be creative and able to balance the use of intervention forms, and only incorporate it when needed.

Although a consensus was achieved for the statement that OBI occurs in client context (environment, cultural and social support) in Phase One, the findings in Phase Two highlight that occupational therapists just do the simulation trainings and purposeful task in the clinic and ask the clients to transfer the skills into their context. The extent of OBI conducted in the client's unique context may be alienated for Malaysian occupational therapists as most are working in a hospital setting, and providing individualised intervention such as OBI is restricted by high workloads and lack of time. OBI is suggested to be delivered in the client context to improve the power of intervention as it allows the occupational therapists to assess barriers for occupational performance (Fisher, 2013; Pierce, 2001a; Toth-Fejel et al., 1998), however it depends on the client's feedback and what their concerns are. For example, if the client reports that they have difficulties in performing daily occupations at home, a home-based OBI may be benefited to that particular client.

Standard operating procedures (SOP) of the Malaysian occupational therapy service from the MOH requires occupational therapists to complete certain information and implement specific assessments with their hand clients. The purpose of the guideline is to standardise the process of providing service to clients for quality assurance. For instance, every client must be assessed with the MBI. Findings of Phase Two indicate that some occupational therapists agreed that the MBI is not sensitive enough to detect occupational performance problems following hand injuries, but still have to be completed as a requirement of the SOP. As a result, occupational therapists spend more time in the evaluation process by counter assessing the clients with more valid, reliable and sensitive assessments such as DASH, JHFT and Functional Independence Measure.

7.5.2 Occupation as a means

The difference between *occupation as a means and as an end* is its purpose, but both centralised on occupation and can be present in a single therapy session. Occupational therapists are required to analyse the therapeutic values and qualities of occupation before they prescribe it as an intervention medium to improve impaired hand function (Nelson, 1996). Findings of this study further develop the notion of *occupation as a means* in hand injury rehabilitation where occupational therapists begin with analysis and synthesise the therapeutic values of the occupation. For example, typing on a keyboard, one of the occupational tasks prescribed in Phase Three, is said by occupational therapists to improve fingers ROM, fine motor and hand manipulation, fingers strength and finger isolation. The relevance and meaningfulness of occupations or purposeful tasks to the clients also have to be considered. Occupational therapists should make sure that the occupations or purposeful tasks prescribed are not odd and strange to

the clients. For instance, the occupations and purposeful tasks selected in Phase Three are based on what people in Malaysia commonly do in their everyday lives. Previous studies reported that the clients are more interested and motivated to participate in meaningful tasks than doing rote exercises (Jarus et al., 2000; King, 1993).

The difference between Gray's (1998) and Trombly's (1995) description of *occupation as a means* is the meaning of occupation. Trombly (1995) uses 'purposeful task', while Gray (1998) uses 'occupation' as an agent to remediate body functions and structures. The findings in Phase One and Two support both notions, where occupations and purposeful activities are used by the Malaysian occupational therapist as modalities to improve the client's performance skills. Using only occupation for *occupation as a means* is strange for some occupational therapists as they mostly work in the hospital, and the clinic environment does not simulate the client's unique context. Practising or doing occupation with the clients in the clinic is still considered as purposeful activities (American Occupational Therapy Association, 2008). This justifies the reason why the occupational therapists said *occupation as a means* uses occupations and purposeful tasks as the treatment medium.

The findings from Phase One and Two highlight that *occupation as a means* targets improving specific components through an evaluation process. Components' deficits or hand function problems are examined using the standardised assessment tools such as a goniometer, dynamometer, pinch gauge and Semmes-Weinstein monofilament before providing *occupation as a means* to improve hand functions. Once the components' deficits are identified, occupations or purposeful tasks that challenge the client's current abilities are prescribed. Consistent with the

literature, occupational therapists are recommended to use occupations or purposeful tasks that have the prospect of success to avoid frustration if the tasks are too difficult for the clients (Trombly, 1995). Occupations and purposeful tasks can be modified and graded to suit client abilities, and re-evaluation should be done regularly so that occupations or purposeful tasks that are prescribed benefit the clients.

Findings in Phase Two highlight the fact that occupational therapists apply the element of Constraint Induced Therapy to provide *occupation as a means* as a good example. Constraint Induced Therapy was initially used for clients with stroke to improve impaired upper limb after a study with deafferented apes showed a positive result (Taub et al., 1993). The clients are encouraged to use the affected upper extremity more by constraining the unaffected side with a padded mitt during the therapy session (Dromerick, Lum, & Hidler, 2006). Similarly as described by the occupational therapists in Phase Two, the clients are encouraged to use the injured hand during the therapy session and daily living activities to avoid the *learned non-use*. The *learned non-use* occurs when the clients do not use the injured hand due to pain or fear it will further damage the hand. The clients have to avoid excessive pain when they use the injured hand for *occupation as a means* to prevent any damage and promote healing to the injured structures. *Occupation as a means* appears to be suitable for the client in the active phase and when they have moved on from the protective phase such as post fracture, nerve, tendon, and ligament injury protocols.

The same concept was further applied in Phase Three to examine the effectiveness of a combination of OBI (*occupation as a means*) and TE versus TE alone in hand rehabilitation of

hand injuries. The occupations and purposeful tasks for the *occupation as a means* were based on perceived therapeutic values of occupations or purposeful tasks from the occupational therapists, and what people in Malaysia commonly do in their daily lives. These occupations and purposeful task are accessible for every client in their context. The uniqueness of the Phase Three study is the shift of purposeful tasks to occupation. *Occupation as a means* performed in the clinic during the therapy session is considered a purposeful task, but is considered an occupation when the clients do it at home as part of their daily living tasks. Although the effect of the intervention was influenced by the confounding variables such as duration of injury and gender, the group that received the combination of OBI and TE worked better in all parameters compared to the TE group alone. The findings of Phase Three further support the efficacy of occupations or purposeful tasks as a restoration agent in hand injury rehabilitation (Guzelkucuk et al., 2007; Omar et al., 2012; Toth-Fejel et al., 1998; Wilson et al., 2008).

The findings of Phase Three further support that integration of OBI decreased DASH disability score and improved total active motion (Guzelkucuk et al., 2007). As with previous studies, participants who took part in OBI reported to have less pain intensity than those who participated in the TE (Guzelkucuk et al., 2007; Omar et al., 2012). In contrast with a previous study (Guzelkucuk et al., 2007), OBI did not produce significant outcomes on pinch strength, grip strength and Purdue pegboard test. This might be due to the fact that the three tasks selected did not adequately address these components despite OBI producing better results compared to TE.

Surprisingly, although *occupation as a means* aims to improve the function of injured hand, the findings in Phase Three indicate the intervention also effects the clients' occupational

performance goals, which was measured using the COPM. One possible explanation is the skills and techniques the client learned for *occupation as means* can be easily transferred to other daily living tasks. The clients might use their injured hand to perform other daily living tasks, which also help them to practise their targeted occupational performance goals. Evidence from Phase Three indicates that OBI that uses *occupation as a mean* has a high potential to be integrated into hand injury rehabilitation. The findings can be used to support practice and to change the occupational therapists' perception about the power of occupation.

7.5.3 Perceived benefits of occupation based intervention in hand rehabilitation

Other than assisting with professional identity, the findings of Phase Two highlight that OBI provides an enjoyable rehabilitation experience to both clients and occupational therapists as the therapeutic relationship is developed during the therapy session. The clients feel more comfortable to express their concerns, and become active partners to achieve their occupational performance goals. The findings support the therapeutic relationship as part of the therapeutic process in providing OBI to the clients (Price & Miner, 2007). The findings further support that OBI is more fun compared to rote exercise (Colaianni & Provident, 2010; Estes & Pierce, 2012; Jarus et al., 2000; Omar et al., 2012) and can divert the client's attention from thinking about the painful injured hand (Omar et al., 2012).

As *occupation as a means and as an end* unites in a single therapy session (Gray, 1998), findings further illuminate that OBI has double benefits when the occupation use for therapy improves impaired hand functions and attains the client's occupational performance goal. Participants in Phase Two describe OBI as an intervention that '*kills two birds with one stone*'. Findings of

Phase Two also suggest that OBI is cost effective as it uses occupation, and materials related to the client's occupation, which are readily available in the client's context. OBI can be utilised in the clinic and home as a therapy without burdening the clients to buy expensive exercise equipment. Finally, it is consistent with the literature that OBI improve the client's satisfaction as it directly focuses on the client's occupational performance goals (Colaianni & Provident, 2010; Larsson Lund et al., 2011; Legault & Rebeiro, 2001; Lindén et al., 2011; Lindström et al., 2013; Schindler, 2010).

7.5.4 Issues in applying occupation based intervention in hand injury rehabilitation

Although Phase One was conducted among the occupational therapists in various specialty fields, the findings are consistent with Phase Two regarding the issues encountered when implementing OBI for clients with hand injuries. Occupational therapist factors, such as lack of knowledge, training and creativity skills, are barriers to implement OBI in hand injury rehabilitation. For instance, some occupational therapists in the USA perceive OBI to be only *occupation as an end* not *occupation as a means* (Colaianni & Provident, 2010). It is also associated with the lack of knowledge and understanding of the environmental concepts of objects, spaces and occupational forms as a basis to understand occupational performance (Lee et al., 2008). Additionally, occupational therapists often undermine the power and value of occupations in practice (Chisholm et al., 2004). For example, occupational therapists have negative feelings about using OBI with their hand clients because they are concerned that the clients might not have the confidence or be interested in the intervention.

The results of Phase Two stress that occupational therapists are influenced by their colleagues and top management to incorporate OBI in hand rehabilitation. For instance, occupational therapists claimed that it is difficult to practise OBI when their colleagues and top management do not support it (Chisholm et al., 2004). Their colleagues prefer to use hands-on exercise because it is easier than OBI, which requires the occupational therapist to understand clients and the variation of human occupations. OBI is an individualised intervention and cannot be applied in groups as human occupations are different and are based on the individual's meaning. Thus, occupational therapists are restricted from adopting OBI due to time constraints and a high number of clients in day to day practice (Chisholm et al., 2004; Colaianni & Provident, 2010). Component-driven practice such as using PAMs and therapeutic exercises however, can be applied in a group and require minimal supervision from the occupational therapists. Despite the individualistic nature of OBI, , findings of Phase Three provide some evidence that OBI is possible to be undertaken in a group setting provided the OBI tasks used for hand therapy are commonly done by the clients in everyday lives. However, the three tasks selected were solely based on occupational therapists' perception rather than what is really meaningful and relevant to the clients.

