Psychosocial Inclusivity in Design: A Definition and Dimensions

By

Yonghun Lim

Department of Design

College of Engineering, Design and Physical Science

Brunel University London

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I would like to dedicate this thesis to my loving parents

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ABSTRACT

Significant changes in demographics, including a growing ageing population and a larger number of people with disabilities, have made inclusive design an increasingly relevant notion in the design of products, services, and environments. However, there is considerable concern that the concept of inclusive design is rather limited in its current definition and applications and has not yet been thoroughly applied. This is possibly due to the conventional understanding and application of inclusive design, mainly rooted in and focused on physical aspects of inclusion, such as accessibility, usefulness, and usability. This limited focus has led various voices in design academia and industry to speak of the need for further consideration of the psychological and social aspects of inclusive design as the next step to facilitate inclusive design, and make impact. In this research, inclusivity on psychological and social levels, is referred to as "psychosocial inclusivity".

The concept of psychosocial inclusivity, including a clear definition thereof and its application, is rather limited in the existing literature. Therefore, this PhD research aims to further explore this concept by establishing a clear definition and the dimensions thereof. In order to achieve this, an initial definition and dimensions of the psychosocial inclusivity in design are established through a critical review of existing literature from both social science and design perspectives. The initial definition and dimensions are then developed, refined, and evaluated through four empirical studies: the Delphi study (expert survey); field study I (ethnographic interviews with mobility scheme users); field study II (ethnographic interviews, creative workshop, and observation of older individuals); and an evaluation study (online survey of design academics and professionals). These studies have been designed based on a triangulation approach in order to enhance the reliability and validity of the outcomes.

At the end of this research, the definition and dimensions for psychosocial inclusivity in design (Cognitive, Emotional, Social, and Value dimensions) are proposed. The outcomes of this research can enhance the understanding and knowledge of the concept of psychosocial inclusivity in design. Also, the definition and dimensions can be used by design academics and professionals or third parties to consider psychosocial aspects. The dimensions also can be developed as a complete set of framework or toolkit through further research.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: Introduction

1.1 Research background and motivation

Due to the growth in the world population and rapid demographic changes, including the growing number of people with disabilities and people aged 60 years or over, various social issues such as social exclusion and isolation have emerged or been further highlighted. These social issues have led to increasing cases of design exclusion on physical, cognitive, emotional, and social levels. Social exclusion includes issues of social isolation and inequality (Brynn, 2013). These issues can also be seen impacting the daily lives of individuals where they have a reduced social role and limited opportunities for community participation. Such individuals experience social exclusion due to a lack of social support and contact, unemployment, low economic status, health problems, and discrimination (Salles, 2013).

There is therefore a need for inclusive design in the global social context (Coleman, et al., 2016; Flecher, 2011). Several government and non-government organisations (NGOs) in developed countries including Japan, Norway, Sweden, the UK, and the US, are working to resolve these issues and to provide improved inclusion through design (Broers et al., 2005; Johnson et al., 2010; Fitzpatrick et al., 2005; Piatt, 2005).

However, it could be argued that the existing notion of inclusive design has not yet been thoroughly and holistically applied. This is because the conventional trend within the field of inclusive design is focused on physical inclusivity (i.e. usability and accessibility) rather than the inclusivity of intangible factors (i.e. psychological and social factors) as the main focus of inclusive design studies (Steinfeld, 2013). Most policies and interventions in developed countries, for example, technological enhancement and infrastructure, are currently focused on physical inclusivity (Lim and Nickpour, 2015). However, the world of design has already moved beyond physical inclusivity and fields such as *pleasurable design* (Jordan, 2002); *emotional design* (Norman, 2005); *experience design* (Hassenzahl, et al., 2010; Pullman and Gross, 2004; Hekkert, et al., 2003); *meaning-centred design* (Giacomin, 2017; Verganti, 2013); and *human-centred design* (Giacomin, 2014; Brown, 2009); have emerged.

This imbalance between physical and non-physical aspects of inclusivity may require enhancement and an evaluation with the aim of achieving greater inclusivity through

consideration of both the tangible and intangible aspects of inclusive design (Langdon, 2015; Frye, 2013; Hedvall, 2013; Nickpour, et al., 2012; Demirkan, 2007; Imrie, et al., 2001; Demirbilek, et al., 1998). An illustration of this is people make the choice of products during their shopping not only based on physical aspects of the products (function or appearance), but they also consider intangible aspects such as emotional, social or ideological aspects. Further details of examples of non-physical inclusion and exclusion in design are provided in Chapter 2. To this end, the inclusivity of these intangible aspects of inclusive design will be referred to as "psychosocial inclusivity" in this thesis. Furthermore, considering that the psychosocial aspects of inclusive design are underexplored, a clear definition of psychosocial inclusion in the field of inclusive design is needed.

1.2 Research scope

Inclusive design

Inclusive design is applied in various design disciplines, such as products, services, systems, and environmental design to provide greater opportunities of accessibility and inclusivity for as many people as possible. In this research, the concept of inclusive design is the main context.

Psychosocial aspects

The term "psychosocial" reflects the dynamic interrelationship between social and psychological issues (Williamson, et al., 2006). With this in mind, it is clear that the concept of the psychosocial is used to highlight the connection between people's personal experiences and wider social experiences such as culture, traditions, and social relationships. In this research, the concept of the psychosocial is selected as the area of exploration and the main research scope. Inclusivity regarding any non-physical aspects of design such as psychological and social aspects, is referred to as "psychosocial inclusivity" in this PhD research.

1.3 Research aim, objectives, and questions

Aim and objectives

The aim of this research has been established to explore, define and detail the concept of psychosocial inclusivity in design by taking the following steps:

- to explore the importance and potential role of psychosocial inclusivity in design;

- to synthesise the existing relevant definitions and dimensions of psychosocial inclusivity from different fields of study in order to build an initial definition and dimensions for psychosocial inclusivity in design; and
- to refine and develop the initial definition and dimensions as explained above in order to evaluate them through a series of empirical studies.

Research questions

- What is the importance in psychosocial inclusivity in design?
- What is the definition of "psychosocial inclusivity in design"?
- what are the dimensions for psychosocial inclusivity in design?

1.4 Research structure

This PhD research is composed of eight chapters as summarised below:

Chapter 1 - Introduction

- An overview of the research, including its background, scope, aim, objectives, questions, and structure.

Chapter 2 - Literature analysis and synthesis

- Literature review of the existing concept of psychosocial aspects of inclusive design from both social sciences and design perspectives.
- Synthesis of the initial definition and dimensions of psychosocial aspects of inclusive design based on the literature review and analysis.

Chapter 3 - Research methodology

- A review of different research strategies and methodologies.
- An introduction to the research strategies and methodologies adopted in this research.

Chapter 4 - The Delphi study: An expert survey

- Conducting an in-depth open-ended questionnaire with 10 experts.
- Confirmation of the findings from Chapter 2.
- Identification of further psychosocial aspects of inclusive design.

Chapter 5 - Field study I: Interviews with individuals with mobility scheme users

- Conducting ethnographic interviews with 37 mobility scheme users to identify possible psychosocial aspects of inclusive design in terms of personal mobility.

Chapter 6 - Field study II: Interview, creative workshop, and observation of older individuals

Conducting a range of empirical studies to identify possible psychosocial aspects of inclusive design in terms of older individuals' shopping experiences through:

- Ethnographic interviews with 31 older individuals regarding their lifestyle and shopping experience.
- A creative workshop with 19 older individuals regarding psychosocial issues in their supermarket shopping experience.
- Observations of eight older individuals regarding psychosocial issues in their supermarket shopping experience.

Chapter 7 – Evaluation study: Online survey of design academics and professionals

Conducting online survey with 47 design academics and professionals in order to evaluate the definition and synthesised dimensions from the previous chapters

Chapter 8 - Conclusion

Discussion of the key research outcomes, contribution to knowledge, limitations, and recommendations for future research.

CHAPTER 2: Literature Analysis and Synthesis

2.1 Introduction

According to the United Nations (UN) (2017), the world population is more than 7.6 billion, and this number will be increased a billion every 12 to 15 years. With this increase of world population, there are significant demographic changes such as growth number of people aged 60 years or over and people with disabilities. This demographic trend has raised various issues from social, economic, environmental, technological, and political perspectives.

According to the UK Office for National Statistics (2015), people aged 65 years or over are 11.4 million; 23.2 million people are aged 50 or over and this number is about 30 percent of the UK population. With this, currently, the number of people aged 60 or over are more than of people aged under 18 years in the UK. Further, there are 11.9 million (19 percent) people in the UK are suffering from at least one impairments, such as mobility, vision, hearing, mental health, social and behavioural issues (Department for Work and Pensions, 2015), and 53 to 83 percent of them have more than two impairments (Langdon, 2015). Such issues have placed these people in social poverty (Morrow et al., 2003), which have given rise to social exclusion of the older population and people with disabilities, and they have been disabled by society (Age Concern and Help the Aged, 2009; Goodley, 2011).

Accordingly, the social issues of diverse populations have accompanied the need for psychosocial intervention in various individual and social support systems. The psychosocial interventions are used in various fields such as psychology, sociology, health care, and ergonomics to allow people who have psychosocial issues to be psychosocially inclusive in their community where they are living in.

With the trend of the social issues, the need of psychosocial - or related concepts - inclusivity in the field of inclusive design has been raised by several design experts (Frye, 2013; Hedvall, 2013; Steinfeld, 2013; Nickpour et al., 2012; Demirkan, 2007; Imrie and Hall, 2003; Webb et al., 2001; Gaver and Martin, 2000; Demirbilek and Demirkan, 1998). With this trend, the concept of inclusive design has gradually developed and become recognised within the global social context as a wider application to improve social inclusion, equality, and equity for better quality of life for all population without the need for special knowledge or skills. Its

aim is one of the strongest solutions we need to consider for our future regarding a world we can all enjoy as equals (Steinfeld, 2013). Several developed countries such as the UK, Scandinavian countries, the US and Japan, for example, have applied several inclusive design related policies and movements (Broers et al., 2005; Johnson et al., 2010; Fitzpatrick et al., 2005; Piatt, 2005).

However, there is limited understanding of psychosocial aspects in inclusive design despite similar types of non-physical aspects are frequently used and focused in the world of design such as *emotional design* (Norman, 2005); *pleasurable design* (Jordan, 2002); *experience design* (Hassenzahl et al., 2010; Pullman and Gross, 2004; Hekkert et al., 2003); *human-centred design* (Giacomin, 2014; Brown, 2009); *meaning-centred design* (Giacomin, 2017; Verganti, 2013). This is a result of imperfections in the existing inclusive design strategy, and the need for further evaluations and developments for better inclusion is stressed in much of the literature (Marie, 2013). It was identified from the literature review that the conventional applications including principles and tools of inclusive design are still focused on developing the physicality, usability and accessibility of the design of products, services and environments.

Therefore, identifying existing concepts of psychosocial aspects is essentially needed as the first step to create the initial definition and dimensions for psychosocial inclusivity in the field of inclusive design. With this, the existing contexts of psychosocial aspects from design area and the original areas including psychology, sociology, and healthcare were reviewed, and key psychosocial aspects and factors were collected from the review. The collected aspects and factors were coded to create initial definition and dimensions for psychosocial inclusivity in this chapter. Figure 2.1 presents map of this chapter.

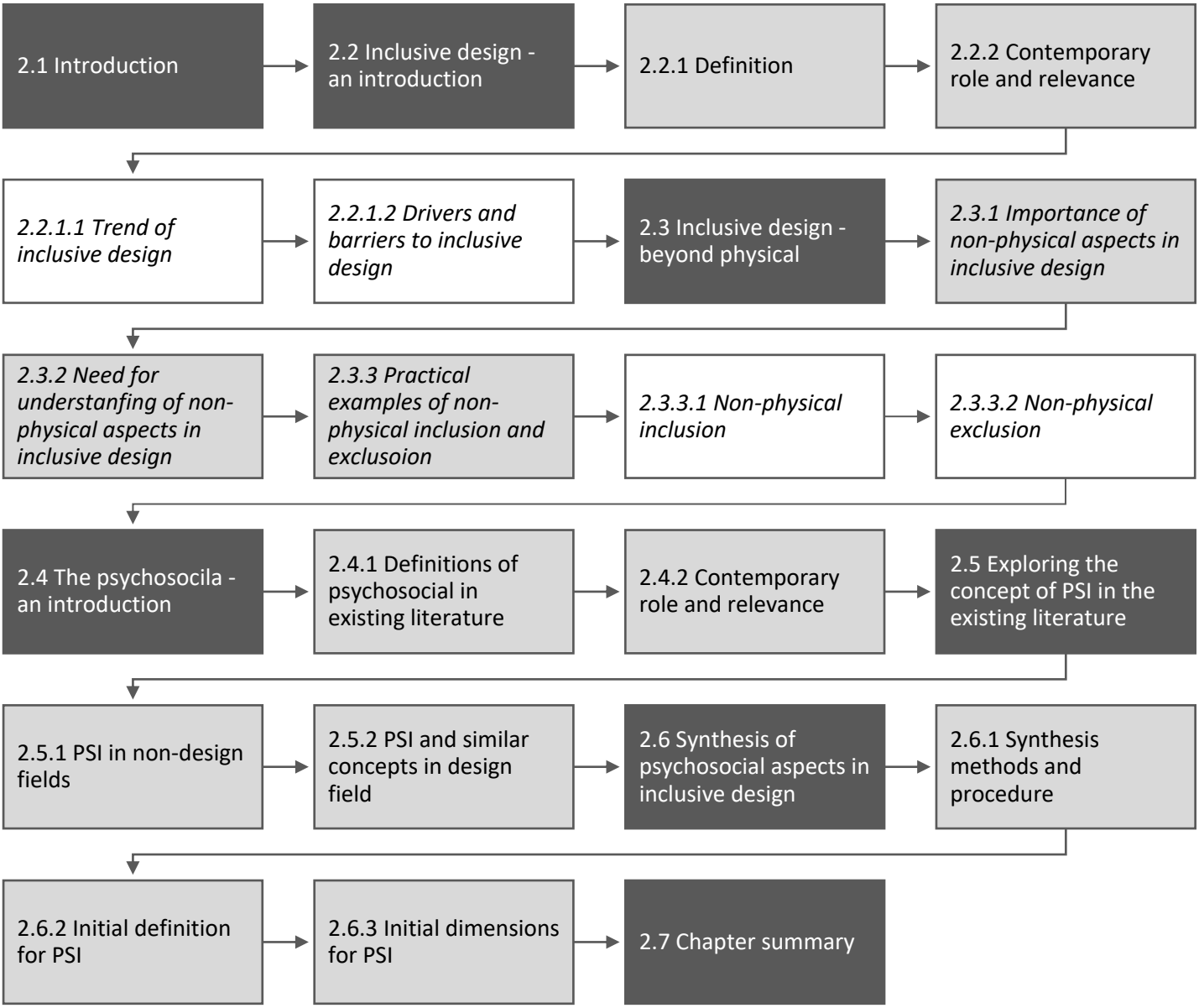


Figure 2.1 Chapter map
** PSI: Psychosocial inclusivity*

2.2 Inclusive design - an introduction

2.2.1 Definition

Inclusive design is defined by the British Standards Institute (2005) as "The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible ... without the need for special adaptation or specialised design". This is similar to the definition of another well-known concept, universal design, which is defined as “an approach to design that incorporates products as well as building features which, to

the greatest extent possible, can be used by everyone." (Mace, 1985). The concept of inclusive design has been introduced by a range of different names including universal design, design for all, barrier-free design and accessible design. In the northern and central Europe and the United Kingdom, the term Inclusive design and design for all have been prevalent. On the other hand, the term universal design and life-span design has been mostly used in North America. In this way, inclusive design has been adopted in many countries and applied to many different processes (Haugeto, 2013). Table 2.1 presented a set of definitions of similar concept of inclusive design.

Table 2.1 Definitions of similar concepts of inclusive design

Concept	Definitions
Inclusive design	"The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible ... without the need for special adaptation or specialised design" (British Standards Institute, 2005) "a feature of mainstream technology: part of the quality of mass market products and services, which makes them usable for a wider market" (InClude, 1999)
Universal design	"an approach to design that incorporates products as well as building features which, to the greatest extent possible, can be used by everyone." (Mace,1985) "The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design." (Connell et al, 1997) "shall not exclude assistive devices for particular groups of persons with disabilities where this is needed." (CRPD, 2008)
Design for All	"design for human diversity, social inclusion and equality" (The European Institute for Design and Disability, 2004). "the designing of products, services and systems that are flexible enough to be directly used, without assistive devices or modifications, by people within the widest range of abilities and circumstances as is commercially practical" (Porrero and Ballabio, 1998)

Accessible design	"maximizing the number of potential customers who can readily use a product. While no product can be readily used by everyone, accessible design can impact market size and market share through consideration of the functional needs of all consumers, including those who experience functional limitations as a result of aging or disabling conditions" (TIA Access, 1996) "products and buildings that are accessible and usable by people with disabilities… Accessible design has a tendency to lead to separate facilities for people with disabilities, for example, a ramp set off to the side of a stairway at an entrance or a wheelchair accessible toilet stall." (Steinfeld, 1994) "can be accessed by anyone" (Royal National Institute for the Blind, 2000)

With the emerging of inclusive design and similar concepts such as universal design and design for all, they are used in a similar way (Dong, 2013). In this sense, the definition of the inclusive design from the British Standards institute was used as a representative of other similar concepts in this research for convenience.

2.2.2 Contemporary role and relevance

2.2.2.1 Trend of inclusive design

The concept of inclusive design has been emerged since mid 1990. In 1960 and beyond, the concept of inclusive design was considered not as a design approach, but it was a form of synthesis of experiments, insights, and initiatives. It was focused on link between social need and design i.e. disabilities, ageing, and social equality. The previous approach of the design put the disabled and older people in the subset of the whole population, but the concept of inclusive design is a latest international trend that integrate people with disabilities and older population with the mainstream of society (Clarkson and Coleman, 2015).

This trend has been established in different ways in different countries which is based on social and cultural environments, and local conditions. In the US, for example, the increasing accessibility of public spaces and built environments for enhancing the right of individuals with disabilities was mainly focused on. This focus led to the Americans with Disabilities Act 1990 (ADA, 1990) within the civil rights movement. This focus was extended to the better access in terms of information and its related services by using internet and communications technology (ICT) (COM, 1999) in the European Union and regarding services (Disability Rights Commission, 2002) in the UK. In the UK, furthermore, the Equality Act 2010 (Lockwood et al., 2012) has been updated. The existing legislations were by simplified and developed in the

context of public, business, community, and voluntary sectors. Table 2.2 presented several policies with details based on several developed countries.

Table 2.2 Inclusive design related policies in developed countries

Country	Policy	Purpose	Key focus
UK	"Equality Act 2010: guidance" (Lockwood et al., 2012)	To protect individuals from discrimination society including workplace	Discrimination Social movement
	"National Planning Policy Framework" (Mar, 2012) "British Standards Institute BS8300: 2009: Design of buildings and their approaches to meet the needs of disabled people" (Cook, 2009)	To provide more accessible and less complex system To provide guidance of the design for new accessible buildings	User interface Service Infrastructure
EU	"European Disability Strategy 2010-2020: a renewed commitment to a barrier-free Europe" (European Commission, 2010)	To provide accessible ICT, buildings, and transport to evaluate regulatory measures	Accessibility Education and training Employment Equality External Action Health Infrastructure Participation Service Social protection
Norway	"Norway Universally Designed by 2025" (Norwegian Ministry of Children and Equality, 2009)	To support anti-discrimination, new planning, building act, accessibility act, and new inclusive design related legislation	Building and construction ICT (Information and communication technology) Planning and outdoor areas Transportation
U.S.	"Disability Employment Policy" (Mont, 2004)	To provide better work environment for disabled people	Communication Physical environment Technology
Japan	"General principles of universal design policy" (Ministry of Land, Infrastructure and Transport, 2005)	To provide barrier-free environment	Infrastructure in public area
	"Design Guidelines of Dwellings for the Ageing Society" (Kose, 2001)	To provide dwelling units for older people	Housing support Older people

Political perspective

In the UK, there are 49 % of people aged 65 or over agree that the British government do not treat them well enough (TNS Tracker Survey for Age UK, 2015). Such respondents also added some details such as poor provision of pension (56%) and benefits (41%), poor standards of daily care (66%) - both in personal home and care home - and health care (51%), and low job opportunities (19%) for older people (TNS Tracker Survey for Age UK, 2015). With this as an example, the growth of demand for accessibility and social equality has led to the increased global importance of regulations. So far, for example, 153 countries have signed and 112 countries have ratified the UN Convention on the Rights of Persons with Disabilities: the CRPD is an important foundation for national strategy, global cooperation and attention (Hole, 2013). The legal capability of the European Union (EU) lies at national and international levels of regal capability, and the EU is endeavouring to achieve the objectives of the United Nations (UN) Convention on the Rights of Persons with Disabilities (Brynn, 2013).

Although the EU has various inspiring factors to ensure accessibility for all the population, the EU and the UN Convention ratified the two most noticeable factors from the strategy; the Right of Persons with Disabilities was the first ratification and the challenges for the ageing population in Europe was the second (Brynn, 2013). The main objectives of the EU policy to guarantee accessibility to services and products are as below:

- Contribution to providing equality for disabled people in Europe
- Community-based services
- Combating discrimination for equality
- Employment in the open labour market
- Inclusivity in education and training
- Combating poverty and social exclusion for social protection
- Ensuring equal access to health services and related facilities
- External action including international improvement programmes, neighbourhood and EU expansion

Thus, there is the presence of well-improved design principles, standards and codes for various design factors such as accommodation and accessibility in developed countries (Shibani, 2013). Despite these improved principles in developed countries, there is a lack of standards or codes for accessible information and communication technologies (ICTs),

provision of accessible services and built environments in developing countries and in countries in transition (Shibani, 2013). Additionally, 3rd International Conference of Universal Design focused on this issue through the BRICK (Brazil, Russia, India, China and Korea) countries, as Inclusive design has begun to be seriously addressed within these countries (Dong et al., 2004). Balaram (2010) also stated in the conference that the Indian government need to consider a powerful and urgent universal design policy intervention.

Economic perspective

According to OECD data (2016a), the definition of term working-age population is "those aged 15 to 64", and people in this population have the core economic impact in their society. However, this population has become decreased from about 2010 in most of OECD member countries (OECD, 2016a) (Figure 2.2). The population change is one of the main reasons that the decrease of the young population, which is defined as "those people aged less than 15" (OECD, 2016bandc) and rise of people aged 65 or over (OECD, 2016d).

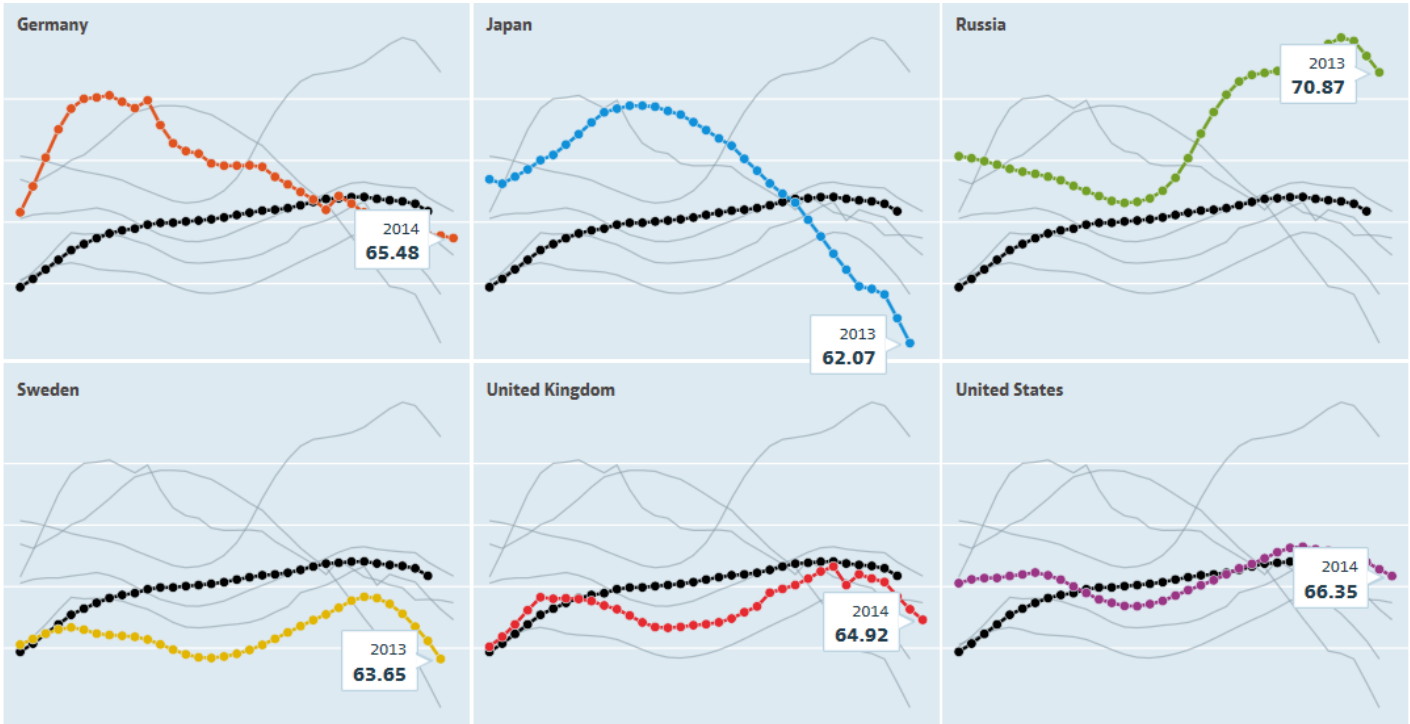


Figure 2.2 The working-age populations in some OECD member countries (OECD, 2016a). These graphs show that the working-age population in developed countries have decreased about from 2010.
**Black dotted line in each graph: OECD average.*

This change will become a menace to economic and social balance (Hole, 2013). For example, in 2007, public expenditure connected with ageing issues in European Union

countries was 23.1% of GDP. Another compelling factor is disability. Over 60% of the disabled population are already over retirement age, requiring a high level of financial support such as primary care, medical attention and transport services (Frye, 2013). A means of maintaining economic and social sustainability to meet the needs of all people is therefore necessary. Thus, the well-designed details have influence on a national scale although this is small (Hole, 2013).

Social and environmental perspectives

Various types of life issues, such as technological, financial and life pattern changes or poor social support, cause the social exclusion of the older and disabled population; they have been disabled by society (Goodley, 2011; European Conference of Ministers of Transport (ECMT), 2004). In the UK, for instance, 36% (3.5 millions) of people aged 65 or over live alone; two millions of people aged over 75 year live alone (Office for National Statistics (ONS), 2015), and this number is still rising with social and cultural change (Haugeto, 2013). In connection with this, 17% of older keep less than weekly contact with their family, neighbours and friends, Furthermore, and about 600,000 (6%) of old adults in the UK go out their own house once a week or less (TNS Tracker Survey for Age UK, 2014); 9% of older people agree that they feel they are trapped in their house (Office for National Statistics (ONS), 2015). There are around 30% of older people are still would like to have more opportunities to go out (Age, 2009). In another case of social barriers, 60% of older people think that there is age-discrimination in their daily life in the UK (Age, 2009). Also, 53% of old adults in the UK complained there is social trend that people commonly treat older people as a child (Age, 2009). These social isolations could lead to mental issues such as loneliness and depression (Haugeto, 2013). According to the OECD (2007), furthermore, people with mental disorder have experienced many social issues such as being forced to resign or laid-off (about 30%) and denied the job opportunities (40%). These interrelated social issues affect quality of life of whole social members (Haugeto, 2013).

Although there is variety of social issues that affect the quality of life of senior citizens and people with disabilities, their social role is rising in many countries with the increasing populations of them. Consequently, many developed countries or societies also show interest in various social inclusion realms such as design disciplines, social care and public health based on the reasons outlined above (Wang, 2010). In the future, it is clear that social innovation and co-creation will be main subjects (Dong, 2013), and all individuals should contribute to it to create a sustainable and qualitative society (Haugeto, 2013).

Technological perspective

Accessibility issues have been addressed with technological development following the growth of the ageing and disabled population. This is because personal and unique needs for adaptation and improvement are created by individual physical limitations. Coleman et al. (2016) also argued that the ageing population has rising potential in the consumer sector. Thus, the application of technology has become a crucial factor in getting over limitations. However, Rose et al. (2007) argued that solely focus on the design of Assistive Technology (AT) will cause an increase the price of the ATs and the mobility-limited environment which is barrier-ridden and poorly designed. In the fourth International Conference on Universal Design (Fukuoka, 2012) the need for technology that provides equality for all people to enjoy the world was declared. Guimarãe (2013) also stressed "influences of design and technology in directing the trend towards the development of inclusive societies". In addition, Guimarãe (2013) also emphasises that it is a waste of social resources for only a narrow range of users to utilise beautiful, high end technology without concern for different needs and abilities of users. Consequently, the application of inclusivity in technology for people with physical limitations would be a solution. This would not only be an advantage for people with disabilities or body limitations, but would also benefit all people, including non-disabled people. For example, technological solutions for wheelchair users can be advantageous to users with trolleys, carts and baby carriages (Rose et al., 2007).

Therefore, the extension of the definition and increased use of inclusive design extend the existing inclusive design context, which was mainly focused in products and services, to wider contexts such as interactional, psychological, political, economic, social environmental, technological and business contexts (Reed and Monk, 2011; Hirsch et al., 2003; Hirsch et al., 2000; Gronbaek et al., 1997).

2.2.2.2 Drivers and barriers to inclusive design

Considering several inclusive design related concepts and different understanding of them in the literature and industries, there are several existing drivers and barriers to inclusive design. Table 2.3 provides specific details of barriers and drivers to inclusive design. According to the references in the table 2.3, there is no rank between these barriers and drivers, but the significant barriers to inclusive design based on the frequency of occurrence are: 1) lack of practicality, including lack of regulation; guideline; standard; training; 2) misconception

regarding the fundamental understanding of the concept of inclusive design; 3) lack of time and budget.

These barriers and drivers can be explained by the limitation of the seven principles of universal design, equitable use; flexibility in use; simple and intuitive use; perceptible information; tolerance for error; low physical effort; size and space for approach and use (Connell et al., 1997; Centre for Universal Design, 1997). The seven principles have been used for over 20 years in design areas. However, it is not sufficient to apply to the public sphere or to a wide range of professional communities. Considering this limited use of the principles, it could be argued that the physical accessibility and usability aspects are mainly focused in inclusive design, and the other outcomes of inclusive design practices were not clearly addressed in the principles (Steinfeld, 2014). It is because, the relationship between various social and physical facets is dynamic and complex (Webb et al. 2001). Thus, the positive support and attempts at reducing limitations are needed for diverse groups to enhance their social integration and participation (Steinfeld, 2014), and better theoretical underpinning is required for the theory of inclusive design (Webb et al. 2001).

Table 2.3 Details of drivers and barriers to inclusive design

Source	**Country that investigation was conducted**	**Drivers**	**barriers**
Goodman et al., 2006	UK		- Lack of knowledge - Lack of tools to practice it - Lack of time and budget - Not perceived as the need of the end users
Dong et al., 2004	Japan	- high demand from consumer and society needs - quality improvement/more consumer satisfaction - development of a new and expanding market - differentiation of own products - drivers from Government such as regulations	- More expensive - Difficult to practice and learn - Time consuming - technical complexity and lack of cost-effectiveness - lack of knowledge and techniques - lack of guidelines

Underwood, 2003; Bellerby, 2003	UK	Provision of guidelines and standards, Legislation and brand imaging	
Sims, 2003	UK		- Not practised within the design community - Time and financial costs.
Keates et al., 2000	UK		Misunderstanding of notion of inclusive design - design only for older population or people with disabilities
Vanderheiden, 2000	US		- Government regulation - Market data - Training - Consumer demands - Technical complexity - Unavailability of highly relevant data, techniques and knowledge

2.3 Inclusive design - beyond physical

2.3.1 Importance of non-physical aspects in inclusive design

The existing concept of inclusive design was aimed to provide the usable and accessible world for as many people as possible. However, the physical and social environments have shifted and guided to changes in cultural ideologies and innovations in design (Webb et al., 2001). The concept of inclusive design has been increasingly wider and solidified that better social inclusion with growth of human rights movement and variety of societies within the global social context have been focused (Steinfeld, 2013). This shift was recognised in the previous sections. This trend is also serve researchers and designers to use the notion of inclusive design as an application in various design disciplines, built environments, products and communications with their interests and practices (Coleman et al., 2003: Story et al. 1998). Dong et al. (2004) argued that the utilisation of inclusive design and its values should be proven within diverse local contexts and different cultures, and inclusive design will show strong potentiality to be used to achieve social inclusion as an approach to appropriate design disciplines, a means of identifying design deficiencies and a method for innovation (Dong, 2013). The concept of inclusive design, for example, has even been adopted as a national strategy by the Norwegian government (Dong et al., 2004). In this sense, the concept of

inclusive design has been increasingly being emphasised as a focus for better social equality in governmental context and as tools in commercial context (Coleman et al., 2016).

Webb et al. (2001) also argued an importance of non-physical aspects in design by the person-environment fit model (Figure 2.3) which is focused on the relationship between people and their environments. The model shows the exceptional range of attributes of the individuals and environments among the possible variable context in person and his or her environments.

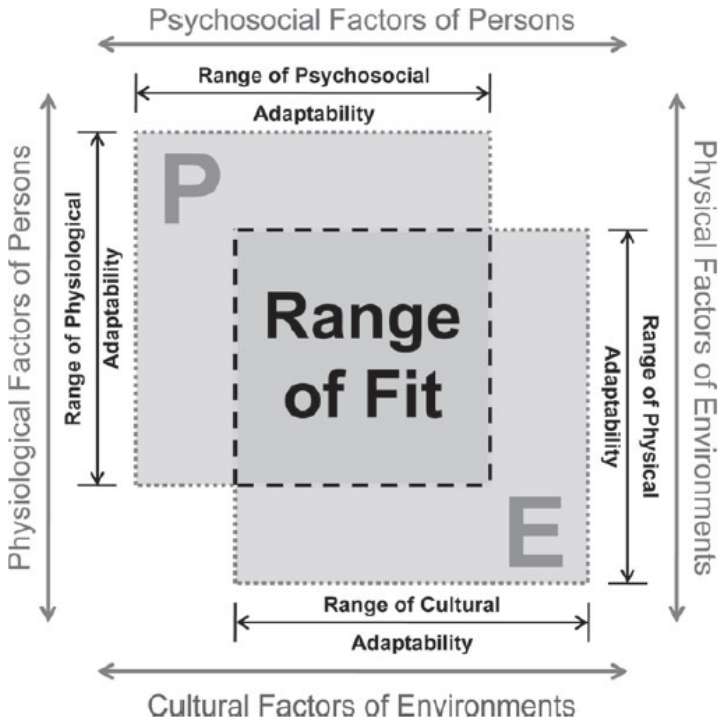


Figure 2.3 A person-environment fit model (Webb et al., 2001). The area between the person and environment

The person is consisted of psychosocial and physiological aspects which is an exclusive set of characteristics of individuals. The psychosocial aspects include emotions, behaviours, self-concept and worldview, which are inspired by self-efficacy, perception, mores and religious beliefs (Altman and Chemer, 1984). The physiological aspects contain the biological health, motor skills, cognitive ability and sensory that can be measured quantitatively and listed objectively (Webb et al., 2001). There are further factors such as short-term and long-term memory, height, presence of disease, gender, tactile sensitivity and aural acuity (WHO, 1980, 2001). There are two separated realms in the environment domain that are the physical environment and the cultural environment. The physical environment is consisted of the constructed environments, such as buildings, roads and transportations, and natural

environments, such as climate, flora and topography (Webb et al., 2001). Another domain is cultural environment that is consisted of hierarchies and cultural definitions, legal and political codes, and shared mores and values (Altman and Chemer, 1984). This domain also includes, social and health care programs, family and household structure and community ideals (WHO, 1980).

From these perspectives and interrelation between human and environment, it is possible for people to create more inclusive and human centred societies, the aim of inclusive design being equality and equity for all people to contribute, participate and enjoy lives within their communities (Haugeto, 2014; Hedvall, 2014).

2.3.2 Need for understanding of non-physical aspects in inclusive design

It can be argued that the inclusive design application as a responsible, positive, and holistic approach has been rather limited while it has normally highlighted as good practice (Persson et al., 2015). In addition, it can be argued that life-style changes and multifaceted global socio-cultural challenges are recognising issues of design exclusion beyond those which are purely access or physical related.

The world of design already has forwarded beyond 'physical inclusivity', and faced metaphysical fields: emotional design (Norman, 2005); pleasurable design (Jordan, 2002); experience design (Hassenzahl et al., 2010; Pullman and Gross, 2004; Hekkert et al., 2003); human-centred design (Giacomin, 2014; Brown, 2009); meaning-centred design (Giacomin, 2017; Verganti, 2013). In this research, such aspects were referred to as 'physical aspects'.

Although the importance of non-physical aspects has been stressed in the field of design, the main focus in the field of inclusive design has remained on the tangible and physical aspects of accessibility functionality and usability (Steinfeld, 2013). The emphasis on physical aspects in the field of inclusive design can also be noticed in the existing regulations and policies in developed countries which mainly focus on barriers to physical access in relation to the development of infrastructure and technologies (Lim and Nickpour, 2015; Persson et al., 2015; ANSI, 1998). It is possibly not unforeseen that the concepts of non-physical aspects in inclusive design are currently limited, neither systematically discovered and investigated in applications of inclusive design (Steinfeld, 2013), nor in the existing literature (Lim and Nickpour, 2015). It is currently often argued that further identifications, explorations, and evaluations are needed to achieve holistic and genuine both physical and non-physical

inclusivity within the increasingly complex and diverse societies (Frye, 2013; Hedvall, 2013; Nickpour et al., 2012; Gaver and Martin, 2000; Demirkan, 2007; Imrie and Hall, 2003; Demirbilek and Demirkan, 1998). At the current point in time, it can be argued that there is a need for better understanding of non-physical aspects in general inclusive design practice. Considering such need, identifying and analysing the existing concepts of non-physical aspects can be helpful to understand and explore the concept of non-physical aspects. Furthermore, it can be valuable data to create a comprehensive definition and dimensions for the non-physical inclusivity in design. In this thesis, theses non-physical aspects of inclusivity including social and psychological aspects are referred to as 'psychosocial inclusivity.