Findings of this study further highlight that client factors such as being much more concerned with symptoms and impairments, and preferring to use high technology and hands-on exercise rather than actively 'doing' are the perceived barriers to practise OBI by occupational therapists. This demonstrates that the client does not know the effect of OBI, or even the role of the occupational therapist in hand rehabilitation (Chisholm et al., 2004). However, the findings are from the occupational therapists' views, rather than the clients' input. Future research that

describes the client's experience whilst receiving OBI from occupational therapists is needed to confirm these issues.

A challenge to practising OBI in hand injury rehabilitation includes the environment of clinics or units that have limited space and are ill-equipped with impairment-based modalities (Chisholm et al., 2004; Colaianni & Provident, 2010; Stack & Barker, 2011). The findings are consistent with the literature that the clinic environment and facilities remained a significant challenge to the implementation of OBI. Occupational therapists claimed that their clinic or clinical settings are not set-up for OBI and it is difficult for them to undertake occupational performance training in such settings. The space in the clinic is just enough to place hand therapy tables and modalities. Although occupational therapists claimed that OBI uses materials related to the client's occupation, it is not always readily available in the clinic particularly for IADLs, work, and leisure. Most of the modalities in the clinic are focused to remediate impairments following hand injuries, rather than occupational functioning.

Previous studies inform that hand injuries result in various difficulties in daily living activities such as washing, cooking, dressing and cleaning (Bell et al., 2011; Fitzpatrick, 2007; Kingston et al., 2010). Findings highlight the influence of Malaysian culture as a challenge in delivering OBI for clients with hand injuries. Participants in Phase Two described the family members as being over protective and allowing the sick member in the family to take a sick role, which makes OBI challenging for them. Findings of the study support the literature that Asian culture permits the sick role in the family when one of the family members suffers from disease or injuries (Nilchaikovit et al., 1993). It is important for occupational therapists to educate the family

members regarding these issues as hand injuries are not a chronic disease, and restraining from using the injured hand will deteriorate the condition and function further.

The findings of Phase Two highlight inadequate information about the role of occupational therapy for clients with hand injuries as a challenge to practise OBI. Additionally, findings of Phase One and Two illuminate a barrier of organisational culture within the MOH whereby the occupational therapists have to follow the orders from the referring physicians. Occupational therapists claimed that orthopaedic doctors, who are the main resource for referrals, have much less understanding of the occupational therapy roles in the rehabilitation of the injured hand. Thus, the occupational therapists hardly receive referrals for OBI; instead, the clients are mostly referred for orthotic fabrication. Although occupational therapists know that they are supposed to provide a holistic service to the clients, they have to follow the physicians' orders because of the power differential in terms of their position. The barrier can also be associated with the dominance of the medical model in orthopaedic and hand surgery, which directs the physicians to focus on the remediation of body functions and underlying structures, rather than view the clients in a holistic manner (Engel, 1980). The medical model forces the occupational therapists to adopt the component-driven practice to be in line with the physicians' goals. This complex situation makes it more difficult for occupational therapists to practise OBI in hand injury rehabilitation within the MOH hospitals. A solution for this issue is education and information to be provided to physicians and healthcare professionals regarding the scope and holistic concepts of occupational therapy, which address the psychosocial, environment and biomedical aspects of hand injuries (Dale et al., 2002).

The literature demonstrates that reimbursement issues are one of the challenges to practising OBI (Colaianni & Provident, 2010; Dale et al., 2002; Rogers, 2007; Toth-Fejel et al., 1998), but none of the participants in Phase Two mentioned this issue when implementing OBI in hand injury rehabilitation. It is because none of the participants in Phase One and Two were working in private hospitals and non-government organisation centres, where the treatment costs are covered by the insurance companies. The public hospitals in Malaysia however, are subsidised by the government, and clients can have access to occupational therapy services by paying only a minimal cost, about one to five Malaysia ringgit (AUD $0.35-1.80), per visit.

The results of Phase One and Two highlight that occupation as a remediation agent is a barrier to implementing OBI for clients with hand injuries. For instance, participants in Phase Two described *occupation as a means* was not as straight forward as the component-driven practice, which has a clear goal to improve specific components' deficits. They have to explain to clients clearly the specific purpose of doing *occupation as a means*, which requires more contact and time with the clients. Furthermore, there is a paucity of research to support the use of *occupation as a means* in hand injury rehabilitation. The findings are consistent with the literature that the credibility of occupation is a barrier to implement OBI in hand injury rehabilitation (Colaianni & Provident, 2010). This study suggests the need for more research to examine the effectiveness of OBI in hand injury rehabilitation.

Consistent with the literature, the findings of Phase Two highlight the barriers imposed by the medical conditions of the injured hand when applying OBI (Colaianni & Provident, 2010). OBI requires the client to use the injured hand actively during the therapy session, but certain hand

therapy protocols require the hand to be immobilised and protected for a specific duration to promote the healing of bone, tendon, nerve, ligament and blood supply. OBI, especially *occupation as a means*, cannot be applied at the initial stage due to activity restrictions imposed by hand therapy protocols (Colaianni & Provident, 2010). It is suggested to use the *occupation as an end* first, which focuses on assisting the clients to perform and engage in daily occupations following a hand injury. Later, *occupation as a means* can be adopted when the clients are in the active rehabilitation phase where mobilisation of the injured hand is no longer restricted by the hand therapy treatment protocol such as in Phase Three.

7.6 Implication for practice: Translating knowledge into action

This research suggests OBI can be implemented through the concept of *occupation as a means and as an end*. OBI can be applied regardless of the phase of hand injuries, but it requires occupational therapists to be creative and to have a better understanding of the concepts of occupation and the healing process of the injured hand. All that is required to practise hand rehabilitation is an integration of occupational therapy concepts, as hand therapy concepts were developed by those who practise in this field (Fitzpatrick & Presnell, 2004). This study is not meant to disregard other forms of intervention such as PAMs, orthotic interventions, and other biomedical treatments, but rather to provide a deeper understanding and creative strategies to integrate OBI in hand injury rehabilitation. Practising OBI in hand injury rehabilitation benefits the clients and transmits a strong message to health professionals that occupational therapists have adopted occupation as the core intervention, which will reflect the professional identity of occupational therapy profession.

Although this study was conducted in a Malaysian occupational therapy practice context, findings from this study might be generalised and transferable to other countries with similar issues. Firstly, the findings of Phase One provide a clear and concise definition of OBI, which can be translated into practice, education and research around the globe. It is important for occupational therapists to use a consistent term in practice, education and research for the clarity of occupational therapy discourse. Secondly, Phase Two provides a deeper understanding about the description of experience of Malaysian occupational therapists applying OBI in hand injury rehabilitation. The findings might be transferable to other countries that have similar practice contexts and issues as Malaysia. Thirdly, findings from Phase Three can be generalised to hand injuries population around the globe. However, when selecting occupations or purposeful tasks for the clients, they must be meaningful and relevant to the clients and culture where they live. For instance, using occupational tasks such as washing/wiping dishes in Phase Three might not be suitable for clients in countries where people use dishwashers.

7.6.1 Implementing occupation based intervention in hand injury rehabilitation

This research suggests *occupation as a means* can be adopted as home-based hand therapy (HBHT). In that case, materials related to a client's occupation are used, which are readily available at the client's home. Using the occupation as a therapeutic medium does not require the client to buy expensive exercise materials for HBHT. However, occupational therapists have to prescribe the *occupation as a means* to the client and re-evaluate the client's condition from time to time to ensure the suitability and effect of the occupation prescribed. Thus, occupations or purposeful tasks that are prescribed to the client have to be rich with therapeutic benefits to improve the function of the injured hand. Home program checklists may be provided to remind

the client to complete the occupational tasks prescribed to them. Occupational therapists are recommended to discuss with their clients and to consider their clients occupational profile before prescribing *occupation as a means* so that the occupations prescribed are meaningful and relevant. Using *occupation as a means* may enhance compliance, as the occupations prescribed for therapy are part of the client's occupational tasks. This highlights that *occupation as a means and as an end* merge together in the client's context as occupations are performed to fulfil occupational needs and to remediate the injured hand.

The findings of this study argue that *occupation as an end* does not necessarily occur in the client's unique context. However, it is suggested that *occupation as an end* should be done in the client's context when the client raises the issue of performing occupation in their environments such as home, workplace and school. It allows occupational therapists to assess and spot any barriers to successful and safe occupational performance in the client's natural environment (Pierce, 1998; Toth-Fejel et al., 1998). At the initial stage of injury, the goal of the *occupation as an end* is to help the client to adjust to their injuries. Adaptation strategies such as demonstration, compensation techniques, task simplification, environmental modification and assistive devices may be suggested to the client. As the client begins to perform daily occupations using the adaptive strategies, the goal of occupation *as an end* shifts to normalise the way occupations are performed. Intervention forms such as PAMs, therapeutic exercises, and purposeful activities may be incorporated to achieve the goal. The injured hands are trained and used to perform daily occupations as soon as the protective phase is over.

The results of this study suggest that occupational therapists use the client-centred approach to be more occupation based practitioners in hand injury rehabilitation. The evaluation, intervention, and outcome must be client-centred and centralise on occupation. The most important thing is to obtain a complete occupational profile of the client so that *occupation as a means* and as *an end* provided to the client is meaningful and can meet their goal. Client-centred assessments such as the COPM are recommended to be used with the client to identify priority in occupational performance goals following hand injuries. It is suggested that occupational therapists involve their clients actively in the rehabilitation process, and work in partnership with them to achieve their goals.

7.6.2 Removing barriers to occupation based intervention: Making it a reality

Adopting OBI in practice may help to resolve the professional identity crisis of occupational therapy profession in Malaysia. Based on the findings of the study, potential solutions to overcome the barriers of implementing OBI in hand injury rehabilitation through education and information, training, reflective practice and research are suggested.

Education, Information and Promotion

Education and information should be provided to clients, health professionals and family members who are directly involved in the rehabilitation process. It is important for the clients, health professionals and family members to understand the purpose of occupational therapy and how the occupational therapist can help them so that they can be more cooperative and actively involved in the rehabilitation process. With regard to the sick role within the Malaysian culture, occupational therapists are required to educate the clients and family members about how the

sick role could affect the rehabilitation process and why the clients have to remain independent in life.