The main purpose of this study is to define psychosocial inclusivity in design, which is needed to clarify the correlation between inclusive design and quality of life. Such a relationship is the main theme of psychosocial aspects as it is shown in the result of the analysis.

The importance of quality of life can be explained through the purpose of inclusive design, which is to provide usable and accessible products, services or environments for as many types of people as possible without further knowledge or skills. In other words, this definition suggests improving individuals' quality of life (Shibani, 2013). In the literature analysis, the purpose of the psychosocial aspects; enhancing the quality of life, is the crucial fact that meets the purpose of inclusive design.

2.3.3 Practical examples of non-physical inclusion and exclusion

2.3.3.1 Non-physical inclusion

Social service - Cycling lesson

According to Walker (2016), 60 percent of city journeys are made by bicycle in Utrecht, which is the fourth biggest city in the Netherlands. Harten voor Sport (Hearts for Sport), which is one of the local non-profit community groups, started cycling lessons for the public, including immigrants, in 2015. The aim of the lessons is to encourage people who feel that cycling in the city is unsafe, or who have never cycled before, to use a bicycle not only as a means of transportation but also to integrate them into the society they are living in (Figure 2.4). As an illustration of this, one of the participants commented that 'I can do the shopping on it and go and see friends. But also, being able to ride a bike makes me feel more Dutch, more part of the community' (Walker, 2016).

Figure 2.4 Cycling lesson organised by Harten voor Sport (Hearts for Sport) in Utrecht, Netherlands (Walker, 2016).

Environment and service – Child-friendly hospital

There are over 35,000 children using hospitals annually (Coad and Coad, 2008). However, hospitals are feared by children and make them anxious. Hence, there have been many attempts to improve hospitals for children as 'child-friendly' environments: for example, by decorating the hospital with vivid colours or providing superhero costumes. An illustration of

this is the Valenciennes hospital in Valenciennes, France, which has begun to provide an electric toy car for children rather than anti-anxiety drugs to alleviate fears of surgery (Figure 2.5). According to Fanny Defrancq, an anaesthetist at Valenciennes hospital, 'It allows (children) to arrive in the operating theatre in a fun manner and avoids the stress associated with the context' (Pavesi and Wafaa, 2018).

Figure 2.5 A two-year-old boy drives an electric toy car to the operating room (Presti, 2018).

Senior care – De Hogeweyk

In 2008, a special village opened in Weesp, Netherlands. It is called De Hogeweyk and is a model village for older people with dementia. There are 23 houses, a supermarket, a theatre, a restaurant, a pub, and an outpatient care unit (Figure 2.6). Over 150 older people live in this village, and carers, i.e. doctors and nurses, stay there as residents such as cashiers or servers in order to provide as real and normal a life as possible for older people (Hurley, 2012). Such a normal and familiar lifestyle reduces residents' (older people's) anxiety and fear (Archer, 2012). It perhaps also increases their quality of life, given the more active lifestyle and less medication (Archer, 2012).

Figure 2.6 Illustration of De Hogeweyk (Hogeweyk, n.d.)

2.3.3.2 Non-physical exclusion

Personal mobility – mobility scooter

In the UK, there are approximately 13.3 million people with disabilities (Department for Work and Pensions, 2015/16; 2017), and 52% of these people have mobility impairments. Figure 2.7 shows general illustration of mobility scooter. According to Lim et al. (2016), people with mobility impairments are not only suffered by physical exclusion, but they are also suffered by non-physical exclusion. An illustration of this is that of a young mobility scooter user, who feels embarrassment due to public judgment. The young man mentioned that 'I'm heavier than I should be and I think there is a natural tendency for people to look at you and pass judgment perhaps if you're too big or you're young and you're in a chair or a scooter they think there's nothing wrong with you, you're taking the mickey.' Hence, Pullin (2009) argued that 'people are therefore disabled by the society they live in, not directly by their impairment'.

Figure 2.7 The illustration of generic mobility scooter (Woman on scooter, n.d).

Assistive device – Hearing aid

A hearing aid is an electronic device that people can wear behind or in their ear (Figure 2.8). It helps people with hearing issues to hear so as to have a better life. However, many current and potential users, including about 80 percent of adults aged between 55 and 74, are not using a hearing aid (McCormack and Fortnum, 2013). There are several physical and non-physical related reasons, i.e. efficiency of hearing aid; functional factors; maintenance, comfort, and fit of the hearing aid; financial reasons; appearance; users' behaviour; attitude of healthcare professionals; psychosocial and situational factors; and ear-related problems.

Figure 2.8 Illustration of a behind-the-ear hearing aid (Man with hearing aid, n.d.)

System – e-government website

The e-government website has increasingly provided better accessibility and usability in many counties (Figure 2.9). People are also encouraged to use it rather than previous methods such as visiting and mailing the governmental office. However, there is an argument that it is not fully accessible and usable for people who are not familiar with it, including older people or people with disabilities: for example, cognitive disabilities, low vision, blindness, hard of hearing, or deafness (Abanumy et al., 2005).

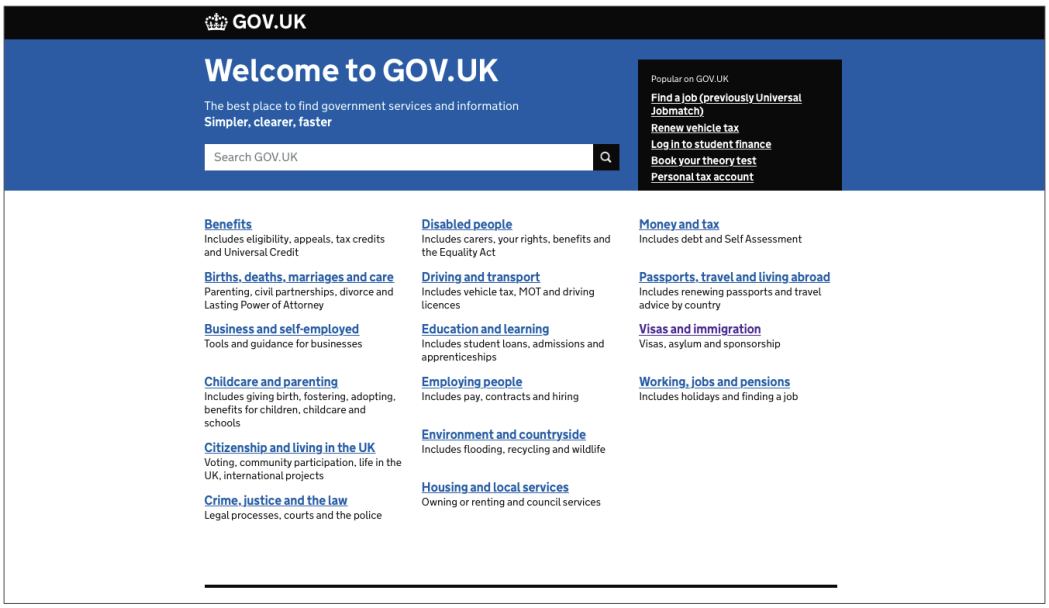


Figure 2.9 The front page of the UK government website

2.4 The psychosocial - an introduction

The concept of the 'psychosocial' is commonly described to be a context-dependent and multidisciplinary notion. The notion of psychosocial has been used since the 1950s mostly in psychiatry and medical journals. Study of the psychosocial addresses the interaction of human subjects with wider political and cultural identities including religion and ethnicity, providing individuals additional depth, social experience, complexity and enhancing their emotional lives in historical and social contexts (Strang and Ager, 2003). Within this understanding of the psychosocial, it has been recognised to address psychosocial needs for conflict-affect population since the 1980s (Williamson and Robinson, 2006), and the concept is strongly represented in the academic realm since the 1990s (Roseneil, 2014). Psychosocial issues also have been extensively analysed in many areas such as the humanities, psychology, and social

sciences (Roseneil, 2014). Figure 2.10 shows a rapid increase of interest in the literature of the psychosocial (Roseneil, 2014).

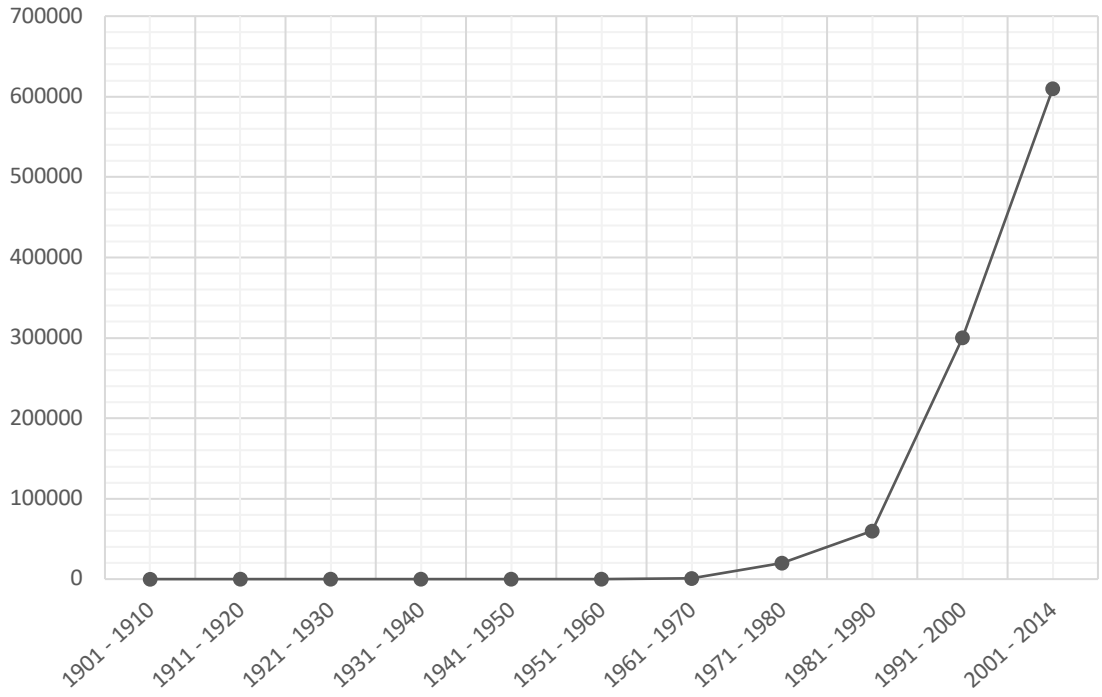


Figure 2.10 Google Scholar search for the term 'psychosocial' (Roseneil, 2014)

Furthermore, several concepts of psychosocial interventions such as psychosocial support and psychosocial care based on communities were applied (The Psychosocial Working Group, 2003). These types of community based psychosocial interventions are also used for children in such case of abuse or areas of political and communal violence to improve their well-being and quality of life (Al-Gamal et al., 2013; Aldabev et al., 2010; Jordans et al., 2010; Tol st al., 2010; Action for the Rights of Children, 2009). Within this use of the concept of the psychosocial, it has developed into an important organising concept in the modern world, and the psychosocial development is an intellectual trend in the US, Canada, Australia and Europe. In the UK particularly, the psychosocial development is an international policy trend.

2.4.1 Definitions of psychosocial in existing literature

The Oxford English Dictionary (2017) defined the term 'psychosocial' as "relating to the interrelation of social factors and individual thought and behaviour". A set of definitions of the term 'psychosocial' in several contexts were provided in the Table 2.4. The Psychosocial Working Group (2003) defined the term psychosocial intervention as "any programme that

aims to improve the psychosocial well-being of people". In this definition, the need of psychosocial support has been recognised. There are several literatures that are using the concept of psychosocial support as "any type of local or outside support that aims to protect or promote psychological well-being and/or prevent mental disorder" (Davidson, 2010; IASC, 2007; Van Ommeren and Wessells, 2007). With this definition, it seems that the mental problem is strongly related to psychosocial support and well-being - it is common for people with mental disorder have also psychosocial issues - although different approaches are needed for each of them (Hansen, 2009). Based on these definitions and their context and key notions, the concept of psychosocial is used in mainly health care fields to enhance individuals' quality of life. In this thesis, the definition from The Psychosocial Working Group (2003) was used to refer to the term the 'psychosocial':

> *"The close relation between psychological factors (emotion, behaviour, cognition) and the socio-cultural context" (Psychosocial Working Group, 2003).*

The psychosocial working Group definition covers both psychological and social aspects that suggest several general but crucial appropriate details which should be considered in inclusive design.

Table 2.4 Existing definitions of the term the 'psychosocial'

Term	***Definition***	***Context***	***Key notion***
Psychosocial	"Relating to the interrelation of social factors and individual thought and behaviour" (Oxford English dictionary, 2017)	General	Social factors/ individual thought/ behaviour
	"The close relation between psychological factors (emotion, behaviour, cognition) and the socio-cultural context" (The Psychosocial Working Group, 2003)	Mental health (Improving quality of care for children)	Socio-cultural context/ emotion/ cognition/behaviour
Psychosocial intervention	"Factors pertaining to a person's ability to deal effectively with the demands and challenges of everyday life. This involves a person's ability to maintain a state of mental well-being and to demonstrate this in adaptive and positive behaviour while interacting with others, his/her culture and environment." (Andersen et al. 2014)	Health care (Study of pain- identifying a relationship between psychosocial aspects and chronical musculoskeletal pain)	Mental well-being/ adaptive and positive behaviour/ culture/ environment

	"Including practices that have the purpose of improving the patient's psychological, social and behavioural functioning (Thirsk et al., 2014)."	Health care (Improving patients' psychosocial functioning)	Psychological/ social/ behavioural/ improving functioning
	"Cognitive behavioural therapy for patients, family intervention for family members and case management for patients and families" (Ruggeri et al., 2013)	Mental health (Improving quality of mental health care)	Cognitive behavioural therapy (CBT)/ family intervention/ case management
	"Improving quality of life and maximizing function in the context of existing deficits. Such interventions use a wide range of approaches including behaviour-oriented, emotion-oriented, cognition-oriented, and stimulation-oriented approaches and are carried out by a wide range of health and social care practitioners." (Vernooij-Dassen et al., 2010)	Psychogeriatric (Improving quality of life and care of people with dementia)	Quality of life/ maximising function/ behaviour-oriented/ emotion-oriented/ cognition-oriented/ simulation-oriented
	"To produce some beneficial effect on psychological distress or emotional adjustment of patients" (Rodgers et al., 2005)	Health care (Improving quality of life and care)	Psychological destress/ emotional adjustment
	"being any intervention that focuses on psychological and/ or social factors rather than biological factors" (Ruddy and House, 2005)	Mental health (Improving quality of care)	Psychological/ social
	"Any programme that aims to improve the psychosocial well-being of people." (Psychosocial Working Group, 2003)	Complex emergencies (Improving psychosocial well-being)	Well-being
	"Studies employing intervention techniques designed to utilize cognitive, behavioural or social mechanisms of action" (Cooke et al., 2001)	Psychogeriatric (Improving psychosocial intervention for care givers)	Cognitive/ behavioural/ social/ mechanisms of action

2.4.2 Contemporary role and relevance

The concept of the psychosocial has been used as an umbrella term in many academic and practical areas to cover a wider range of distinctions than the conventional realm of psychology and sociology particularly much of the literature regarding health-related areas (Martikainen et al., 2002). The term health was defined by World Health Organization (WHO) (1948) as "a state of complete physical, mental and social well-being", and the health is not just "the absence of disease and infirmity". Several documents in the literature (Patrick and

Erickson, 1993; Bell et al., 1983; Ware and Young, 1979; Barenthin, 1975) have criticised this definition from the WHO due to its confusing handling of causes and effects. From an explanatory perspective, the term 'health' is a combination between traditional medical definitions of infirmity and disease with individual responses to disease and its social context. This definition has the advantage of being able to recognise and understand the quality of life and experiences of the individual. With this understanding of health, the relationship between psychosocial aspects and health was elucidated by several studies (Martikainen et al., 2002; Hertzman, 2001; James, 1990). The existing literature showed a contrast between micro, meso and macro levels of role of psychosocial factors in the field of health research as a sociological framework (Figure 2.11). In this pathway, the psychosocial was considered in the meso-level which includes social supports and network, work control, autonomy and security, balance between effort and reward, work-family conflict and home control. These factors can be found in interpersonal relationships of individuals in the society. Therefore, the multiple levels of interventions of micro (individual) and macro (social) are needed to capture psychosocial explanations in health (Martikainen et al., 2002*)*.

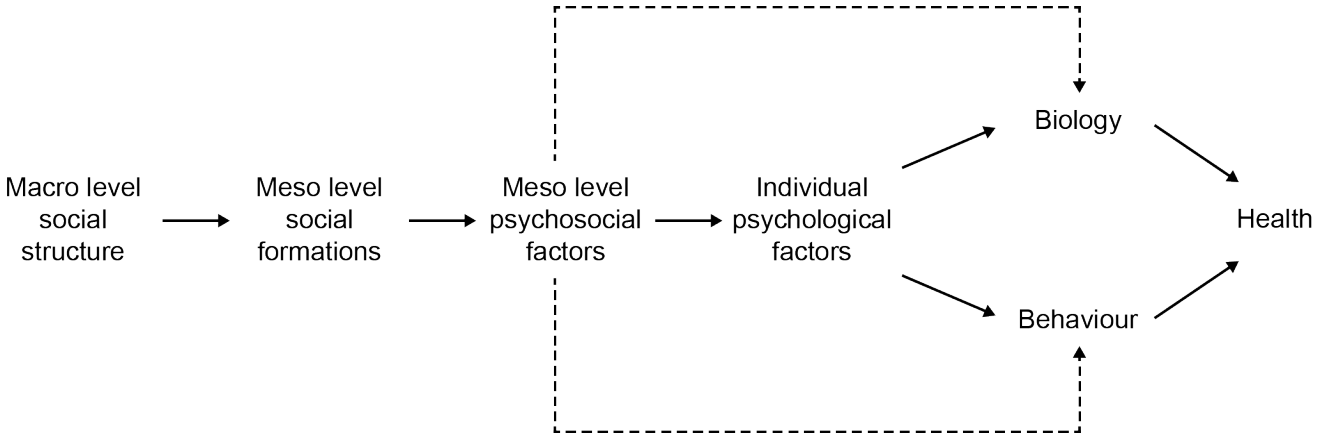


Figure 2.11 "A tentative schematic representation of psychosocial pathways" (Martikainen et al., 2002)

In this scope of the psychosocial in health, the patients' psychosocial background or history such as gender, historical experiences, occupation/leisure, personality and education plays a crucial role. The psychosocial history helps health professions to identify patients' unique patterns, and the identified patterns based on one's psychosocial history are used to be adopted to the individuals' particular requirements to improve the quality of life of patients such as people with dementia and cognitively impaired people (Kolanowski and Rule, 2001).

Further, there are several studies in regard to psychosocial aspects that are related to physical and mental health issues at work places（Daoud et al., 2009; Sjögren et al., 2006; Cox and Rial-Gonzalez, 2002; Bongers et al., 1993). Such factors are not only influenced by individual characteristics such as physical and mental conditions, but it also is effected by the working environments including social relationship where they work for. There are key psychosocial factors of workers in their work place that are demands and control - such as mental strain, time pressure, monotonous work, lack of clarity and high work load - and social support - such as poor social support from colleagues and superiors (Bongers et al., 1993). Hence, this interrelationship reflects that the psychosocial factors play an important role in the different types of societies, and this is the reason that the concept of the psychosocial has been used in many health related studies to improve better quality of life. This close relationship between such enhancements of the quality of life and the social inclusion based on individuals' mental and physical health have shown in various studies.

On the other hands, the social exclusion such as social rejection or isolation of anyone is seriously stressful especially people with mental disorders (Lloyd et al., 2006). This social exclusion often causes the deterioration of individuals' physical health and increase of mental issues such as anxiety and stress (Mulphy, 1998), and such issues reduce individual's social quality. The social inclusivity can be indicated by individual's level of education, housing, state of employment, participation in social activity and cultural background, health condition, gender, sexual orientation (Office of the Deputy Prime Minister, 2004). This concept of social inclusion together with empowerment, social cohesion and socio-economic security are reflected by social quality. Beck et al. (1998) defined the term social quality as 'the extent to which citizens are able to participate in the social and economic life of their communities under conditions which enhance their well-being and individual potential'. Social quality is often compared with the quality of life, but the social relationship is more focused in the concept of social quality that stresses the variety of individual's quality of human and social relationships (Walker and Van der Maesen, 2004).

2.5 Exploring the concept of psychosocial inclusivity in the existing literature

Considering the notion of psychosocial is a broad and over-arching concept in various study areas, needs of multi-disciplinary approach in a systematic literature review (Burgess et al., 2006; Tranfield et al., 2003). For this, two main searching areas for the data collection were

selected. The first searching area includes any fields such as psychology, sociology and healthcare where the concept of the psychosocial has been widely used. In this searching area, the notion of the psychosocial has already been well-identified and established, so it can be a crucial foundation for identifying any potential components for psychosocial inclusivity in design. This first searching area is referred to as 'non-design field' in this thesis for convenience. The second searching area includes any design fields, where similar ideas to the psychosocial - such as psychological, emotional or social aspects - are widely used, were selected. Reviewing such psychosocial related ideas in design can be helpful to identify any accepted non-physical aspects in design and potential components for inclusive design. This second searching area is referred to as 'design field' in this thesis. Therefore, the exiting definitions and key components of psychosocial aspects and its related concepts in non-design and design fields were reviewed.

For the data collection tools, Google scholar, Scopus and the British library were sellected. These three databases are effective mix of data collection sources that cover extensive materials such as published papers, books and articles. The terms 'psychosocial', and 'psycho-social' were separately used as keywords to search the literature. Each keyword was searched with the terms identified above together with the following terms: aim, define, definition, and defining. In this process, searching filters were not used to extend the range of searching. The number of citations is one of the important criteria for data verification, but it is possible for the latest papers to have low numbers of citations. Thus, a conjunction of three criteria: year of publication; number of citations; and correlation of study with any psychosocial aspects, were used to avoid loss of potential data source.

2.5.1 Psychosocial inclusivity in non-design fields

A total of 102 papers for the concept of psychosocial in non-design areas were selected. The distribution of the reviewed papers according to the contexts is shown as in the Figure 2.12. The figure highlights that a wide range of core fields: *health* (n=50); *mental health* (n=16); *psychology* (n=16); *sociology* (n=13); *medicine* (n=7), for the concept of psychosocial were reviewed as the nesting fields.

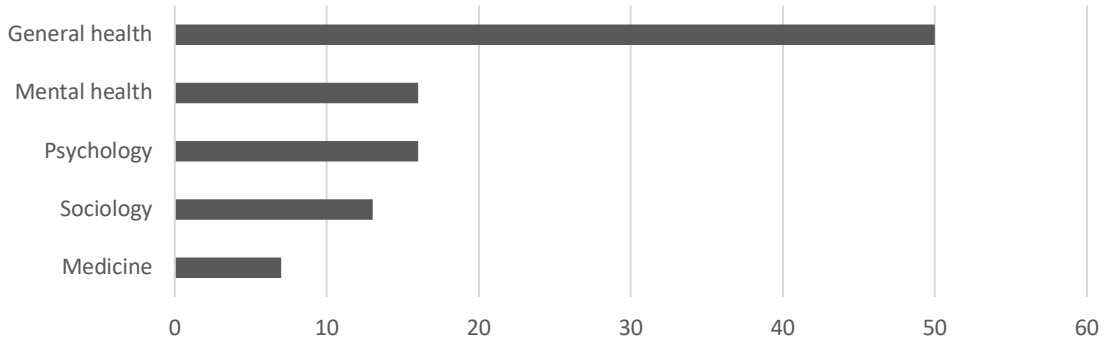


Figure 2.12 Distribution of the reviewed papers from non-design area according to the contexts

From this collected data source, there was a core set of existing definitions of the notion of psychosocial and its relevant terms were identified. Such definitions were identified from the fields mainly in the psychology and sociology related health care field. The major set of the definitions, contexts and key notions of them were presented in the table 2.5. These existing definitions are initial sources to identify the definition of psychosocial inclusivity in the field of inclusive design in later sections. Further, core set of existing dimensions of the psychosocial was presented in Appendix A. The set of existing dimensions were initially categorised together based on its meaning or implication by use of coding analysis.

Table 2.5 Core set of definitions, contexts and key notions of the psychosocial relevant terms

Term	Source	Definition	Context	Key notion
Psychosocial support	Hill et al., 2014;	"Addressing a range of needs, including quality of life, emotional well-being, safety and a sense of hope	Health care	- quality of life - emotional well-being - sense of hope
	Davidson, 2010; IASC, 2007; Van Ommeren and Wessells 2007;	"A continuum of care and support which influences both the individual and the social environment in which people live (Action for the Rights of Children, 2009)." "any type of local or outside support that aims to protect or promote psychological well-being and/or prevent mental disorder	Mental health	- local or outside support - psychological well-being - mental disorder
	Action for the Rights of	"A scale of care and support which influences both the individual and the social environment in which people live and ranges from care and	Policy and	- daily basis care and support from social members

	Children, 2009	support offered by caregivers, family members, friends, neighbours, teachers, health workers, and community members on a daily basis but also extends to care and support offered by specialized psychological and social services	Health care	- specialised psychological and social services - individual and the social environment
	Hansen, 2008	"A process of facilitating resilience within individuals, families and communities"	Health care	- resilience within individuals, families and communities
Psychosocial well-being	The Psychosocial Working Group, 2003	"To highlight the link between wider social experience such as culture, traditions and social relationships and the personal experiences of people represented by, for example, their behaviour, emotions and thoughts	Mental health	- social experience (culture, traditions and social relationships emotions) - personal experiences (behaviour and thoughts)
Psychosocial factors	Andersen et al. 2014;	"Factors pertaining to a person's ability to deal effectively with the demands and challenges of everyday life. This involves a person's ability to maintain a state of mental well-being and to demonstrate this in adaptive and positive behaviour while inter- acting with others, his/her culture and environment."	Health care	- mental well-being - positive behaviour - culture - environment
	Hemingway and Marmot, 1999	"Studies employing intervention techniques designed to utilize cognitive, behavioural or social mechanisms of action	Health care	- cognitive - behavioural and social mechanisms
Psychosocial assets	Cohen, 1988	"A single index including personal characteristics, health, and social support"	Mental health	- personal characteristics - health - social support
Psychosocial disability	Kleintjes et al., 2013;	"People who have experienced enduring mental and emotional distress which in interaction with various barriers. . .hinder their full and effective participation in society on an equal basis with others	Policy	- mental distress - emotional distress - participation in society - equal basis with others
	National Mental Health	"The disabilities that are associated with mental health conditions.	Mental health	- disabilities - mental health conditions

	Consumer and Carer Forum, 2011			
Psychosocial theories of aging	Wadensten, 2007	"Human development and ageing in terms of individual changes in cognitive functions, behaviour, roles, relationships, coping ability and social changes	Health care	- human development - ageing - cognitive functions - behaviour - roles - relationships - coping ability - social changes
Psychosocial hazard	Cox and Rial, 2002	"Aspects of the design, organisation and management of work, and its social and environmental context, which can cause psychological, social or physical harm	Mental health	- social and environmental harm - psychological harm - social harm - physical harm - organisation and management of work - design
Psychosocial characteristic	Butler et al., 2014	"One of combined determinants (personality traits and level of depression) to account for variation in particular outcomes such as quality of life	Mental health	- personality traits - level of depression - quality of life
Psychosocial environment	Siegrist and Marmot, 2004	"To produce some beneficial effect on psychological distress or emotional adjustment of patients	Health care	- psychological distress - emotional adjustment
Family psychosocial interventions	Martire, 2004	"Nonmedical interventions that are psychologically, socially, or behaviourally oriented and that involve a member of an adult patient's family or both the patient and family member	Health care	- psychological - social - behaviour - patient's family member
Psychosocial Safety Climate (PSC)	Idris and Dollard, 2014;	policies, practices, and procedures for the protection of worker psychological health and safety	Policy	- policies - practices - procedures

Dollard and Bakker, 2010	- protection of worker - psychological health - psychological safety

The concepts of psychosocial presented in the Table 2.5 suggested that the purpose of psychosocial is achievement of psychosocial well-being for individual's quality of life (Waycott et al., 2014; Hill et al., 2014; Sarah, 2010; IASC, 2007; Van Ommeren et al., 2007; and Johnson et al., 1996), which is defined as "an overall general well-being that comprises objective descriptors and subjective evaluations of physical, material, social, and emotional well-being together with the extent of personal development and purposeful activity, all weighted by a personal set of values" (Felce and Perry, 1995). The term psychosocial well-being contains broad and general sense that it is difficult to define, but it essentially stresses the link between psychosocial aspects of wider social, such as cultures, traditions and relationships, and individuals' experiences, such as behaviour, emotions and thoughts (Strang and Ager, 2003; The Psychosocial Working Group, 2003). The Psychosocial Working Group (2003) introduced three core factors that affect the psychosocial well-being of communities and individuals to define the psychosocial well-being for societies and individuals (Figure 2.13).

Human capacity: Human capacity is composed of physical and mental health including skills and knowledge of individuals. Human capacity perhaps be reduced by physical and mental disabilities and withdrawal of social life (Strang and Ager, 2003).

Social ecology: Social ecology indicates social supports and connections that include support system of the communities and individuals, social network and relationship. These social engagements are complementary important factors that are strongly related to individual's mental health outcomes (Goldberg and Huxley, 1992), and the individual capacities are the essential resources to support the well-being of communities (Colletta and Cullen, 2000).

Culture and values: This factor refers to behaviour and cultural norms which are related to the value system in social and individual expectations of each society. Both individual and social aspects of functioning are influenced by culture and value systems (PWG, 2003).

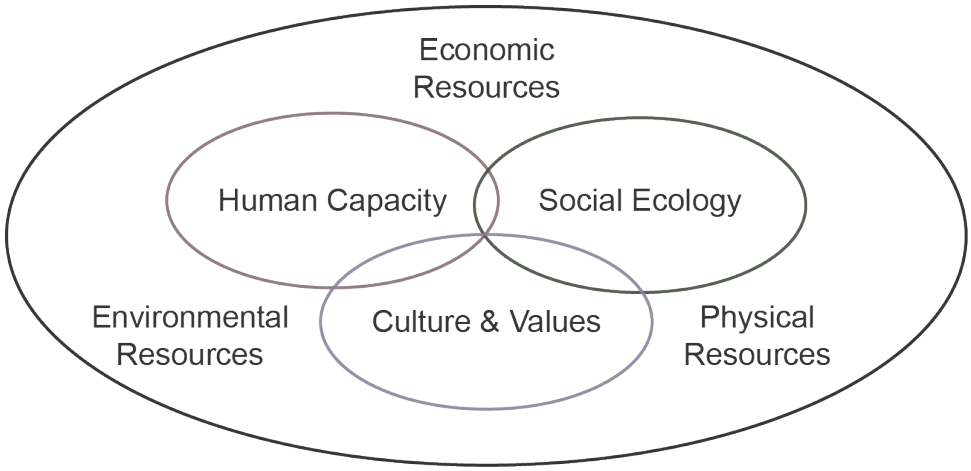


Figure 2.13 Conceptual framework for psychosocial interventions (Psychosocial Working Group, 2003)

These key factors have inter-relationship to each other and they affect the other factors. The psychosocial well-being of individuals and communities are also influenced by external factors such as the physical, economic and environmental resources.

2.5.2 Psychosocial inclusivity and similar concepts in design field

According to the literature on inclusive design, the limited understanding of the psychosocial has been possibly confirmed. Such limitations led to the extension of research scope which is design field. In the design field, there are several non-physical related concepts have been using.

A total of 37 papers regarding psychosocial and its related concepts in design area were selected. The distribution of the reviewed papers according to the contexts was shown as in the Figure 2.14. This figure presents a range of design contexts for the concept of psychosocial and its related notions: *design applications* (n=13); *product design incl. health care device* (n=11); *environmental design incl. transportation and infrastructure* (n=6); *interface design* (n=4); *service design* (n=2); *furniture design (*n=*1).*

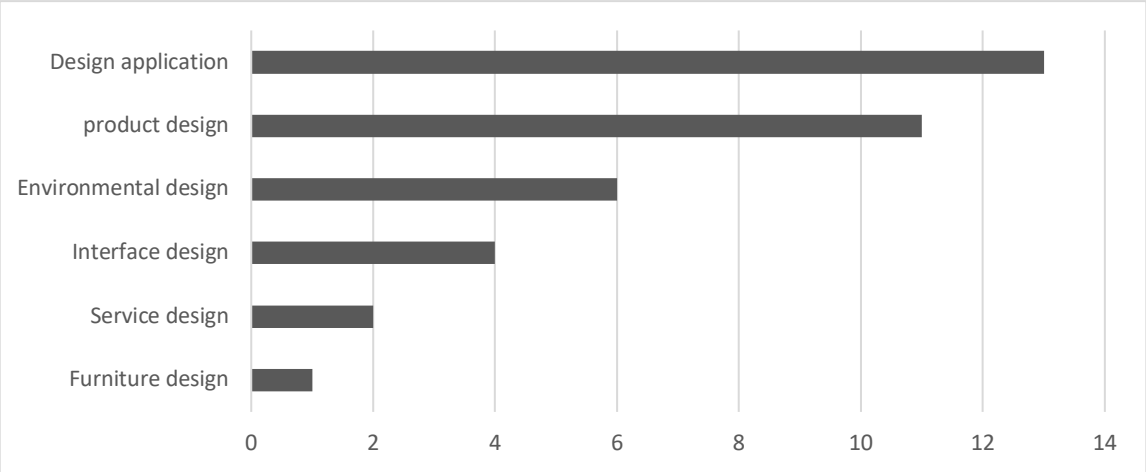


Figure 2.14 Distribution of the reviewed papers from design area according to the contexts

From this collected data source, there are several existing definitions and approaches which include psychosocial relevant factors in the literature on design. These particular approaches propose various factors which are based on psychological, emotional, social, and physical including ergonomic contexts (Table 2.6). The approaches presented in Table 2.6 aim to provide the human well-being and individuals' quality of life through considering theses particular factors. These factors possibly have a close relation to the concept of psychosocial, hence such factors were collated and assembled in the next section. Further, core set of existing dimensions of the psychosocial and its related concepts in design were presented in Appendix B. The set of existing dimensions were initially categorised together based on its meaning or implication by use of coding analysis.

Table 2.6 Key approaches of the psychosocial related ideas in design

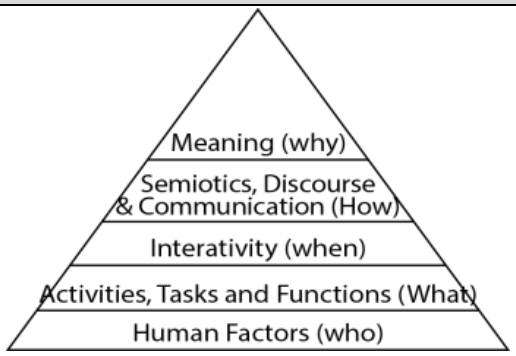
Approach	Factor	Figure (if applicable)
HCD Pyramid (Giacomin, 2014)	Meaning (why) Semiotics, Discourse and Communication (How) Interactivity (when) Activities, Tasks and Functions (What) Human Factors (who)	

Figure 2.15 HCD Pyramid (Giacomin, 2014)

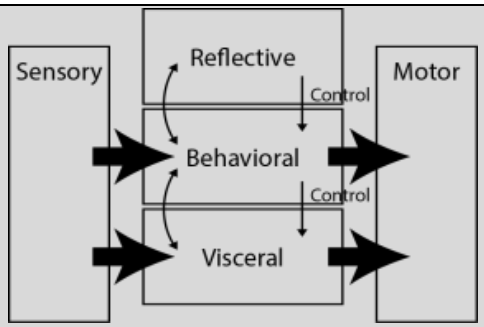
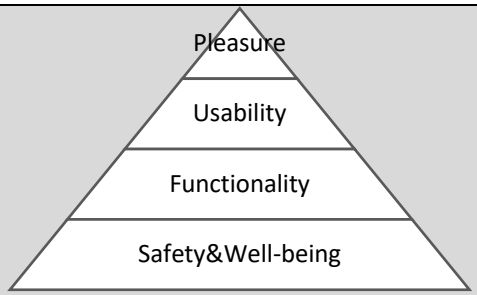
Three levels of design (Norman, 2004)	Visceral Behavioural Reflective		
Psychosocial Impact of assistive Devices Scale (PIADS) (Demers et al., 2002)	Competence	- Competence - Adequacy - Efficiency - Productivity - Usefulness - Expertise	- Capability Performance - Skilfulness - Independence - Quality of life - Confusion
	Adaptability	- Adaptability - Willingness to take chances - Ability to participate - Eagerness to try new things	- Ability to adapt to activities of daily living - Ability to take advantage of opportunities - Well-being
	Self-esteem	- Self-esteem - Security - Sense of power - Embarrassment	- Happiness Sense of control - Frustration - Self-confidence
Hierarchy of user needs when interacting with products (Bonapace, 2002)	Safety and Well-being Functionality Usability Pleasure		

Figure 2.16 Three levels of design (Norman, 2004)

Figure 2.17 Hierarchy of user needs when interacting with products (Bonapace, 2002)

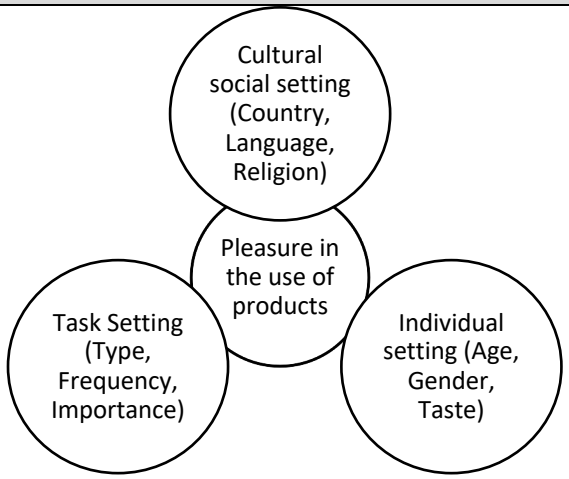
Pleasure in the use of products (Hauge-Nilsen, 2002)	Cultural social setting (Country, Language, Religion) Individual setting (Age, Gender, Taste) Task Setting (Type, Frequency, Importance)	

Figure 2.18 Pleasure in the use of products (Hauge-Nilsen, 2002)

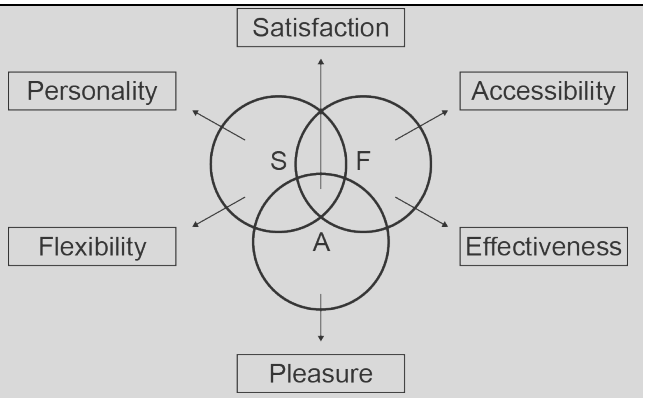
The involvement framework (De Angeli et al., 2000)	Satisfaction	Social qualities	- Personality - Flexibility	
		Aesthetic qualities	- Pleasure	
		Functional qualities	- Accessibility - Effectiveness	

Figure 2.19 The involvement framework (De Angeli et al., 2000)

Four pleasures (Jordan, 2000*)*	Physio-pleasure Psycho-pleasure Socio-pleasure Ideo-pleasure

2.6 Synthesis of psychosocial aspects in inclusive design

As the first step, an initial definition and dimensions of the expression "psychosocial inclusivity in design" is required. Following the review of literature regarding existing definitions and notions of the psychosocial in chosen search areas, a set of definitions of the

psychosocial and its related concepts were combined into a database that served as the foundation for a thematic analysis.

2.6.1 Synthesis methods and procedure

The data analysis procedure was conducted by three coders which are one final year PhD researcher in design (male), one design researcher with over 15 years' experience (male), and one design manager with over 20 years of experience (male). The 'six phases of thematic analysis', which was proposed by Braun and Clarke (2006), was adopted for the coding analysis process. This approach is consisted of familiarisation with the data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and producing the report.

For the first and second phases, two steps of qualitative coding methods: *initial coding* (known as open coding in earlier literature in grounded theory); and *axial coding,* were used as they are considered effective and suitable tools to categorise raw data (Saldaña, 2012). The purpose of this stage was to identify any possible components of psychosocial aspects indicated from the raw data. With this purpose, any words and phrases that have potential impacts on psychosocial inclusivity were extracted from the raw data source and initially coded. The extracted codes were initially grouped by their meanings and implications. Appropriate themes were initially given for each group. For the later stage of analysis as many themes and codes as possible were identified and categorised avoiding loss of any potential components of psychosocial inclusivity in this initial coding process. In this stage, the codes and themes were still general and broad.

In the second stage, extracted codes and initial themes were refined by using *axial coding.* This process provided the different perspective of identified codes and themes from the first stage. In the axial coding process, there were several newly identified codes and themes. Such new items were synthesised with similar codes or themes; categorised under the existing themes as sub-themes; or separately categorised and named based on their implications or meanings. The refined themes, sub-themes, and codes were reviewed and re-categorised repeatedly by the two coders.

From the two steps of coding analysis, an initial definition and dimensions for psychosocial inclusivity in design were created based on both non-design and design fields

2.6.2 Initial definition for psychosocial inclusivity

The core set of existing definitions of the psychosocial and related terms presented in the Table 2.4 and 2.5 were considered for creation of the initial definition. The definitions from the data analysis in both non-design and design fields was related to helping people to have quality of life through emotional and psychological wellbeing (Waycott et al., 2014; Hill et al., 2014; Sarah, 2010; IASC, 2007; Van Ommeren and Wessells et al., 2007; and Johnson et al., 1996). The resulted in an initial definition of 'psychosocial inclusivity' in design was adopted for the purpose of this research:

"provision of equal opportunity for better quality of life to as many people as possible by considering both psychological and social factors"

The initial definition addresses both social and psychological aspects which are appropriate considerations in the design applications. However, the definition is still broad and general in this stage because it is based on the existing concept of the psychosocial in the original fields and design field.

2.6.3 Initial dimensions for psychosocial inclusivity

Data collection of the existing notions of the psychosocial and its related concepts from the non-design and design areas were presented in 2.5 section.

The identified key dimensions of the psychosocial and its related concepts in both non-design and design fields were analysed and combined in this section. From this analysis, five major psychosocial themes were identified: 'Cognition dimensions'; 'Emotional dimensions'; 'Individual circumstance'; 'Social dimensions'; 'Value dimensions'. Table 2.7 presents the five themes along with their sub-themes and codes. The themes, sub-themes and codes were listed in alphabetical order.

Table 2.7 Initial dimensions of psychosocial inclusivity in design

Theme	**Sub-theme**	**Code**	
Cognition dimensions	Attitude	Appraise	Locus of control
		Dispositional optimism	Loss of control
		High responsibility	Personal image
		Having hostility	
	Motivation		
	Perception	Confusion	

		Misconception Predictability	
Emotional dimensions	Positive emotion	A sense of hope A sense of community efficacy Calming	Desire Enjoyment Thrill
	Negative emotion	Anxiety Boredom Depression Decreased self-esteem Distress Fears Hopelessness	Loneliness Sadness Stress (including perceived stress and chronic stress) Time pressure Trauma
Social dimensions	Social activity	Social participation	Social engagement
	Social awareness	Public judgment	Public attitude
	Social interaction	Community efficacy Corporate culture Social acceptance Social changes	Social exclusion / isolation Social integration Social network Social role
	Social support	Emotional support Perceived social support	Support from family or society Financial support
Value dimensions	Happiness	Hopes Physio-pleasure Psycho-pleasure	Socio-pleasure Ideo-pleasure
	Life satisfaction	Long-term health Safety Security	Social satisfaction Successful aging
	Self-esteem	Fulfilment of emotional demand	Self-confidence Self-efficacy

Cognition dimensions

'Cognitive dimensions' is consisting of three sub-themes including 'Attitude', 'Motivation', and 'Perception'. 'Attitude' is including the codes of *Appraise, Dispositional optimism, High responsibility, Having hostility, Locus of control, Loss of control* and *Personal image*. 'Perception' in turn consists of *Confusion, Misconception* and *Predictability*.

In the general context, the term 'cognition' is defined as "the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses."

(Oxford English Dictionary, 2017). This definition is a multi-disciplinary and wide concept, so in various filed of application, the notion of cognition is used as a crucial factor (Messick, 1994; Lazarus, 1991). In this research, the definition of 'cognitive styles' which was proposed by Messick (1994) was used to define the theme 'Cognitive dimensions'. The definition of 'cognitive styles' is: "characteristic modes of perceiving, remembering, thinking, problem-solving, and decision-making, reflective of information-processing regularities that develop in congenial ways around underlying personality trends"

Emotional dimensions

'Emotional dimensions" is consisted of two sub-themes which are 'Negative emotion' and 'Positive emotion'. The term 'emotion' is defined as "A natural instinctive state of mind deriving from one's circumstances, mood, or relationships with others." by Oxford Dictionary (2017). However, there is a limited consensus on the designation of this term in the existing literature considering the notion of emotion is a wide and overarching (Mulligan and Scherer, 2012; Cole et al., 2004; Kleinginna and Kleinginna, 1981; Chaplin and Krawiec, 1979). Kleinginna and Kleinginna (1981) suggested various definitions of 'emotion', and *affective definition* of emotion was used to describe 'emotional dimensions'. Within this, English and Ava (1958) defined the term emotion as "a complex feeling-state accompanied by characteristic motor and glandular activities; or a complex behaviour in which the visceral component predominates." Within this definition, the codes which are relevant to human senses and feelings were categorised in this theme.

Social dimensions

'Social and cultural dimensions' includes four sub-themes which are 'Social activity', 'Social interaction', Social awareness' and 'Social support'. 'Social activity' includes *Social participation* and *Social engagement*. 'Social awareness' sub-theme consists of *Public judgment* and *Public attitude.* 'Social interaction' in turn consists of: *Community efficacy; Corporate culture; Social acceptance; Social changes; Social exclusion/isolation; Social integration; Social network;* and *Social role*. 'Social support' sub-theme includes codes of *Emotional support; Perceived social support; Support from family or society;* and *Financial support.*

The Social dimensions generally related to individuals' societal and cultural background, which influences social members' psychosocial well-being such as emotion, opinion or behaviour. Larson (1996) argued that social dimensions have a strong influence on one's well-

being and the quality of life and also an interdependent relationship with physical, mental and emotional factors. Within this concept, 'Social factors' includes "physical environment, external stressors, family environment, interpersonal relationships, social support and isolation, role models, social expectations, value system, sociocultural factors, and culture." (Kaslow et al., 2007). In this research, 'social dimensions' referred to these types of dimensions which affect individuals' social life.

Value dimensions

'Value dimensions' in turn consist sub-themes of 'Happiness', 'Life satisfaction', and 'Self-esteem'. 'Happiness' includes *Hopes, Physio-pleasure, Psycho-pleasure, Socio-pleasure,* and *Ideo-pleasure.* 'Life satisfaction' sub-theme contains *Long-term health, Safety, Security, Social satisfaction,* and *Successful ageing.* 'Self-esteem' include codes of *Fulfilment of emotional demand, Self-confidence*, and *Self-efficacy.*

The concept of 'value' is a wide-spanning and an over-arching concept which has been used in various fields such as business, chemistry, ethics, marketing, mathematics, music, and physics (Gil Saura et al., 2008; Zeithaml, 1988). Within this broad notion of value, the three bases were proposed by Diener and Suh (1997): continuous choice; judgement of satisfaction; judgment with reference to cultural norms or value system. Such can recognise which factors are valuable or not to individuals, and also meet the general definition of value: "principles or standards of behaviour; one's judgment of what is important in life" (Oxford English Dictionary, 2017). In this research, this general definition was used to describe 'Value dimensions'

2.7 Chapter summary

In this chapter, a review of existing literature and also analysis and synthesis of collected information from both non-design and design areas were conducted. The key findings from the literature review, analysis and synthesis were:

a) *the importance and need for psychosocial inclusivity in design,*
b) *insufficient understanding of psychosocial aspects in the field of inclusive design, and*
c) *Initial definition and dimensions of psychosocial inclusivity in design.*

Background information on both concepts of 'inclusive design' and 'psychosocial' including finding a) and b) was identified through an illustrative overview of existing literature on both non-design (psychology, sociology, and healthcare) and design areas. Based on these results, and through analysis and synthesis of the existing definitions and applications of

psychosocial and its related concepts in both non-design and design areas, finding c) was established. However, these definition and dimensions are the findings collated from a general data analysis based on the existing literature. It has not been proven yet whether the initial definition and dimensions are appropriate or not when they are applied in the real world.

Therefore, several empirical studies will be planned, designed and conducted in the next chapters of this PhD thesis in order to identify possible components and develop the initial definition which contributes to the psychosocial inclusivity construct in design. In the next chapter, the research methodology is presented, detailing each study designed to fulfil the research purpose in depth.

CHAPTER 3: Research Methodology

3.1 Introduction

In the previous chapter, the initial definition and dimensions of psychosocial inclusivity in design were identified by means of a critical review and analysis of the literature on this topic.

In this chapter, thus the adopted research strategies and research methodology will be described in order to explain how this research was designed, and what specific methods were conducted. For the purpose of adopting the appropriate research strategies and research methodology, a critical review of several research strategies and research methodologies was conducted. From this critical review, several methodologies were identified with the aim of refining, developing, and evaluating the initial findings. The general picture of the research strategy and methodology will be presented first. The specific details of each method (including their purpose, sampling, data collection and analysis protocols) will be introduced in the subsequent chapters. An overview of the research strategy and methodology will be introduced in the following sections as presented in the chapter map (Figure 3.1).

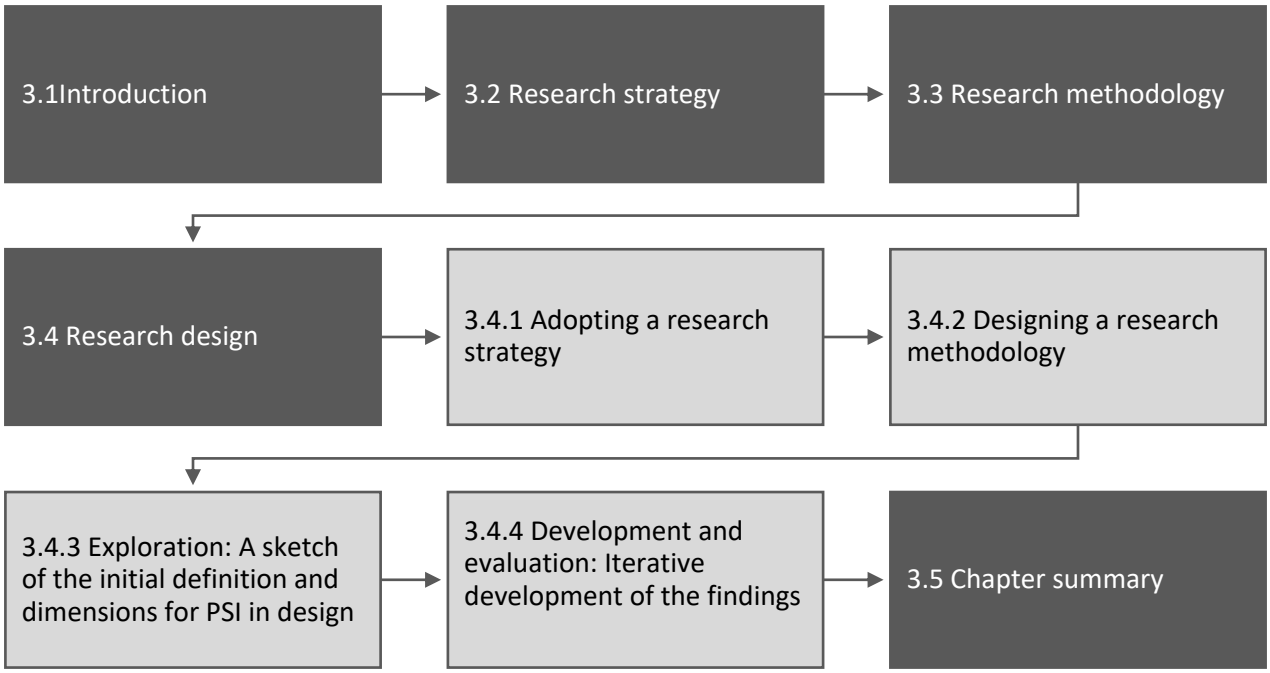


Figure 3.1 Chapter map
**PSI: Psychosocial Inclusivity*

3.2 Research strategy

Considering that the psychosocial aspects, and inclusive design are broad and multi-disciplinary, in this section, several research strategies will be reviewed to identify an appropriate strategy for this research.

A research strategy is defined as "a general plan of how the researcher will go about answering the research questions" (Saunders, et al., 2009). Patton (1990) explained that a research strategy can be referred to as a framework, an action that should be taken to achieve the research goal. Saunders, et al. (2009) established eight categories of research strategies: action research, case studies, cross-sectional studies, ethnographic studies, experimental studies, exploratory studies, grounded theory studies, and survey studies.

Epistemology

The theoretical viewpoints of a researcher, the methodology, and the method(s) of data collection are generally influenced by a researcher's epistemological perspectives; thus, epistemology is a priority in research design (Gray, 2013). Epistemology has been defined as "the nature of the relationship between the knower or would-be knower and what can be known" (Gula and Lincoln, 1998) and "how we know what we know" (Crotty, 1998). It is a philosophical approach to knowledge (Crotty, 1998; Miller and Brewer, 2003; Easterby-Smith, et al., 2008). It is therefore related to "ontology", "the nature of reality" (Lincoln and Guba, 1985) or "the study of being" (Crotty, 1998). Crotty (1998) explained the three major epistemological stances: objectivism, subjectivism, and constructivism. Table 3.1 presents the three major epistemological stances and their meanings. There are two theoretical perspectives in social science which are positivism and interpretivism. While positivism has a link with objectivism (Crotty, 1998; Gray, 2013), Gray (2013) argue that there is a close relationship between Interpretivism, which is dealing with building theory (Henn, et al., 2009), and constructivism. Considering the characteristic of this research, therefore, it can be explained by interpretivism and constructivism.

Table 3.1 Major epistemological stances (Crotty, 1998)

Epistemological stance	Purpose
Objectivism	Testing theories or hypotheses to explain particular phenomena
Subjectivism	Comprehending human behaviour to understand their meanings
Constructivism	Making meaning of knowledge in social context by individuals

Three research design strategies

Robson and McCartan (2016) suggested three research design strategies: a fixed strategy (appropriate for the pre-specified research, mostly used as a quantitative strategy), a flexible strategy (appropriate for the non-specified and non-numerical research, commonly used as a qualitative strategy), and a multi-strategy (a combination of the fixed and flexible strategies, which often begins with a flexible phase and moves to a fixed phase). These design strategies are also known as "theory building (qualitative)" or "theory testing (quantitative)" (Bryman and Teevan, 2005; Henn, et al., 2009). Table 3.2 presents the details of these three research designs. This research will use both qualitative and quantitative methodologies in order to explore psychosocial inclusivity in the field of inclusive design. Therefore, the multi-strategy has been selected for this research.

Table 3.2 Three research design strategies

Research design	Research strategy	Appropriate type of data
Fixed design	Quantitative strategy	Numerical data
Flexible design	Qualitative strategy	Non-numerical data
Multi-strategy design	Mixed strategy (Quantitative + Qualitative strategies)	Numerical data + Non-numerical data

The deductive and inductive research

In social science, the terms "deductive research" and "inductive research" are commonly used (Case, 2008). The deductive approach is commonly adopted in quantitative research, such as surveys (Kumar, 2011) and is defined as "applying a theory to a particular case in an attempt to test the theory" (Case, 2008). On the other hand, the inductive approach is explained as examining "particular instances and reasons toward generalisation" (Case, 2008) and is used for qualitative research, such as case studies, observations, and interviews (Creswell, 2009).

The current research is primarily qualitative; therefore, it can be classified as inductive. However, a deductive approach is also adopted in order to establish the initial definition and dimensions of the psychosocial aspects of inclusive design based on the concepts discussed in Chapter 2. In addition, the online survey (quantitative study) will be conducted at the end of the research in order to evaluate the findings of previous chapters. Therefore, this research

mainly uses an inductive approach but does make use of a deductive approach in the literature review and the evaluation study.

Basic and applied research

There are two main uses of research, basic and applied (Neuman, 2003). Basic research focuses on the creation of academic and scientific knowledge which benefits general knowledge. On the other hand, applied research focuses on solving particular issues or problems with a pragmatic orientation (Neuman, 2003). The current PhD research aims to address the problems of the limited understanding of and the lack of clarity about people's perspectives on and the dimensions of psychosocial inclusivity in inclusive design. Therefore, a basic research approach is adopted herein, and this research is designed according to those principles.

The purpose of research

There are three main purposes of research: exploratory, descriptive, and explanatory (Robson & McCartan, 2016; Yin, 2009; Neuman, 2003). Table 3.3 presents a summary thereof. Saunders (2009) explained that the purpose of exploratory research is to answer "what" questions regarding unexplored natural or social phenomena. For this purpose, a flexible, qualitative strategy is commonly adopted (Robson & McCartan, 2016; Neuman, 2003). The purpose of descriptive research is to respond to "how" and "who" questions (Neuman, 2003), by providing an overview of natural or social phenomena, describing the association between certain events, individuals, or situations (Gray, 2013). For this purpose, a non-experimental, fixed strategy is appropriate (Robson & McCartan, 2016). Explanatory research is used to answer "why" questions in order to explain existing social phenomena or human behaviours (Neuman, 2003, Yin, 2009). For this purpose, an experimental fixed design strategy is appropriate (Robson & McCartan, 2016).

Table 3.3 The purposes of research (Robson & McCartan, 2016; Neuman, 2003; Yin, 2009)

	Purpose	**Question type**	**Appropriate design strategy**
Exploratory	Identifying unexplored natural or social phenomena	What	Flexible (Qualitative) design strategy
Descriptive	Providing an overview of natural or social phenomena	How and who	Non-experimental, fixed (Quantitative) design strategy

Explanatory	Explaining existing social phenomena or human behaviours	Why	Experimental fixed design strategy

3.3 Research methodology

In social science research the paradigms of the research methodology along with quantitative, qualitative, and mixed-method research has been recognised and established, although 'Design research' has not been well established with its shorter history (Neuman, 2007). It could be argued that there is a difference between social science research and design research (Cross, 2006; Frayling, 1993). Therefore, in this section, several research methodologies in design research and social science research will be reviewed.

A framework for research design

Robson and McCartan (2016) suggested a framework for a research design, composed of five components (Figure 3.2): purpose (what a researcher tries to achieve), conceptual framework (what are the features or aspects of researcher's theory and how they related to each other), research questions (what the researcher needs to know to achieve the research purpose), methods (techniques for collecting and analysing data), sampling procedures (the ethnographical context for data collection). These components are correlated and should be compatible with each other (Robson & McCartan, 2016).

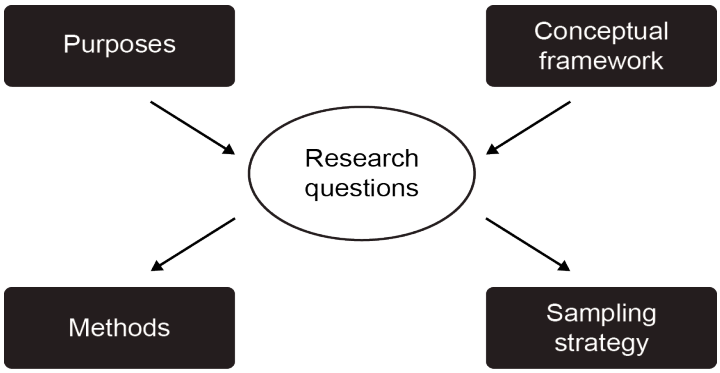


Figure 3.2 A framework for research design (Robson & McCartan, 2016)

Design research triangle

Fallman (2008) created the "Interaction Design Research Triangle" model which is consisting of three extremes (Figure 3.3): design practice, design exploration, and design

studies. In the model shown in the Figure, two spaces between the extremes represent design research activities. Furthermore, Table 3.4 provides three extremes and their working areas.

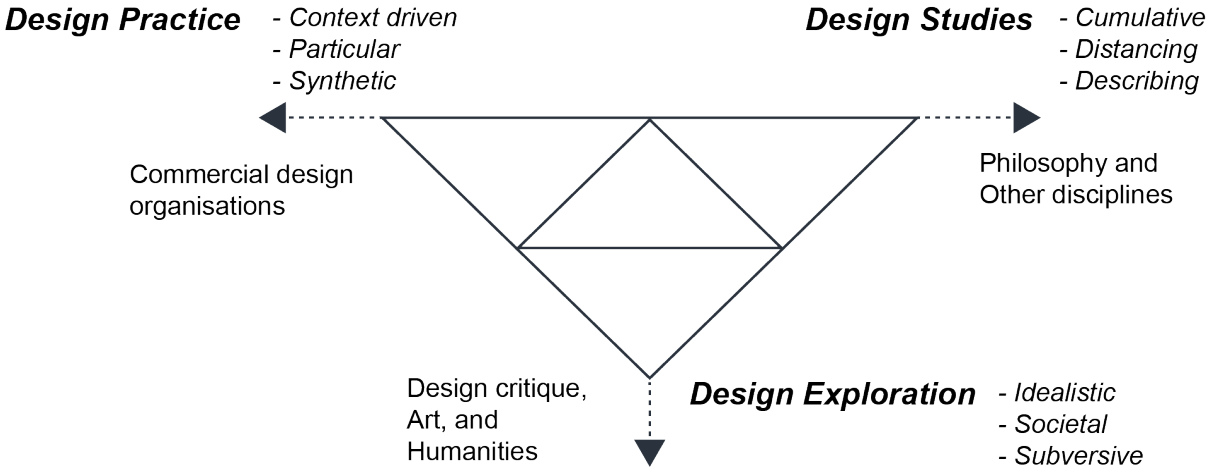


Figure 3.3 Interaction Design Research Triangle (Fallman, 2008)

Table 3.4 The three extremes and the working areas of the Interaction Design Research Triangle (Fallman, 2008)

Extreme	Working area
Design practice	Practical design areas, such as an in-house design team, a consultancy company, and a commercial interaction design company.
Design exploration	Beyond current design paradigms base on "What if?" questions, such as economic boundaries, technology, or the paradigm of style and use.
Design studies	Design research in analysis, such as design philosophy, design history, design theory, and design methodology.

Research in art and design

Frayling (1993) explained that research in art and design is a classification derived from an overview of research, art, and design. It consists of three categories of suitable research approaches: research into art and design, research through art and design, and research for art and design. Table 3.5 presents the three categories and the suitable types of research.

Table 3.5 Research in art and design (Frayling, 1993)

Category	Type of research
Research into art and design	- Historical research - Perceptual or aesthetic Research - Research into various theoretical perspectives on art and design such as political, economic, social, technical, material, structural, cultural, ethical, and iconographic research.

Research through art and design	- Action research - Development work - Materials research
Research for art and design	The end product is an artefact A sense of visual or iconic or imagistic communication

Design Research Methodology (DRM)

The Design Research Methodology (DRM) (Blessing and Chakrabarti, 2009) has also been considered for this research. It is a well-known methodology and has been widely adopted in design research by several researchers, such as Green (2016), McGinley (2012), Nickpour (2012), Cifter (2011), Gupta (2007), Cardoso (2005), Dong (2004), and Ahmed (2000). The DRM consists of four stages as shown in Table 3.6.

Table 3.6 Design Research Methodology (Blessing and Chakrabarti, 2009)

Stage	Basic means	Purpose	Main outcomes
Research clarification	Literature analysis	To clarify the research goal	Research definition/goals
Descriptive study 1	Empirical data analysis	To understand the criteria	Detailed understanding
Prescriptive study	Assumption, experience, synthesis	To develop the understanding and methods to support the results from the previous stage	Developed support
Descriptive study 2	Empirical data analysis	To evaluate (test) the results from the previous stage	Evaluation

3.4 Research Design

3.4.1 Adopting a research strategy

In the previous section, several key and relevant research strategies were reviewed. Considering the nature of this research and that the concept of the psychosocial aspects in inclusive design is new and unspecified in the wider field of inclusive design, a qualitative, flexible approach is appropriate.

However, a quantitative approach is also necessary for the evaluative study, the online survey, which aims to evaluate the initial definition and dimensions of the psychosocial aspects of inclusivity in design as understood from the previous chapters. Such a combination of both qualitative and quantitative approaches provides multiple perspectives about the phenomenon (Robson & McCartan, 2016).

An inductive approach has been taken in the empirical studies, the Delphi study (expert survey), field study I (ethnographic interviews), field study II (ethnographic interviews, a creative workshop, and observations), and the evaluative study (the online survey) in this research. A deductive approach has been taken in the literature review.

Further, the purposes of this research are *descriptive* and *exploratory*. It can be argued that the research demands an *explanatory* approach because it is mainly used to provide further explanations of a current situation or phenomenon considering the notion of psychosocial aspects have already been established in its original fields. However, the limited understanding of the notion of the psychosocial aspects of inclusivity in design has been identified through the literature review. Thus, this research aims to explore the notion of the psychosocial aspects of inclusivity in design by identifying a definition and dimensions as the first investigation. Therefore, an explanatory research approach should be adopted in future research after the concept has matured through this research. Table 3.7 provides a summary of the research strategies adopted in this research.

Table 3.7 Research strategies adopted in this research

Area of research	Research strategies	The research strategy adopted in this research
General/ social sciences	Fixed (quantitative) Flexible (qualitative) Multi-strategy (mixed)	Multi-strategy (Mixed) design - Flexible (Qualitative: studies 1, 2 and 3) - Fixed (Quantitative: study 4)
	Inductive Deductive	- Inductive (Study 1, 2, 3 and 4) - Deductive (Literature review)
	Basic research Applied research	Basic research
	Exploratory Descriptive Explanatory	Primarily descriptive but also exploratory

Triangulation

Accordingly, triangulation has been used in this research in order to improve the degree of confidence in and the rigour of the results. The triangulation strategy is a well-known and widely used approach. It uses multiple datasets or methods to improve the rigour of a research project (Robson & McCartan, 2016; Denzin, 1973; Jick, 1979). It provides multiple perspectives regarding various aspects of a specific research; hence, the research can be considered more

robust. Denzin (1988) identified four different types of triangulation according to its use: data, observer, methodological, and theory triangulation. Table 3.8 provides details of each type of triangulation. This research uses qualitative (expert survey, ethnographic interviews, a creative workshop, observations, and an online survey) and quantitative (an online survey) approaches. In this research, both data triangulation and methodological triangulation have been applied in an attempt to achieve the greatest potential validity of the results.

Table 3.8 Four types of triangulation (Denzin, 1988)

Triangulation	Detail
Data triangulation	Using more than one method of data collection
Observer triangulation	Using more than one observer during the study
Methodological triangulation	Using a combination of both qualitative and quantitative approaches
Theory triangulation	Using multiple perspectives or theories

3.4.2 Designing a research methodology

Based on a critical review of the existing research approaches, DRM (Blessing and Chakrabarti, 2009), which provides great detail and is flexible, has been selected as the main methodological structure for this research. Robson and McCartan framework for research design (2016) has also been selected in order to design appropriate methods for each chapter.

There are three phases of DRM: exploration (phase I), development (phase II), and evaluation (phase III). In the three phases, several qualitative and quantitative methods, including a literature review, an expert survey, interviews, a creative workshop, observations and an online survey were selected based on Robson and McCartan framework (2016). Figure 3.4 presents an overview of the three phases, the methods chosen for this research, and the relationship between them. Specific details of each phase and study will be presented in the next sections, sections 3.4.3 and 3.4.4.

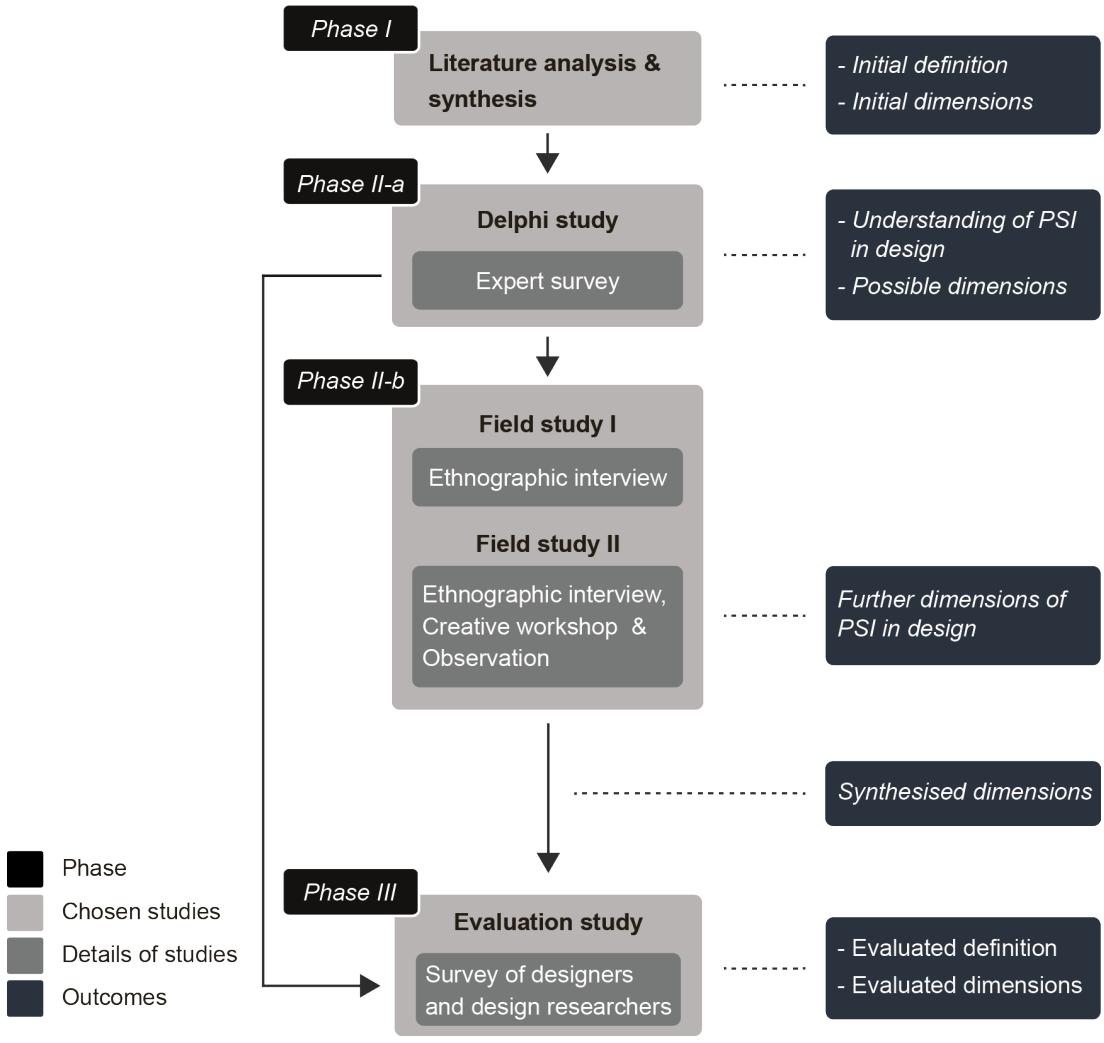


*Figure 3.4 Overview of the research design *PSI: Psychosocial Inclusivity*

3.4.3 Exploration: A sketch of the initial definition and dimensions for psychosocial inclusivity in design

In phase I of this research, an illustrative literature review and coding analysis were conducted to identify the initial definition and dimensions of the psychosocial aspects of inclusivity in design. In the literature review, the limited understanding of the notion of the psychosocial aspects of inclusivity in design was identified as well as the need for the concept to be recognised in the field of inclusive design. Based thereon, illustrative data collection was conducted, and appropriate articles were selected from the chosen data collection areas: non-design and design areas. This was done according to the following criteria: year of publication, number of citations, and correlation of study focus with any psychosocial aspects. Based thereon, an appropriate number of databases were built based on both the non-design and

design areas. This data was then analysed and synthesised using several coding analyses: *initial coding* and *axial coding* (Saldaña, 2012), following the "six phases of thematic analysis" (Braun and Clarke, 2006) to establish the initial definition and dimensions of psychosocial inclusivity in design. The specific data collection and analytical methods and processes were presented in Chapter 2.

3.4.4 Development and evaluation: An iterative development of the findings

The design research process is mostly iterative (Reeves, et al., 2005; Cobb, et al., 2003; Design-Based Research Collective, 2003; van den Akker, 1999) because the iterative process strengthens contextual insights. Thus, iterative empirical studies were designed for phases II and III of this research (the development and evaluative stages). The findings of the literature review included the initial definition and dimensions of the psychosocial aspects of inclusivity in design, which were developed and evaluated in phases II and III. Several methods were used to achieve the research purpose. In these phases, both data triangulation (an expert survey, ethnographic interviews, a creative workshop, observations, and an online survey) and methodological triangulation (qualitative and qualitative approaches) were applied in an attempt to achieve the greatest potential validity of the results. In this sense, the selected studies were:

- *The Delphi study (study 1) – a first round of expert survey to verify the importance and limitations of the psychosocial aspects of inclusivity in design;*
- *Field study I (study 2) – ethnographic interviews of individuals with mobility issues to identify possible psychosocial factors to refine the initial definition and dimensions;*
- *Field study II (study 3) – ethnographic interviews, a creative workshop, and the non-participatory observation of the older individuals to identify possible psychosocial dimensions in order to refine the initial definition and dimensions; and*
- *Evaluative study (study 4) – an online survey of designers and design researchers as the second round of Delphi study undertaken in order to evaluate and develop the initial definition and dimensions.*

Table 3.9 Research strategies and methods adopted in this research

	Chosen method	**Ethnographic context**	**Type of research**	**Data collection methods**	**Data analysis methods**
Study 1:	Expert survey	Group of experts (n=10)	Qualitative	Open-ended questions	Qualitative coding analysis

Delphi study					
Study 2: Field study I	Ethnographic interview	People with mobility issues (n=37)	Qualitative	Semi-structured interviews	Qualitative coding analysis
Study 3: Field study II	Ethnographic interview	The older individuals (n=31)	Qualitative	Semi-structured interviews	Qualitative coding analysis
	Creative workshop	The older individuals (n=19)	Qualitative	Group discussion	Qualitative coding analysis
	Observations	The older individuals (n=8)	Qualitative	Observations and semi-structured interviews	Qualitative coding analysis
Study 4: Evaluative study	Online survey	Designers and design researchers (n= 47)	Qualitative and Quantitative	Online survey (multiple-choice questions and open-ended questions)	Statistical analysis Qualitative coding analysis

Table 3.9 summarises the specific details of the selected research strategies and methods for each study in this research. After having conducted each study, the initial working definition and dimensions of psychosocial inclusivity, obtained from the previous study findings, were analysed and synthesised with the findings of the new study by means of appropriate data analysis methods by multiple coders. The specific details of the coders and their roles were summarised in Table 3.10 for convenience. This process was conducted iteratively from studies 1 to 4. Hence, the initial definition and dimensions were developed by adding new dimensions and/or by refining or removing dimensions based on the findings of these studies. The specific details of each method, including their purpose, study design, ethnographic context, sampling method, method of data collection, analytical method, and limitations, will be presented in each chapter 4, 5, 6, and 7.