The findings indicate that physicians have limited understanding about the role of occupational therapy in hand rehabilitation. This implies that promotion is needed to ensure clients receive optimal occupational therapy. Occupational therapy does not only provide orthotic and therapeutic exercises to the hand clients, it also addresses the activity limitations, participation restrictions and environmental factors in the rehabilitation process. Exhibitions, presentations at hospital conference, back door promotions and campaigns may be used as a means to promote the roles of occupational therapy in hand injury rehabilitation to health professionals. Occupational therapists could also use interdisciplinary reports to promote and educate their service to colleagues (Whiteford & Wilcock, 2001), but they have to use a universal language in the medical field rather than using occupational therapy jargon. Occupational therapists have a tendency to speak a different language, and their professional jargon is different from other health professionals (Wilding & Whiteford, 2007). As the awareness of ICF is increasing with the development of rehabilitation medicine in Malaysia, occupational therapists may be better placed to use the terminology in the ICF in their communication and reports so that other health professionals can have a better understanding of the scope and service of occupational therapy through the common professional language adopted.

Training of occupational therapists

Another implication of this study is the need for training to enhance the knowledge and skills of occupational therapists, at least in Malaysia, particularly around the conceptual foundations of

occupational therapy. There are many workshops and seminars that focus on biomedical aspects of hand injuries for occupational therapists in Malaysia due to the domination of the medical model and biomechanical approach, but little emphasise on the application and integration of occupational therapy theories in this field. The seminars and workshops related to occupational therapy concepts and theories are important to translate OBI in practice. A consensus definition of OBI in this research may be a beginning to understand OBI and the definition should be consistently used in practice and education to avoid confusion. For those who are in practice, on-site training such as coaching and mentoring can be used. Occupational therapists who have strong knowledge of occupation based models and constantly practise OBI may be appointed as mentors, coaches and role models to guide their colleagues and encourage them to use the intervention in practice. It may help to fix the negative perception of occupational therapists about the power of occupation.

Universities and colleges that offer occupational therapy courses in Malaysia should update their curriculum from the biomedical focus to a more occupational focus to ensure sustainability integration of OBI in practice. Occupational therapy borrows the knowledge from biomedical, biological and social sciences (Wilcock, 1998; Yerxa, 1998), which makes it difficult for occupational therapists to use occupation in practice and contributes to a professional identity crisis. Therefore, it is suggested that occupational therapist students and trainees are equipped with the knowledge and skills that align with the philosophy and premises of occupational therapy since the beginning of the profession (Whiteford & Wilcock, 2001).

Reflective practice

Reflective practice is defined as an '*ability to access, make sense of and learn through work experience to achieve more desirable, effective and satisfying work*' (Johns, 1995, pp. 23-24). Reflective practice improves the quality of service and learning, and enhances professional development (Kinsella, 2001). This research recommends that occupational therapists need to be reflective practitioners to overcome barriers such as logistic issues and contextual factors in implementing OBI. For instance, the issue of time and high caseloads as barriers to practise OBI might be solved if occupational therapists reflect back on how they use time in their practice. Scheduling of clients' appointments and proper planning will help them to use OBI with their clients with hand injuries. Contextual barriers such as space, equipment, materials and the environment of the clinic could be solved if the occupational therapists implement OBI in the client's natural context at least once for each client. It permits the occupational therapist to have a general idea of each client's context and allows the occupational therapist to suggest a home-based *occupation as a means and as an end* program to the client.

Instead of individually working towards OBI, occupational therapists may be interested in forming a support group with their colleagues to discuss the barriers and strategies to solve the issues. Reflective practitioners do not merely reflect on the obstacles in their practice context, but identify the strategies and actions to translate it into action (Kinsella, 2001). A step by step improvement could be made in practice such as being more client-centred with clients and create a friendlier OBI clinic environment. With support and collaborative efforts from colleagues, it might be easier to integrate OBI with hand clients. The most important things are that the occupational therapists have to be aware whether they truly practise occupational therapy or not, and whether they are willing to change or not. Awareness of the current situation and taking

action to improve this situation are very important in reflective practice. Since the initial development of the profession, occupational therapy has been used with a holistic approach in a client's care (Meyer, 1977). Therefore, occupational therapists have to question themselves–do they only address the biomedical aspect or address both biomedical and psychosocial aspects of hand injuries?

Research and evidence-based practice

Although Phase Three of this study provides evidence regarding the effectiveness of OBI, more research and evidence is needed to support practice. Given that research and evidence for using OBI in occupational therapy is increasing, there is still little focus on the application of OBI in hand rehabilitation. The evidence of the effectiveness of OBI is important, as occupational therapy can provide this information to top management to obtain support and funds. It should also be shown that OBI is not just meaningless interventions for clients. Framed by the *occupation as a means and* as *an end* concept, occupational therapists may begin with simple research, such as using a case study to investigate the benefits of OBI for their hand clients.

Finally, this research suggests occupational therapists need to be evidence-based practitioners. Evidence-based practice is defined as an approach to decision making, which requires occupational therapists to access, appraise and integrate evidence from the literature to inform clinical decisions (Bennett et al., 2003). Occupational therapists should have the capabilities to understand and evaluate the evidence around OBI so that they can translate the best evidence into practice. Reliance on experience as clinical reasoning, to provide intervention is not recommended (Bennett et al., 2003). If the occupational therapists think that their experience and

clinical reasoning would benefit the clients, they have to find a means to validate it through research (Dubouloz, Egan, Vallerand, & von Zweck, 1999). In the unit or clinic, occupational therapists may initiate a journal club with their colleagues to enhance skills and confidence to evaluate and translate the evidence into practice (McQueen, Nivison, Husband, & Miller, 2006). MOH, Malaysian Occupational Therapy Association (MOTA) and Malaysia universities that offer occupational therapy courses should provide the support for occupational therapists to become evidence-based practitioners in providing OBI for their hand clients.

7.7 Limitations of research

One limitation of this study was that all the occupational therapists recruited for Phase One (Delphi) and Two (IPA) were working in the MOH hospitals. As such, the findings cannot be generalised to those who are working in the private practice or non-government organisation centres. A specific limitation in Phase One was the anonymity of participants with the Delphi technique that may restrict the topic to be explored further. The Delphi technique may also lead to conformity rather than consensus as the participants were supplied with analysis of the second round questionnaire to help them re-rank their agreement. The sampling bias in the Delphi technique was also a limitation as those who participated in the study might be more interested in the topic, which could affect the results obtained. A specific limitation in Phase Two was member checking where only four participants agreed to take part in the focus group discussion. Finally, some participants in Phase Two were not familiar with the term *occupation as a means and as an end*, which might restrict their ability to give responses, although the definition was explained to them before the interview.

A further limitation of this research was the protocol for the OBI+TE group in the RCT study, which was solely developed based on qualitative data without any follow-up survey or interviews. It is challenging to transform and quantify the qualitative data for protocol development. A follow-up survey or interview would add more validity to the protocol development and might contribute to more significant results in the RCT study. Additionally, the RCT did not take into consideration the severity of hand injuries, which also might influence the outcome of the intervention in Phase Three. Although the client-centred approach is one of the elements of OBI, the occupations selected for *occupation as a means* in the RCT study were not client-centred and individualised due to the challenge in standardising the treatment protocol (Dromerick, Lum, & Hidler, 2006). The occupations selected were based on what Malaysians commonly perform in everyday life and are accessible by everyone. Other limitations of the RCT study were it was not double blinded and did not use intention to treat analysis, which might contribute to bias outcomes.

7.8 Recommendation for future research

The research process was conducted in three phases. The first phase aimed to achieve a consensus of OBI, and the second phase was to describe the experience of the occupational therapist based on the definition from the first phase. Importantly, there is a research gap regarding the extent to which the OBI is practised in hand injury rehabilitation. A cross-sectional study such as using a survey-based design to examine the extent of occupational therapists using OBI in hand injury rehabilitation is needed. A retrospective study based on occupational therapists' documentation and statistics is also suggested. These studies may confirm the extent to which OBI is used in practice. As mentioned by one of the participants in Phase One

‘*Occupation based intervention may be well mentioned but the practice may not be as widely used as we wanted it to be*’.

This research highlights the need to explore OBI in every area of occupational therapy practice, especially in the acute and medical model dominated areas. Future research to explore OBI in different settings such as private hospitals, community-based centres, and non-government organisation centres are also needed. The way OBI is implemented may be different, as occupational therapists in these settings need to be reimburse the cost of interventions from the insurance company or individual clients. It may involve a lot of documentation and reports. Future research to develop a framework or model for the provision of OBI for hand clients is also needed. This framework is necessary to guide occupational therapists to be more occupation based practitioners in hand injury rehabilitation.

Lastly, Phase Three of the study did not consider the severity of the clients’ hand injury, which might affect the intervention outcomes. The results in Phase Three also found that gender and duration of injury influence the effect of the intervention. These confounding variables must be considered in future studies. A study that examines three different interventions; a combination of OBI and TE versus TE alone and OBI alone, is needed to further verify the effectiveness of OBI in hand injury rehabilitation. It remains unclear whether OBI can stand alone or whether the combination of OBI and TE is better in the rehabilitation of hand injuries.

7.9 Conclusion

Using an exploratory sequential mixed methods design, the aim of this research was to investigate OBI in hand injury rehabilitation. The research was conducted because the researcher observed that OBI is not often used and implemented in hand rehabilitation. Occupational therapists in Malaysia have been under pressure due to their identity crisis and for the need to provide the best treatment to the client. With the belief that OBI benefits the clients and may be a way to resolve this identity crisis, the research began by seeking a consensus definition of OBI amongst the experts of occupational therapists in Malaysia. As such, the definition is easier to translate and transfer in Malaysia's occupational therapy practice context. OBI was defined as a means and as an end by the Malaysian occupational therapists. The outcome of Phase One allows for the definition to be used consistently in practice and education to avoid confusion.

In Phase Two, the experience of occupational therapists applying OBI based on the definition from Phase One was further explored. The results provided a deeper understanding of how occupational therapists implement OBI with hand injury clients. Occupational therapists who have more than five years' experience described that *occupation as a means and as an end* benefits their clients, but they have many challenges to use OBI in hand injury rehabilitation. The challenges included logistic issues, client factors, credibility of occupation as treatment modalities, contextual factors, and occupational therapist factors. Findings of this phase recommend potential solutions to overcome the barriers in implementing the OBI in hand injury rehabilitation.