Table 3.10 Summary of the coders and role based on each study

	Coder	**Role**	**Experience**	**Gender**
Study 1: Delphi study	Main researcher (Author)	Main coding and review	Final year PhD researcher in design	male
	Design researcher	Review	Over 15 years of experience	female
	Design manager	Review	Over 20 years of experience	male
Study 2:	Main researcher (Author)	Main coding	Final year PhD researcher in design	male

Field study I	Design researcher	Review	Over 15 years of experience	female
	Design manager	Review	Over 20 years of experience	male
	Postdoctoral researcher	Multi coding	Postdoctoral researcher in design	female
	PhD researcher	Multi coding	Final year PhD researcher in design	male
	PhD researcher	Multi coding	Second year PhD researcher in design	female
	PhD researcher	Multi coding	Second year PhD researcher in design	female
Study 3: Field study II	Main researcher (Author)	Main coding and review	Final year PhD researcher in design	male
	Design researcher	Review	Over 15 years of experience	female
	Design manager	Review	Over 20 years of experience	male
	Design manager	Multi coding and review	Over 15 years of experience	female
	PhD researcher	Multi coding	Final year PhD researcher in design	male
	PhD researcher	Multi coding	Third year PhD researcher in design	female
Study 4: Evaluative study	Main researcher (Author)	Main coding and review	Final year PhD researcher in design	male
	Design researcher	Review	Over 15 years of experience	female
	Design manager	Review	Over 20 years of experience	male
	PhD researcher	Multi coding	Final year PhD researcher in design	male

3.5 Chapter summary

Several research strategies and methodologies have been reviewed in this chapter. This critical review has provided a clear perspective for adopting an appropriate research strategy and for designing the research. Based on these reviews, appropriate methods were selected and detailed for the research purpose based on the three phases of the study: exploration, development, and evaluation.

The selected research methods in this PhD study include: a literature review, an expert survey, field study I (ethnographic interviews with people with mobility issues), field study II (ethnographic interviews, a creative workshop, and non-participatory observations of older individuals' shopping in the supermarket), and an online survey of designers and design researchers. Appropriate data analysis methods were also explored and selected. These include qualitative coding methods and statistical data analysis method (using NVivo and SPSS

software, two key software packages which will be introduced in later chapters of this study). Finally, the research has been designed as a first investigation to identify the notion of the psychosocial aspects of inclusivity in design, which can form a crucial basis for future research on this topic.

In the subsequent chapters, each of the following will be detailed: the study purpose, study design, ethnographic context, sampling, data collection and analysis protocol, and findings.

CHAPTER 4: The Delphi study - Expert survey

4.1 Introduction

This chapter will present the structured expert survey which was performed for the purpose of clarifying and extending the findings identified in the literature review in Chapter 2. The results from Chapter 2 showed: 1) the importance of psychosocial aspects in inclusive design; 2) a lack of understanding of psychosocial aspects in inclusive design; and 3) an initial definition and the dimensions of psychosocial inclusivity in design involving specific constructs. Such findings were identified by desk research; hence, empirical studies are required to confirm, refine, and develop the findings.

In this chapter, Delphi study was selected. Delphi is a well-known example of an iterative expert survey (McKenna, 1994; Lynn, et al., 1998) that can assist in the clarification of the results of the literature review. For this study, a group of experts was selected from several sectors including design, psychology, sociology, healthcare, the government, and non-government organisations (NGOs). Such sectors were chosen based on a stakeholder analysis (Grimble and Wellard, 1997) which identified the minimum set of stakeholders for the study.

Several personas were created based on each stakeholder, to identify the potential participants who would meet the necessary criteria for the study. Ten participants were selected for the study, five with a background in design and five with backgrounds in psychology, sociology, the government and NGOs.

The Delphi study was designed as a structured online survey and provided several benefits, including the anonymity of the participants; iterative interview rounds; controlled feedback; and the statistical agreement of experts' opinions (Rowe, et al., 1999). Specific details of these benefits will be explained in section 4.2. The questionnaire was designed based on the findings from Chapter 2. In the survey the experts were asked about inclusive design, psychosocial aspects in their own fields, and psychosocial aspects in inclusive design. Specific details of the Delphi study protocol and data analysis will be explained in section 4.3.

Through the survey, several findings from the previous chapter were confirmed and also several possible dimensions of psychosocial aspects were identified. The subsequent

discussion of the findings including identified dimensions will be presented in section 4.5 as presented in the chapter map (Figure 4.1)

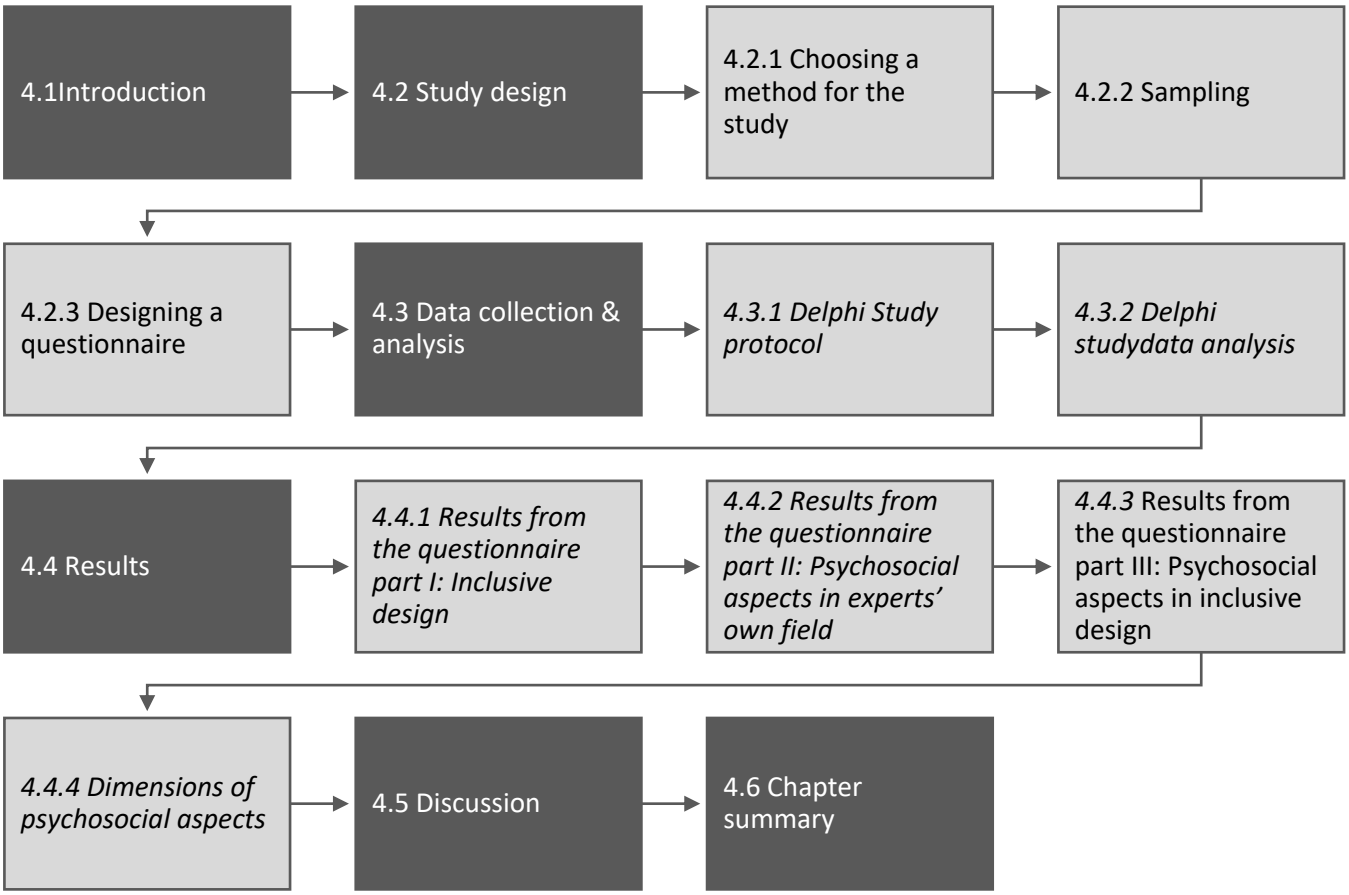


Figure 4.1 Chapter map

In the remaining sections of this chapter, the conducted Delphi study will be explained.

Aim, objectives, and research questions

The study was conducted to explore psychosocial inclusivity in design through interviews with chosen experts, specifically to achieve the following objectives:

- to clarify the importance and potential role of psychosocial aspects in inclusive design; and
- to identify the dimensions for the initial dimensions of psychosocial inclusivity in design.

Furthermore, the study aimed to answer the following research questions:

- what is the importance in psychosocial inclusivity in design?
- what are the relevant concepts for psychosocial inclusivity in design?

- what are the dimensions for psychosocial inclusivity in design?

4.2 Study design

4.2.1 Choosing a method for the study

The Delphi study method was selected in order to answer the research questions. The Delphi study is an iterative, multistage survey which is performed with a group of experts in order to synthesise each opinion to make a group consensus (Hasson, et al., 2000; McKenna, 1994; Lynn, et al., 1998). The Delphi study has been used in many studies since it was conducted by RAND corporation in the 1950s (Dalkey and Helmer, 1963), particularly in social sciences and healthcare (Hasson, et al., 2000). There are four key features of the classic Delphi study method (Rowe, et al., 1999):

- Anonymity of participants – the anonymity allows experts to provide a subjective perspective of the topic area;
- Iterative interview rounds – the multistage interview process allows researchers to have an opportunity to refine and develop the data collected in each round;
- Controlled feedback – collected data from the questionnaire is analysed and used to design the questionnaire for the next round. The questionnaire, based on the synthesised data from the previous round, may reflect experts' points of view in the next round; and
- Statistical agreement of experts' opinions – this provides an opportunity to appropriately interpret and analyse the data.

With these features, Rowe, et al. (1999) argued that the Delphi study can be used for forecasting or decision-making. It can also be used to identify inadequate knowledge of phenomena and problems (Adler and Ziglio, 1996). Due to these benefits, the Delphi study was selected to confirm and clarify the findings from the literature review in Chapter 2 to give a level of confidence in the study before undertaking any empirical studies. Specific details of the study, including the sampling process, the questionnaire design, the study protocol, and the data analysis will now be explained.

4.2.2 Sampling

The selection of the experts is one of the most important processes in the Delphi study method as the quality of the results are based on the participants' expertise and insights. Adler and Ziglio (1996) emphasised four requirements for the selection of experts for conducting a

Delphi study: 1) Experts should have relevant knowledge and experience in the research topic area; 2) Experts should have a willingness and capacity for participation; 3) Experts should have sufficient time availability for participation in the iterative interviews; and 4) Experts should be able to communicate their views effectively.

In addition, Okoli and Pawlowski (2004) suggested five steps for selecting experts for a Delphi study:

1) preparing a Knowledge Resource Nomination Worksheet (KRNW);

2) populating the KRNW with the names of the experts;

3) establishing the first contacts to nominate additional experts;

4) ranking the experts by qualifications; and

5) inviting experts to the Delphi interview study.

These steps help researchers to select qualified groups of experts who have broad expertise, knowledge, understanding, and experience of the research topic. In this study, both the four requirements (Adler and Ziglio, 1996) and the five steps (Okoli and Pawlowski, 2004) have been taken into consideration for the selection of experts.

Stakeholder analysis

As the first step in the sampling process, the KRNW was created by three researchers: one final year PhD researcher in design (male), one design researcher with over 15 years of experience (female); and one design manager with over 20 years of experience (male). The purpose of creating the KRNW is to provide initial class of experts in order to avoid missing any potential experts in the step of selecting actual experts (Okoli and Pawlowski, 2004). Delbecq, et al. (1975) stressed that any specific names of experts should not be listed; rather, identifying types of experts is the main purpose of this step. From the KRNW, appropriate disciplines, skills, literature, and organisations were identified (Table 4.1).

Table 4.1 Knowledge Resource Nomination Worksheet

Disciplines / skills	Literature	Organisations
Design and the psychosocial - Academics - Practitioners - Governmental officials - Business people - Non-governmental organisation (NGO) officials - People with lived experience	- Journal papers - Conference papers - Reports	- Higher educational organisation - Company - Governmental organisation - Non-governmental organisation (NGO) - Non-profit organization

After the KRNW was created, a stakeholder analysis was undertaken by the three researchers. Stakeholders are defined as "persons, groups, or institutions with interests in a project or programme" by Overseas Development Administration (ODA) (Montgomery, 1995). A stakeholder analysis is a helpful method of evaluating appropriate stakeholders in a project. Grimble and Wellard (1997) emphasised two types of stakeholders: a primary/active stakeholder and a secondary/passive stakeholder. Active stakeholders are "those who affect (determine) a decision or action whether positively or negatively" and passive stakeholders are "those affected by this decision or action whether positively or negatively" (Grimble and Wellard, 1997). In this study, a stakeholder model was created based on the KRNW. Figure 4.2 presents six stakeholders, including five active stakeholders (academics, practitioners, governmental officials, businesspersons, and NGO officials) and one passive stakeholder (people with lived experience).

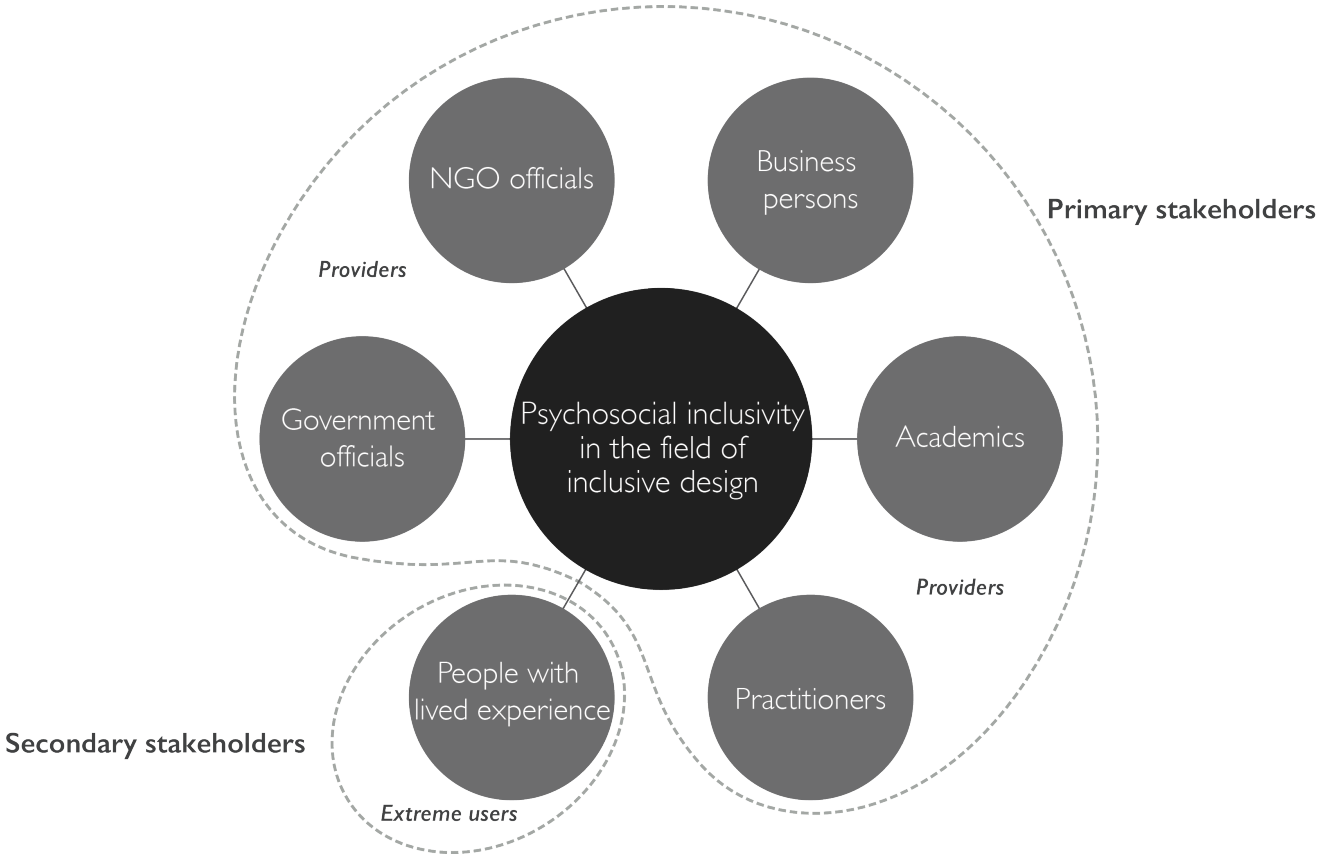


Figure 4.2 Stakeholder model (Available at: http://tinyurl.com/pw7vhoh)

The six stakeholders are:

- ***Academics***: In academia, there are potential experts, researchers and lecturers in academic fields such as design, psychology, sociology, and healthcare. They are aware of the concept and importance of psychosocial aspects of design. In addition, the experts might suggest some potential opportunities and challenges in achieving psychosocial inclusivity in the academic field of inclusive design.
- ***Practitioners***: Experts who have a clear understanding of the importance and existing practical applications of psychosocial aspects are practitioners. They work in different fields, such as design, healthcare, and psychology.
- ***Governmental officials***: Policymakers fall into this stakeholder group. Government policies or actions are relevant to the concept of inclusive design. The experts in this stakeholder group have in-depth knowledge of inclusive design as an application for better social inclusion and quality of life. In addition, they are aware of the importance of and need for psychosocial inclusivity.

- ***Businesspersons***: The experts who are dealing with financial issues in the field in which the psychosocial aspects or inclusive design is considered fall into this group.
- ***NGO officials***: NGO officials from various organisations were also selected. These organisations focus on social issues concerning inclusion or exclusion and human wellbeing and quality of life.
- ***People with lived experience***: This group includes experts from one of the above stakeholder groups and who have also experienced the issue, such as disabled persons or the older individuals (aged 60 or over). The experts in this stakeholder group have psychosocial inclusivity or exclusion-related issues. This group has unique insights into the issues they have experienced in the real world as well as their own expertise.

Creating personae

Based on the identified stakeholder model, several personas were created by three researchers, including three researchers: one final year PhD researcher in design (male), one design researcher with over 15 years of experience (female); and one design manager with over 20 years of experience (male), in order to detail each stakeholder (Figure 4.3). Each persona includes a direct quote, a life scenario, motivations, goals, and needs. The life scenario provides the demographic information of each persona, including some examples of their insights into the psychosocial aspects of inclusive design. Specific features of each persona can be described by the quote, motivations, goals, and needs. Such details provide possible scenarios and criteria for selecting actual experts.

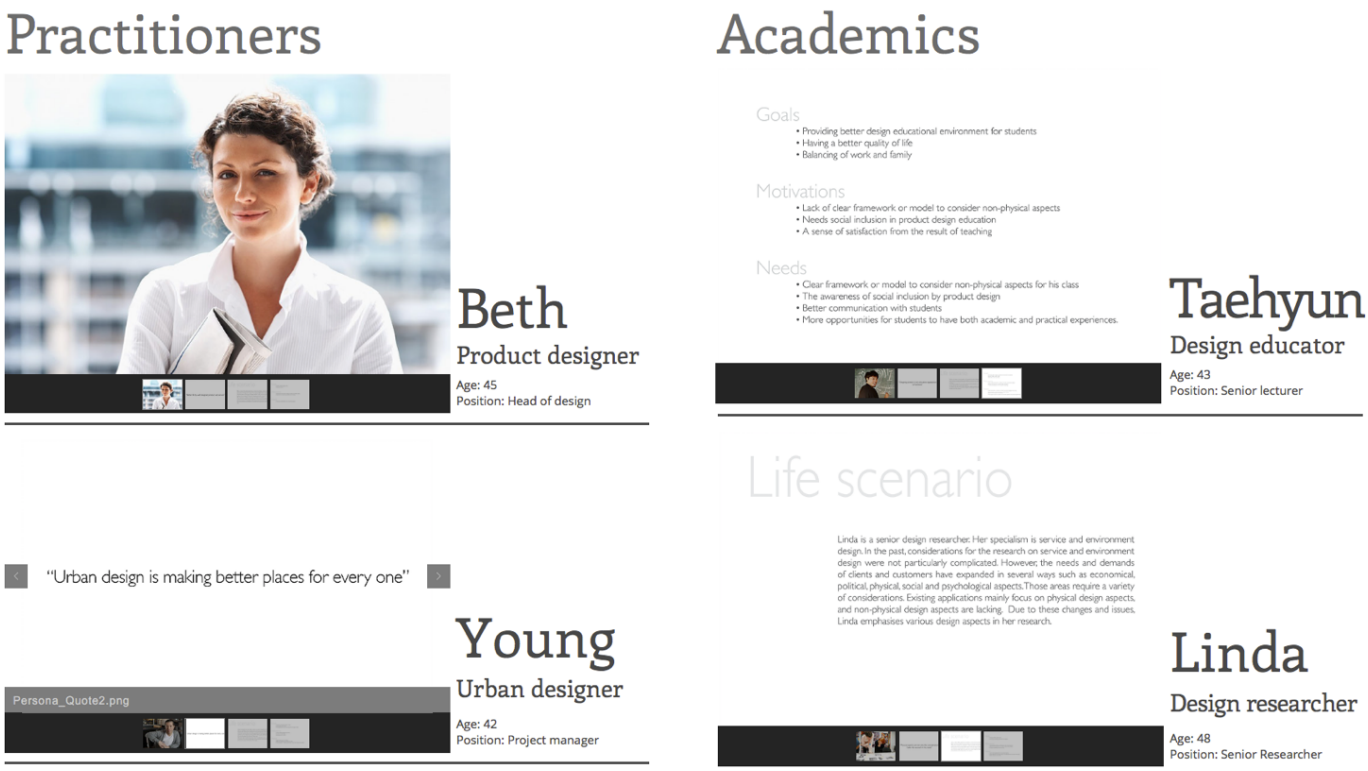


Figure 4.3 Examples of the personas (all personas are available in Appendix C and also from: http://tinyurl.com/pw7vhoh)

Selecting experts

A list of actual experts from different disciplines was identified based on the stakeholder analysis and the personae. Each persona was carefully reviewed and considered in order to find suitable experts matching such personae. There is no consensus regarding a necessary sample size for a Delphi study; therefore, a controllable sample size is commonly recommended (Williams and Webb, 1994). In this study, the target number of experts was between 10 and 15. However, considering the possibility that some experts would be unwilling to participate in the study, and that others who initially agreed to participate might withdraw during the study, and in order to avoid a low participation rate, as many experts as possible were included on the expert list (Table 4.2). Table 4.2 presents the listed experts according to their discipline and experience. These experts are ranked according to their qualifications.

Table 4.2 The chosen experts according to their profession and experience

Stakeholders	Areas of profession	Experience
Academic	Inclusive design (n=12) Psychosocial study (n=5) Psychology (n=4) Ergonomics (n=3) Occupational therapy (n=3) Sociology (n=2)	
Practitioner	Design (n=8: Architecture=1; service=4; product=2; interior=1) Health care (n=5) Transportation planner (n=2)	
Government official	Policy development (n=3) Public transportation (n=2) Public welfare (n=2)	
NGO official	Disabled health and life (n=4) Aging health and life (n=2)	
Business	Finance (n=3) Design Branding (n=2)	
People with lived experience	Inclusive design (n=4) General health care (n=1)	Disabled (n=4: mobility=2; low vision=2) Aged (n=1)

4.2.3 Designing the questionnaire

The questions were designed based on a mixture of principal tools which provides great possibility of responses (Coleman, 1996). In the mixture, Ethnographic framework (Grand tour, Mini tour, Example, Experience, Native-language [Spradley, 2016]), 5Ws (What, Why, Where, Who and when) and H (How) framework, and Back casting framework (Robinson, 1988) were used.

Two types of questionnaire were designed according to the two participant groups based on their different levels of understanding of the concept of inclusive design and the psychosocial aspects thereof. The design experts include design academics and design practitioners and are referred to as ‘designers’. On the other hand, experts from the fields of psychology, sociology, the government, and NGOs are referred to as ‘non-designers’ in this research, for convenience. It was considered that the designer group could possibly have a

better understanding of inclusive design than the non-designers, but they might not have sufficient knowledge of the psychosocial aspects of design. Thus, the term "non-physical aspects" has been used herein rather than the term "psychosocial" in order to avoid any potential confusion. On the other hand, the non-designer group were believed to have less of an understanding of inclusive design than the designer group. Apart from general information on the concept of psychosocial aspects, a general definition of inclusive design was included in the questionnaire for this group.

Questionnaire type A was for the designers and questionnaire type B was for the non-designers. The questionnaires each consisted of the same three parts: 1) inclusive design; 2) non-physical aspects in the experts' own field; and 3) non-physical aspects of inclusive design. The purpose of the questionnaire was threefold: 1) to confirm the importance and future role of inclusive design; 2) to identify existing non-physical applications including design dimensions, frameworks, and models; and 3) to ask experts to think of non-physical aspects of inclusive design. The complete set of both questionnaire types A and B are included in Appendix D and E.

These questionnaires allowed experts in different fields to have a general understanding of the non-physical aspects of inclusive design. The questionnaires were designed to identify:

- the experts' level of understanding of the concept of inclusive design and the psychosocial aspects thereof;
- the context of psychosocial aspects in the experts' own field;
- the importance of psychosocial inclusivity in the experts' own field and inclusive design;
- the potential role of psychosocial inclusivity in design; and
- awareness of any existing application of psychosocial inclusivity or related concepts.

First round

Schmidt (1997) explained that the first round of a Delphi study is usually a brainstorming stage. In this study, the first round was used as a familiarisation stage to confirm the findings of Chapter 2 and to further understand psychosocial inclusivity in design.

Second round

The second round of interviews is generally designed based on the results of the first round of interviews (Skulmoski, et al., 2007). Considering the several limitations of the Delphi study (the size and composition of the sample [Reid, 1988; Goodman, 1987]; the reliability of

the technique [Reid, 1988]; time consumption [Williams and Webb, 1994]; and the potential distortion of data [Dodge and Clark, 1977]), the questionnaires for the second round was designed after having conducted several empirical studies in the later chapters: *Field study I* (Chapter 5) and *Field study II* (Chapter 6). Therefore, the second round of Delphi study was performed as an expanded form of the survey i.e. *Evaluation study,* in Chapter 7. The specific details including study design, data collection and analysis method for the second round of Delphi study will be introduced in Chapter 7.

4.3 Data collection and analysis

4.3.1 Delphi study protocol

Skulmoski, et al. (2007) established the Three Round Delphi Process (Figure 4.4). This study was designed as two rounds of surveys. Skulmoski, et al. (2007) stressed that conducting a pilot study before performing an actual study using the Delphi study method allows researchers to gain a variety of perspectives of the study protocol and the questionnaire. In this study, therefore, a pilot study was conducted with participants who met the criteria to test the questionnaire. Such participant group is referred to as the "semi-experts" in this study. The pilot study was conducted with three semi-experts, including one design academic, one design practitioner, and one child healthcare practitioner. The questionnaires were refined and developed based on the feedback from the pilot study.

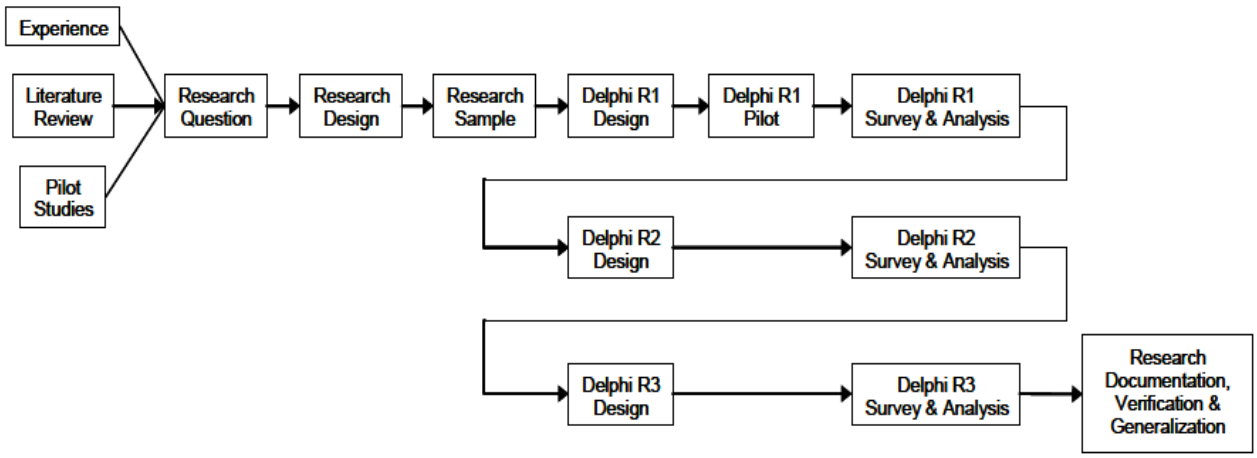


Figure 4.4 "Three Round Delphi Process" (Skulmoski, et al., 2007)

After having conducted the pilot study, invitation emails were sent to the selected experts based on their rankings in the list. These emails included a brief introduction to the research

topic, together with an information sheet and consent form (approved by the Research Ethics Committee of Brunel University London). The information sheet included further details of the research topic and the Delphi study. The questionnaire for the first round was sent to experts who accepted to participate in the study.

4.3.2 Delphi study data analysis

The questionnaires included both open- and close-ended questions (Robson & McCartan, 2016). Considering the combination of both types of questions, a qualitative coding analysis method and a simple statistical analysis method were selected for analysing the collected data from the survey. For the close-ended questions, mean values and colour coding were used to identify and rank the answers.

For the open-ended questions, the answers were first put into the same table to compare each participant's answer. In this comparison, thematic coding analytical methods (*domain and taxonomic coding* and *process coding*) (Saldaña, 2015) were used to extract any important codes according to their meanings and implications. This data analysis protocol was conducted following the "six phases of thematic analysis" (Braun and Clarke, 2006). The phases were performed by two coders, including a male final year PhD researcher in design (the main coder) and a female design researcher with over 15 years of experience (who reviewed each phase for quality control of the analysed data). The age and cultural differences of the two coders helped to minimise possible biases caused by experience or lifestyle. The extracted codes were initially grouped and named. These collated groups are known as initial themes (patterns). At this stage, as many codes and themes as possible were extracted in order to prevent the potential loss of any data.

The collated initial codes and themes were imported into NVivo, which assists an effective coding analysis process (Edhlund and McDougall, 2012). The initial codes and themes were reviewed and categorised again according to their meanings and implications. In this stage, several new codes and themes were extracted and categorised as new themes or as sub-themes of existing themes.

4.4 Results

The identified findings of the survey are summarised under each question.

4.4.1 Results from the questionnaire part I: Inclusive design

The first parts of the questionnaire for both participants concern “inclusive design”. The first two questions were asked regarding understanding and importance of inclusive design. In the first question, it was identified that all participants have a good understanding of inclusive design. Further, out of ten overall responses from experts, a total of six experts (designers=2; non-designers=4) indicated that the concept of inclusive design is very important and three experts (designers=2; non-designers=1) said that it is important. Only one design expert gave neutral feedback regarding the importance of inclusive design (Figure 4.5). The main reason for this was a consideration of inclusive design as an appropriate method to provide optimal accessibility and inclusivity for as many people as possible. Additionally, the experts responded that Key areas of inclusive design are product design (n=8), environment design (n=6), service design (n=4), architecture (n=3), and transport (n=3).

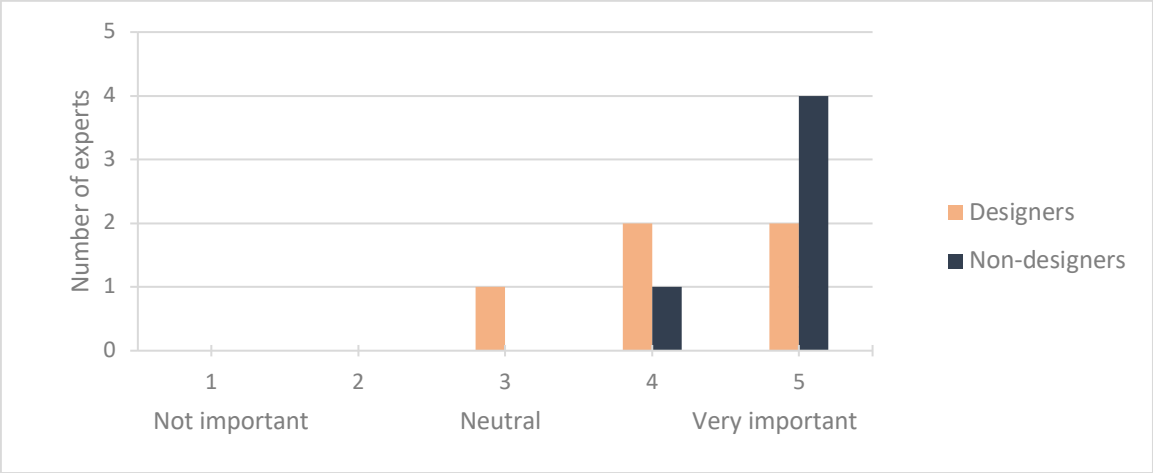


Figure 4.5 The importance of inclusive design

Key challenges, opportunities, trends, and the future role of inclusive design were also investigated through the rest questions which were open-ended questions. The main challenges mentioned by experts are a limited understanding and awareness of inclusive design (n=6). On the other hands, the major opportunities are awareness and understand of cultural issues in diverse population (n=4), Increasing public support (n=3), and establishing inclusive design as norm in legislation (n=2).

Furthermore, the trends of inclusive design include supporting and improving the focus of demographic diversity (n=4). The future role of inclusive design stressed by experts were development of technology for older individuals care (n=2), focusing demographic diversity

(n=2), working with different domains for diverse population (n=2). Table 4.3 presents the analysis results from the open-ended questions (Question 1.3 - 1.6) in the questionnaire part I.

Table 4.3 The results of coding analysis from the question 1.3 to 1.6 in the questionnaire part I
**ID: inclusive design*
*** Numbers: number of occurrences*

1.1. Understanding of *ID			
designing for a wide range of human needs (n=10)			
1.2. Importance of ID			
Very important (n=6) / Important (n=3) / Neutral (n=1)			
Demographic change (n=7)		Lack of development of current theories & practices (n=2)	
Barrier free for older people & people with disabilities (n=2)		Lack of equality and equity (n=2)	
1.3. Key areas of application of ID			
Product design (n=8)	Consumer goods (n=1)	Interior design (n=1)	Public space (n=1)
Environment design (n=6)	Corporate design (n=1)	Online design (n=1)	Retail design (n=1)
Service design (n=4)	Ergonomic basis (n=1)	Packaging design (n=1)	Tactile basis design (n=1)
Architecture (n=3)	Fashion design (n=1)	Print design (n=1)	Typography (n=1)
Transport (n=3)	Industrial design (n=1)	Private sector provision (n=1)	Urban planning (n=1)
Auditive basis design (n=1)	Interaction design (n=1)	Public sector provision (n=1)	Visual basis design (n=1)
1.4. Key challenges & opportunities of ID			
Challenges - In 10 years			
Embracing increasing diversity (n=3)		Evidence of the business case (n=1)	
Social characteristics (n=3)		Importance of customer involvement in design process (n=1)	
Mental aspects (n=2)		Increasing competition for resources (n=1)	
Need for practical approach (n=2)		Increasing specificity of products and services, tightening design parameters (n=1)	
Communication (n=1)			
Embedding ID into users (engineers, designers, architects) (n=1)		Need for short term progress for faster development (n=1)	
		Public transport (n=1)	
Challenges – Now			
Limited awareness & understanding (n=6)		Embedding ID into users (engineers, designers, architects) (n=1)	
Considering ID for low and high-income societies (n=4)		ICT (information and communications technology) (n=1)	
Diverse population (primary focus) (n=2)		Public transport (n=1)	
Opportunities - In 10 years			

Public support (n=3)	Establishing ID as norm in Education (n=1)
Awareness & Understand of cultural issues & Diversity (n=2)	Older individuals care (n=1)
Establishing ID as norm in Legislation (n=2)	Making harmonious society (n=1)
Digital technology (n=1)	Reducing environmental impact (n=1)
	Working with different domains for diverse population (n=1)

Opportunities - Now	
Aging population (n=2)	Ensuring financial sustainability (n=1)
Showcasing ID (n=2)	Housing (n=1)
Certification (n=1)	Importance of providing accessible products (e.g. reducing development cost) (n=1)
Importance of ID (n=1)	
Providing self-esteem (Products & Service) (n=1)	

1.5. Trend& future role of ID	
Direction & Trend of ID	
Development of technology for older individuals care (n=2)	Assistive technology (n=1)
Focusing demographic diversity (n=2)	Economic (n=1)
Working with different domains for diverse population (n=2)	Focusing societal needs & aspiration (n=1)
Future role	
Public support (n=3)	Including disabled people (n=1)
Communication with mental challenged people (n=1)	Participation society (n=1)
Connectivity (n=1)	Sustainable living (n=1)
Impact of assistive technology (n=1)	Usable environment & system (n=1)

1.6. Other non-physical aspects			
Diverse population (n=4)	Emotional needs (n=2)	Moving line (n=1)	Participation of actual users at the early design stage (n=1)
Cultural aspects (n=3)	Colour preference (n=1)	Safety (n=1)	
Mental aspects (n=3)	Communication challenged people (n=1)	Spiritual needs (n=1)	Sensory issues (n=1)
Social aspects (n=3)		Weather (n=1)	Time (n=1)
Cognitive (n=2)	Dietary culture (n=1)	Learning opportunities (n=1)	
Economic aspects (n=2)	Language (n=1)		

4.4.2 Results from the questionnaire part II: Psychosocial aspects in experts' own field

This part presents the experts' opinions on the non-physical/psychosocial aspects in experts' own field. Out of ten overall responses, a total of seven experts (designers=4; non-designers=3) responded that the concept of psychosocial aspects is very important and one non-designer felt that it is important. Two experts (designers=1; non-designers=1) responded that psychosocial aspects are neither important nor unimportant in their field (Figure 4.6).