Data from Phase Two were used to develop an OBI protocol, which was tested in Phase Three. This phase was based on *occupation as a means* to rehabilitate the function of the injured hand

as literature suggested more research is needed to examine the effectiveness of OBI as therapy modalities. A RCT, to examine a combination of OBI and TE versus TE alone, was conducted at Kuala Lumpur General Hospital, Malaysia. The results found the combination OBI and TE worked better than TE alone on all parameters, although the effects of intervention were influenced by gender and duration of hand injury. The findings in this phase add more evidence to the literature on the effectiveness of OBI as a healing agent to improve the function of injured hands. This research was the first study conducted in Malaysia, and the findings of this study contribute towards the improvement of hand rehabilitation service. The outcomes of this study now are ready to be translated into action, which allows occupational therapists to shift from impairment-based treatment to OBI.

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APPENDIXES

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TITLE OF CONTRIBUTION: A consensus definition of occupation-based intervention from a Malaysian perspective: A Delphi study

INTENDED FOR PUBLICATION IN: British Journal of Occupational Therapy

AUTHOR NAME(S): Che Daud, Ahmad Zamir; Yau, Matthew; Barnett, Fiona

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Abstract Reference: HE 002 Date: 25 February 2015

Dear Ahmad Zamir Che Daud*, Matthew Yau, Jenni Judd, Fiona Barnett
Department of Occupational Therapy, Faculty of Health Sciences, Universiti Teknologi Mara, Kampus Puncak Alam, Selangor ,Discipline of Occupational Therapy, College of Healthcare Sciences, Division of Tropical Health and Medicine, James Cook University, Townsville, Queensland, Australia, Division of Tropical Health and Medicine, James Cook University, Townsville, Queensland, Australia, Institute of Sport and Exercise Science, College of Healthcare Sciences, Division of Tropical Health and Medicine, James Cook University, Townsville, Queensland, Australia*

Re: Letter of Approved Full Paper (LOAFP)

We are pleased to inform you that your Full Paper entitled **"Issues in Applying Occupation Based Intervention in Clinical Practice: A Delphi study"** for the AicQoL2015Jakarta, Indonesia, has been approved for the 15-minute Oral Presentation.

Selected approved Full Papers received, upon amendments made as per comments from the double blind peer review International Scientific Committee (ISC), if any, shall be published in Elsevier's ***Procedia Social & Behavioural Sciences***, accessible online via **www.ScienceDirect.com.**

Further selection amongst the best papers, condensed, shall be published in the international journals – ***ajE-Bs*** (Asian Journal of Environment-Behaviour Studies) or ***jABs*** (Journal of ASIAN Behavioural Studies). As notified earlier, only papers that cited in their References, **at least 50%** of the articles published from those journals or AcE-Bs / AicE-Bs proceedings published in Elsevier's Procedia shall be considered for publications in those journals.

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See you in Jakarta !

Yours sincerely

Prof. Dr. Mohamed Yusoff Abbas
Chair, AicQoL2015Jakarta

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C. Accepted receipt: Scandinavian Journal of Occupational Therapy

Ahmad Zamir Che Daud
ahmadzamir.chedaud@my.jcu.edu.au
11 Jun 2015

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D. Conference poster presentation: 16th International Congress of the World Federation of Occupational Therapist

The Efficacy of Occupation Based Intervention in Comparison with Therapeutic Exercise in the Rehabilitation of Injured Hands: A Randomized Controlled Trial Study in Malaysia

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1 Introduction

Hand therapy has been recognized as one of the specialities within occupational therapy since the 1940s. Occupational therapists use a holistic approach to patient care, which not only aims to remediate physical dysfunctions but also to optimize the client's response to the dysfunctions. One of the definitions of Occupation Based Intervention (OBI) is "occupation as a means"[1,2] . Occupation as a means refers to occupations or purposeful activities functioning as a remediation agent to restore a client's physical functions [3,4] . Few studies have investigated the effectiveness of using occupation and purposeful activities as the remediation agent to improve function of injured hands:

- Purposeful activities that mimic the activities of daily living [5].
- Computer games [6,7].
- Craft - Origami [8].

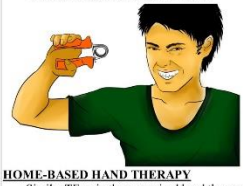
OBJECTIVE:
To investigate the efficacy of OBI in comparison to conventional exercise in the rehabilitation of individuals with hand injuries.

HYPOTHESIS:
Participants in the OBI group would be more likely to have grater improvements in all outcome measures compared to the participants in the Therapeutic Exercise (TE) group.

2 Methodology

- A single centre, parallel groups Randomized Controlled Trial (RCT) study was conducted in Kuala Lumpur Hospital (KLH) in collaboration with the Hand Occupational Therapy Unit, and the Hand and Upper Limb Unit.
- Participants were recruited from the hand out-patient occupational therapy clinic according to the following inclusion criteria:
  I. Experienced bone, tendon and peripheral nerve injury to the hand, wrist and forearm
  II. Not on any hand therapy protocol (e.g.; flexor/extensor tendon protocol, post fracture stabilization, etc.)
  III. No communication or cognitive deficits
  IV. Able to read and write either in Malay or English
  V. Consent to take part in the study
- Participants were randomly allocated to either OBI group or TE group using a computer generated random number table. Both participants and assessors were blinded to the treatment.

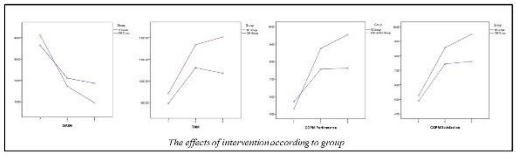
INTERVENTION PROTOCOL

TE GROUP (n=23)	OBI GROUP (n=23)
SUPERVISED HAND THERAPY - Paraffin bath treatment -60 minutes of TE/ session - Two session per week, for six weeks	**SUPERVISED HAND THERAPY** - Paraffin bath treatment -30 minutes TE & 30 minutes OBI/ session - Two session per week, for six weeks
	
HOME-BASED HAND THERAPY -Similar TE as in the supervised hand therapy -Two hours of TE per week, for four weeks	**HOME-BASED HAND THERAPY** -Incorporates these task into their occupation -Two hours of OBI per week, for four weeks

- Evaluations were conducted at baseline, post six weeks of supervised hand therapy and post four weeks of home based therapy. The primary outcome measure was Disability of Arm, Shoulder and Hand (DASH) score, and the secondary outcome measures were: (1) Purdue pegboard dexterity test; (2) Total Active Motion (TAM); (3) Grip strength; (4) Pinch strength; (5) Neuropathic pain; and (6) Canadian Occupational Performance Measure (COPM).
- Three sets of *t*-tests were also used to compare the groups at baseline, post six weeks of supervised hand therapy and post four weeks of home based hand therapy. Linear mixed models were used to examine possible confounding effects, and to examine whether the effects of treatment varied among the classes of participants.

Results 3

- Forty participants completed the whole procedure, with 20 participants in each group.
- Following six weeks of supervised hand therapy: significant differences were found in TAM ($p<.05$), neuropathic pain ($p<.01$), COPM performance ($p<.05$) and COPM satisfaction ($p<.05$) in favour of the OBI group.
- Following four weeks home-based hand therapy: significant differences were found in DASH ($p<.05$), TAM ($p<.05$), neuropathic pain ($p<.05$), COPM performance ($p<.001$) and COPM satisfaction ($p<.001$) in favour of the OBI group.



The effects of intervention according to group

- Examining the effect of intervention using mixed effects models:
  - All participants did show significant improvements in all outcome measures regardless of intervention group.
  - OBI works better in the rehabilitation of TAM, DASH, COPM performance and COPM satisfaction.
  - Gender and duration of injury were found to influence the effect of intervention.

Discussion 4

- OBI treatment works better in improving range of motion and reducing the DASH scores regardless of age, injured hand, cause of injury, number of digits affected, occupation or type of injury.
- Although the interventions in the study were not directly focused on regaining participants' occupational performance, those in the OBI group were found to be more satisfied and had greater occupational performance than those in the TE group.
- Duration of injury and gender were factors that had the most effect on the difference between the treatment groups.
- Consistently, the range of motion and dexterity decrease as the individual gets older [9] . Hand injury rehabilitation for older individuals may require a longer time due to slower recovery times when compared to younger people.

LIMITATIONS:
- Small sample size and severity of hand injury.
- Major type of injuries were fracture.
- The selected OBI treatment may not translate to other cultures or countries.

FUTURE STUDIES:
- Compare three different types of treatment (TE vs OBI vs OBI + TE) with larger sample size.
- Take into consideration the most influential covariates.

Conclusion 5

- This study supports the hypothesis that using a combination of OBI and TE is more effective than using TE alone. It is beneficial for OBI to be incorporated into hand rehabilitation in addition to physical agent modalities and TE in current hand rehabilitation practice.
- Besides applying the OBI in clinic setting, it can be part of hand treatment regime and used in home therapy. OBI helps to remediate impairments using purposeful activities and client's occupation, as well as providing a platform for clients to practice and achieve performance competence in the selected occupation.