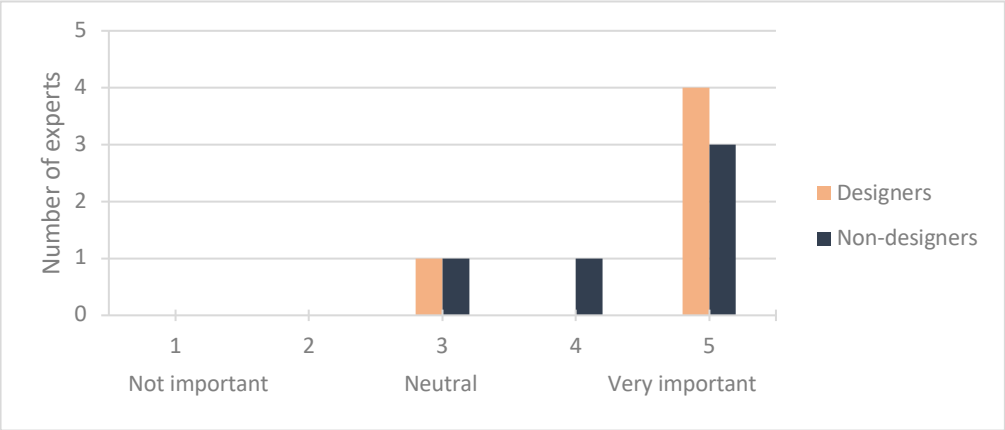


Figure 4.6 Importance of psychosocial aspects in experts' own field

Existing concepts including applications of psychosocial and related concepts were investigated and several existing applications were mentioned by the experts through the questions 2.3, 2.4, and 2.5. These applications are discussed in the discussion section.

Key challenges, opportunities, trends, and the future role of inclusive design were also investigated through the questions 2.6 and 2.7. The significant challenges are demonstrating the psychosocial benefit of intangibles (n=3) and Social characteristics (n=3). On the other hand, the opportunities are embracing increasing diversity (n=9) and public support (n=3).

Further, the experts mentioned that the trend of psychosocial aspects in their own area is embracing increasing diversity (n=4) and increased understanding of psychosocial issues (n=3). The future role is public support - contributing to investment decisions and policies (n=2). Table 4.4 presents the complete set of the analysis results from the questionnaire part II.

Table 4.4 The results of coding analysis from the questionnaire part II
**NPA: Non-physical aspects*
***PS: Psychosocial*
****PSA: Psychosocial aspects*
***** Numbers: number of occurrences*

Type-A: Q2. NPA* in your area	**Type-B: Q2. PSA*** in your area**
2.1. Any NPA in your area	**2.1. Definition of PS****
Cultural aspects (n=6)	Disability (n=1)
Environmental aspects (n=4)	Health delivery (n=1)
Income differences (n=3)	Innovation (n=1)
Sensory issues (n=3)	Medical model (n=1)

Social mood (n=3) Cognitive limitations (n=2) Safety (n=2) Diverse demographic category (n=1) LGBT issues (n=1)	Mental health (n=1) Nursing education (n=1) Occupational therapy (n=1) Social context (n=1)
2.2. Importance of NPA	**2.2. Importance of PSA in your area**
Very important:4 / Neutral:1 Demographic aspects (n=1) Environmental and cultural aspects (n=1) Self-perception (n=1)	Very important:3 / Important:1 / Neutral:1 Increasing the quality of life (n=1) focusing diverse aspects of human (n=1)
2.3. Examples of NPA in your area	**2.3. Examples of SA in your area**
Lack of self-confidence (n=3) Social awareness (n=2) Social interaction (n=2)	Charity support (n=1) Personal safety (n=1) Planning (n=1)
2.4. NPA related F, M, G or P	**2.4. PS related framework, model, guideline or principle**
Strategies for Universal Design - under development at the IDeA Centre (n=1) The Goals of Universal Design (n=1)	All aspects of persons (n=1) IASC Guidelines on Mental Health and Psychosocial Support in Emergencies (n=1) Psychosocial Working Group framework (n=1) success of the life style (n=1)
2.5. Have you used the above	**2.5. Have you use the above**
Goals and Strategies guide (n=1) Interaction & interface (n=1) Certification (n=1) New construction (n=1) Post construction evaluation (n=1) Product evaluation (n=1) To research methodology (n=1)	Economic innovation (n=1) Psychosocial well-being (n=1) Social innovation (n=1)
2.6. Key challenges & opportunities of PA	**2.6. Key challenges & opportunities of PS**
Challenges - 10 years	*Challenges*
Demonstrating the psychosocial benefit of intangibles (n=3) Embracing increasing diversity (n=3) Social characteristics (n=3) Mental aspects (n=2)	Limitation of practical approach (n=1) Training of professional working (n=1) Diverse needs base on diverse population (n=1) lack of research evidence on the impact of PS humanitarian interventions (n=1)

Lack of generalization (n=1) Lack of independence as single context (n=1)	
Challenges – Now	
Diverse population (primary focus) (n=2) Considering accessibility for low income societies (n=2) Considering ID for high income societies (n=2) Understanding resting capacity (n=1) Income difference (n=1)	
Opportunities - 10 years	*Opportunities*
Public support (n=3)	Creating environment to fulfil people's needs (n=1) Advances in technology & science (n=1) Understanding of the human body & mind (n=1)
Opportunities - Now	
Increasing adoption (n=1)	
2.7. Direction, Trend & Future role of NPA in 10 years	**2.7. Direction, Trend & Future role of the PSA in 10 years**
Direction & Trend	*Direction & Trend*
Embracing increasing diversity (n=4) Social participation (n=1)	Increased understanding of psychosocial issues (n=3) Increasing self-qualification by information & education (n=1)
Future role	*Future role*
	Contributing to investment decisions & policies (n=2)

4.4.3 Results from the questionnaire part III: Psychosocial aspects in inclusive design

This part presents the experts' opinions on the non-physical/psychosocial aspects of inclusive design. Out of ten overall responses, a total of nine participants (designers=4; non-designers=5) responded that psychosocial aspects are very important in inclusive design (Figure 4.7), and the main reason is fulfilment of diverse population (n=6).

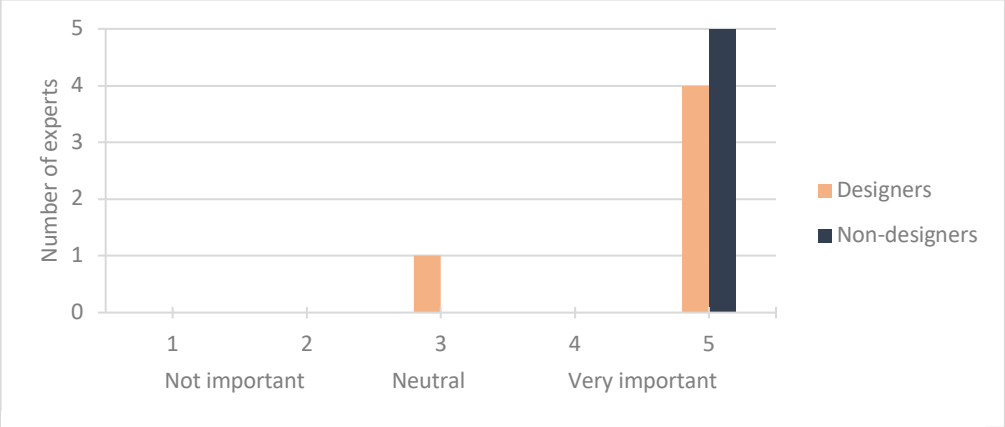


Figure 4.7 The importance of psychosocial aspects in inclusive design

The participants were asked regarding specific details of non-physical/psychosocial aspects in inclusive design through the questions 3.2 to 3.4 in order to identify possible dimensions of psychosocial aspects and related concepts. The identified dimensions are introduced in the next section together with dimensions identified from the questionnaire part I and II. The complete set of the results based on each question of questionnaire part III is presented in Appendix F.

4.4.4 Dimensions of psychosocial aspects

Several possible dimensions of psychosocial aspects and related concepts were identified from Parts 1, 2, and 3 of both questionnaire types A and B. The identified dimensions were analysed by using coding analysis methods and are presented in Table 4.5. These collated dimensions were categorised according to their meanings or implications within the themes and sub-themes. These themes and sub-themes were directly extracted from the experts' responses. These dimensions are discussed in the next section. Further, the themes were listed in alphabetic order to keep consistency through this PhD research, and the codes were ordered according to their frequency of occurrence.

Table 4.5 Possible dimensions of psychosocial aspects and related concepts based on both questionnaire types A and B

Theme	Sub-theme	Code (number of occurrences)	
Cognitive dimensions		Understanding of other's physical and mental (n=8)	Health beliefs (n=1)
			Mental health (n=1)
		Cognitive issues (n=5)	Mental and cognitive issues (n=1)

		Behaviour (n=2) Preference (n=2)	
Emotional dimensions		Self-confidence (n=4)	Emotional needs (n=2)
Social dimensions	Cultural aspects	Cultural meanings Incl. religious beliefs (n=2)	Cultural appropriateness (n=1) Dietary culture (n=1)
	Inclusivity of diverse population	Older people (n=6) Disabled people (n=4) Accessibility for low and high-income societies (n=3)	Ethnic background (n=1) Language difference (n=1) Lesbian, gay, bisexual, and transgender (LGBT) issues (n=1)
	Support	Public support (n=4) Educations (Learning opportunities) (n=2)	Charity support (n=1) Policies (n=1)
	Social interaction	Social characteristics and mood (n=6) Social awareness (n=2)	Changing social role (n=1)
Value dimensions		Safety (n=7) Equality (n=3) Self-esteem (n=2)	Empowerment (n=1) Environmental sustainability (n=1) Spiritual needs (n=1)
Miscellaneous		Weather (n=3) Applicability (n=2)	Lifestyle (n=1)

4.5 Discussion

The Delphi study was conducted to address research questions: 1) what is the importance in psychosocial inclusivity in design? 2) what are the relevant concepts for psychosocial inclusivity in design? 3) what are the dimensions for psychosocial inclusivity in design?

The first, second, and third questions were answered through the first round of the expert survey.

The importance of psychosocial inclusivity in design based on the literature review was confirmed in this chapter through the expert surveys. Most experts responded that the concept of inclusive design is currently important considering that it is an effective method of providing greater accessibility and inclusivity for a diverse population in the context of rapid demographic and cultural shifts. The limited understanding of psychosocial inclusivity in

design was confirmed. Experts also argued that this limited consideration of psychosocial aspects (such as society, culture, and the mind) are major challenges in inclusive design, and that finding possible solutions could be one potential opportunity for the future of inclusive design.

The existing applications of psychosocial aspects found in Chapter 2 were confirmed through the survey. Several frameworks and models related to the concept of psychosocial aspects such as Psychosocial Working Group framework (The Psychosocial Working Group, 2003) and IASC Guidelines on Mental Health and Psychosocial Support in Emergencies, 2007 (IASC, 2007) were mentioned by the experts. The confirmed dimensions were: cognitive limitations; cultural aspects; diverse demographic category; environmental aspects; income differences; LGBT issues; safety; sensory issues; social mood; self-perception; support; and planning. Additionally, the confirmed applications were the IASC Guidelines on Mental Health and Psychosocial Support in Emergencies (IASC, 2007) and the Psychosocial Framework (The Psychosocial Working Group, 2003). Such applications have a strong relationship with cognition, culture, society, and emotions.

However, existing psychosocial applications in inclusive design such as definitions, dimensions, frameworks, or guidelines did not appear during the survey. This finding supports the results of Chapter 2.

Several possible psychosocial dimensions and related concepts were mentioned by the experts. The confirmed themes and sub-themes which appeared in Chapter 2 were: cognitive aspects; economical aspects; emotional aspects; individual circumstances; social aspects; social interaction; support and service; and several codes.

However, the results of this survey suggested additional dimensions: ‘cultural aspects’; ‘environmental aspects’; ‘inclusivity of a diverse population’; and ‘mental aspects’. In addition, several new codes were identified: ‘dietary culture’; ‘ethnic background’; ‘language’; ‘learning opportunities’; ‘spiritual needs’; and ‘time’. These new themes, sub-themes, and codes were synthesised with the initial dimensions created in Chapter 2 according to their meanings and implications.

Study limitations

There are several limitations of a Delphi study which are: time consumption (Okoli, et al., 2004; Williams and Webb, 1994; Huckfeldt, et al., 1974; Gordon, et al., 1964); a lack of consensus about the necessary size and criteria for sampling (Landeta, 2006; Williams and Webb, 1994); and reliability of the data and data analysis technique (Martino, 1993; Sackman, 1974). Despite these limitations, a rigorous study design process can control the quality of the study.

Regarding time issues, for example, designing a study and carrying out an actual survey requires a certain amount of time because a Delphi study is commonly performed iteratively. This is necessary for data collection and analysis in each round of the study. Furthermore, the questionnaire for the following round should be made based on the data analysis of the previous round's results. Such a time delay may lead to the withdrawal of participants or unexpected delays.

In terms of the necessary size and criteria for sampling, sometimes a small selection of experts is needed without the fulfilment of rigorous criteria or standards (Williams and Webb, 1994). It is also possible that the selected experts are not able to participate in iterative surveys (Skulmoski, et al., 2007). These issues could not only lead to low participation, but it can also affect the quality of selection of the experts. In this chapter, therefore, several requirements were introduced and used for the optimal selection of experts, including creating the stakeholder model and the personae in order to find appropriate experts. These activities provided comprehensive approaches to the selection of experts.

4.6 Chapter summary

The results from the literature review were confirmed and further findings were identified by means of the Delphi study explained in this chapter. These findings were a) the importance of the psychosocial aspects of inclusive design; b) the limited understanding of the concept of psychosocial aspects in inclusive design; and c) several psychosocial dimensions. The confirmed findings provide a degree of confidence regarding the findings of the literature review. Furthermore, there were also the newly identified findings, the possible psychosocial dimensions of psychosocial inclusivity in design. These new findings were synthesised with the initial dimensions.

In the next chapters, the synthesised dimensions will be refined and developed through the empirical studies: field studies I and II. During these studies, the possible psychosocial dimensions were also identified to fulfil the research purpose in depth.

CHAPTER 5: Field study I - Interview of people with mobility scheme users

5.1 Introduction

In Chapter 2, the initial definition and dimensions of psychosocial inclusivity in design were established by synthesising the findings from the literature review in the design and non-design fields. Based on these findings, the expert Delphi study was conducted (Chapter 4) to confirm the results from the literature review and identify further psychosocial components in design. Through this expert survey, the importance of psychosocial inclusivity in design, trends in the field, and several possible psychosocial dimensions were identified and discussed.

In order to develop the findings from the previous chapters, considering that the findings were still general, several empirical studies were designed to form a triangulation approach to facilitate rigorous and in-depth research, in order to achieve the research aims.

In this chapter, ethnographic interviews with people with impairments were performed as the first empirical study, in order to identify further psychosocial components of inclusive design in the real world. The chosen participant group in the study i.e. people with impairments are one of the core audiences of inclusive design alongside older adults. Among various types of impairments, mobility impairment, the most significant impairment in the UK (Department for Work and Pensions, 2015/16; 2017), was selected as the focus of the study. In addition, specific mobility scheme users were considered as the core audience of the study. Considering that the members of this participant group have various experiences of personal mobility in both individual and social context, it as believed that they could provide a broad perspective of the psychosocial aspects involved in personal mobility.

A total of 37 mobility scheme users were interviewed. In the interviews, the participants were asked about their overall mobility experiences, including their general background, the mobility scheme that they were using, and the physical and psychosocial issues they faced in daily life. The recorded interviews were then transcribed and analysed. For the analysis of the transcripts, appropriate qualitative coding methods (domain and taxonomic coding and process coding - Saldaña, 2015) were used. Multiple coders participated in the data analysis

process in order to increase the degree of confidence in the results. Specific details of the interview protocol and data analysis are discussed in later sections in this chapter.

From the data analysis, several themes, sub-themes, and codes were identified as potential components for psychosocial inclusivity dimensions. The subsequent discussion of the identified dimensions is presented in after the Results section. Figure 5.1 presents map of this chapter.

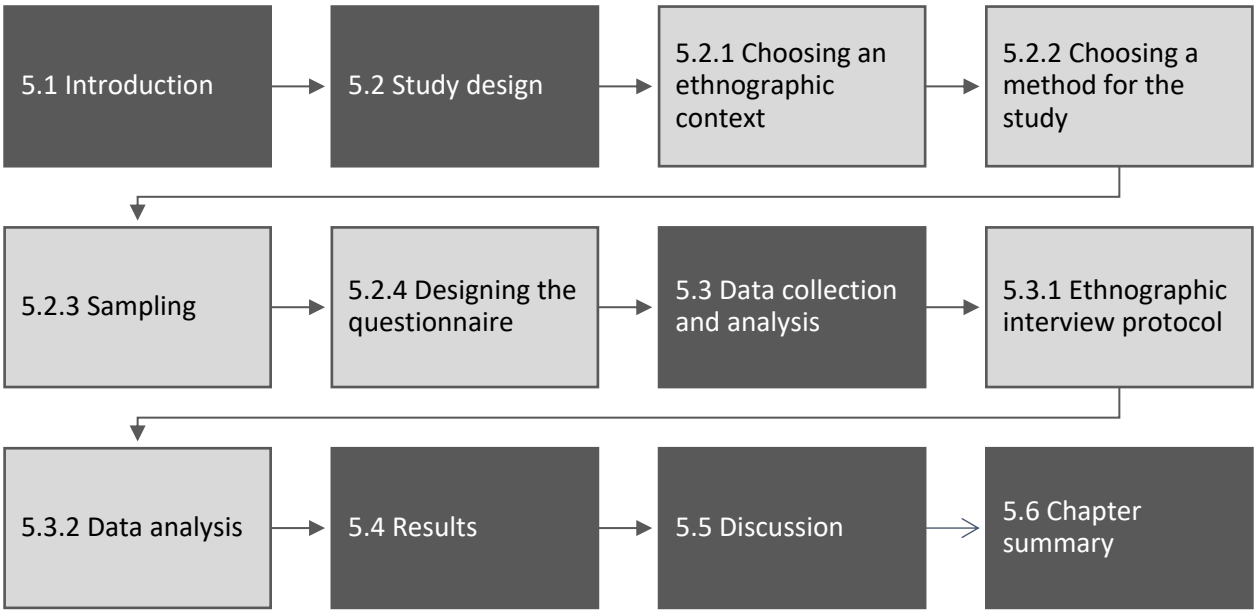


Figure 5.1 Chapter map

The aim, objectives and research questions of this chapter are as presented below.

Aim, objectives, and research questions

The study had two objectives, in order to explore the psychosocial aspects of personal mobility. These included:

- to identify the dimensions of psychosocial inclusivity in the context of personal mobility and
- to develop the initial dimensions for psychosocial inclusivity in design.

To achieve these objectives, an empirical study was designed to answer the following research questions:

a) Which psychosocial dimensions from the previous chapters were confirmed in this chapter?
b) What are the psychosocial dimensions in the personal mobility experience?

5.2 Study design

5.2.1 Choosing an ethnographic context

The two core beneficiaries of inclusive design are people with disabilities and the older people aged 60 and over (Hedvall, 2013; Nickpour, et al., 2012; Gaver and Martin, 2000; Demirkan, 2007; Imrie and Hall, 2003; Demirbilek and Demirkan, 1998). Considering that concept of psychosocial inclusivity is context dependent and multi-faceted, people with disabilities were selected as the focus of the first field study in order to facilitate rigorous and in-depth research and to avoid generalisation.

The World Health Organisation (WHO) provided a classification of the term impairment, disability, and handicap in the context of health experience (Wood, 1980):

- *Impairment*: "any loss or abnormality of psychological, physiological, or anatomical structure or function..."
- *Disability*: "any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being ..."
- *Handicap*: "a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal (depending on age, sex, social, and cultural factors) for that individual."

In this research, the above terms from WHO's classification where appropriate, and the term 'people with disabilities' is the main reference point. There are approximately 13.3 million people with disabilities in the UK (Department for Work and Pensions, 2015/16; 2017). This number has increased from 11.9 million in 2013/14. Table 5.1 presents the number of people with disability based on the type of impairment from 2013 to 2016 (Department for Work and Pensions, 2015/16; 2017). According to Table 5.1, 52% (7 million) of people with disability experienced mobility impairments in the UK in 2015/16. This percentage is noticeably higher than other impairments such as stamina/breathing/fatigue (38%/5.1 million), dexterity (27%/3.7 million), and mental health (22%/2.9 million). this statistics highlights mobility impairment as the most widespread and significant impairment in the UK.

Table 5.1 Number of people with impairments based on the type of impairment from 2013 to 2016 (Department for Work and Pensions, 2015/16; 2017)

Type of impairment	2013/14		2014/15		2015/16	
	Millions	Percentage	Millions	Percentage	Millions	Percentage
Vision	1.5	13%	1.8	14%	1.8	13%
Hearing	1.7	14%	1.9	15%	1.9	14%
Mobility	6.5	55%	6.9	53%	7.0	52%
Dexterity	3.4	28%	3.8	29%	3.7	27%
Learning	1.5	12%	1.6	13%	1.8	13%
Memory	1.9	16%	2.1	16%	2.1	16%
Mental health	2.1	18%	2.6	20%	2.9	22%
Stamina/breathing/ fatigue	4.5	38%	5.0	39%	5.1	38%
Social/behavioural	0.8	6%	0.8	7%	1.0	8%
Other	1.8	15%	1.9	15%	2.0	15%
Sample size	9,221		9,638		9,688	

Note: Several participants had more than one impairment; hence, the total percentage is over 100%.

Therefore, individuals with mobility impairments were selected as the key ethnographic context for the investigation of further dimensions of psychosocial inclusivity. Nickpour, et al. (2012) referred to an individual with mobility impairments as a "mobility-challenged individual", and defined it as "someone whose mobility has been challenged due to age, physical or mental impairment, or an external physical condition". The term "mobility-challenged individual" is used here to refer to an individual with a mobility impairment.

Webber, et al. (2010) argued that mobility impairments could trigger several psychosocial and physical problems in both social and individual contexts, affected by cognitive, physical, financial, and environmental determinants. These psychosocial and physical issues cause multiple and diverse types of exclusion for mobility-challenged individuals. For example, Dodson, et al. (2004) argued that the transport disadvantage results in socio-economic exclusion of individuals. Considering the scale and significance of mobility impairments, mobility-challenged individuals were chosen for the identification of possible psychosocial dimensions in the context of disabilities.

5.2.2 Choosing a method for the study

"Ethnographic interview" (Spradley, 2016) from the Human-Centred Design tools (Giacomin, 2014) was selected as the main method for this study. Ethnographic interviews were conducted to identify any possible components for psychosocial inclusivity in design based on participants' lived experiences. Prior to conducting the interviews, ethical approval for the study was obtained from the Research Ethics Committee of Brunel University London.

5.2.3 Sampling

Mobility support users were selected for sampling purposes. In this study, mobility support users are considered individuals with mobility disabilities and include: Driver of an Adapted Car (DAC); Mobility Scooter Customer (MSC); Wheelchair Accessible Vehicles (WAV); People with a Disability as a Passenger and Car Driver (PDC); Powered Wheelchair User (PWU); Passenger with a Disability (PD), and their caregivers. Therefore, the scheme supports these individuals in leasing mobility equipment, including an adapted car, a scooter, or a powered wheelchair. The scheme's users have various lived experiences based on their mobility impairment, services, and support provided. Purposeful sampling (Higginbottom, 2004; Marshall, 1996), a common sampling approach in qualitative research, was adopted for the participant selection process. 37 mobility-challenged individuals participated in the interview. Table 5.2 presents the participant demographics, including individuals' type of mobility support. A mixture of mobility support type, country, gender, and age range was considered for the selection of the participants in order to identify various psychosocial dimensions in personal mobility.

Table 5.2 Participant demographics of 37 interviewees including their mobility support type

Country	Gender	Age band	Participant type
England (n=27)	Female (n=19)	31-45 (n=8)	DAC (n=24)
Scotland (n=4)	Male (n=18)	46-60 (n=6)	MSC (n=3)
Wales (n=4)		61-75 (n=22)	PDC (n=3)
Northern Ireland (n=2)		Over 76 (n=1)	PD (n=3)
			PWU (n=2)
			WAV (n=2)

- *DAC: Driver of an Adapted Car*
- *MSC: Mobility Scooter Customer*
- *PD: Passenger with a Disability*
- *PDC: People with a Disability as a Passenger and Car Driver*
- *PWU: Powered Wheelchair User*
- *WAV: Wheelchair Accessible Vehicles*

5.2.4 Designing the questionnaire

In order to address the objectives of the study, participants' overall experiences of mobility, including any physical and psychosocial aspects, needed to be explored. Therefore, a mixture of principal tools was used to create a questionnaire which provides great possibility of responses (Coleman, 1996). This was in order to maximise the potential to identify possible dimensions for psychosocial inclusivity in personal mobility (Table 5.3). Table 5.3 presents the selected tools based on the purposes of the questions. The complete set of questions is available in Appendix G.

Table 5.3 Mixture of principal tools for designing the questionnaire to achieve the three main research purposes

Context	Meaning and needs	Possible future
- A.E.I.O.U (Activities, Environments, Interactions, Objects, and Users) framework (Wasson, 2000)	- Ethnographic framework (Grand tour, Mini tour, Example, Experience, and Native-language) (Spradley, 2016) - 5Ws (What, Why, Where, Who and When) and H (How) framework - Semantic differential framework (Evaluation, Potency, and Activity) (Osgood et al., 1964)	- Back casting framework (Robinson, 1988)

5.3 Data collection and analysis

5.3.1 Ethnographic interview protocol

Ethnographic interviews were performed with 37 mobility challenged people (Table 5.2) in order to investigate any psychosocial issues in their mobility experiences. The interviews were semi-structured i.e. they followed a set procedure, but several prompts were also prepared in order to allow for further discussions according to participants' various responses.

Each interview took around one hour. Each interview response was recorded by means of audio recorders. The interviews were then transcribed to text by means of professional transcription team.

5.3.2 Data analysis

Qualitative thematic coding analysis (Saldaña, 2015) was used in order to analyse the data from the interviews. This was performed by two main coders: a final year PhD researcher in design and a design researcher with over 15 years of experience. The "six phases of analysis" of Braun and Clarke (2006) which include familiarisation with the data; generating initial codes;

searching for themes; reviewing themes; defining and naming themes; producing the report, were adopted for the data analysis.

An initial coding analysis was conducted for the sake of familiarisation before analysing the whole dataset. In order to create an initial structure for the coding analysis, ten interview transcripts were selected based on criteria including type of mobility support and demographic information such as gender and age. The criteria allowed for the generalisation of the chosen transcript, which represented the rest of the interviewees.

In the initial coding analysis, domain and taxonomic coding and process coding, also known as action coding (Saldaña, 2015), were used. Such coding methods are effective tools in the early stage of interview transcription analysis (Saldaña, 2015). By using these coding methods, keywords and comments were extracted from the interviewees' responses, referred to as "codes". In this stage, as many codes as possible were extracted to avoid the potential loss of any dimensions. These codes were initially grouped and categorised based on their implications or meanings. Each group representing the collection of same category codes, was referred to as a theme. These codes and themes remained in their original forms at this stage. The structure created based on the initial data analysis was reviewed by conducting two rounds of workshops with four new coders, including one female postdoctoral researcher and three PhD researchers in design (two females and one male).

In each workshop, a "card sorting exercise" was performed. In the first round of the workshop, each coder was given a set of around 100 cards containing each theme or code identified from the previous analysis. The coders reviewed each card and created their own structures by grouping and categorising cards. The result from each coder was then reviewed and combined to create the expanded set of cards for conducting the second round of the card sorting exercise. Figure 5.2 illustrates the card sorting exercise.

The second round of card sorting exercise was performed in the same way as the first round. The completed sorted cards by the four coders and the initial structure were compared. The mutual themes of these coding results were: wellbeing, social aspects, emotional aspects, economical aspects, and equipment. This iterative coding analysis by multiple coders provides

objective perspectives and a degree of confidence in the data (Barry, et al., 1999). From this review, a working structure for analysing the remaining interview transcripts was created.

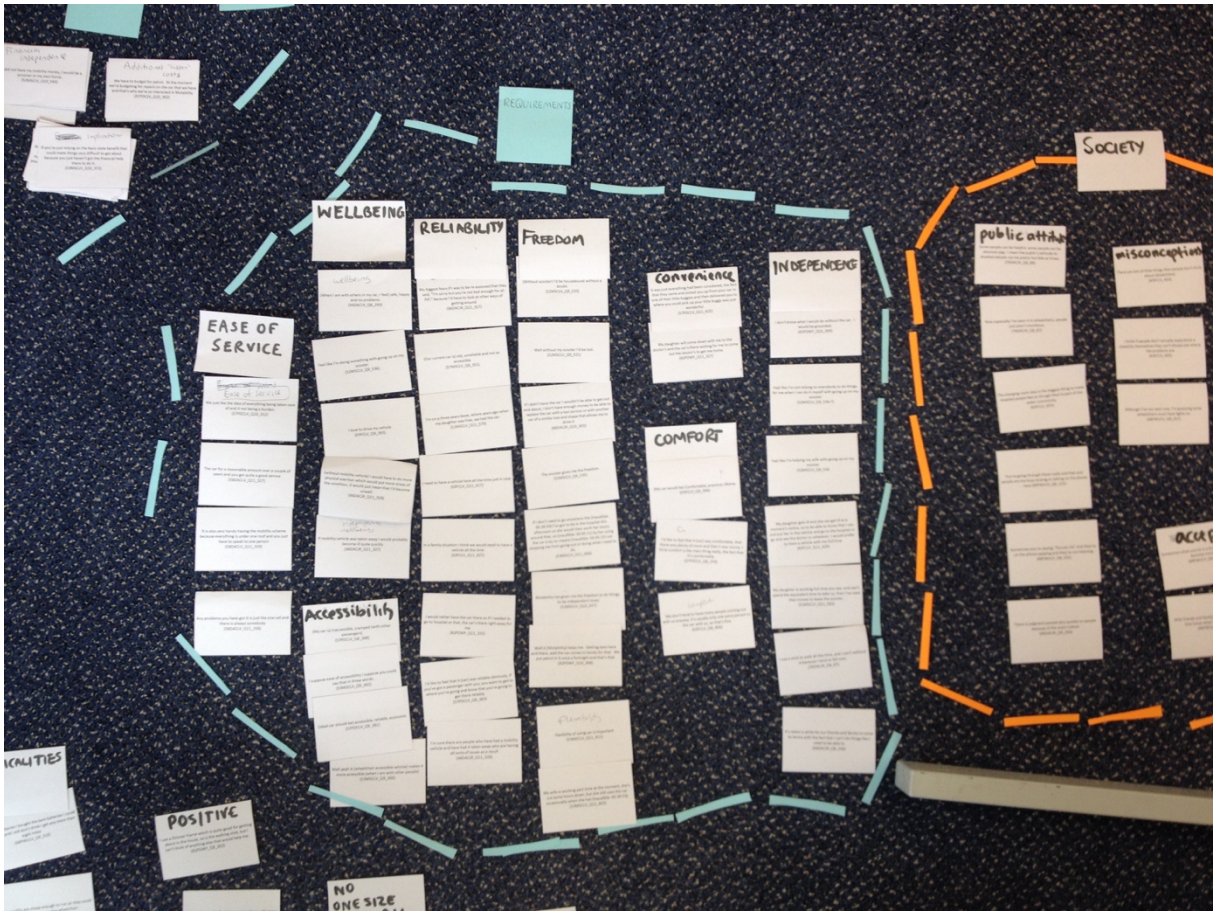


Figure 5.2 Illustration of the card sorting exercise: One of the multi coders categorised themes and codes using her own structure.

The remaining interview transcripts were analysed based on the working structure created in the familiarisation stage. For this, NVivo software, an effective qualitative data analysis tool (Edhlund and McDougall, 2012), was used. NVivo software has various benefits in qualitative data analysis, such as a multiple combinational matrix of analysed data and an efficient and effective coding process.

The working structure was imported to NVivo and the remaining interview transcripts were analysed line-by-line based on the working structure. Any codes containing the same meanings as the existing themes or codes in the working structure were combined and the newly identified codes were categorised under the existing theme or as a new theme based on their implication or meaning. Braun and Clarke (2006) suggest a "15-point checklist of criteria for good thematic analysis" as a tool for the review of coding analysis results. The

checklist refers to the five phases of analysis: Transcription, Coding, Analysis, Overall, and Written report. Specific details regarding the five phases are shown in Appendix H. The checklist was used in order to review the final results of the coding analysis of the interviews.

5.4 Results

Nine main themes were identified based on analysis of 37 interview transcripts. These nine themes consisted of four "psychosocial" themes (cognitive, emotional, social, and value dimensions [Table 5.4]) and five "other" themes (accessibility, facilities and equipment, financial dimensions, individual characteristics, and usability [Table 5.5]). Tables 5.4 and 5.5 present the "psychosocial" and "other" themes, sub-themes, and their codes in terms of personal mobility. In the Table 5.4, the themes were listed in alphabetic order to keep consistency through this PhD research, and the sub-themes and codes were ordered according to their frequency of occurrence.

In this section, in line with the context of this research and the aim and objectives, the four psychosocial themes are proposed. The "confirmed themes and codes", already identified in the previous chapters, and the "new themes and codes", newly identified in this chapter, form the specific focus of this study.

Table 5.4 "Psychosocial" dimensions in personal mobility

Theme	**Sub-theme**	**Code (number of occurrences)**		
Cognitive dimensions		Being independent (n=65) Information (n=62) Reliance (n=55)	Circumspection (n=37) Self-consciousness (n=36) Stress (n=22)	Empowerment (n=6)
Emotional dimensions		Satisfaction/Dissatisfaction with equipment (n=182) Comfort (n=33)	Lack of confidence (n=28) Anxiety (n=22) Embarrassment (n=17)	Frustration (n=17) Vulnerability (n=16) Loneliness (n=1)
Social dimensions	Social awareness and Public attitude (n=69)			
	Social interaction	Social engagement (n=35) Social isolation (n=26)	Social participation (n=15)	
	Support and service	Social service (n=130) Family support (n=116) Public service (mobility related: n=86; other public service: n= 22)	Financial support (n=60) Support from surrounding people (n=30)	
Value		Happiness (n=56) Freedom (n=32)	Self-confidence (n=25) Safety (n=24)	

	Equality (having equal life opportunities with others [n=31])	Security (n=11)

Table 5.5 "Other" dimensions in personal mobility

Theme	Sub-theme	Code (number of occurrences)	
Accessibility		Accessibility in public sector (shop, shopping mall, public toilet, train etc. [n=99])	Accessibility in own home (n=48) Wheelchair access to the adopted car (n=52)
Facilities and equipment	Personal sector	Appearance of personal equipment (e.g. car, framework, stick, scooter, wheelchair [n=7])	Facilities at home (n=27) Technology of equipment (n=15)
	Public sector	Public transportations (n=87) Public building (hospital, shopping mall, shop etc. [n=44])	Parking area (n=36) Road and street (n=21)
Financial dimensions		Extra cost (Cost of equipment, equipment management cost etc. [n=35]) Financial issues (Low income, unstable income etc. [n=23])	
Individual characteristics		Behaviour (n=21) Experience (n=24) Health condition (n=79)	Housing style (n=109) Mobility (n=35)
Usability of equipment		Adaptability (n=198) Capacity (n=7) Convenience (n=26) Difficulty (use) (n=50) Diversity of function or types of equipment/facility (n=47)	Durability (n=11) Efficiency (n=202) Frequency (n=15) Functionality (n=99) Movement radius (n=25) Practicality (n=75)

Cognitive dimensions

In terms of "Cognitive dimensions", all considerations and comments related to participants' thinking, behaviour, or attitudes concerning their mobility experiences were grouped. This theme contains several codes, including *Being independent*, *Circumspection*, *Empowerment*, *Self-consciousness*, *Information*, *Reliance*, and *Stress*. The participants stressed that their mobility impairments influenced cognitive aspects of their experiences, such as their level of *Independence (n=65), Information (n=62), Reliance (n=55), Circumspection (n=37),* and *Self-consciousness (n=36).* Significant examples of participants' comments include:

[Being independent] "we're okay really. I mean we don't require any real special adaptations and moneywise, you could always do with a bit more but there again you learn to live with what you've got."

[Information] "well I've been to one at Torbay Leisure Centre, I've been to one at Newton Abbott Race Course. They're really really good for gathering information."

[Reliance] "I don't go too far, well I won't go anywhere by myself so I am always with someone, you know."

[Empowerment] "It's empowering because through my chair I can do anything the exact same as anybody else. So, it's my game changer, it makes me equal."

*[*Self-consciousness*] "I suppose you could be embarrassed about having to use equipment […] descriptive words are embarrassed and conscious, […] you'd want it to be a bit more discreet, less obvious, less obtrusive."*

[Stress] "That is the only problem you have got to go every three years and plead your case, like beg with them, which is not right. […] that is what you have got to do if you need it. It is very stressful."

Emotional dimensions

"Emotional dimensions" include any feelings or senses of the participants in their personal mobility experience. Emotional dimensions included eight codes including *Satisfaction/dissatisfaction with equipment (n=182), Comfort (n=33), Lack of confidence (n=28), Anxiety (n=22), Embarrassment (n=17), Frustration (n=17), Vulnerability (n=16),* and *Loneliness (n=1).* Significant examples of participants' comments include:

[Satisfaction/dissatisfaction with equipment] "having Motability it helps so much because it does give me the freedom to go out and about, and obviously to maintain it, put petrol in it"

[Lack of confidence] "when I'm outside I'm a bit funny, I've lost my confidence outside walking, that I'm going to fall over and won't be able to get back up."

[Anxiety] "I'll use one then but I'm not in a position … I don't want to do that yet, I'm afraid of losing the even limited mobility that I do have so I want to carry on walking as much as possible."

[Embarrassment] "I'm too heavier than I should be and I think there is a natural tendency for people to look at you and pass judgment perhaps if you're too big or you're young and you're in a chair or a scooter they think there's nothing wrong with you, you're taking the mickey"

[Vulnerability] "[…] in a scooter you are looking up at everyone so you're at a significant disadvantage […] you can't see what's going on around you, it's more difficult in a very crowded environment to see things like road signs or shop signs […]. You're instantly more vulnerable when you sit down."

Social dimensions

"Social dimensions" include any social issues concerning mobility which influence the participants' behaviours, thoughts, and feelings. This theme consisted of three sub-themes: '*Social awareness and public attitude*', '*Social interaction*', and '*Support and service*'. '*Social interaction*' includes three codes; *Social engagement (n=35)*, *Social isolation (n=26)*, and *Social participation (n=15)*. '*Support and service'* includes five codes; *Social service (n=130)*, *Family support (n=116)*, *Public service (n=108)*, *Financial support (n=60)*, and *Support from surrounding people (n=30)*. Significant examples of the participants' comments include:

[Social awareness and Public attitude] "attitudes have changed a lot for the better. But it's still not good. Disabled people are still very much seen as not second class but maybe we don't really know what to do."

[Social engagement] "I see my friends a lot, we go out, because I like to go out for meals. So, I got out with my mates a lot because they've got cars and they pick me up and we go out for meals and stuff."

[Social service] "I have got a blue badge and most places you can park right outside the door. […] the blue badge does help immensely."

[Family support] "I think families can offer so much more in encouragement and making things that you're able to do."

Value dimensions

In terms of "Value dimensions", the participants' core values (i.e. desires which fulfil individuals' subjective wellbeing) were categorised. Five sub-themes were identified as mobility-challenged individuals' core values. These included *Happiness* (n=56), *Freedom*

(n=32), Equality (*having equal life opportunities with others [n=32]), Self-confidence* (n=25), and *Safety* (n=24). Significant examples of the participants' comments include:

[Happiness] "Yeah, it's a fantastic idea, oh no I'm very pleased with it, I mean I've got mobility, I go where I want as long as the road is hard I can drive there."

[Freedom] "Just the feeling of freedom when I am in it and driving around."

[Equality-having equal life opportunities] "I mean if I use one I'm fine, just like a normal person."

[Self-confidence] "I think you do as you get older, you do lose your confidence a bit, and with the traffic being so heavy these days, that makes me a bit less inclined to want to go into the town and of course the hospital is right in the town."

[Self-confidence] "I feel confident if I have friends and family in the car while I am driving."

5.5 Discussion

This chapter aimed to answer the research questions: a) Which psychosocial dimensions from the previous chapters were confirmed in this chapter? and b) What are the psychosocial dimensions in the personal mobility experience?

These research questions were answered through ethnographic interviews with individuals with mobility scheme users. The psychosocial aspects of individuals with mobility impairment that emerged from the data were categorised under four themes: *Cognitive, Emotional, Social*, and *Value* dimensions.

Psychosocial aspects

Cognitive dimensions: The results re-confirmed the codes of information and stress as identified in previous chapters.

However, the results from this chapter suggested additional codes, including *Being independent*, *Reliance*, *Circumspection*, *Self-consciousness*, and *Empowerment*, which were not identified in the previous chapters. One example of these codes was the interviewee who seeks help from others rather than going out alone for any special occasions.

Emotional dimensions: Anxiety and Loneliness were already noted in Chapter 2. Participants emphasised that they felt these negative emotions based on their mobility

conditions (e.g. feeling afraid of accidents and feeling trapped at home due to their limited mobility).

However, some further codes were identified in this chapter: *Satisfaction/dissatisfaction with equipment*, *Lack of confidence*, *Embarrassment*, *Frustration*, and *Vulnerability*; for example, the participants who experienced certain feelings while they were using their mobility assistive devices in both individual and social contexts.

Social dimensions: The results in this chapter reconfirmed the sub-themes of *'Social awareness and attitude'* and *'Social interaction'* and several codes (*Social engagement, Social participation, Social service, Family support,* and *Financial support*) as identified in the previous chapters. There are various social services and support systems in place for the elderly and disabled people in the UK; however, these dimensions also relate to the general public's attitudes. These codes were also mentioned by the participants in this chapter.

The 'Support and service' sub-theme and the codes *Public service, Social isolation*, and *Support from surrounding people* were not specifically identified in the previous chapters. The participants in this chapter emphasised that social dimensions, including social environment, affect their mobility experience. For example, having a good social service or support is important considering that mobility assistive devices are commonly expensive and receiving the relevant service requires specific knowledge or experience. In addition, the social dimensions have a strong correlation with cognitive and emotional dimensions. The participants stressed that they experience negative feelings on various occasions due to the negative attitudes of other people in public. This leads to social isolation.

Value dimensions: The codes *Happiness*, *Safety*, and *Security* have already been confirmed in the previous chapters. These codes are general values that people desire in their normal lives and the participants in this chapter also noted them.

However, additional value dimensions including *Freedom*, *Equality*, and *Self-confidence* were suggested in this chapter. The interviewees implied that having mobility provides them with equal life opportunities and freedom (e.g. feeling that they can go anywhere) as people generally have a good mobility condition. In addition, the participants possibly could have a better quality of life based on these dimensions.

Limitation

A methodological limitation of the current study was the sampling and data collection. There was an age band imbalance in recruited participants (31-45 = 8; 46-60 = 6; 61-75 = 22; Over 76 = 1) (Table 5.2). Robson and McCartan (2016) argued that there is no specific agreement regarding sample size. He added that various dimensions should be considered for selecting the sample size in study design, so size of sample is commonly considered by the research community. However, from some points of view the total sample size of 37 participants possibly be considered to be small.

The scope of the conducted study in this chapter is limited to individuals' personal mobility. Considering the notion of inclusive design is broad and a multidisciplinary concept, additional key context need to be considered in order to explore the concept of psychosocial inclusivity in design.

5.6 Chapter summary

In this chapter, psychosocial inclusivity in personal mobility was explored based on the findings from the previous chapters, a) the importance and limited understanding of psychosocial inclusivity in design and b) the initial definition and dimensions of psychosocial inclusivity in design. In this chapter, the personal mobility of individuals with mobility impairments was selected as the first field study in order to explore psychosocial inclusivity. The exploration was conducted by means of an empirical study: ethnographic interviews with individuals with mobility impairments. Together with the older individuals, people with impairments form two core areas of focus in inclusive design, and mobility impairment was focused upon as the most significant impairment in the UK (more than 50% of the UK population have a mobility impairment). In this context, a total of 37 individuals with mobility impairments were chosen for the sample group of this chapter. Through this study, the possible components of psychosocial inclusivity in personal mobility were identified and grouped by using a thematic analysis based on the initial dimensions: "Cognitive", "Emotional", "Social", and "Value" dimensions. The sub-themes and codes were also identified from the interviews according to their implications or meanings within the four core themes in order to reinforce the initial dimensions.

In the next chapter, Field Study II, a second empirical study, will be conducted in order to identify further components of psychosocial inclusivity in design. For this purpose, another core target group for inclusive design, the older individuals, have been selected and one significant activity of daily living is focused upon.

CHAPTER 6: Field study II – Interviews, Creative workshop and Observations of older individuals' supermarket shopping

6.1 Introduction

In the previous chapters, initial definition and dimensions for psychosocial inclusivity were created from the literature analysis (Chapter 2), and additional components were identified through filed studies which included an expert survey and ethnographic interviews of individuals with mobility issues (Chapter 4 and 5).

In this chapter, older individuals were selected as one of the core beneficiaries of inclusive design along with individuals with impairment. Further, older individuals' supermarket shopping was selected as a key context for the study. Shopping is one of the significant Instrumental Activities of Daily Living (IADL), particularly for older individuals. It is strongly influenced by both physical and psychosocial aspects e.g. physical and health conditions, and geographic availability of individuals. Additionally, supermarket shopping is often related to other instrumental activities such as preparing meals, money management, and personal transportation (Spector et al., 1987).

A total of 58 older individuals were recruited for the three investigations: ethnographic interviews (n = 31), creative workshop (n = 19), and observations (n = 8). In the first investigation i.e. ethnographic interview, 31 participants were asked regarding their general background and lifestyle including shopping experience. In the creative workshop, several discussion sessions were conducted regarding the physical and psychosocial issues participants faced throughout their supermarket shopping experience. Participants included 19 older individuals and 17 design students. In the observation, eight participants' shopping activities were observed in order to identify any further psychosocial dimensions based on the collected data from the above two investigations. The collected data was analysed by multiple coders using appropriate analysis methods including qualitative coding methods and NVivo software. Specific details of each data collection and analysis protocol are provided in section 6.3; Data collection and analysis.

At the end of the chapter, several sub-themes and codes of psychosocial aspects in personal mobility were identified. The subsequent discussion of the identified theme and codes were presented at the end of the chapter as presented in the chapter map (Figure 6.1)

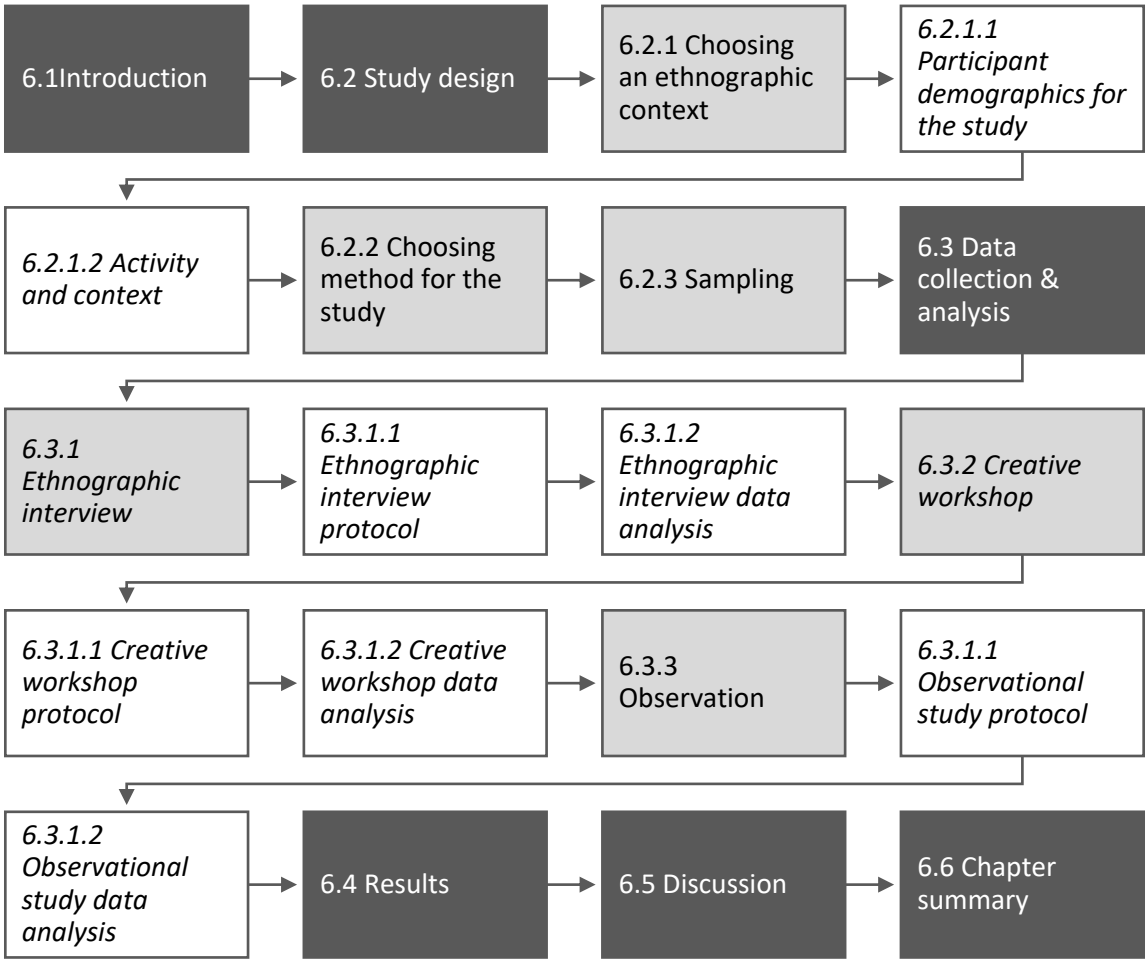


Figure 6.1 Chapter map for field study II

The aim, objectives and research questions of this chapter were established as presented below.

Aim, objectives and research questions

To explore the psychosocial inclusivity in older individuals' supermarket shopping experience the following objectives:

- to identify dimensions of psychosocial inclusivity in the context of older individuals' supermarket shopping experience and
- to develop the initial dimensions for psychosocial inclusivity in design.

With this purpose for the study, the remaining sections of this chapter including exploratory investigations were performed in order to answer the research questions:

a) Which psychosocial dimensions from the previous chapters were confirmed in this chapter?

b) What are the psychosocial dimensions in the older individuals' supermarket shopping experience?

6.2 Study design

6.2.1 Choosing an ethnographic context

6.2.1.1 Participant demographics

As mentioned in the previous chapter, the core beneficiaries of inclusive design are individuals with disabilities and older population (Hedvall, 2013; Nickpour et al., 2012; Gaver and Martin, 2000; Demirkan, 2007; Imrie and Hall, 2003; Demirbilek and Demirkan, 1998). Individuals with mobility impairment was considered as a key audience for conducting ethnographic interviews in the previous chapter, hence older individuals were chosen as a key audience in this chapter. The older population is referred as aged 60 and over by the United Nation (2007). On the other hands, the term 'older person' is defined as "chronological age of 60 or 65" by the World Health Organisation (WHO, 2007). WHO definition meets most developed countries' retirement age, e.g. state pensionable ages in the UK are 60 for female and 65 for male. Therefore, WHO definition was adopted to refer to the core audience i.e. 'older person/people' aged over 60 years, together with the related terms including 'elderly people', 'older adults', 'senior citizens' and older individuals' in this chapter.

6.2.1.2 Activity and context

Inclusive design is applied in various contexts such as the design of transport systems, services and facilities, education, products and goods, premises and built environment (Casserley and Ormerod, 2003). Within these contexts, practical implications for psychosocially inclusive design are often evaluated through Instrumental Activities of Daily Living (IADL). These are essential activities for independent living by humans (Spector et al., 1987), especially older individuals (Katz, 1983; Lawton and Brody, 1970). IADL include housework, preparing meals, taking medication managing money, shopping for groceries or clothing, use of the telephone or other forms of communication, and transportation within the community.

Amongst those activities, shopping is one activity which is strongly influenced by both physical and non-physical aspects - an individuals' physical and health conditions, geographic availability (Aggarwal et al., 2014; Chow et al., 2014; Yakushiji and Takahashi, 2014; Ishikawa et al., 2013; Pettigrew et al., 2005; Rose and Richards, 2004; Aylott and Mitchell, 1998) and socioeconomic status (Ishikawa et al., 2017; Pechey and Monsivais, 2016; Ministry of Agriculture et al., 2014). Shopping is also frequently associated with other daily activities such as personal transportation, money management and preparing meals (Spector et al., 1987)

In addition, supermarket shopping for older individuals is considered to be one of the most important contributors to independent lifestyle and choice of diet (Lang and Hooker, 2013; Thompson et al., 2011). Physical aspects of store environment such as queues at checkouts, parking access, accessibility of products on the shelves, and the availability of food products in appropriate sizes (Moschis et al., 2004; Hare, 2003; Hare et al., 2001; Goodwin and McElwee, 1999; Kent Dychtwald, 1997; Moschis, 1992) have been discussed as critical issues that impact older individuals' supermarket shopping experience. While issues of physical inclusivity are evident, combinations of psychological, social, and health factors such as mental illness, social isolation (Davies and Knutson, 1991), entertainment (Tongren, 1988), the attitude of staff, and social interaction (Leventhal, 1997; Moschis et al., 2004) also affect the supermarket shopping experience of older individuals.

It has been suggested that shopping activity affects not only physical well-being, but also the psychological and social well-being of older individuals (Amarantos et al., 2001). These aspects of well-being are linked to *quality of life,* which is defined as "a multi-faceted concept comprised of subjective evaluations of material, physical, emotional and social well-being" (Felce and Perry, 1995). Since supermarket shopping involves a rich mixture of both physical and psychosocial considerations, it was selected as the ethnographic context for the current study.

6.2.2 Choosing methods for the study

Three empirical methods were chosen as a research data triangulation approach (Denzin, 1988) so as to achieve the purpose of the study. Denzin (1988) suggested that conducting more than one method for collecting data (data triangulation) raise the degree of confidence

and rigour of the results. With this sense, the human centred design tools (Giacomin, 2014) of semi structured 1) 'ethnographic interviews' (Spradley, 2016), 2) 'creative workshop' (Steen et al., 2011), and 3) 'fly-on-the-wall observation (Non-participant observation)' (Robson & McCartan, 2016).

1) The ethnographic interview and the 2) creative workshop were selected as methods in order to identify the existing psychosocial aspects of older individuals' supermarket shopping experiences. 3) The fly-on-the-wall observation was conducted to validate the findings from the above two methods and also in order to discover possible psychosocial dimensions of older individuals' supermarket shopping experiences in the real world which were not commonly identified by means of verbal interactions such as interview or discussions in the workshop. In order to achieve these purposes, a checklist which helps an observer (researcher) to not miss any identified and possible psychosocial aspects, was created based on the findings from the above methods. Additionally, the findings from the former methods were used in the observational data analysis stage as an initial structure.

This data triangulation based on combination of multiple methods was predicted to provide greater validity and multiple perspectives in this chapter.

6.2.3 Sampling

Supermarket shopping reflects not only personal preference but also correlates with the socio-economic circumstances of the individual (Ishikawa et al., 2017). Table 6.1 presents the three main marketing categories relative to UK supermarkets. The best known UK supermarket brands are presented in relation to the marketing distinction of low, middle or high-cost supermarkets (Pechey and Monsivais, 2015), and their number of stores and market penetration are provided for reference (USDA Foreign Agricultural Service, 2016).

Table 6.1 supermarkets in the UK categorised by target customers

Category by cost	Supermarket	Market share (2016)	Number of stores (2016)
High-cost	Waitrose	5.4%	350
	M&S	4.3%	914
Medium-cost	Tesco	28.2%	3,493
	Sainsbury's	16.0%	1,312
	Asda	15.6%	626
	Morrisons	10.4%	569

	The Co-operative	6.5%	4,000
Low-cost	Aldi	6.2 %	620
	Lidl	4.6%	630
	Iceland	2.1%	864

Based on this classification, in 2015, more than 99.7 percent of the UK households (24,828 out of 24,879 households) used medium-cost supermarkets such as Tesco, Sainsbury's, Asda and Morrisons (Pechey and Monsivais, 2015) as part of their overall shopping. Also, the number of stores (8,688) and the market share (76.70%) of these middle-cost supermarkets are more than double compared to those in the other two categories.

In this study, therefore, older individuals aged 60 years or above who use the medium-cost supermarkets at least once in a fortnight for shopping were selected as participants for the three investigations. A total of 58 older individuals were selected. Table 6.2 presents the breakdown and details of the participants involved in each investigation. Ethical and consent forms related to each method were provided at the beginning of each investigation. Prior to starting the investigations, a research ethics approval was sought and granted by the research Ethics Committee of Brunel University.

Table 6.2 the variables of the three chosen investigations

Investigations	**Total number of participants**	**Gender (M/F)**
Background Interviews	31	10/21
Creative workshop	19	5/14
Non-participant Observations	8	3/5

6.3 Data collection and analysis

6.3.1 Ethnographic interviews

6.3.1.1 Ethnographic interview protocol

Ethnographic interviews were conducted with 31 participants (Table 6.2) as the first step to identify the behaviours and experiences of older individuals in their general daily lives and in supermarket shopping. The aim of the background interviews was to explore the key issues

so as to provide a foundation for the further two investigations. The background section of the interviews provided an understanding of older individuals' general lifestyle, routines, health, well-being and shopping habits.

The interviews were semi-structured and comprised of three main sections: *warm-up questions* (general background and supermarket shopping style related questions), *lifestyle and habits* (diet related questions), *health and well-being* (health and psychosocial related questions). The complete set of questions is included in the Appendix I. Each interview with each individual lasted no more than 30 minutes, and the interview responses were audio recorded using a voice recorder and later transcribed to text by means of professional transcription team.

6.3.1.2 Ethnographic interview data analysis

Analysis of the data from the background interviews was performed by three coders, including one final year PhD researcher in design (male), one design researcher with over 15 years of experience (female), and one design manager with over 20 years of experience (male]. The process adopted for the coding followed the recommendations (Braun and Clarke, 2006) of the 'six phases of thematic analysis' which include familiarisation with the data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; producing the report.

In the first stage, five out of the 31 interviews were analysed to generate an initial structure by using *domain and taxonomic coding*, and *process coding* (Saldaña, 2015). The participants' comments were initially coded and grouped according to their meaning and implications. Based on meaning, the initially coded data were named, merged together, categorised and collated into potential themes (patterns). During this initial coding process as many codes as possible were identified from the raw data so as to avoid losing any potential psychosocial components for the second round of analysis.

The initial structure from the familiarisation stage was imported into the NVivo software so as to use multiple combinational matrices (Edhlund and McDougall, 2012) to analyse the rest of the interview data. Within NVivo, any data codes which were considered to involve similar meanings to the initially identified themes were grouped together. The newly identified codes were named and categorised as new themes or under the existing themes

according to their meaning or implications. The final structure was then reviewed following the '15 point checklist of criteria for good thematic analysis' (Braun and Clarke, 2006).

6.3.2 Creative workshop

6.3.2.1 Creative workshop protocol

A three-hour creative workshop was conducted by bringing together 19 older shoppers (five males and 14 females) who predominantly used a middle-cost supermarket, and 17 design students as assistants to support the workshop session by means of sketching, note-taking and other forms of organising and recording (Figure 6.2). A co-design approach was adopted in the creative workshop in order to allow natural and holistic sharing of information. Co-design has been recognised as a helpful human-centred concept by various organisations and businesses (Binder et al., 2008). It allows stakeholders such as designers, researchers, developers, clients, and potential users who are experts of their experiences (Sleeswijk Visser et al., 2005) to creatively participate in a development activity (Steen et al., 2011).

Figure 6.2 Illustration of the creative workshop at Brunel University London

At the end of each session the groups shared insights and issues in the format of post-it notes. These were then categorised into three themes: 'like' (positive aspects of the shopping experience)', 'dislike' (negative aspects of the shopping experience), and 'to be improved'

(aspects be improved in the shopping experience). The three categories were used in this investigation in order to focus attention.

6.3.2.2 Creative workshop data analysis

The identified issues and insights which were collected under the three categories via the post-it notes were initially clustered by five coders, including two design researchers with over 15 years of experience (females) and three final year PhD researchers in design (two females and one male).

Thematic coding was used (Braun and Clarke, 2006; Saldaña, 2015) and the comments from the participants were coded, clustered and initially named based on their meanings or implications. The clustered codes were then merged and subdivided into potential themes and sub-themes, or edited into suitable names. The created themes and sub-themes were reviewed and re-categorised repeatedly by the five coders in an iterative process until full agreement was achieved.

6.3.3 Observation

6.3.3.1 Observational study protocol

Non-participant observations were conducted to clarify the previously identified psychosocial issues and to identify any new psychosocial aspects by observing real-time shopping experience and behaviour. Eight participants which met the criteria, i.e. aged 60 or over; middle-cost supermarket user, were recruited. The participants were asked to suggest the time, date and the supermarket for observing their normal shopping behaviour. Information and consent forms were provided in advance for both participants and the supermarket managers. Each observation session, including the initial and supporting interview, was conducted by a single researcher in order to assist the participants to feel comfortable to shop as normal. Each observation session took approximately one hour to complete. All the observations were performed in London Borough of Hillingdon

At the beginning of each observation session an initial interview of approximately 30 minutes was conducted as a familiarisation stage at the participant's home. Conducting the initial interviews allowed participants to become familiar and comfortable with the observation session and encouraged them to follow their normal routines. The participants were asked about their backgrounds such as previous career, social activities, lifestyle and their general shopping journey. The initial interviews were recorded using voice recorder. The complete set of questions is presented in the Appendix J.

After the initial interview, compact digital video cameras (GoPro: HERO4 Session Action Camera) were prepared for recording the participants' shopping experience. A single researcher (author) was equipped with two video cameras in order to prepare for a malfunction of camera. Further, each participant was equipped with an action camera for recording any incidents or aspects of their shopping experience which they considered interesting and relevant. Figure 6.3 presents an illustration of the observer and one of the participants with the compact digital video cameras. The cameras were all equipped in the shoulder strap of a backpack or shoulder bag the observer and participants wore in order to allow participants to shop as they normally did.

Figure 6.3 Illustration of the observer and participant with video recorders (yellow arrows): The researcher equipped with two compact digital video cameras in order to prepare for a malfunction of camera.

The observation phase of the investigation began from the outward journey of the participants to the supermarkets, to identify any potential psychosocial aspects that were related to the overall shopping experience such as the choice and experience of travel by walking, taking public transportation or driving. During the shopping in the supermarket all the activities of each participant were observed, including situations such as meeting other people, dropping items from the shelf, etc.. The homeward journeys of the participants from the supermarkets were also observed for the same reasons as that of outward journeys.

After completing the shopping activity, a final interview of approximately 30 to 60 minutes was carried out in each participant's home which sought further information and feedback. The recorded video of their shopping journey was provided during the interview to facilitate recall and stimulate analysis. The participants were asked to comment on their thoughts, feelings and relevant behaviour in the situations observed during the shopping in the supermarket and also the journey from/to supermarket. The questions included examples such as: 'During the shopping, you had a chat with the lady at the pet section. Could you please describe this?', and 'Could you please tell me top three things you liked in your shopping journey today? And why?'. The complete set of questions is presented in the Appendix J. The initial and final interview responses were audio recorded using a voice recorder and later transcribed to text by the lead researcher.

6.3.3.2 Observational study data analysis

The analysis of the observational data was guided by the interview responses which helped to detect priority issues and emotionally relevant events. The analysis methods and process for the observational data were the same as those of the ethnographic interviews of the first investigation. The *domain and taxonomic coding*, *process coding,* and NVivo10 software were used as data analysis methods followed 'six phases of thematic analysis' (Braun and Clarke, 2006).

6.3.4 Synthesis of results from the three investigations

The results from the three investigations were combined by three coders (one final year PhD researcher in design [male], one design researcher with over 15 years of experience [female], and one design manager with over 20 years of experience [male]) using thematic coding method. *Axial coding* (Strauss and Corbin, 1998), was used to provide enhanced validity (Saldaña, 2015).

The extracted sub-themes and codes from the three investigations were re-categorised, merged or edited, based on their meanings and implications. The individual themes were placed separately, and then reconsidered to be refined, separated, combined or discarded. This process was repeated several times using NVivo software to compare different combinations of the results to evaluate the analysed data. At the end of the coding analysis, the 15 steps of checklist for thematic coding analysis (Braun and Clarke, 2006) was used as the termination criteria.

6.4 Results

The findings from the three investigations: ethnographic interview, creative workshop, and observation, were categorised and detailed in four groups. The four categories were '*Psychosocial aspects'*; *'Physical aspects'* (accessibility, usability, efficiency, etc.); '*Shopping'* (factors that were related to supermarket including environments, store facilities and items, surrounding facilities, etc.); '*General background'* (Participants' physical condition and socio-demographic characteristics etc.). Considering the purpose of this research, the details of major themes, subthemes and codes of the first category 'Psychosocial aspects' were only presented and discussed regarding their interpretations in this chapter. The complete summary of the three categories i.e. '*Physical aspects', 'Shopping',* and *'General background'* were presented in Appendix K, L, and M.

Psychosocial aspects

Several sub-themes and codes were identified under the four major psychosocial themes: '*Cognitive'*, '*Emotional', 'Social',* and *'Value' dimensions,* which were identified in Chapter 2. The extracted sub-themes and codes from the synthesised results of the three investigations were presented in Table 6.3. The themes were displayed in alphabetic order to keep consistency through this PhD research, and the sub-themes and codes were ordered according to their frequency of occurrence.

Table 6.3 Psychosocial aspects in older individuals' supermarket shopping experience

Theme	Sub-theme	Code (number of occurrences)
Cognitive dimensions	Cognitive judgement	Preference (supermarket products and services) (n=97)
		Familiarity (n=45)
		Helpfulness (supermarket products and services) (n=29)
	Self-awareness	Self-awareness of age (n=97)
		Self-awareness of health (n=56)
Emotional dimensions	Positive emotion (Positive affect)	Satisfaction (with supermarket products and services) (n=68)
		Enjoyment (n=53)
		Pleasure (n=46)
		Sense of independence (n=1)
	Negative emotion (Negative affect)	Frustration (n=28)
		Self-consciousness (n=23)
		Tiresomeness (annoyance and losing interest) (n=7)
		Embarrassment (n=6)

		Anxiety (n=4)	
Social dimensions	Social activity	Hobbies (classes, clubs, etc.) (n=62)	
		Volunteering activities (n=24)	
		Socialising	Interaction with others in the supermarket (n=42)
			Having guests (entertaining, hosting etc.) (n=8)
	Socio-economic status (n=69)		
	Public attitude	Public awareness and language (n=23)	
		Generational differences (n=5)	
		Cultural differences (n=1)	
	Support and Service	Support from others (n=16)	
		Social service (n=3)	
Value dimensions	Life satisfaction	Sense of belonging (n=37)	
		Trust and Reliability (n=19)	
		Sustainability (n=9)	
		Fairness (n=6)	
		Safety (n=2)	
		Social satisfaction	
	Self-esteem (61)	Self-confidence (n=19)	
		Self-satisfaction (n=18)	
	Happiness (n=37)		

Cognitive dimensions: The 'Cognitive' dimensions theme consists of two sub-themes which are 'Cognitive judgement' and 'self-awareness'. The 'Cognitive judgement' sub-theme in turn consisted of the codes of *Preference* (supermarket products and services); *Familiarity; Helpfulness* (supermarket products and services). 'Self-awareness' sub-theme included *Self-awareness of age* and *Self-awareness of health.* The codes of each sub-theme were presented in the Table 6.3.

The theme 'Cognitive dimensions' grouped all those comments and considerations which expressed the participants' attitude, thinking and behaviour during their shopping experiences. *Preference (supermarket products and services [n=97])*, *Self-awareness of age (n=97)*, and *Self-awareness of health (n=56)* were amongst the most frequently mentioned by the participants. Indicative examples of participant comments include:

[Preference] "Yes I got a later date on it. […] If I got the one it's gonna be expired by tomorrow, I would only use part of it, and it's going off a bit before I consume that, so I always hang around for the one with the most time left on it […] Yes, I only use even top 300 ml top like that I only ... that allows me five days. […] If it's few days left before it's expired, it's not very nice. It's gonna be passed expire date."

[Self-awareness of health] "I have a heart condition so I do need to watch my fats. I try to be careful with that, but other than that no I'm fine. Keep low on the salt if I can, I find that difficult, I'm a savoury person rather than a sweet one, much prefer savoury food to the sweet stuff."

Emotional dimensions: 'Emotional' dimensions theme included two sub-themes which are 'Positive emotion' and 'Negative emotion'. 'Positive emotions' sub-theme consisted of *Satisfaction with supermarket products and services; Enjoyment; Pleasure; Sense of independence.* 'Negative emotions' sub-theme consisted of *frustration; Self-consciousness; Tiresomeness (annoyance and losing interest); Embarrassment; Anxiety*. The codes of each sub-theme were presented in the Table 6.3.

These included feeling or senses related codes caused by an individual's relations with others, mood, or circumstances. *Satisfaction (with supermarket products and services [n=68])*, *Enjoyment (n=53)*, *Pleasure (n=46)*, *Frustration (n=28)*, and *Self-consciousness (n=23)* were amongst the most noticeable emotions encountered during the supermarket shopping by the older individuals. Examples of specific comments include:

[Satisfaction] "I like the bargain. And finding everything I am looking for is exactly in the same place it was in last week. That's quite satisfactory […] Well, when they move things. […] when you find an assistant, they are all very very helpful, really nice. They spend time to help you."

[Enjoyment] "Oh, quite often! I mean today we didn't, no chatting today at all. I didn't see anyone I knew, and I didn't see anyone else to speak to … oh we often do … especially, perhaps about cat food […] we are all doing the same things, we know what we are doing. And I will talk about it because we do."

[Pleasure] "Uhm well, I enjoy going there physically because often especially in the winter, the sun is going down, and the so very nice sky, and the yes they got the trees there and as I said little leaves coming out from the bottom, and they are so pretty."

[Frustration] "I mean I'll drive around here to go shopping and bits. But I don't enjoy it. So I'd rather go on the train if I go anywhere. Um, I think there's a bit of an old age thing really. […] I'm, not losing my confidence but I'm, I'm very, I'm not slow but I don't know. I just feel that I, I could cause an accident because perhaps, no, I don't know. Anyway, I don't, I don't enjoy it anymore so."

[Self-consciousness] "I usually try to go at times when I know there's not going to be a lot of people there. Everybody's got to shop but it is difficult and I've got a fairly big scooter that I take over to [Supermarket A]."

Social dimensions: The 'Social' dimensions theme included four sub-themes: 'Social activity', 'Socio-economic status', 'Public attitude', and 'Support and service'. The 'Social activity' sub-theme consisted of *Hobbies (classes, clubs, etc.); Volunteering activities; Socialising (consisting of interaction with others in the supermarket* and *Having guests).* The 'Public attitude' sub-theme consisted of *Public awareness, language etc.; Generational differences; Cultural differences.* 'Support and service' sub-theme consisted of S*upport from others* and *Social service*. The codes of each sub-theme were presented in the Table 6.3.

'Social dimensions' in this study referred to any activities, support, services, public awareness and attitude which can affect an individuals' thought, feeling, and behaviour in their social life. The codes of *Socio-economic status (n=69)*, *Hobbies (n=62)*, *Interaction with others in the supermarket (n=42)*, *Volunteering activities (n=24)*, and *Public awareness and language (n=23)* were the most frequently mentioned by the participants. Indicative examples of participant comments include:

[Socio-economic status] "I go to [Supermarket A] because I think they are better value in terms of price."

[Hobbies (classes, clubs, etc.)] "Tomorrow there is my coffee morning group. Yesterday, I had to miss my scrabble group because it was my granddaughter's graduation in the Sussex. […] Tuesday is different scrabble group. Monday is I call a

day off. Sunday, I go to a church in the morning, and friend comes to see me most Sunday afternoon."

[Interaction with others in the supermarket] "I don't want to do online shopping because I like to go and see things and people."

[Volunteering activities] "Since retirement, I tried to get involve to various activities mainly sort of volunteering activities."

[Public awareness and language] "But it just makes it easier for the general public as well. Because it's difficult when you're in there on a scooter for them to get around you, and very often they don't see you. I mean I wear a lime green jacket which you'll see when we go over. And very often people, they'll walk into me and they'll say, 'Oh, sorry! Didn't see you there.' And my scooter's quite big as well!"

Value dimensions: The 'Value' dimensions theme included four sub-themes; 'Life-satisfaction', 'Happiness', 'Self-esteem', and 'Social-satisfaction'. The 'Life-satisfaction' *sub-theme* consisted of the codes *Sense of belonging* and *Safety.* the 'Self-esteem' sub-theme consisted of the codes S*elf-confidence* and *Self-satisfaction.* The 'Social-satisfaction' sub-theme included the codes *Trust and reliability; Sustainability*; *Fairness.* The codes of each sub-theme were presented in the Table 6.3.

The notion of quality of life is highly relevant to value dimensions in psychosocial inclusivity as there was a significant link between supermarket shopping experience and the quality of life of older individuals (Amarantos et al., 2001). Therefore, based on the notion of the quality of life, in this theme participants' thoughts and feelings about themselves as well as their experiences of shopping and general life were extracted and detailed. The codes of *Sense of belonging (n=37)*, *Happiness (n=37)*, *Self-confidence (n=19)*, and *Trust and reliability (n=19)* were the most frequently raised. Indicative examples of participant comments include:

[Sense of belonging] "[…] I always try to go to the counter to see people I know that I recognise would be pleased to say you know "you've had a haircut, nice today." "did you have a nice holiday?" or maybe it's 5 o'clock evening, "you are going home soon are you tired?" […]"

[Happiness] "Going to the supermarket with my partner is the happiest thing"

[Self-confidence] "It is easy to use the self-checkout machine. […] Yes, I know that other old people have difficulty to use it, but we don't have any trouble. It's convenient"

[Trust and reliability] "If you shop carefully at [Supermarket A], a lot of their stuff is not much more expensive, and you get quality […] [Supermarket B] has quality but [Supermarket B] isn't as reliable as [Supermarket A]"

6.5 Discussion

This study aimed to address two research questions: a) Which psychosocial dimensions from the previous chapters were confirmed in this chapter? and b) *What are the psychosocial dimensions in the older individuals' supermarket shopping experience?*

These research questions were addressed through three empirical investigations: ethnographic interviews, creative workshop, and observations. The psychosocial aspects of older individuals' supermarket shopping that emerged from the data were categorised under the four themes: *Cognitive, Emotional, Social*, and *Value* dimensions.

Psychosocial aspects

Cognitive dimensions: The results suggested that older individuals' shopping experience is influenced by a number of 'cognitive' dimensions which can be grouped under the sub-themes of 'Cognitive judgement' and 'Self-awareness'.