Acknowledgements 6

- **Occupational Therapy Department, Kuala Lumpur Hospital, Kuala Lumpur, Malaysia**
- **Occupational Therapy Unit, Raja Perempuan Zainab II Hospital, Kota Bharu, Kelantan, Malaysia**
- **All hand therapy clients who participated in this study**

Ethic approvals : IIREC, JCU (H4901) & MREC, MOH (NMRR-12-660-11901)
Trial registration : ANZCTR12614000569606

CORRESPONDENCE:
Che Daud, Ahmad Zamir
Email: ahmadzamir.chedaud@my.jcu.edu.au

References:

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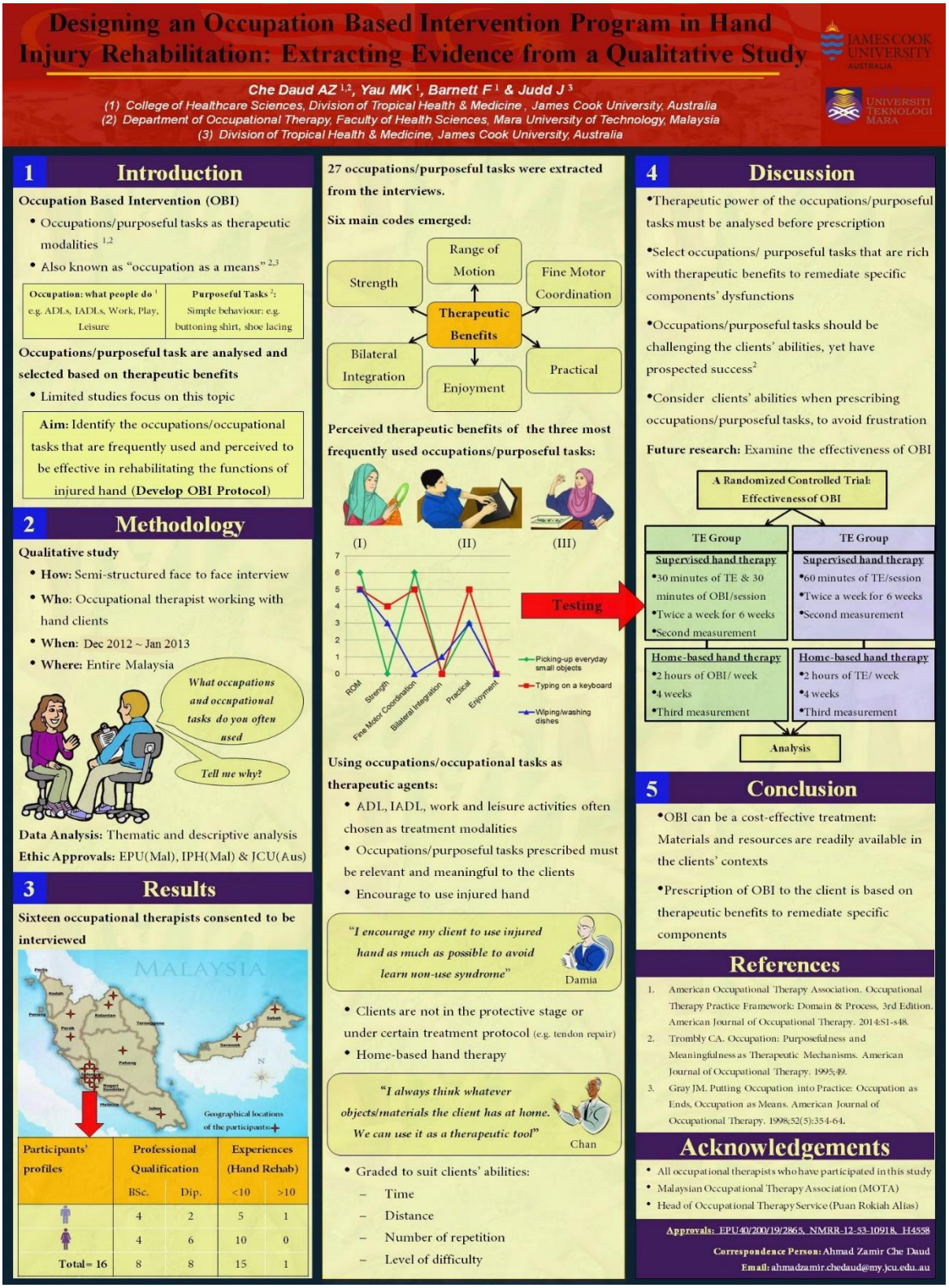
E. Conference poster presentation: 10th Congress of Asian Pacific Federation of Societies for Surgery of the Hand



F. Ethics Approvals

Approvals/Projects	Organisation	Approval No	Date
F1. Approval to conduct a research in Malaysia	Economic Planning Unit Malaysia	UPE: 40/2000/19/2865	6/3/2012
F2. Phase One: A Delphi study	E2.1 Institutional Approval E2.2 Institute for Public Health Malaysia, MOH E2.3 HREC, James Cook University	10918 NMRR-12- 53-10918 H4559	8/2/2012 20/3/2012 1/6/2012
F3. Phase Two: An interpretative phenomenological analysis	E3.1 Institutional Approval- Combined approval with D.2.1 E3.2 Institute for Public Health Malaysia- Combined approval with D.2.2 E3.3 HREC, James Cook University	Same as D.2.1 Same as D.2.2 H4558	8/2/2012 20/3/2012 1/6/2012
F4. Phase Three: A randomised controlled trial study	E4.1 Institutional approval (KLGH) E4.2 MREC, MOH E4.3 HREC, James Cook University	- NMRR-12- 660-11901 H4901	24/4/2012 5/10/2012 14/12/2012

F1. Approval to conduct a research in Malaysia: Economic Panning Unit, Malaysia

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has been removed

F2. Phase One: A Delphi study

F2.1. Institutional approval: Raja Perempuan Zainab II Hospital

F2.2. Institute for Public Health Malaysia

F2.3. Human Research Ethics Committee (HREC), James Cook University

This administrative form has been removed

F3. Phase Two: An interpretative phenomenological analysis

F3.1. Human Research Ethics Committee (HREC), James Cook University

F4. Phase Three: A Randomized Controlled Trial Study

F4.1. Institutional Approval: Kuala Lumpur General Hospital (KLGH)

F4.2. Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia

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has been removed

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F4.3. Human Research Ethics Committee (HREC), James Cook University

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G. Information sheet, consent form and questionnaire: Phase One (Delphi study)

G1. Information sheet

Human Research Ethics Committee

Title: Occupation based intervention from a Malaysian's perspective: A Delphi Study

You are invited to take part in a research project to achieve a consensus definition of occupation based intervention. The study is being conducted by **Ahmad Zamir Che Daud** and will contribute to the **Occupation- Based Intervention in Hand Rehabilitation: A Malaysian perspective Project** in partial fulfilment of his **Doctor of Philosophy Occupational Therapy** at James Cook University.

If you agree to be involved in the study, you will be invited to answer several questionnaires sequentially. For the first questionnaire, you need to answer a few open ended questions. Then the questionnaire will be analysed to develop the subsequent questionnaires. The next questionnaire will be posted or emailed to you, requiring you to rank your agreement about the definition of occupation based intervention. If the agreement is still not achieved for any statement in this questionnaire, the subsequent questionnaire will be developed and posted or emailed to you. This questionnaire process will continue until consensus is achieved. For each questionnaire, you are given 3 weeks in which to return it to the researcher. The questionnaire either will be posted or emailed based on your preferences. Please provide your email or postal address in the informed consent form and select the mode of delivery of for the questionnaire. Each questionnaire should only take 15-200 minutes to complete

Taking part in this study is completely voluntary and you can ask to be removed from participation in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

As occupation based intervention is quite a new term to be used in occupational therapy, you

may find some the questions a little distressing.

If you know of others that might be interested in this study, can you please pass on this information sheet to them so they may contact me to volunteer for the study.

Your responses and contact details will be treated as strictly confidential. The data from the study will be used in research publications and reports only. You will not be identified in any way in these publications.

If you have any questions about the study, please contact the Principal Investigator and Supervisor.

Principal Investigator:
Ahmad Zamir Che Daud
School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University
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Email: ahmadzamir.chedaud@my.jcu.edu.au

Supervisor:
Prof Matthew Yau
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G2. Consent form

JAMES COOK UNIVERSITY AUSTRALIA

Human Research Ethics Committee

PRINCIPAL INVESTIGATOR	**Ahmad Zamir Che Daud**
PROJECT TITLE:	**Occupation based intervention from Malaysian's perspective: A Delphi Study**
SCHOOL	**Public Health, Tropical Medicine & Rehabilitation Science**

I understand the aim of this research study is to achieve a consensus definition of occupation based intervention. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve a sequence of questionnaires and I agree that the researcher may use the results as described in the information sheet.

I acknowledge that:

any risks and possible effects of participating in the sequential questionnaires have been explained to my satisfaction;

Taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided;

That any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

Confidentiality is totally guaranteed.
(Please tick to indicate consent)

I consent to complete a sequential questionnaire	☐	**Yes**	☐	**No**

Name: *(printed)*	
Signature: ***Email address or Address:**	**Date:**

G3. Delphi questionnaires

G3.1 Questionnaire: Delphi Round One

This questionnaire has two sections: A and B. Section A comprises of demographic questions only while section B contains open-ended questions connected to occupation based intervention. Your honest responses are much appreciated.

Section A: Demographic details

Please answer and tick the appropriate box.

1. Gender:

   ☐ Male ☐ Female

2. Age group:

   ☐ 21-30 years old ☐ 31-40 years old

   ☐ 41-50 years old ☐ 51-60 years old

3. Working experience as an occupational therapist/lecturer: _____Years_____Months

4. Clinical experience in occupational therapy: _____ Years _____ Months

5. Qualifications:

   ☐ PhD; please specify area of study_____

   ☐ Master; please specify area of study: _____

   ☐ Bachelor Degree; please specify area of study: _____

   ☐ Diploma; please specify area of study _____

6. Current position:

☐ Occupational therapist grade: _____ ☐ Occupational therapy lecturer grade: _____

7. Do you ever heard of occupation based intervention?

☐ Yes ☐ No..... If no, thank you very much for your time.

Section B: Definition of Occupation Based Intervention (OBI)

Please answer the question in the space given according to your understanding and knowledge on occupation based intervention.

8. In your own knowledge, how do you define and describe occupation based intervention?

_____

_____

_____

_____

9. In your own knowledge and experiences, please describe the essential components of occupation based intervention (provide an example when necessary)?

_____

_____

_____

_____

10. In your experience, do you have any issue in applying/using occupation based intervention in your practice?

_____

_____

_____

_____

_____

11. Do you have any other comment on occupation based intervention that you have not mention in previous questions?

_____

_____

_____

_____

_____

~Thank you for your willingness to participate in this study, and your cooperation are much appreciated. Have a good day~

G3.2. Questionnaire: Delphi Round Two

This questionnaire has three sections:

A. Definition of occupation based intervention
B. Characteristics of occupation based intervention
C. Challenges of applying occupation based intervention

Please tick the appropriate box.

1. To what extent do you agree with the following statements that define occupation based intervention?

No	Statement	S. Disagree	Disagree	Agree	S. Agree
1	An intervention on occupational performance that is meaningful, matches the client's goal and takes place within the client's actual context/environment.				
2	An intervention that includes all levels of interventions such as preparatory and purposeful methods, as long as the end goal is occupational performance.				
3	An intervention that consciously uses the client's occupations and purposeful activities as a healing agent or treatment medium.				