Both sub-themes 'Cognitive judgement' and 'Self-awareness of one's health and age' which had not been specifically identified in the literature analysis chapter, were identified and confirmed as an additional sub-theme. An illustration of this was the participant who made the choice of supermarket based on awareness of her back pain.

Emotional dimensions: This study noted a richer spectrum of considerations by identifying the positive and negative emotions experienced by shoppers during their supermarket shopping activities. The results suggested that older individuals' supermarket shopping experience is affected by not only physical but also 'emotional' dimensions (e.g. feelings of pleasure, frustration, and self-consciousness).

Enjoyment and *pleasure* in 'Positive emotion' and *Anxiety* in 'Negative emotion' were identified in the literature analysis chapter as important emotional affects in psychosocial inclusivity.

However, rest codes which were *Satisfaction (with supermarket products and services)* and *Sense of independence* in 'Positive emotion' and *Embarrassment*, Frustration, *Self-consciousness*, and *Tiresomeness (annoyance and losing interest)* in 'Negative emotion' were newly identified in this chapter. In one instance, an older shopper stressed strong negative emotions of Embarrassment, and Self-consciousness in the process of renting a mobility scooter for use in store. The participant needed to que for a considerable amount of time and had to speak to customer services and security in order to borrow a mobility scooter and its key for use in supermarket. In such case, the supermarket aimed at physical inclusion through providing mobility assistance and improving accessibility, convenience, and usability for shoppers. However, the shopper experienced psychosocial exclusion, feeling embarrassed, uncomfortable and self-conscious due to the unnecessarily complex process of renting a scooter.

Social dimensions: The results suggested that older individual's shopping experience is influenced by 'social' dimensions (e.g. gaining motivation for shopping, feeling positive or negative emotions, and choosing supermarket products and services, stores or transportation). The social dimensions were found to involve four sub-themes of: Social activity; Socio-economic status; Public attitude; Support and service.

The results confirmed the sub-themes of 'Public attitude' and 'Support and Service', and codes of *Support from others* and *Public awareness and language* as identified previously in the literature analysis chapter.

However, several social related sub-themes including 'Social activities', 'socio-economic status', and several codes of 'Public attitude' and 'Support and service' were also identified through this study. On various occasions, participants stressed how their shopping experience was mainly driven or significantly affected by social dimensions e.g. going to supermarket to see or meet people, spending time with partner, or shop for neighbours physically unable to shop.

Value dimensions: The results suggested that older individual's supermarket shopping experience is influenced by certain values (happiness, life-satisfaction, social satisfaction, and self-esteem) which have a crucial influence. For example, feelings of 'happiness' when going to a supermarket with a partner or seeing the sunset on the way back home from shopping appear to be difficult to separate from the specific shopping events and interactions.

The results re-confirmed several sub-themes of 'Life satisfaction', 'Happiness', and 'Self-esteem', and codes of *Self-confidence, Safety,* and *Social satisfaction* as already identified in the literature analysis chapter.

However, the results from this chapter suggested additional codes of *Sense of belonging*, *Trust and Reliability*, *Sustainability*, *Fairness*, and *Self-satisfaction* as relevant values. Participants implied satisfaction with their life or society through their shopping experiences (e.g. feeling a sense of belonging by engaging with others in their shopping experience, choosing fair trade products, or having trust in products and services in the supermarket).

Limitations

A methodological limitation of the current study was the sampling and data collection involved in the three investigations. Due to recruitment difficulties, there was a gender imbalance in participants (Male: 18 and Female: 40) (Table 6.2). While there is not one specific sample size which is generally preferred by the research community, due to the various dimensions which should be considered in study design (Robson & McCartan, 2016), the total sample size of 58 individuals might be considered to be small from some points of view. In this study, a research triangulation approach was applied in an attempt to achieve the greatest possible validity from the results of the relatively small population sample.

The scope of this chapter was limited to older individuals' shopping experiences. When it comes to the wider concept of inclusive design, further key contexts and IADL beyond shopping need to also be investigated in order to thoroughly explore the concept of psychosocial inclusivity.

6.6 Chapter summary

In this chapter, the supermarket shopping of older individuals was selected as the second context for exploring the nature and role of psychosocial inclusivity. The exploration was

performed by means of the human centred design methodologies of ethnographic interview (n = 31), creative workshop (n = 19), and observation (n = 8) with a total of 58 older individuals.

Through these investigations, several psychosocial aspects of older individuals' supermarket shopping were identified using thematic analysis. Several sub-themes and codes were identified and categorised based on their meaning or implications under the four major themes which were identified in the previous chapter: 'cognitive', 'social', 'emotional', and 'value' dimensions (Table 6.3). Several these psychosocial aspects can be found in the existing findings from the previous chapter, although several specific details of the four themes are not identified in the previous chapter. The findings of this study suggest: (a) the importance of psychosocial inclusivity in design and older individuals' supermarket shopping; (b) a partial list of components for inclusive design that can be used to develop the initial dimensions for psychosocial inclusivity in design identified from the previous chapter.

In the next chapter, an evaluation study will be conducted in order to evaluate and develop the definition and synthesised dimensions of psychosocial inclusivity in design. For this purpose, the online survey with potential user groups which are design academics and design practitioners will be conducted.

CHAPTER 7: Evaluation study - Survey of designers and design researchers

7.1 Introduction

In previous chapters, the potential components for psychosocial inclusivity were identified. Several empirical studies, including an expert survey, ethnographic interviews, a creative workshop, and observations, were conducted with chosen experts, individuals with mobility disabilities, and older individuals. Through these studies, several components for psychosocial inclusivity in design were identified.

This chapter is an expanded form of the second round of Delphi study which presents the evaluation of synthesised findings from literature analysis and above empirical studies. The evaluation was carried out in form of an online survey. The design experts who participated in the first round of Delphi study, and additionally designers from industry and design academics who had understanding or experience of the concept of inclusive design were selected as participants in the evaluation study. These selected participant groups were presented with the online format of the questionnaire along with the initial definition:

> *"The provision of equal opportunities for a better quality of life for as many people as possible, considering both psychological and social factors."*

and synthesised dimensions (Table 7.1), created by synthesising data from previous chapters. This was in order to collect participants'' opinions and suggestions regarding any possible developments on the definition and dimensions.

Table 7.1 Synthesised dimensions based on Literature analysis, Delphi study and Field study I and II.

Theme	Sub-theme	Code	
Cognitive dimensions	Cognitive judgement	- Circumspection - Familiarity - Helpfulness - Locus of control	- Misconception - Preference (related to lifestyle, social, public, etc.)
	Motivation		
	Perception		
	Self-awareness	- Personal image	- Self-awareness of age

		- Self-awareness of Health	
Emotional dimensions	Positive emotion	- Comfort - Enjoyment - Feeling calm	- Optimism - Thrill
	Negative emotion	- Anxiety - Boredom - Decreased self-esteem - Embarrassment - Fears	- Feelings of sadness - Frustration - Hopelessness - Loneliness - Self-consciousness
Social dimensions	Public attitude	- Discrimination - Public opinion - Social changes	- Cultural difference - Generational difference
	Social activity (Social participation/ engagement)	- Having guest (entertaining, hosting etc.) - Hobbies (class, club, etc.)	- Socialising - Volunteering activities
	Support & service	- Financial support - Support from others Incl. family	- Social service & support
	Social interaction (Social relation)	- Corporate culture - Interaction with others in public place - Social acceptance	- Social exclusion / Social isolation - Social integration - Social network - Social roles
Value dimensions	Happiness	- A sense of hope - Eudemonic well-being - Fulfilment of Desires - Long-term health incl. mental health	- Meaningfulness - Pleasure - Successful aging
	Life-satisfaction	- Equal life opportunities - Fairness - Freedom	- Privacy - Safety - Security
	Self-esteem	- Sense of independence - Self-confidence	- Self-efficacy - Self-satisfaction
	Social-satisfaction	- Receiving emotional support - Reliability & Trust	- Sense of belonging - Social contribution

The subsequent discussion of the survey findings will be presented at the end of the chapter, as shown in the chapter map (Figure 7.1). The aim, objectives, and research questions of this chapter are presented below.

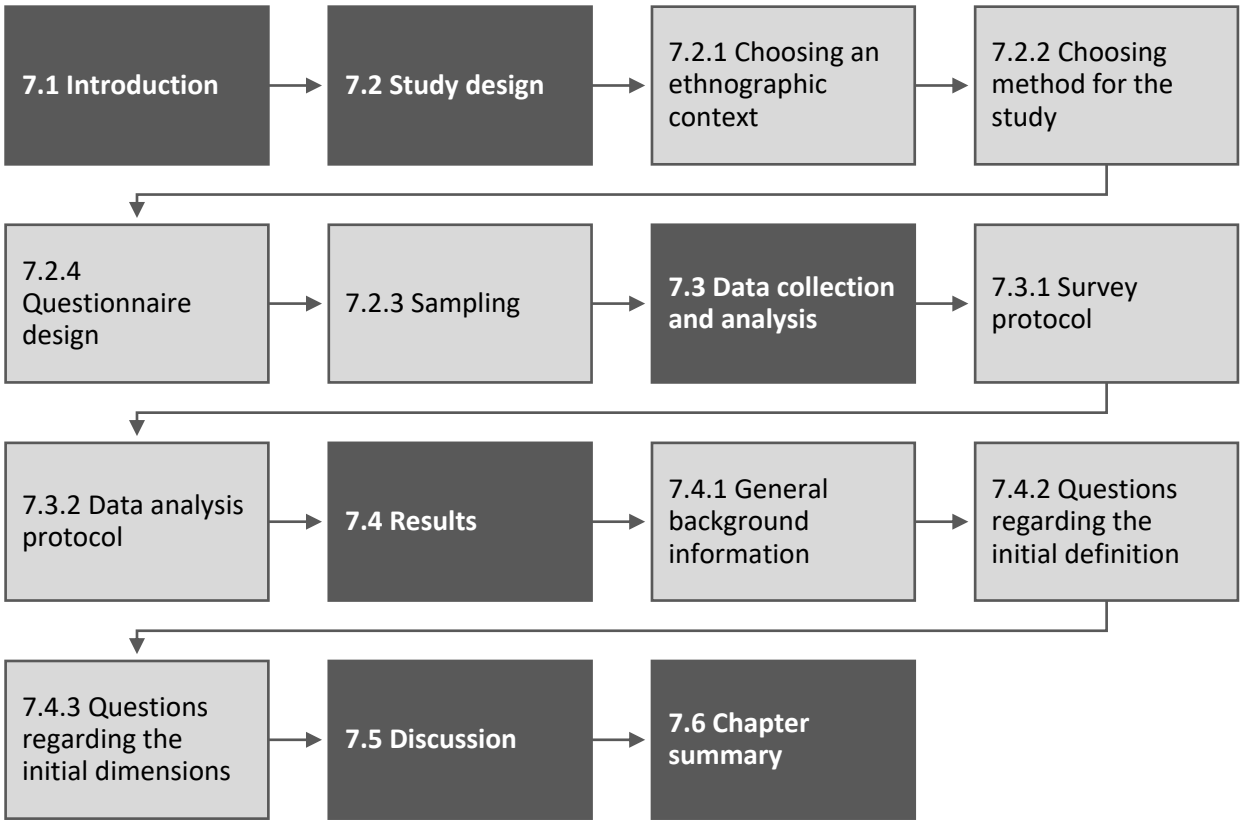


Figure 7.1 Chapter map for evaluation study

Aim, objectives, and research questions

The evaluation study was conducted to clarify the reliability and validity of the initial definition and dimensions for psychosocial inclusivity in design through the online survey, specifically to achieve the following objectives:

- To evaluate the initial definition of psychosocial inclusivity in design with potential user groups
- To evaluate the synthesised dimensions for psychosocial inclusivity in design with potential user groups

In order to achieve the purpose of the study, three research questions were established:

- Are the definition and the dimensions helpful in addressing the psychosocial aspects of inclusive design?
- Are there any wordings or phrases to be refined, added, or removed in the initial definition?
- Are there any dimensions to be refined, added, or removed?

7.2 Study design

7.2.1 Choosing an ethnographic context for the study

Potential users of the definition and the dimensions are the individuals who practice or implement inclusive design in their own expert areas, such as design academics e.g. design researchers and lecturers, and design students, design practitioners, and service providers, including government officials and NGO officials.

Considering that the purpose of this research is to present the general dimensions for psychosocial inclusivity in design as the first exploration, the potential audience groups should have experience in inclusive design. Thus, two main user groups consisting of design practitioners and design academics, including lecturers and researchers, were selected among these potential users.

7.2.2 Choosing a method for the study

A questionnaire survey was selected in this chapter in order to evaluate the initial definition and synthesised dimensions for psychosocial inclusivity in design. A questionnaire survey is one of the typical quantitative methods that provides a direct approach for researchers (Robson & McCartan, 2016). Considering that the survey is a systematic descriptive data collection method, it is used in order to obtain information regarding participants' analytical perspectives and opinions without great concern for the numerical precision (Fowler, 2002), and to provide validation of a theory (Gray, 2013; Henn et al., 2009).

For the survey in this chapter, an online-based questionnaire was chosen. This is an effective data collection method with several advantages, such as low cost and time saving, in comparison to the traditional survey types, such as face to face or mail survey (Robson & McCartan, 2016). 'Google Forms' was selected as the data collection tool. 'Google Forms' is a business product provided by Google, and it provides a survey platform for users to collect and analyse the data easily and effectively.

7.2.3 Questionnaire design

The questionnaire consisted of four sections: Introduction, Part A (questions regarding initial definition), Part B (questions regarding synthesised dimensions), and Part C (background information of participants). A mixture of closed and open-ended questions was selected. Table 7.2 presents the structure of the questionnaire.

Table 7.2 The structure of the questionnaire

Part	Focus	Question type
Introduction	Introduction of the survey including purpose and key definitions	N/A
Part A	Clarification of reliability and validity of the initial definition	Closed-ended question (seven-point Likert scales)
	Evaluation of the initial definition	Open-ended type questions
Part B	Clarification of reliability and validity of the initial dimensions	Closed-ended type questions (seven-point Likert scales
	Evaluation of the synthesised dimensions	Open-ended type questions
Part C	General background information including gender, age, profession, and year of career	Closed-ended type questions + Open-ended type questions

According to Brace (2018), the rating question is the one of the best question types to identify the frequency of participants' attitudes or behaviours. Thus, the seven-point Likert scales (Linkert, 1932), which is ranging from 1 (strongly disagree') to 7 (strongly agree) (Vagias, 2006) and the most common format along with five-point Likert scales (Naresh & Mark, 2006), was adopted for the closed-end questions in order to have greater details of responses from the participants. The open-ended question type was adopted proceeding the Likert scales questions so as to answer the second and third research questions. This question type allowed participants to add their own perspectives regarding the definition and dimensions.

In the design of the questionnaire, the Kirkpatrick four levels of evaluation model (Phillips, 1990) was adopted for designing appropriate questions. Phillips (1990) and Ahmed (2000) suggest that the Kirkpatrick evaluation model is a suitable model for data collection and can act as evaluation criteria in both industry and academia to evaluate new concepts. Table 7.3 presents the details of the Kirkpatrick model and survey question numbers in relation to each level.

Table 7.3 Survey question numbers based on Kirkpatrick four levels of evaluation model

Four levels	Purpose	Question numbers addressing level	
Reaction	Identifying participants' thoughts about the definition and dimensions	A-1	B-1
Learning	Identifying participants' learning from the definition and dimensions	A-2,3, 7, 8, and 9	B-2, 3, 7, 8, and 9

Behaviour	Identifying the capability and behaviour implementation and improvement of the definition and dimensions	A-4,5	B-4,5
Results	Identifying the effect of the definition and dimensions on participants' work	A-6	B-6

Part A consisted of nine questions regarding the initial definition. The initial definition of psychosocial inclusivity in design was provided at the beginning of this part. Through the first six questions, the participants were asked about their impression of the given definition, such as understanding, usefulness, and impact of the definition, by using Likert scale questions. The last three questions were the open-ended questions. Participants were asked to state their own opinions as to whether there were any wordings or phrases to be refined, added, or removed in the initial definition.

In Part B, the participants were asked about the synthesised dimensions through nine questions, which consisted of six Likert scale and three open-ended questions, as in Part A. In order to provide the dimensions at the beginning of this part, a link to the website that consisted of a brief description and illustration of dimensions was provided for participants' convenience, as shown in Figure 7.2. The dimensions on the website were presented in the simple form of an illustration and graphical user interface. Each theme and sub-theme responded with a colour change when participants moved a mouse cursor onto each theme. Participants could check the definitions and codes of main themes and sub-themes by clicking the buttons. Participants were then asked about their impressions regarding the dimensions, such as understanding, usefulness, and impact of the dimensions through six Likert scale questions. The last three questions were the open-ended questions, as in Part A. Participants were asked to provide their own opinions as to whether there were any wordings or phrases to be refined, added, or removed in the dimensions.

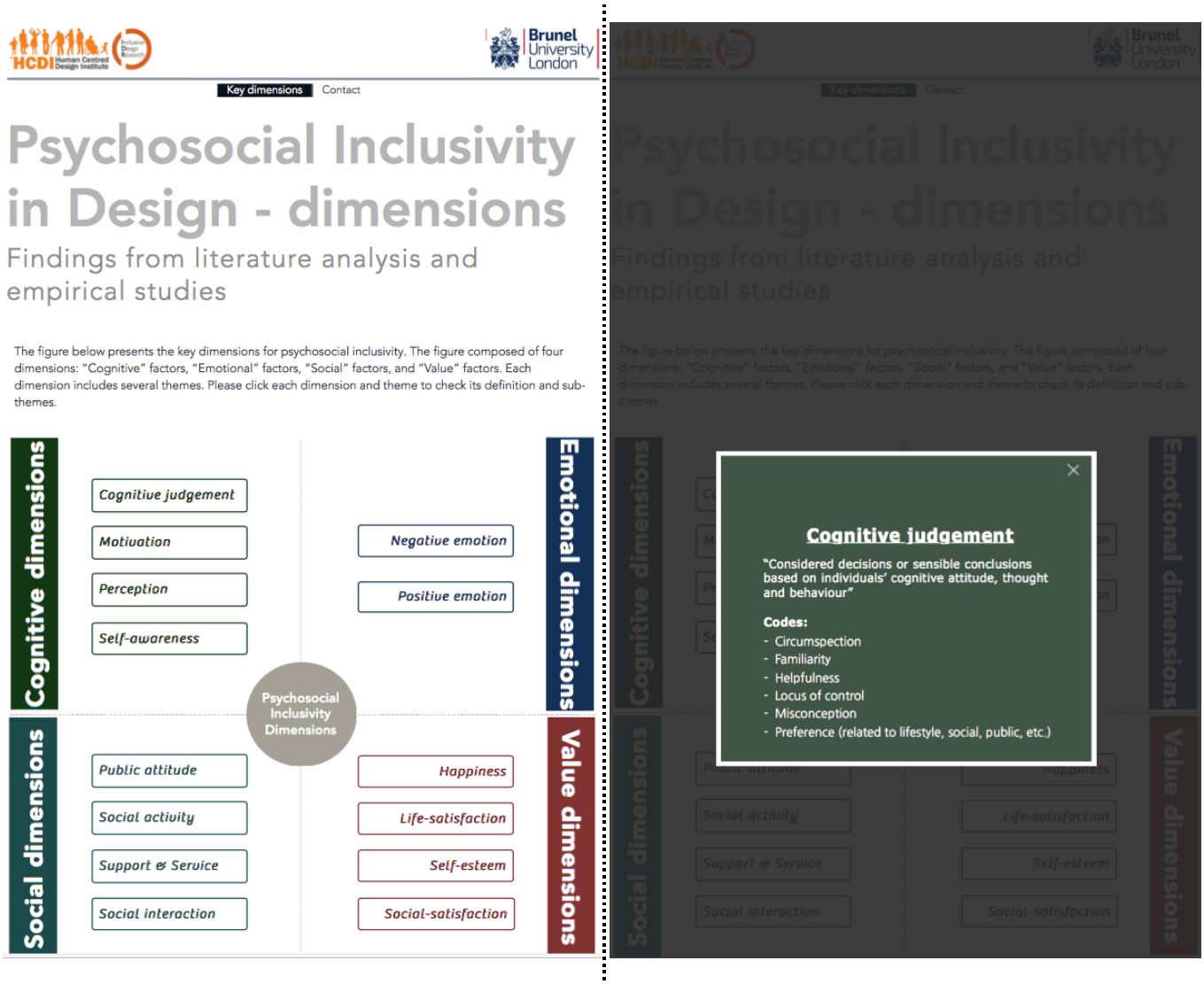


Figure 7.2 Illustration of the synthesised dimensions for psychosocial inclusivity in design. The picture on the left-hand side shows the main page. If a participant clicked on a sub-theme e.g. 'Cognitive judgement', its details including definition and codes were presented in the pop-up window, as shown in the picture on the right-hand side. The website is available from: https://yonghunlim83.wixsite.com/dimensions

In Part C, participants were asked about their background information, including gender, age, profession, and career experience. Email address was requested in order to make further contact if and where needed. The complete set of questions is included in Appendix N.

Additionally, prior to starting the survey, research ethics approval was sought and granted by the Research Ethics Committee of Brunel University London.

7.2.4 Sampling

Non-probability sampling was used for the sampling method. It was considered suitable for the exploratory nature of research and the unidentified population size (Henry, 1990). In

the non-probability sampling, 'purposive sampling' (Robson & McCartan, 2016), which is "the researcher's judgement as to typicality or interest" (Robson & McCartan, 2016) was selected to enhance the representativeness of sample. Additionally, Henry (1990) stressed that a sample size is one of the crucial factors in both qualitative and quantitative approaches. There are several arguments regarding sample size of the quantitative study (Delice, 2010), and Bernard (1995) suggests 30 to 50 valid participants for the questionnaire type study.

In order to obtain an adequate quality and size of samples for the survey, the target audiences were searched through LinkedIn, which is a business-oriented social networking service. On LinkedIn, the relevant individuals, based on their current and past career record, and membership of professional groups, based on the title and details of the group including purpose and members, were searched and selected. Further, several participants from the Delphi study (Chapter 3) who met the criteria of the sampling were included in the study.

7.3 Data collection and analysis

7.3.1 Survey protocol

The invitation email was sent to the list of participants created. Further, the invitation statement was posted on the chosen LinkedIn groups. In order to encourage participation and increase participants' understanding of the survey, the link to the questionnaire was also provided with the invitation email and post.

The participants who were willing to participate in the survey completed the questionnaire via the provided link to Google Forms. Further information or explanation was provided for the participants who showed an interest or had inquiries regarding the survey.

7.3.2 Data analysis protocol

The analysis of the data from the survey was carried out by two researchers, including one final year PhD researcher in design (male) and one design researcher with over 15 years of experience (female). Considering that the conducted survey was a descriptive study, frequency distribution analysis (Neuman, 2003) was selected for the close-ended questions (questions 1 to 6 in parts A and B). Means and Standard Deviation (SD) of scales were calculated by using Google Forms and Statistical Package for the Social Sciences (SPSS) software, which is an effective quantitative data analysis tool for social science research. The results of the calculations are presented and discussed in the later sections.

Further, the 'In Vivo' coding method, a qualitative coding method that is also known as "Literal coding" and "Verbatim coding" (Saldaña, 2015) was selected for analysing open-ended questions (questions 7 to 9 in parts A and B). In Vivo coding is used to capture the actual language, i.e. terms or short phrases used by participants in the collected data (Strauss, 1987). The results of the coding analysis are presented and discussed in later sections.

7.4 Results

A total of 89 survey requests were sent to design practitioners and academic designers including lecturers and researchers. Out of 89 requests, 47 of them were granted and responses were returned, indicating a 52.80 per cent return rate overall. Considering the suggestion of Creech and Steve (2007), a return rate of 50 to 59 per cent is adequate.

7.4.1 General background information

The participants were asked about general background information at the end of the survey (questionnaire part C), and the background information is introduced first for convenience. Figure 7.3 shows the percentages of participant groups. There were 24 design practitioners (51.1%) and 23 design academics (48.9%). Design practitioners were from various fields including product design, industrial design, UX design, design management, environmental design, and architecture. The participants in the design academics group identified themselves as researchers or lecturers.

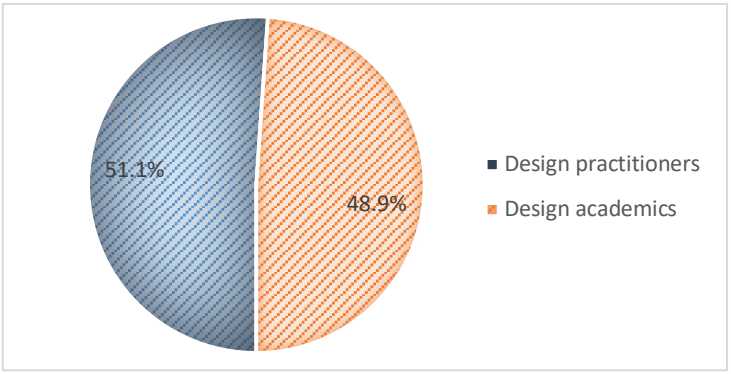


Figure 7.3 Participants' working fields

The participants' number of years of experience was also identified, as presented in Figure 7.4. Considering that this survey was conducted as an evaluation study, the years of working experience was considered relevant to the quality of participants' responses, which possibly provide better reliability and rigour to the survey results. Thus, participants' number of years of working experience was taken into the consideration as an important factor in this

study. Most participants (78.9%) had more than five years of experience in the design industry or academia. More specifically, 42.7 per cent of participants had more than ten years, and 15 per cent of the participants responded that they had more than 20 years of experience.

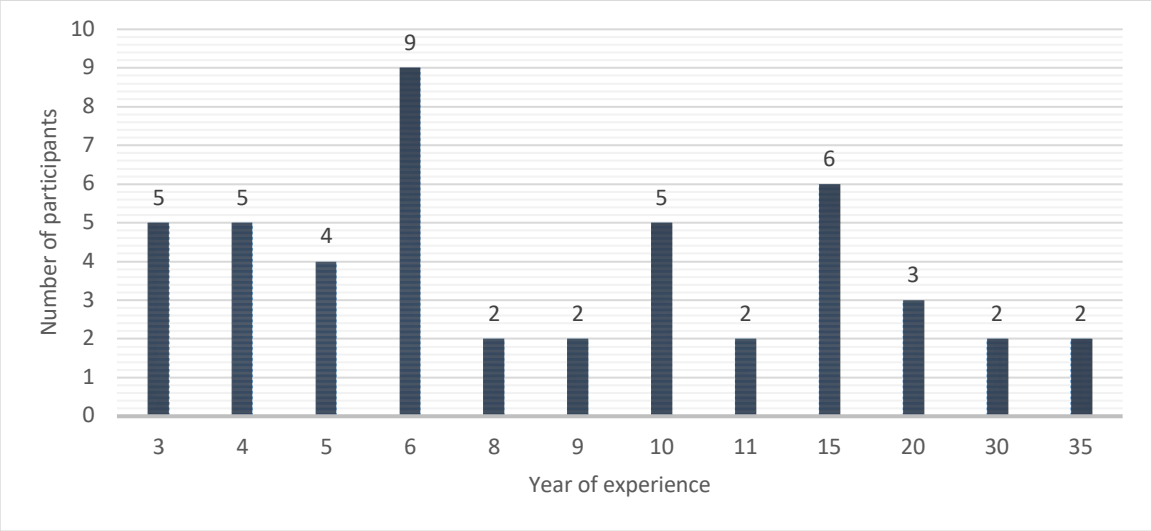


Figure 7.4 Participants' number of year of working experience

Further, Figure 7.5 shows the gender ratio of the survey as 20 females (42.6%), 26 males (55.3%), and one participant as not willing to share (2.1%). Figure 7.6 presents the age group of participants, with more than 57 per cent (27 participants) of participants aged 30 to 39.

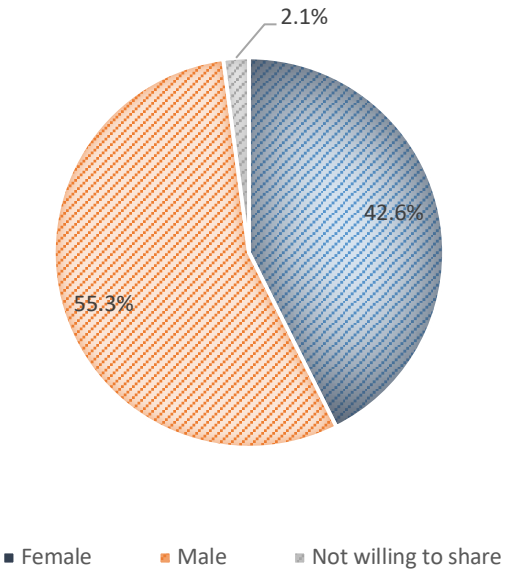


Figure 7.5 Participants' gender

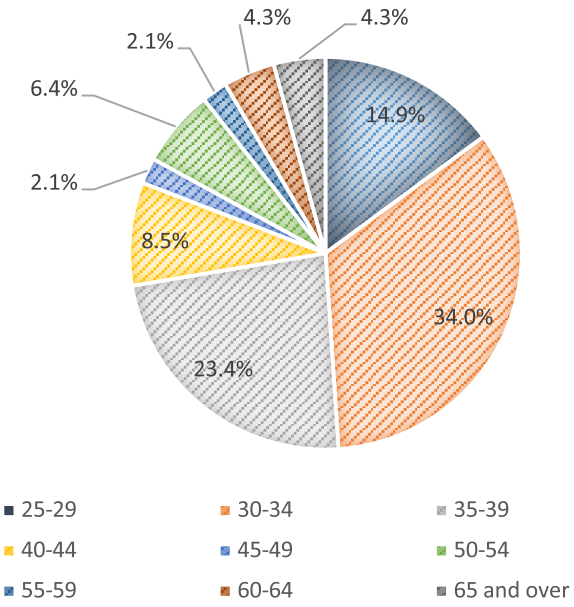


Figure 7.6 Participants' age ranges

7.4.2 Questionnaire part A regarding the initial definition

Closed-ended questions

Table 7.4 presents the closed-ended questions (A-1 to -6) of the questionnaire part A.

Table 7.4 Closed-ended questions in Questionnaire Part A

No.	Closed-ended questions
A-1	Do you think that the definition is rational based on your knowledge, experience or expertise?
A-2	Does the definition help you to understand what the concept of psychosocial inclusivity in design is?
A-3	Do you think the definition addresses the core non-physical aspects that should be considered in inclusive design?
A-4	Would you like to apply the definition to your current or future work?
A-5	Would you like to introduce the definition to other designers or researchers?
A-6	Do you think that applying the definition will benefit and improve your work?

The collected data was analysed in multiple combinations using SPSS software in order to identify appropriate results. Table 7.5 presents the means and SDs of the results from these closed-ended questions. The results are separately presented based on the type of participants (either design practitioners or academics) in Table 7.5. In order to have a better

understanding of means and SDs in this section, the range of Likert scale for questions are presented in Table 7.6.

Table 7.5 The results of comparison analysis of means and standard deviations from questionnaire section A based on type of participants
**SD: Standard Deviation*

Type of participant		Question					
		A-1	**A-2**	**A-3**	**A-4**	**A-5**	**A-6**
Design practitioners	Mean	5.83	5.04	4.96	5.38	5.13	5.54
	Number of participants	24	24	24	24	24	24
	*SD	0.761	1.301	1.233	1.345	1.597	1.318
Design academics	Mean	5.17	4.73	5.35	5.09	5.13	4.91
	Number of participants	23	22	23	22	23	23
	SD	1.370	1.453	1.335	1.444	1.546	1.311
Total	Mean	5.51	4.89	5.15	5.24	5.13	5.23
	Number of participants	47	46	47	46	47	47
	SD	1.140	1.370	1.285	1.385	1.555	1.339

Table 7.6 Range of the seven-point Likert scales

Scale	Range of scale	Meaning
1	1.00 - 1.49	Strongly disagree
2	1.50 - 2.49	Disagree
3	2.50 - 3.49	Somewhat disagree
4	3.50 - 4.49	Neutral
5	4.50 - 5.49	Somewhat agree
6	5.50 - 6.49	Agree
7	6.50 - 7.00	Strongly agree

The total means of most questions in questionnaire section A were between 4.50 and 5.49, which is ‘somewhat agree’ (scale=5), although the total mean of question A-1 was 5.51. There were no significant variables between the means of design practitioners and academic designers.

SD values of the six questions are also provided. The SD presents how participants' answers were matched with each other. The average SD for the six questions was 1.345. question A-1 produced the lowest SD (SD=1.140), and A-5 indicated the highest SD (SD=1.555). The SDs presented in Table 7.5 imply that participants had similar opinions regarding the questions about the initial definition. The results for each question are presented in Appendix O.

Open-ended questions

Table 7.7 Open-ended questions in Questionnaire Part A

No.	Open-ended questions
A-7	Are there any wordings or phrases to be REFINED in the definition? If yes, WHAT are they and WHY? Also, please REFINE them base on your knowledge and expertise.
A-8	Are there any wordings or phrases to be REMOVED in the definition? If yes, WHAT are they and WHY? Please REMOVE them base on your knowledge and expertise.
A-9	Are there any additional wordings or phrases to be ADDED in the definition? If yes, WHAT are they and WHY? Please ADD them base on your knowledge and expertise.

Table 7.7 presents the open-ended questions (A-7 to -9) of the questionnaire part A. Participants were asked to evaluate the initial definition with recommendations for refining, adding, or removing any wording or phrases based on their experience and expertise. The words raised by the participants were 'confusing' and 'missing'. The most significant words and phrases mentioned by participants were 'equal opportunity' (n=11), 'better' (n=10), 'quality of life'(n=8), 'provision' (n=7), 'psychological and social factors' (n=7), and 'as many people as possible' (n=6). Indicative examples of participants' comments include:

> *[Equal] "The word 'equal' can be debatable as it presumes the design is for a specific target audience. Inclusive design for me, as stated in the definition, is for all people trying to include as many people as possible."*
>
> *[Equal] "'Equal' by definition refers to - of the same measure, quantity, amount, or number as another, but when applying to the philosophy of the design that can be appreciated by all, regardless of any differences, 'equality' may fall apart. This is because, for example - the handicapped persons should not be treated equally like the able body persons, due to their disabilities. Instead, they should be given special attention."*

[Opportunities] "The sentence of the definition does not contain a reference to 'design'. It refers to 'opportunities', which is very broad. Maybe this should be 'opportunities in design'?

[Better Quality of life] "'quality of life' may need a definition, and 'better' is a vague term."

[Provision] "The definition talks about provision, not about design. It may be a good definition of psychosocial inclusivity in society or in provision or for a government, but I'm not sure it is helpful for a designer."

[As many people as possible] "I'd refine 'as many people as possible' to 'everyone'. If we're defining psycho social inclusivity, we should be providing an absolute definition for people to aspire to rather than one that allows people to take a shortcut and say 'we're helping as many as possible' while still excluding some."

7.4.3 Questionnaire part B regarding the initial dimensions

Closed-ended questions

Table 7.8 Closed-ended questions in Questionnaire Part A

No.	Closed-ended questions
B-1	Do you think that these dimensions are rational based on your knowledge, experience or expertise?
B-2	Do you think that these dimensions are rational based on your knowledge, experience or expertise?
B-3	Do you think these dimensions address the psychosocial aspects that should be considered in inclusive design?
B-4	Would you like to apply these dimensions to your current or future work?
B-5	Would you like to introduce the dimensions to other designers or researchers?
B-6	Do you think that applying the dimensions will benefit and improve your work?

Table 7.8 presents the closed-ended questions (B-1 to -6) of the questionnaire part B. The answers regarding the initial dimensions are synthesised and analysed in this section. Table 7.9 provides the mean and SD values for questions B-1 to B-6, which were Likert scale questions. In Table 7.9, these values are separately presented based on the type of participant groups (design practitioners and academics). The total mean for each question was identified: 5.63 for question B-1; 5.35 for question B-2; 5.6 for question B-3; 5.4 for question B-4; 5.51

for question B-5; and 5.27 for question B-6. The means for questions B-1, -3, and -5 were over 5.50, which refers to 'agree' (scale=6). The remaining means from questions B-2, -4, and -6 were between 4.50 and 5.49, which is 'somewhat agree' (scale=5).

The SD values of questionnaire Part B were also identified from the data analysis of questions B-1 to B-6. Both groups showed reliable SD values; each average SD value was 1.217 for design practitioners and 0.909 for design academics. Specifically, the academics showed significant agreement in their responses. The results for each question is presented in Appendix O.

Table 7.9 The results of comparison analysis of means and standard deviations from questionnaire section B based on type of participants
**SD: Standard Deviation*

Type of participant		**Question**					
		B-1	**B-2**	**B-3**	**B-4**	**B-5**	**B-6**
Design practitioner	Mean	5.71	5.37	5.74	5.3	5.41	5.35
	Number of participants	24	24	23	23	22	23
	*SD	0.955	1.313	1.01	1.295	1.297	1.434
Design academic	Mean	5.55	5.32	5.45	5.5	5.62	5.18
	Number of participants	22	22	22	22	21	22
	SD	0.596	1.287	0.912	0.802	0.805	1.053
Total	Mean	5.63	5.35	5.6	5.4	5.51	5.27
	Number of participants	46	46	45	45	43	45
	SD	0.799	1.286	0.963	1.074	1.077	1.25

Open-ended questions

Table 7.10 Open-ended questions in Questionnaire Part B

No.	**Open-ended questions**
B-7	Are there any main themes or sub-themes to be REFINED? If yes, WHAT are them and WHY? Also, please REFINE them base on your knowledge and expertise.
B-8	Are there any main themes or sub-themes to be REMOVED? If yes, WHAT are them and WHY? Please REMOVE them base on your knowledge and expertise.
B-9	Are there any additional main themes or sub-themes to be ADDED? If yes, WHAT are them and WHY? Please ADD them base on your knowledge and expertise.