2. If you have other ideas and comments, please write it here:

_____

_____

Section B: Characteristics of Occupation Based Intervention (OBI)

Please tick the appropriate box.

3. To what extent do you agree with the following statements that define occupation based intervention?

No	Statement	S. Disagree	Disagree	Agree	S. Agree
Sub-category 1: The client-centred intervention					
4	Matching the client's goals.				
5	Specifically focused on the occupation that the client aims and desires to do.				
6	Depending on client's own priorities in their occupations.				
7	Identified as meaningful to the client.				
Sub-category 2: The intervention forms					
8	Using the client's daily occupations as the treatment medium.				
9	Implementing treatment on occupations that have been identified problematic to the client.				
10	Preparatory and purposeful methods are used to achieve occupational performance goal.				
11	Using tasks that can generate income.				
12	Using materials related to the client's occupation.				
13	Using a task that has an end product.				
14	Using simulated occupations.				
Sub-category 3: The outcome of intervention					
15	To promote, restore and maintain occupational performance.				
16	To facilitate engagement in occupation within the client's real context.				
17	To engage clients in their occupational roles.				
18	To enable the client to achieve their optimum level of functioning.				
19	To remediate dysfunctional components by using the client's daily occupation.				
Sub-category 4: The operational framework					
20	The Social Model.				
21	The Model of Human Occupation.				
22	The Canadian Model of Occupational Performance.				
23	The concept of occupation as therapy: Occupation as means and end.				

Sub-category 5: The evaluation and assessment					
24	Using top down approach.				
25	Using the occupational profile to identify the client's meaningful occupations.				
26	Requiring occupational therapists to know what motivates people to engage in occupations.				
27	Requiring client's ability to describe their occupations, habits and roles.				
28	Using client-centred assessment to address the client's needs and problems.				
Sub-category 6: The gradable and modifiable intervention					
29	Can be graded to suit the level of capability of the client.				
30	Can be modified to suit client's capabilities.				
Sub-category 7: The contextual factors					
31	Occur in the client's context such as the physical environment, cultural and social support.				
Sub-category 8: The occupation based practice					
32	Should not be the main treatment in an acute setting.				
33	Occupation based intervention is core to occupational therapy intervention.				
34	Occupation based intervention represents the identity of occupational therapy.				
35	Can differentiate between the roles of occupational therapists and physiotherapists.				
36	Occupation is infused or incorporated across the assessment, intervention and outcome phases.				

4. If you have other ideas and comments, please write it here:

_____

_____

_____

Section C: Challenges of Applying Occupation Based Intervention (OBI)

Please tick the appropriate box.

5. To what extent do you agree with the following statements that define occupation based intervention?

No	Statement	S. Disagree	Disagree	Agree	S. Agree
Sub-category 1: The client factors					
37	The client does not value 'independence' in daily living.				
38	The client is not really bothered about the outcome of intervention.				
39	The client is more impressed and motivated by sophisticated and advanced equipment.				
40	The client is not interested in carrying out occupation based intervention.				
41	The client is not motivated to do the occupation based intervention.				
42	The client does not understand the purpose of the occupation based intervention.				
43	The client's understanding of the recovery process; e.g. the client is not ready to engage in occupations until they gain maximal level of strength, and is fully recovered.				
44	It is difficult to obtain the cooperation of client when practising occupation based intervention.				

Sub-category 2: The occupational therapist factors					
45	Skill and knowledge in applying a client-centred approach is lacking among occupational therapists.				
46	Occupational therapists lack the creativity skills to practise occupation based intervention.				
47	Skill in grading activities is lacking among occupational therapists.				
48	Basic skills in activity analysis are lacking among occupational therapists.				
49	Occupational therapists are not able to link preparatory/adjunctive methods to occupational performance.				
50	Occupational therapist rarely uses occupation based assessment in daily clinical practice.				
51	Occupational therapists have limited knowledge and understanding about occupation based intervention.				
52	Occupational therapists are not sufficiently well prepared and well trained to practise occupation based intervention.				
53	Occupational therapists have negative attitudes toward occupation based interventions.				
54	Occupational therapists underestimate the value and power of occupation.				
Sub-category 3: The contextual factors					
55	The Malaysian cultural value of relying on family members to serve the sick client is a challenge to occupation based intervention.				
56	The dominance of the medical model in healthcare delivery makes it difficult to practice occupation based intervention.				
57	Lack of awareness about the role of the occupational therapist by other professionals limits referral for				

	occupation based intervention.				
58	Multidisciplinary members always perceive that movements and strength are essential requirements for function.				
59	Multidisciplinary members do not understand the purpose of occupation based intervention.				
60	Lack of cooperation from other multidisciplinary members makes it difficult to practise occupation based intervention.				
61	Practising occupation based intervention makes occupational therapy services less significant than other multidisciplinary professionals.				
62	Occupational therapy will not be competitive or useful in modern healthcare if practitioners only using occupation based intervention.				
Sub-category 4: Occupation as a treatment modality					
63	Occupation based intervention is less useful and meaningful to the client.				
64	Limited evidence on the efficacy of occupation based intervention.				
65	Occupation based intervention is less practical in an acute care setting.				
66	Occupation based intervention is outdated if used for a long period of time.				
67	Occupation based intervention is less attractive.				
68	Providing good, observable and measurable outcomes in the domain of occupation is difficult.				
69	Balancing the use of occupation based intervention and preparatory methods in practice is difficult.				
Sub-category 5: Logistic issues					
70	Documenting and reporting occupation based intervention is difficult.				

71	Practising occupation based intervention consumes a lot of time.				
72	Practising occupation based intervention is difficult due to time constraints and heavy workloads.				
73	Lack of specific guidelines offered by the Malaysia Ministry of Health (MOH) on occupation based intervention.				
74	Providing a similar context and environment in which the client's occupations take place is challenging.				
75	The department is not set up for practising occupation based intervention.				
76	Appropriate equipment and sources for practicing occupation based intervention are lacking.				
77	Practising occupation based intervention demands more space.				
78	No occupation based assessment is available to be used in the department.				

6. If you have other ideas and comments, please write it here:

_____

_____

_____

_____

_____

_____

~Thank you for your willingness to participate in this study, and your cooperation are much appreciated. Have a good day~

G3.3 Questionnaire: Delphi Round Three

This questionnaire has three sections:

A. Definition of occupation based intervention
B. Characteristics of occupation based intervention
C. Challenges of applying occupation based intervention

Please tick the appropriate box.

1. To what extent do you agree with the following statements that define occupation based intervention?

No	Statement	S. Disagree	Disagree	Agree	S. Agree
1	An intervention on occupational performance that is meaningful, matches the client's goal and takes place within the client's actual context/environment.				
2	An intervention that includes all levels of interventions such as preparatory and purposeful methods, as long as the end goal is occupational performance.				
3	An intervention that consciously uses the client's occupations and purposeful activities as a healing agent or treatment medium.				

2. If you have other ideas and comments, please write it here:

_____

_____

_____

_____

_____

_____

_____

_____

Section B: Characteristics of Occupation Based Intervention (OBI)

Please tick the appropriate box.

3. To what extent do you agree with the following statements that define occupation based intervention?

No	Statement	S. Disagree	Disagree	Agree	S. Agree
Sub-category 1: The client-centred intervention					
4	Matching the client's goals.				
5	Specifically focused on the occupation that the client aims and desires to do.				
6	Depending on client's own priorities in their occupations.				
7	Identified as meaningful to the client.				
Sub-category 2: The intervention forms					
8	Using the client's daily occupations as the treatment medium.				
9	Implementing treatment on occupations that have been identified problematic to the client.				
10	Preparatory and purposeful methods are used to achieve occupational performance goal.				
11	Using tasks that can generate income.				
12	Using materials related to the client's occupation.				
13	Using a task that has an end product.				
14	Using simulated occupations.				
Sub-category 3: The outcome of intervention					
15	To promote, restore and maintain occupational performance.				
16	To facilitate engagement in occupation within the client's real context.				
17	To engage clients in their occupational roles.				
18	To enable the client to achieve their optimum level of functioning.				
19	To remediate dysfunctional components by using the client's daily occupation.				

Sub-category 4: The operational framework					
20	The Social Model.				
21	The Model of Human Occupation.				
22	The Canadian Model of Occupational Performance.				
23	The concept of occupation as therapy: Occupation as means and end.				
Sub-category 5: The evaluation and assessment					
24	Using top down approach.				
25	Using the occupational profile to identify the client's meaningful occupations.				
26	Requiring occupational therapists to know what motivates people to engage in occupations.				
27	Requiring client's ability to describe their occupations, habits and roles.				
28	Using client-centred assessment to address the client's needs and problems.				
Sub-category 6: The gradable and modifiable intervention					
29	Can be graded to suit the level of capability of the client.				
30	Can be modified to suit client's capabilities.				
Sub-category 7: The contextual factors					
31	Occur in the client's context such as the physical environment, cultural and social support.				
Sub-category 8: The occupation based practice					
32	Should not be the main treatment in an acute setting.				
33	Occupation based intervention is core to occupational therapy intervention.				
34	Occupation based intervention represents the identity of occupational therapy.				
35	Can differentiate between the roles of occupational therapists and physiotherapists.				
36	Occupation is infused or incorporated				

	across the assessment, intervention and outcome phases.				

4. If you have other ideas and comments, please write it here:

_____

_____

_____

Section C: Challenges of Applying Occupation Based Intervention (OBI)

Please tick the appropriate box.

5. To what extent do you agree with the following statements that define occupation based intervention?

No	Statement	S. Disagree	Disagree	Agree	S. Agree
Sub-category 1: The client factors					
37	The client does not value 'independence' in daily living.				
38	The client is not really bothered about the outcome of intervention.				
39	The client is more impressed and motivated by sophisticated and advanced equipment.				
40	The client is not interested in carrying out occupation based intervention.				
41	The client is not motivated to do the occupation based intervention.				
42	The client does not understand the purpose of the occupation based intervention.				
43	The client's understanding of the recovery process; e.g. the client is not ready to engage in occupations until they gain maximal level of strength, and is fully recovered.				

44	It is difficult to obtain the cooperation of client when practising occupation based intervention.				
Sub-category 2: The occupational therapist factors					
45	Skill and knowledge in applying a client-centred approach is lacking among occupational therapists.				
46	Occupational therapists lack the creativity skills to practise occupation based intervention.				
47	Skill in grading activities is lacking among occupational therapists.				
48	Basic skills in activity analysis are lacking among occupational therapists.				
49	Occupational therapists are not able to link preparatory/adjunctive methods to occupational performance.				
50	Occupational therapist rarely uses occupation based assessment in daily clinical practice.				
51	Occupational therapists have limited knowledge and understanding about occupation based intervention.				
52	Occupational therapists are not sufficiently well prepared and well trained to practise occupation based intervention.				
53	Occupational therapists have negative attitudes toward occupation based interventions.				
54	Occupational therapists underestimate the value and power of occupation.				
Sub-category 3: The contextual factors					
55	The Malaysian cultural value of relying on family members to serve the sick client is a challenge to occupation based intervention.				
56	The dominance of the medical model in healthcare delivery makes it difficult to practice occupation based intervention.				

57	Lack of awareness about the role of the occupational therapist by other professionals limits referral for occupation based intervention.				
58	Multidisciplinary members always perceive that movements and strength are essential requirements for function.				
59	Multidisciplinary members do not understand the purpose of occupation based intervention.				
60	Lack of cooperation from other multidisciplinary members makes it difficult to practise occupation based intervention.				
61	Practising occupation based intervention makes occupational therapy services less significant than other multidisciplinary professionals.				
62	Occupational therapy will not be competitive or useful in modern healthcare if practitioners only using occupation based intervention.				
Sub-category 4: Occupation as a treatment modality					
63	Occupation based intervention is less useful and meaningful to the client.				
64	Limited evidence on the efficacy of occupation based intervention.				
65	Occupation based intervention is less practical in an acute care setting.				
66	Occupation based intervention is outdated if used for a long period of time.				
67	Occupation based intervention is less attractive.				
68	Providing good, observable and measurable outcomes in the domain of occupation is difficult.				
69	Balancing the use of occupation based intervention and preparatory methods in practice is difficult.				

Sub-category 5: Logistic issues					
70	Documenting and reporting occupation based intervention is difficult.				
71	Practising occupation based intervention consumes a lot of time.				
72	Practising occupation based intervention is difficult due to time constraints and heavy workloads.				
73	Lack of specific guidelines offered by the Malaysian Occupational Therapy Association (MOTA) on occupation based intervention.				
74	Providing a similar context and environment in which the client's occupations take place is challenging.				
75	The department is not set up for practising occupation based intervention.				
76	Appropriate equipment and sources for practicing occupation based intervention are lacking.				
77	Practising occupation based intervention demands more space.				
78	No occupation based assessment is available to be used in the department.				

6. If you have other ideas and comments, please write it here:

_____

_____

_____

~Thank you for your willingness to participate in this study, and your cooperation are much appreciated. Have a good day~

H. Information sheet, consent form and interview guide: Phase Two (IPA study)

H1. Information sheet

Title: Occupation based intervention in hand rehabilitation: a phenomenology study among Malaysian occupational therapists

You are invited to take part in a research project to describe how Malaysian occupational therapists perceive and experience providing occupation based intervention for hand therapy clients. The study is being conducted by **Ahmad Zamir Che Daud** and will contribute to the **Occupation- Based Intervention in Hand Rehabilitation: A Malaysian perspective Project** in partial fulfilment of his **Doctor of Philosophy Occupational Therapy** at James Cook University.

If you agree to be involved in the study, you will be invited to be interviewed. The interview, with your consent, will be digitally recorded, and should only take approximately 30 minutes to 1 hour of your time. The interview will be conducted at a venue of your choices. Please leave your email or phone number in consent form for interview arrangement.

Taking part in this study is completely voluntary and you can ask to be removed from participation in the study at any time without explanation or prejudice. You may also withdraw any unprocessed data from the study.

As occupation based intervention is quite new term used in occupational therapy, you may find some the questions a little distressing.

Your responses and contact details will be strictly confidential. The data from the study will be used in research publications and reports only. You will not be identified in any way in these publications.

If you have any questions about the study, please contact Principal Investigator and Supervisor.

Principal Investigator:
Ahmad Zamir Che Daud
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Supervisor:
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Phone: +61 7 4781 6672

Email: matthew.yau@jcu.edu.au

Human Research Ethics Committee

H2. Consent form

PRINCIPAL INVESTIGATOR	**Ahmad Zamir Che Daud**
PROJECT TITLE:	**Occupation based intervention in Hand Rehabilitation: A phenomenology study among Malaysian Occupational Therapist**
SCHOOL	**Public Health, Tropical Medicine and Rehabilitation Sciences**

I understand the aim of this research study is to explore the phenomenon of occupation based intervention in hand rehabilitation. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve an interview and I agree that the researcher may use the results as described in the information sheet.

I acknowledge that:

any risks and possible effects of participating in the have been explained to my satisfaction;

taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and to withdraw any unprocessed data I have provided;

that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

Confidentiality is totally guaranteed.

(Please tick to indicate consent)

I consent to be interviewed	☐	**Yes**	☐	**No**
I consent for the interview to be digitally recorded	☐	**Yes**	☐	**No**

Name: *(printed)*	
Signature:	Date:
Email address	Phone no:

H3. Interview guide

Title: Occupation based Intervention in Hand Injury Rehabilitation: A phenomenology Study among Malaysian Occupational Therapist

Demographic Checklist:

1. Gender: ☐ Male ☐ Female
2. Location:_____
3. Professional qualification:_____
4. Years of experience as an occupational therapist:_____
5. Years of experience in hand rehabilitation:_____
6. Current % of direct contact with hand clients:_____

Introductory statement:

Findings from my previous study described that occupational based intervention is an intervention on occupational performance that is meaningful, matches the client's goal and takes place within the client actual context/environment. This refers to *occupation as an end*, where the occupational engagement is the end goal of intervention. Additionally, my previous study also found that occupation based intervention was not just as-ends, but also as a means, which refers occupation as a healing agent to remediate capacities and abilities of the client.

1. Do you have experience providing such intervention with clients with hand injuries? Please tell me more.

Occupation as-ends

2. Tell me your experience in engaging your hand therapy client in their occupations (activities of daily living, work and leisure)?

3. What kind of daily occupational problems (ADLs, IADLs, work, leisure, social activities and etc.) your clients normally have? Please give few examples based on your experience working with the clients.

4. Could you tell me how you initiate the *occupation as an end* with your hand therapy client? And what factors you consider before implementing the *occupation as an end*?

5. If I were in the intervention session with you, what would I see you doing? (Patton, 2002)

6. What context or situation usually influences you to use the *occupation as an end* intervention for clients with hand injuries? (Creswell, 2007)

7. When you use the *occupation as an end* with your clients. How do they respond to the intervention? (Colaianni, 2011)

8. How do you feel about using the *occupation as an end* for clients with hand injuries? (Patton, 2002)

9. What do you see about the use of occupation as an end in hand rehabilitation in Malaysia in the future?

Occupation as a means:

10. Tell me your experience in using occupations (activities of daily living, work or leisure) as treatment modality for hand therapy clients? Could you give me an example of typical scenario or case?
11. Could you tell me how you plan or initiate the *occupation as a means*? And what factors you consider before implementing the *occupation as a means*?

12. How do you use *occupation as a means* in hand therapy? Could you give few examples?

13. Could you list me few occupations (activities of daily living, work or leisure) you normally used as the treatment modality for your hand clients? Please explain why you choose the occupations (activities of daily living, work or leisure) as treatment modality?

14. What context or situation usually influences you to use the *occupation as a means* for hand therapy clients? (Creswell, 2007)

15. When you use the *occupation as a means* with your clients. How do they respond to the intervention? (Colaianni, 2011)

16. How do you feel about using *occupation as a means* for hand therapy client? (Patton, 2002)

17. What do you see about the use of the *occupation as a means* in hand rehabilitation in Malaysia in the future?

Last question:

18. Do you have anything to add regarding your experience of using OBI (occupation as a means and as an end) in hand injury rehabilitation that you have not mentioned earlier or I have forgotten to ask? (Moustakas, 1994)

~THANK YOU~

I. Information sheet, Consent form and Protocol: Phase Three (RCT study)

I1.1. Information sheet: English Version

TITLE: THE EFFICACY OF OCCUPATION BASED INTERVENTION IN COMPARISON WITH THERAPEUTIC EXERCISE IN THE REHABILITATION OF ADULT CLIENTS WITH HAND INJURIES

You are invited to take part in a research project to investigate the efficacy of occupation based intervention in comparison with therapeutic exercise in the rehabilitation of adult clients with hand injuries. The study is being conducted by **Ahmad Zamir Che Daud** and will contribute to the **Occupation- Based Intervention in Hand Rehabilitation: A Malaysian perspective Project** in **Doctor of Philosophy Occupational Therapy** at James Cook University, Australia.

From occupational therapy registration record, we found that you are eligible to participate in this study. You are being asked because your occupational therapist thinks you might be interested in taking part.

If you agree to be involved in the study, you will be provided with 2 sessions of occupational therapy treatment twice a week. The treatment will be continued for six weeks and every therapy session takes 30 minutes to complete. After the treatment completed at the Occupational Therapy Unit, you will be given a home exercise program for 4 weeks. Then, you have to come again to occupational therapy department for follow-up session. Additionally, you will be evaluated by an occupational therapist before the treatment, after the six weeks treatment and during follow-up session.

Treatment will be provided by an occupational therapist who has experience in hand rehabilitation. The occupational therapist also will arrange your treatment schedule and appointments. If you have any problem with the treatment schedule and appointments, please consult directly with the occupational therapist.

Your information will be strictly confidential. A code number will be used to identity data about you, and the list that links codes to people identity will be kept separately from the data.

The data from the study will be used in research publications and reports. You will not be identified in any way in these publications.

As this study involving therapy to your injured hand, you may experience minimal pain and discomfort during the therapy session, which is similar with standard hand therapy treatment. Please consult your occupational therapist if you experience pain, discomfort and distressed for counselling and further treatment.

This study is funded by Internal Research Grant, Faculty of Medicine and Molecular sciences, James cook University, Australia.

If you have any questions about the study, please contact Principal Investigator and Principal Supervisor.

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I1.2. Information sheet: Malay version

TAJUK: KEBERKESANAN RAWATAN BERASASKAN 'KERJA' BERBANDING DENGAN SENAMAN TERAPUTIK DALAM PEMULIHAN PESAKIT DEWASA YANG MENGALAMI KECEDERAAN TANGAN

Jika anda bersetuju untuk menyertai kajian ini, anda akan diberikan rawatan pemulihan carakerja sebanyak dua sesi, dua kali seminggu. Rawatan akan berterusan selama lapan minggu, dan setiap sesi terapi/rawatan memakan masa selama 30 minit. Selepas rawatan tersebut selesai, anda akan diberikan satu program latihan di rumah selama 4 minggu. Kemudian, anda dikehendaki datang ke Jabatan Pemulihan Carakerja untuk sesi susulan. Selain itu, penilaian akan dibuat ke atas anda oleh seorang jurupulih perubatan carakerja sebelum rawatan, selepas lapan minggu rawatan dan semasa sesi susulan.

Rawatan ke atas anda akan dijalankan oleh jurupulih perubatan carakerja kanan yang mempunyai pengalaman dalam bidang pemulihan tangan. Jurupulih perubatan carakerja kanan tersebut juga akan mengatur segala jadual rawatan dan temujanji untuk anda. Sekirnaya anda mempunyai sebarang masalah dengan jadual rawatan dan temujanji, sila berunding secara langsung dengan jurupulih perubatan carekerja tersebut.

Segala maklumat anda akan dirahsiakan.Satu nombor kod akan digunakan untuk setiap data identity peserta, dan senarai yang menghubungkan kod identiti akan disimpan berasingan daripada data tersebut. Data daripada kajian ini akan digunakan untuk penerbitan penyelidikan dan laporan. Anda tidak akan dikenal pasti dalam apa jua cara dalam penerbitan dan laporan tersebut.

Kajian ini melibatkan terapi ke atas tangan anda yang tercedera, jadi anda mungkin mengalami sedikit kesakitan dan ketidakselesaan semasa sesi terapi. Sila laporkan kepada jurupilh carakerja anda sekiranya anda mengalami kesakitan yang berterusan, seterusnya

anda akan dirujuk kepada doktor yang merawat anda.

Kajian ini dibiayai oleh Geran Penyelidikan Dalaman, Fakulti Perubatan dan Sains Molekul, James Cook University, Australia dengan kerjasama Jabatan Pemulihan Carakerja, Hospital Besar Kuala Lumpur.

Sekiranya anda mempunyai sebarang soalan mengenai kajian ini, sila hubungi penyelidik utama, penyelia kajian dan jurupulih perubatan perubatan carakerja terlibat.

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I2.1 Consent form: English version

PRINCIPAL INVESTIGATOR	**AHMAD ZAMIR BIN CHE DAUD**
RESEARCH TITLE:	**THE EFFICACY OF OCCUPATION BASED INTERVENTION IN COMPARISON WITH THERAPEUTIC EXERCISE IN THE REHABILITATION OF ADULT CLIENTS WITH HAND INJURIES**
SCHOOL	**PUBLIC HEALTH, TROPICAL MEDICINE AND REHABILITATION SCINCES**

I understand the aim of this research study is to investigate the efficacy of occupation based intervention in comparison with therapeutic exercise in the rehabilitation of adult clients with hand injuries. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written information sheet to keep.

I understand that my participation will involve undergo eight weeks treatment at occupational therapy department and 4 weeks self-exercise program at home.

I acknowledge that:

any risks and possible effects of participating in this study have been explained to my satisfaction;

Taking part in this study is voluntary and I am aware that I can stop taking part in it at any time without explanation or prejudice and can withdraw any unprocessed data I have provided;

That any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval;

Confidentiality is totally guaranteed.

(Please tick to indicate consent)

I consent to be evaluated by occupational therapist		**Yes**		**No**
I consent to undergo 6 week treatment at Occupational Department		**Yes**		**No**
I consent to undergo 4 weeks self-exercise program at home		**Yes**		**No**

Name of Patient:	
Signature:	**Date:**
Name of Person Obtained the Consent:	
Signature:	**Date:**

I2.2. Consent form: Malay version

PENYELIDIK UTAMA	**AHMAD ZAMIR BIN CHE DAUD**
TAJUK KAJIAN	**KEBERKESANAN RAWATAN BERASASKAN 'KERJA' BERBANDING DENGAN SENAMAN TERAPUTIK DALAM PEMULIHAN PESAKIT DEWASA YANG MENGALAMI KECEDERAAN TANGAN**
SEKOLAH	**KESIHATAN UMUM, PERUBATAN TROPIKAL DAN SAINS PEMULIHAN**

Saya faham tujuan kajian ini adalah untuk mengkaji keberkesanan rawatan berasaskan kerja berbanding dengan senaman teraputik dalam pemulihan pesakit dewasa yang mengalami kecederaan tangan. Saya bersetuju untuk mengambil bahagian dalam projek ini, butir-butir kajiantelah diterangkan kepada saya, dan saya telah diibekalkan dengan helaian maklumat kajian untuk disimpan.

Saya faham penyertaan saya akan melibatkan lapan minggu rawatan di Jabatan Pemulihan Carakerja dan empat minggu program senaman sendiri di rumah.

Saya mengakui bahawa:

Sebarang risiko dan kesan yang mungkin berlaku dalam mengambil bahagian di dalam kajian ini telah dijelaskan dengan memuaskan;

Megambil bahagian dalam kajian ini adalah secara sukarela dan saya sedar bahawa saya boleh berhenti mengambil bahagian pada bila-bila masa tanpa sebarang penjelasan atau prejudis, dan boleh menarik balik apa-apa data yang belum diproses;

Bahawa apa-apa maklumat yang saya berikan akan dirahsiakan dan bahawa tiada nama akan digunakan untuk menegenal pasti diri saya dalam kajian ini tanpa persetujuan saya;

Kerahsian adalah dijamin sepenuhnya.

(Sila tandakan untuk menunjukkan persetujuan:)

Saya mengizinkan untuk dinilai oleh jurupulih perubatan carakerja		**Ya**		**Tidak**
Saya mengizinkan untuk menjalani 6 minggu rawatan pemulihan carakerja		**Ya**		**Tidak**
Saya mengizinkan untuk menjalani 4 minggu sesi senaman sendiri di rumah		**Ya**		**Tidak**

Tandatangan:	**Tarikh:**
Nama Pegawai yang Mendapatkan Keizinan:	
Tandatangan:	**Tarikh:**

J. Certificate of translation of information sheet and consent form into Malay

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K. Trial registration (study protocol)

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L. List of occupation based intervention tasks recommended by the participants in Phase Two (IPA study)

OBI Tasks	Therapeutic benefits (Pseudonyms*)						Frequency count of recommendation (N=16)
	Strength	ROM	Bilateral integration	Fine motor	Enjoyment	Practical	
1. Typing on a keyboard	4 codes (h,k,l,o)	6 codes (a,c,f,h,l,o)	-	5 codes (a,f,h,k,l,)	-	5 codes (a,c,f,l,o)	7
2. Picking everyday small objects	-	6 codes (a,e,i,k,l,o)	-	6 codes (a,e,i,k,l,o)	-	3 codes (a,i,o)	6
3. Wiping or washing dishes	3 codes (a,b,e)	5 codes (a,b,e,l,n)	4 codes (a,e,l,n)	-	-	1 code (b)	5
4. Squeezing wet towel	4 codes (a,b,g,i)	2 codes (g,i)	1 code (a)	-	-	-	4
5. Writing practice	2 codes (i,k,)	4 codes (b,i,k,l,)	-	3 codes (b,i,l,)	-	4 codes (,b,i,k,l)	4
6. Lifting or carrying everyday objects	4 codes (i,k,n,o)	-	3 codes (i,k,o)	-	-	2 codes (k,o)	4
7. Clipping clothes using pegs	4 codes (c,h,m,n)	1 code (m)	-	1 code (n)	-	2 codes (c.m)	4
8. Assembling/dissembling nuts and bolts	-	1 code (d)	2 codes (l,p)	3 codes (l,d,p)	-	2 codes (d,p)	3
9. Making origami/collage	-	2 codes (b,d)	-	2 codes (a,b)	2 codes (b,d)	1 code (a)	3

*__Pseudonyms__: a-Damia, b-Billy, c-Husain, d-Idris, e-Melur, f-Daisy, g-Anita, h-Rosni, i-Melati, j-Bavani, k-Kesuma, l-Chan, m-Bolhan, n-Nurul, o-Zul and p-Shima

10. Folding Clothes	2 codes (b,c)	3 codes (b,c,e)	3 codes (b,c,e)	-	-	1 code (e)	3
11. Mopping or sweeping floor	3 codes (b,e,o)	-	2 codes (b,e)	-	-	-	3
12. Making a cup of coffee	2 codes (e,h)	2 codes (e,h)	2 codes (h,p)	-	1 code (p)	1 code (e)	3
13. Making a dough for pastry	3 codes (e,h,m)	3 codes (e,h,m)	2 codes (e,h)	-	-	-	3
14. Stringing the beads	-	2 codes (i,j)	3 codes (i,j,o)	3 codes (i,j,o)	-	1 code (j)	3
15. Buttoning shirt	-	2 codes (d,i)	2 codes (d,i)	2 codes (d,i)	-	1 code (d)	2
16. Shoe lacing	-	2 codes (a,l)	2 codes (a,l)	2 codes (a,l)	-	2 codes (a,l)	2
17. Cutting vegetables/fruits	2 codes (f,p)	2 codes (f,p)	2 codes (f,p)	-	-	-	2
18. Open and close door using doorknob	2 codes (d,o)	2 codes (d,o)	-	-	-	-	2
19. Zipping and unzipping clothes	2 codes (a,k)	2 codes (a,k)	2 codes (a,k)	-	-	1 code (a)	2
20. Watering the plants using jug	1code (g)	1code (g)	-	-	-	-	1
21. Ironing clothes	1 code (p)	-	1 code (p)	-	1 code (p)	1 code (p)	1
22. Stapling a bundle of papers	1 code (k)	1 code (k)	1 code (k)	-	-	-	1
23. Pottery	1 code (p)	1 code (p)	1 code (p)	1 code (p)	1 code (p)	-	1
24. Brushing teeth	1 code (l)	1 code (l)	-	-	-	-	1
25. Combing hair	1 code (l)	1 code (l)				1 code (l)	1
26.Flipping the page of book to read	-	1 code (l)	1 code (l)	1 code (l)	1 code (l)	1 code (l)	1
27. Arranging a bundle of paper	1 code (o)	1 code (o)	1 code (o)	-	-	-	1

M. Assessing normality of the main parameter in Phase Three (RCT study)