Table 7.10 presents the open-ended questions (B-7 to -9) of the questionnaire part B. The participants were asked to further revise and develop the initial dimensions by giving recommendations under the three categories of refining, adding, or removing main themes, sub-themes, or codes, based on their experience and expertise. The suggestions from the participants regarding the dimensions are presented in Table 7.11.

Table 7.11 Summary of participants' suggestions for the initial dimensions

	Refine (number of occurrences)	**Remove**	**Add (number of occurrences)**
Cognitive dimension	- In 'Perception', 'many people' should be refined as 'oneself' (n=1) - 'self-awareness of health' and 'age' should be combined (n=1)	N/A	- More details for 'self-awareness'(n=1) - 'Sensorial factors' (n=1) - 'Affordances' (n=1) - 'Cognitive capability' (e.g. memory, executive function, intelligence, etc. Self-efficacy) (n=1)
Emotion dimension	- Several codes also could be placed under other dimensions (n=2)	N/A	- More details of 'Emotional dimensions' (n=4) - 'Feeling of anger' (n=1) - 'safety' to both the positive and negative emotions (n=1) - 'Neutral emotions' (e.g. surprise & suspense) (n=1) - 'Threat level' (n=1)
Social dimension	- 'Social activity' should be refined as 'Social opportunity' (n=1) - More sub-themes are needed (n=1)	N/A	- 'Socio-cultural context' (n=1) - "bandwagon effect' should be in "public attitude" (n=1) - 'Environmental/economical' factors (n=1) - Details (examples) of social factor (n=1)
Value dimension	- 'Social-satisfaction" should be move to under 'social interaction' (n=1) - 'Social activity' and 'social interaction' should be combined (n=1) - 'Life-satisfaction' and 'self-esteem' should be combined (n=1) - Sub-themes and codes of Value dimensions should be move to under 'Emotional dimensions' (n=1)	N/A	- 'Purpose' (n=1) - 'Meaning' (n=1) - 'Self-actualisation' (n=1) - 'Personal values' (n=1) - 'Social values' (n=1) - 'Political values' (n=1) - 'Economic values' (n=1) - 'Religious values' (n=1)
Further suggestion	N/A	N/A	- 'Stages of life' (n=1) - 'Experience' (n=1)

Indicative examples of participants' comments regarding each dimension and the general aspects based on the three categories are presented in Table 7.12.

Table 7.12 Significant comments from the participants regarding the initial dimensions

	Comment
General aspects of dimensions	"I am not sure they are as separate as they appear in the diagram. E.g. Motivation is not always a cognitive thing. Perhaps could do a Venn-type diagrams and blend them little bit?"
	"The concept is very valid, reflecting in some ways much earlier work by people like Maslow. I like the analysis as it is clear and cohesive."
	"No suggestions - range of themes, sub-theme, and codes seems conclusive"
	"I didn't understand what some of the definitions meant […] The definitions need to be refined to be clearer to someone who is not an expert in psychology."
	"The main areas are good and cover most aspects, but I don't think the themes within each area are comprehensive."
	"I would not remove anything."
Cognitive dimensions	"In 'Perception' definition, the words "many people" Is the definition about individuals or the general public? If it is the former, perhaps "oneself" might be better."
	"Maybe combining self-awareness of health and age"
	"Enrich self-awareness"
	"Sensorial factors or affordances, should be added because products and services can support user action or well-being without requiring users' memory, inference, and further interpretation"
Emotion dimensions	"Emotions can't be defined as black and white. Emotional/value dimensions seem to overlap to each other, though i understand the context, it needs to articulate better, it's too conceptual for me."
	"Under Emotional Dimensions I would have included the term Threat Level. This is measured by looking at the non-social way finding opportunities and spatial logic in the design. This might be covered by Negative Emotion, but people may also interpret this as being sad, which is not quite the same thing."
Social dimensions	"instead of Social Activity I would have used the term Social Opportunity. The reason for this is that in my work I look to provide a range of social access opportunities. These range from Individual, where a user plays on their own, but has visual and possibly verbal social access, to Group, where opportunity is provided for groups to interact."
	"Social activity and Social interaction seem very similar."

Value dimensions	"It is also a bit unclear, why 'social-satisfaction' belongs to Value dimensions (it seems very closely linked to 'social interaction')"
	"In 'social-satisfaction' definition, '...firm' can be changed to '...society'? Or '...organisation'?"
	"Codes under "value dimensions" seem to be related to a person's level of satisfaction, not their values.
	"Value factor does not seem very clear to me why it needs to be a separate category. Some of the items in the category may be outcomes of the other defined categories in the framework."

7.5 Discussion

This chapter attempts to answer the research questions: a) Are the definition and the dimensions helpful to address the psychosocial aspects of inclusive design? b) Are there any wordings or phrases to be refined, added, or removed in the initial definition? c) Are there any main themes or sub-themes to be refined, added, or removed in the dimensions?

In order to answer these research questions, an online-survey with designers from both academia and industry was conducted. Several suggestions were provided by participants as presented in the results section. In this section, the suggestions made regarding the evaluation of the initial definition and dimensions for psychosocial inclusivity in design are discussed. Significant recommendations are presented below.

Suggestions regarding the initial definition

Participants mentioned that several words and phrases were somewhat confusing. In particular, 'better', 'quality of life', and 'psychological and social dimensions' were considered general and broad; hence, the terms could be construed in different ways and therefore needed more details. For example, the word 'better' is a broad term without a specific definition, so it can be open to interpretation. Also, the phrase 'quality of life' may lead to misunderstanding, as it is a multi-disciplinary concept that is used in various fields. The details of the 'psychological and social factors' were introduced through the initial dimensions in questionnaire part B.

Further, several participants mentioned that 'equal' was an inappropriate term. The term equal indicates two or more things that are the same in number, value, or size, etc. However,

considering that the target audience of inclusive design is 'as many people as possible', providing equal opportunities may not meet the aim of inclusive design.

Several participants added that the term 'design' should be included in the definition, as the definition was created for design academics and practitioners. One participant suggested that the term 'opportunity' in the definition could be replaced by 'design'.

Consequently, the definition was slightly revised based on participants' comments. The evaluated definition of the psychosocial inclusivity in design is:

> *"The provision of equal or equitable opportunities in design for a better quality of life for as many people as possible, considering both psychological and social factors."*

This revised definition encompasses the psychological and social aspects of inclusive design that could be appropriate considerations in design applications.

Suggestions regarding the initial dimensions

Several participants commented that the dimensions were reliable and conclusive, although some participants argued that the dimensions were general. Further, several sub-themes and codes overlapped, so a Venn diagram was suggested to present the dimensions. However, there were also several detailed comments regarding some major themes, sub-theme, and codes.

In relation to the 'cognitive dimensions', participants recommended adding more details to the sub-themes and codes, such as 'sensorial factors', 'affordances', 'self-efficacy', and 'cognitive capability', including memory, executive function, and intelligence. For example, one of the participants argued that user action or well-being could be supported by the products or services without users' 'sensorial factors', such as memory, inference, and further interpretations, so the 'affordance' or 'sensorial factors' could be one important psychosocial factor.

In relation to the 'emotional dimensions', participants argued that current sub-themes (positive emotion and negative emotion) could be more specific, as the concept of emotion is multi-faceted and used in various study areas. In addition, several codes such as 'feeling of sadness' and 'feeling calm' seemed to be the results of other sub-themes or codes rather than the factors of emotion.

In relation to the ‘social dimensions’, participants suggested changing ‘social activity’ to ‘social opportunity’, because social opportunity is given to individuals to participate in social activities in a social group. Participants also suggested several additions to the ‘social dimensions’. In the suggestions, ‘socio-cultural context', ‘bandwagon effect’, ‘environmental and economical factors’, and also the specific examples of social dimensions were recommended by the participants.

Regarding the ‘value dimensions’, several participants agreed that they overlapped with other dimensions. For example, one of the sub-themes, ‘social satisfaction’, seemed to be part of ‘social dimensions’, or should have been combined with ‘life-satisfaction’. Several new dimensions as further details of value dimensions were also suggested by participants. The suggested dimensions were ‘purpose’, ‘meaning’, ‘self-actualisation’, ‘stages of life’, ‘personal values’, ‘social values’ ‘political values’, ‘economic values’, and ‘religious values’.

The most common comments from the participants regarding the identified dimensions of the psychosocial aspects of inclusive design include: a) the dimensions are rather general and b) several codes overlapped with other themes or sub-themes. In response to the first comment, the concept of the psychosocial aspects of inclusive design is a wide and overarching notion in various study areas. Hence, the identified dimensions can be categorised in several ways based on the purpose of the research. In response to the second comment, there is currently a limited understanding of the psychosocial aspects of inclusive design. A basic understanding is sought herein. Therefore, the dimensions remain in their original form at this stage considering there were no major issues raised by the participants.

Limitations

There was a methodological limitation in the sampling procedure. The sample size was limited, although Bernard (1995) suggests that a valid number of participants for questionnaire research is between 30 and 50. Considering the purpose of this study, which was evaluating the initial definition and dimensions for psychosocial inclusivity in design, purposive sampling (Robson & McCartan, 2016) was adopted. For this, the participants should have an understanding or experience of the concept of inclusive design. Therefore, in the sampling, undergraduate-level design students who had limited understanding and experience in design were excluded from the potential participants. With the sampling criteria,

the number of potential participants (n=89) for the study was narrowed down. In addition, the four levels of evaluation model by Kirkpatrick was adopted for designing the questionnaire. This critical sampling and designing procedure for the questionnaire was used to raise the quality and reliability of the responses.

7.6 Chapter summary

In this chapter, an online survey with designers from both academia and industry was conducted as an evaluation study. Through the online survey, the evaluation and discussion of the research findings has led to recommendations in the form of the definition and dimensions for psychosocial inclusivity in design. Based on the comments and suggestions of the participants, the initial definition and dimensions identified through the empirical studies (Delphi study, field studies I and II) in the previous chapters were evaluated and validated. Several questions regarding the definition and dimensions raised by participants were clarified in the discussion section.

In the next chapter, a discussion of the key outcomes of the overall research based on the research purpose and questions will be provided. Further, the research limitations and future research will be discussed.

CHAPTER 8: Conclusion

8.1 Introduction

The purpose of this PhD research has been to explore the concept of psychosocial inclusivity in design. In order to achieve this purpose, the initial definition and dimensions for psychosocial inclusivity in design were established through a literature review in both the social science and design fields. In order to refine and develop these initial outcomes, several different empirical studies were conducted. The empirical studies were: the Delphi study (expert survey, n=10); field study I (ethnographic interviews with mobility scheme users, n=37); field study II (ethnographic interviews, n=31; creative workshop n=19; and observation of older individuals, n=8); and evaluation study (online survey of design academics and professionals, n=47). The studies were conducted using a triangulation approach in order to enhance the validity and reliability of the outcomes.

This chapter provides an overall summary of the outcomes of the studies, of the contribution to knowledge of this PhD research, of its limitations, and provides recommendations for future research (Figure 8.1).

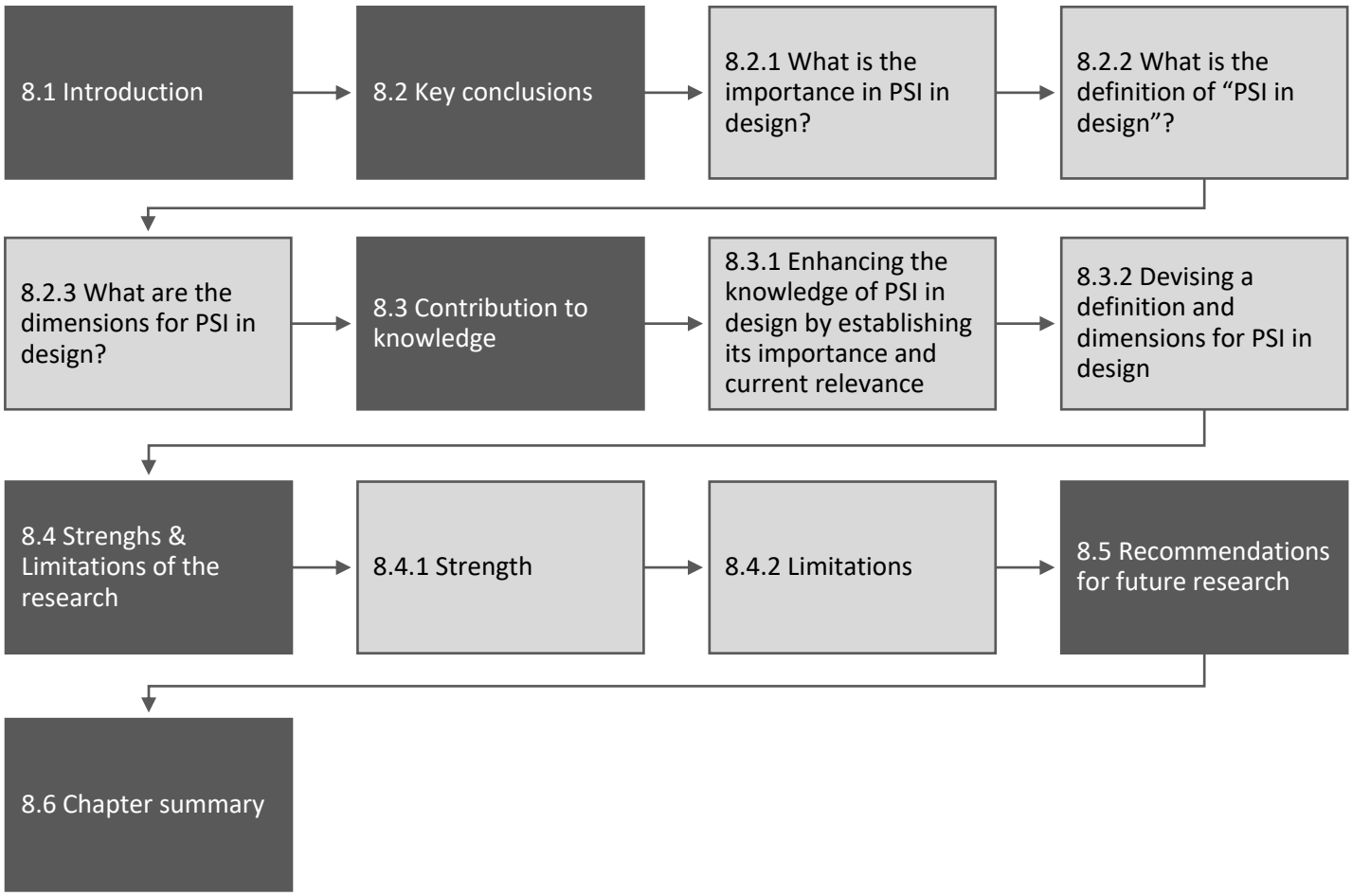


Figure 8.1 Chapter map
**PSI: Psychosocial Inclusivity*

8.2 Key conclusions

The PhD research was conducted in order to answer the research questions (as presented in Chapter 1):

8.2.1 What is the importance in psychosocial inclusivity in design?

United Nations (2017) stressed that the world population is more than 7.6 billion, and this number will be increased a billion every 12 to 15 years. Within this worldwide population changes, in the UK for example, 23.2 million people are aged 50 or over; 11.4 million people are aged 65 years or over and these number is about 30 percent of the UK population (UK Office for National Statistics, 2015). Another compelling factor is disabled people. According to the Department for Work and Pensions (2015), there is 19 percent (11.9 million) of people in the UK are suffering from at least one impairment such as mobility, vision, hearing, mental health, social and behavioural issues. This demographic change causes several social and the

economic issues. For example, public expenditure connected with ageing issues in European Union countries was 23.1% of GDP in 2007. Additionally, over 60% of the disabled population is already over retirement age, requiring a high level of financial support such as primary care, medical attention and transport services (Frye, 2013).

The world of inclusive design has broadened and diversified alongside these global social changes (including socio-economic changes and cultural movements) in order to achieve better social inclusion although the purpose of inclusive design is the provision of accessible and usable design for as many people as possible. Within this trend, the concept of inclusive design has been highlighted in various papers as a driving force to achieve better social equality for diverse populations (Broers et al., 2005; Johnson et al., 2010; Fitzpatrick et al., 2005; Piatt, 2005).

However, inclusive design remains focused on physical and tangible inclusivity: accessibility, usability, and functionality. This limited focus can also be traced in existing policies and regulations, which mainly focus on resolving barriers to physical access or usability in infrastructure and technologies. This limitation has led various voices in academic and professional design to speak of the need for further consideration of the psychosocial inclusivity in design (Frye, 2013; Hedvall, 2013; Steinfeld, 2013; Nickpour et al., 2012; Demirkan, 2007; Imrie and Hall, 2003; Webb et al., 2001; Gaver and Martin, 2000; Demirbilek & Demirkan, 1998).

While the importance of the psychosocial inclusivity in design has been emphasised in some research, a limited understanding of psychosocial aspects of inclusive design has also been identified. A possible explanation is that the psychosocial inclusivity in design is not particularly visible or explicit, hence seen as a 'soft' issue. Therefore, it is complex and challenging to define, measure, improve, and assess it. In order to identify the psychosocial inclusivity in design, several empirical studies have been conducted in this research.

8.2.2 What is the definition of "psychosocial inclusivity in design"?

Until now, lack of universal definition of psychosocial inclusivity existed in the field of inclusive design, as identified in the literature review in Chapter 2. In this review, 102 references from non-design fields (including psychology, sociology, and healthcare) and 37 references from design field were collected and analysed. Based on an analysis thereof, an initial definition and set of the dimensions of psychosocial inclusivity in design were created

as presented in Chapter 2. In Chapter7, the initial definition was then evaluated using an online survey with selected participants: academic and professional designers. The evaluated definition for psychosocial inclusivity in design is:

> *"The provision of equal or equitable opportunities in design for a better quality of life for as many people as possible, considering both psychological and social factors."*

8.2.3 What are the dimensions for psychosocial inclusivity in design?

The initial dimensions for psychosocial inclusivity in design, including four main themes of 'Cognitive', 'Emotional', 'Social', and 'Value' dimensions and their sub-themes and codes, were identified based on the existing psychosocial dimensions from the literature analysis in Chapter 2. Further sub-themes and codes of these dimensions were identified through a range of empirical studies, and categorised according to the four dimensions based on their meanings and implications. These identified sub-themes and codes were synthesised, refined, and evaluated in Chapter 7. Figure 8.2 shows an illustration of dimensions for psychosocial inclusivity in design including four major themes and their sub-themes. Additionally, the full set of the dimensions are presented in the table 8.1.

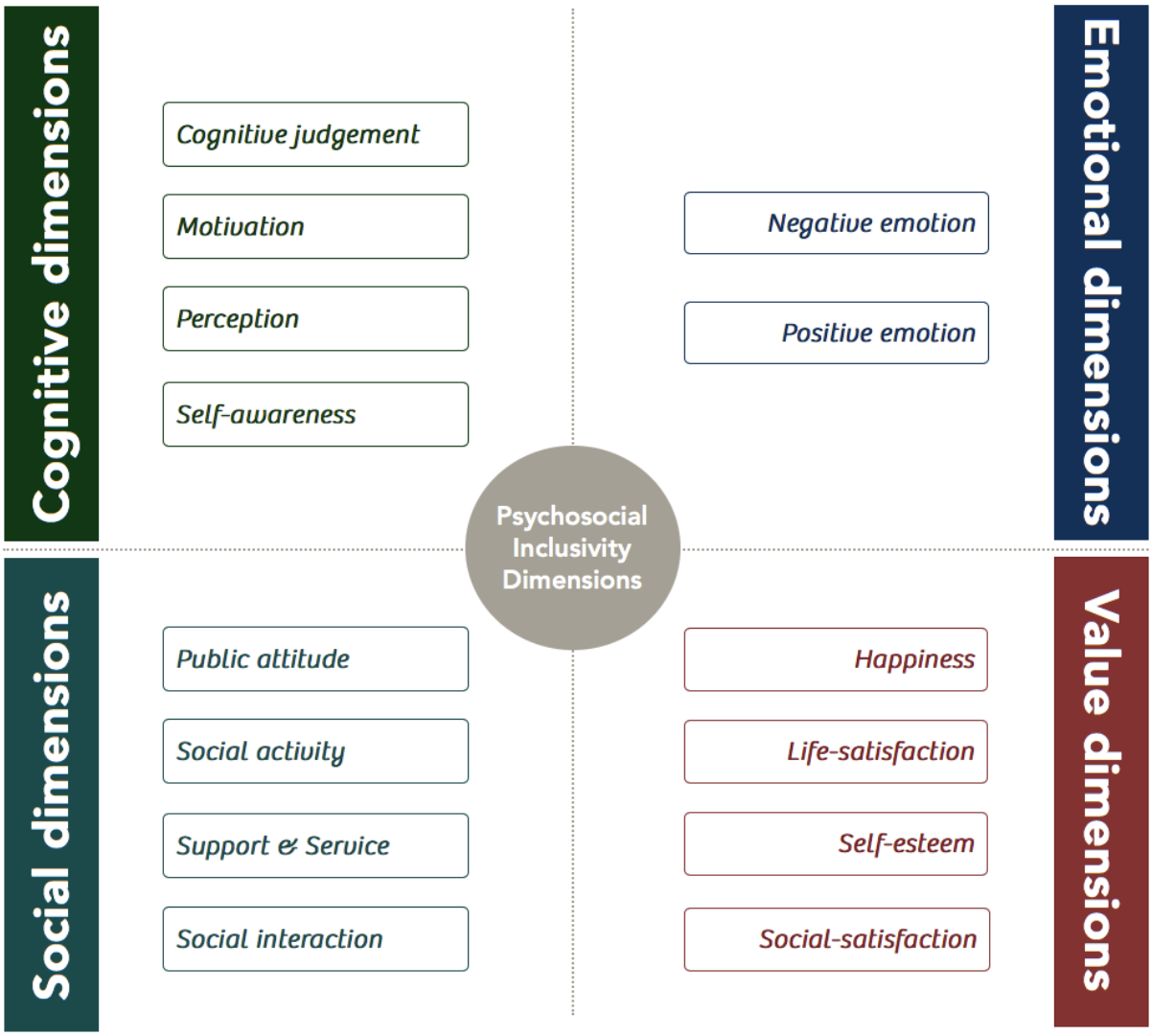


Figure 8.2 Illustration of the dimensions including theme and their sub-themes for psychosocial inclusivity in design

Table 8.1 Full set of dimensions including themes, sub-themes and codes for psychosocial inclusivity in design

Theme	Sub-theme	Code	
Cognitive dimension	Cognitive judgement	- Circumspection - Familiarity - Helpfulness - Locus of control	- Misconception - Preference (related to lifestyle, social, public, etc.)
	Motivation		
	Perception		
	Self-awareness	- Personal image - Self-awareness of Health	- Self-awareness of age

Emotional dimension	Positive emotion (Positive affect)	- Comfort - Enjoyment - Feeling calm	- Optimism - Thrill
	Negative emotion (negative affect)	- Anxiety - Boredom - Decreased self-esteem - Embarrassment - Fears	- Feelings of sadness - Frustration - Hopelessness - Loneliness - Self-consciousness
Social dimension	Public attitude	- Discrimination - Public opinion - Social changes	- Cultural difference - Generational difference
	Social activity (Social participation/ engagement)	- Having guest (entertaining, hosting etc.) - Hobbies (class, club, etc.)	- Socialising - Volunteering activities
	Support & service	- Financial support - Support from others Incl. family	- Social service & support
	Social interaction (Social relation)	- Corporate culture - Interaction with others in public place - Social acceptance	- Social exclusion / Social isolation - Social integration - Social network - Social roles
Value dimension	Happiness	- A sense of hope - Eudemonic well-being - Fulfilment of Desires - Long-term health incl. mental health	- Meaningfulness - Pleasure - Successful aging
	Life-satisfaction	- Equal life opportunities - Fairness - Freedom	- Privacy - Safety - Security
	Self-esteem	- Sense of independence - Self-confidence	- Self-efficacy - Self-satisfaction
	Social-satisfaction	- Receiving emotional support - Reliability & Trust	- Sense of belonging - Social contribution

Cognitive dimensions:

This research applies this definition of the term “cognitive styles” to the “cognitive dimensions”: “characteristic modes of perceiving, remembering, thinking, problem-solving, and decision-making, reflective of information-processing regularities that develop in

congenial ways around underlying personality trends" (Messick, 1994). In this theme, the dimensions of behaviour, thinking, and attitude were categorised. The "cognitive dimensions" theme consists of four sub-themes: cognitive judgement, motivation, perception, and self-awareness. The sub-themes *'Motivation'* and *'Perception'* have been established from the initial dimensions (Chapter 2) and confirmed through the studies undertaken and discussed as part of this research. However, the sub-themes *'Cognitive judgement'* and *'Self-awareness'* have been newly identified by this research.

Emotional dimensions:

In the existing literature, there is a surprisingly limited consensus on the definition of the term "emotion," considering that it is such a broad and overarching concept (Mulligan and Scherer, 2012; Cole, et al., 2004; Kleinginna and Kleinginna, 1981; Chaplin and Krawiec, 1979). In this research, feeling or sense-related dimensions caused by relations with others, one's mood, or one's circumstances are included in the emotional dimensions theme. This theme consists of two sub-themes, positive emotions and negative emotions. There were no new sub-themes; however, several codes were additionally identified through the empirical studies in Chapters 5 and 6: *Comfort, Optimism, Embarrassment, Frustration,* and *Self-Consciousness.* These codes were identified from the two field studies in Chapters 5 and 6, and the participants in the studies emphasised that they had experienced such emotions in relation to other dimensions such as social interaction and public attitude. In the evaluative study in Chapter 7, the participants highlighted the correlation between emotional dimensions and other dimensions.

Social dimensions:

Larson (1996) highlighted that social interaction has a great influence on individuals' quality of life and wellbeing. It is also interdependent with physical, mental, and emotional factors. Kaslow, et al. (2007) also argued that the social factors dimension consists of "physical environment, external stressors, family environment, interpersonal relationships, social support, isolation, role models, social expectations, value system, sociocultural factors, and culture". This theme includes any activities, support, services, and specific dimensions such as public attitude and awareness can affect individuals' thoughts, feelings, and behaviour in their social lives. The social dimensions theme includes '*Public* attitude', '*Social* activity (social participation/engagement)', '*Service'*, and '*Social interaction (social relations)'*. While '*Social activity (social participation/engagement)', 'Support'*, and '*Social interaction (social*

relations') have already been identified in the initial dimensions (Chapter 2), '*Public attitude*' and '*Service'* were identified in Chapters 5, 6, and 7. These new themes and their codes relate to the practical situations of individuals in their community or society and provide great details of the social dimensions of inclusive design.

Value dimensions:

Gil Saura, et al. (2008) and Zeithaml (1988) stressed that the notion of value is also a wide concept in the literature. It has been used in various areas, including business, chemistry, ethics, marketing, mathematics, music, and physics. The general definition of value is as follows: "principles or standards of behaviour; one's judgment of what is important in life" (Oxford English Dictionary, 2017). This definition is used herein to describe the value dimensions theme in this research. Diener and Suh (1997) suggested three bases for identifying what is valuable or not to an individual: continuous choice, judgement of satisfaction, and judgment with reference to cultural norms or a value system. These are subjective and highly relevant to quality of life. Therefore, the dimensions of individuals' desires or beliefs are related to what is important in life based on their thoughts, beliefs, and emotions have been included in the value dimensions theme. This theme consists of happiness, life satisfaction, self-esteem, and social satisfaction. Through the empirical studies (Chapter 4, 5, 6, and 7) in this research, various new codes were additionally identified: *Eudemonic well-being, Fulfilment of Desires, Long-term health incl. mental health, Meaningfulness,* and *Successful aging,* in *'Happiness'; Equal life opportunities, Fairness, Freedom, Privacy* in *'Life-satisfaction'; Sense of independence* in *'Self-esteem'; and Receiving emotional support, Reliability and Trust, Sense of belonging, Social contribution* in *'Social-satisfaction'.* These sub-themes and codes provide further details of the value dimensions of psychosocial inclusivity in design.

8.3 Contribution to knowledge

This research has two main contributions to knowledge in this field: a) Enhancing the knowledge of psychosocial inclusivity in design by establishing its importance and current relevance and b) Devising a definition and dimensions for psychosocial inclusivity in design. The research provides specific details of the psychosocial inclusivity in design by providing the definition and the dimensions thereof.

8.3.1 Enhancing the knowledge of psychosocial inclusivity in design by establishing its importance and current relevance

This research has suggested the importance of the concept of psychosocial inclusivity in design through the literature review (Chapter 2) and expert survey (Chapter 4). Significant demographic changes, including the growing size of the population of people with disabilities and the older people due to the general increase in the size of the world population, have been recognised. This rapid demographic trend has raised various issues for these social groups, such as unemployment, social exclusion and isolation, low economic status, inequality, and discrimination. In the expert survey, it was found that the importance of psychosocial inclusivity in design is rooted in these social issues. Within these social issues, the utilisation of inclusive design has broadened in various fields, such as policymaking, lobbying, and social services in the global social context. With this extended utilisation of inclusive design based on lifestyle changes and multifaceted global socio-cultural challenges, several design experts from the literature and the expert survey have stressed the need for further consideration of the psychosocial aspects of inclusive design.

This research has also suggested the current relevance of psychosocial inclusivity in design. The importance of the psychosocial aspects of design in general has already been noted: pleasurable design (Jordan, 2002); emotional design (Norman, 2005); experiential design (Hassenzahl, et al., 2010; Pullman and Gross, 2004; Hekkert, et al., 2003); meaning-centred design (Giacomin, 2017; Verganti, 2013); and human-centred design (Giacomin, 2014; Brown, 2009). However, it is generally recognised that the current understanding and holistic application of inclusive design is limited, despite that it has been considered a responsible, positive, and widely applicable concept. This is because the main focus of inclusive design at present is physical access and inclusivity. This limited emphasis on the physical aspects of inclusive design can also be found in existing inclusive design policies and regulations in several developed countries. These policies and regulations mainly aim to provide greater physical accessibility and usability of technology and infrastructure. This was also confirmed in the expert survey. All the experts stressed that there are no existing concepts or applications regarding the psychosocial aspects of inclusive design. Accordingly, it was identified in Chapters 2 and 4 that the notion of the psychosocial aspects of inclusive design are scarce and have not been systemically explored in the existing literature and applications

of inclusive design. This has led to a great need for an appropriate definition of and applications for psychosocial inclusivity in design.

Furthermore, several chapters from this thesis have introduced through a journal and several conferences as a contribution impact

Journal paper

Lim, Y., Nickpour, F., & Giacomin, J. (2016). Beyond Accessible Mobility: Insights into Psychosocial Inclusivity Dimensions in Personal Transport. *Studies in health technology and informatics*, 229, 571-581.

Conference papers

Lim, Y., Giacomin, J. & Nickpour, F. (2018). Beyond Accessible Aisles? Psychosocial Inclusivity of Shopping Experience: an ethnographic investigation. *Proceedings of the DRS2018, Limerick, Ireland, 25-28.06.18.*

Lim, Y., Nickpour, F. & Giacomin, J. (2016). Beyond Accessible Mobility: Insights into Psychosocial Inclusivity Dimensions in Personal Transport. *Proceedings of the 3rd Universal Design 2016 (UD2016), York, UK, 21-24.08.16.*

Lim, Y., Nickpour, F. & Giacomin, J. (2016). Mentality Shift in Inclusive Design: From Physical to Psychosocial Inclusion. *Proceedings of the 8th Cambridge Workshop on Universal Access and Assistive Technology (CWUAAT 16), Cambridge, UK, 21-23.03.16.*

Lim, Y. and Nickpour, F. (2015). Inclusive design: from physical to psychosocial - a literature analysis towards a definition of psychosocial dimensions in design. *In DS 80-9 Proceedings of the 20th International Conference on Engineering Design (ICED 15) Vol 9: User-Centred Design, Design of Socio-Technical systems, Milan, Italy, 27-30.07.15.*

Poster presentation at conferences

Lim, Y., Nickpour, F. & Giacomin, J. (2016). Mentality Shift in Inclusive Design: From Physical to Psychosocial inclusion. [Poster] exhibited at. The 8th Cambridge Workshop on Universal Access and Assistive Technology (CWUAAT 16), University of Cambridge, UK, 22.03.16.

Lim, Y. and Nickpour, F. (2015). Psychosocial Inclusion in Design A definition and framework. [Poster] exhibited at. Include 2015, Royal College of Art, UK, 17 - 18.09.2015.

Lim, Y. and Nickpour, F. (2015). Inclusive design: from physical to psychosocial - a literature analysis towards a definition of psychosocial dimensions in design. [Poster] exhibited at. 20th International Conference on Engineering Design (ICED 15) Vol 9: User-Centred Design, Design of Socio-Technical systems, Milan, Italy, 27-30.07. 2015.

Lim, Y. and Nickpour, F. (2014). Psychosocial inclusion: A Framework for Design. [Poster] exhibited at. 7th Annual Student Research Conference 2014 (ResCon14), 23-26.06.2014.

8.3.2 Devising a definition and dimensions for psychosocial inclusivity in design

The outcomes from this PhD research provide a definition of psychosocial inclusivity in design. This PhD research also proposed dimensions for psychosocial inclusivity in design, including four themes i.e. 'Cognitive', 'Emotional', 'Social', and 'Value', along with the details of each theme and sub-theme. The dimensions for psychosocial inclusivity in design derived from several empirical studies (Chapter 5, 6, and 7) undertaken for this PhD research. They provide a basis for broadening the understanding of psychosocial inclusivity in design, with the potential to be considered by academics and professional designers as well as third parties and other professions which use inclusive design. The definition and dimensions are currently rather general and broad, but can form a basis for enhancing potential users' understanding and future exploration of psychosocial inclusivity in design.

Potential application

In Chapters 5 and 6, two major contexts of inclusive design were considered: people with mobility impairments and elderly individuals' supermarket shopping. Through the field studies, several psychosocial dimensions specifically related to these two contexts were identified. It can thus be argued that the findings from these two studies form an important starting point for designing psychosocially inclusive personal mobility or shopping experiences for elderly individuals.

It can also be argued that the definition and dimensions of the psychosocial aspects of inclusive design can be used to create practical tools, such as a complete framework or design toolkit, which can be used in practical design settings. For example, "Design Play Cards" developed by Eco Innovators (Wölfel and Merritt, 2013), a well-known design tool for sustainable design, can serve as an inspiration for the development of similar tools which address the issue of psychosocial inclusivity. This set of cards was designed based on agenda-driven or context-specific purposes, which provide a focus for a particular design agenda or context.

8.4 Strengths and limitations of the research

8.4.1 Strengths

***Originality*:** The previous understanding of psychosocial aspects was rather limited in design. This research has suggested the current limitations of inclusive design and has proposed a new definition and the associated dimensions of psychosocial inclusivity in design based on the existing literature and empirical studies.

Significance: The concept of psychosocial inclusivity in design was explored as a first investigation through this PhD research. It can be argued that the research can play a significant role in expanding the notion of psychosocial inclusivity in design.

Rigour: The research was thoroughly designed using appropriate research methodologies and included several empirical studies which involved both qualitative and quantitative methods. Method triangulation was used to enhance the rigour and robustness of the investigation.

8.4.2 Limitations

A range of methodological limitations, such as the small sample sizes, limited choice of the study context, or disadvantages associated with the chosen methods were discussed in detail in the discussion sections related to each of these studies in Chapter 4 (Delphi study), 5 (Filed study I), 6 (Field study II), and 7 (Evaluation study). A summary of overall limitations is presented below.

i. It could be argued that the outcomes of this research, specifically the definition and dimensions for psychosocial inclusivity in design, are rather general and broad. It is important to note that this research has been conducted as a first step in the exploration of the concept, which has so far received limited academic attention. At this stage, it could be more important to identify the possible dimensions of the concept rather than to propose a complete set of applications, such as a model or guidelines.
ii. It could also be argued that most of the empirical studies mainly use qualitative methods; Chapter 4 (expert survey), Chapter 5 (ethnographic interviews) and Chapter 6 (ethnographic interviews, creative workshop, and observations). An online survey, a quantitative method, was included in Chapter 7. Robson and McCartan (2016) suggests that in mixed-method research, qualitative methods are commonly conducted first, followed by quantitative methods.

iii. Mobility scheme users and older individuals' shopping experiences were the main context and focus in field studies I and II, as highlighted in Chapters 5 and 6. As already discussed, concept of inclusive design has been used in various design disciplines, such as product, service, environmental, and communications design. The PhD research time constraints implied a selective approach in terms of focus and context. Thus, two key and strategic groups and contexts were focused upon; people with disabilities and the older people are two main beneficiaries of inclusive design. Mobility is the most significant impairment among various types of impairments. In addition, shopping is a significant activity of daily living for the older individuals.

iv. Analysis of qualitative data needs to be carefully considered in order to avoid subjective analysis and bias. The data collected from each study was mainly analysed by the PhD researcher. It could be argued that the researcher's subjective point of view has possibly been reflected in the outcomes. However, in order to avoid this, several researchers (several design PhD researchers, a design researcher with over 15 years of experience, and a design manager with over 20 years of experience) were recruited to conduct comparative analyses for each study:

Chapter 4 (expert survey): three coders including one final year PhD researcher in design (author, male), one design researcher with over 15 years of experience (female); and one design manager with over 20 years of experience (male);

Chapter 5 (ethnographic interviews): three main coders (one final year PhD researcher in design [author, male], one design researcher with over 15 years of experience [female]; and one design manager with over 20 years of experience [male]) and four multi coders (three PhD researchers in design [two females and one male] and one female postdoctoral researcher);

Chapter 6 (ethnographic interviews, creative workshop, and observations): three main coders (one final year PhD researcher in design [author, male], one design researcher with over 15 years of experience [female]; and one design manager with over 20 years of experience [male]) and three multi coders (one design manager with over 15 years of experience [female] and two PhD researchers in design [one male and one female]); and

Chapter 7 (Online survey): three main coders including one final year PhD researcher (author, male); one design researcher with over 15 years of experience (female); and one design manager with over 20 years of experience (male), and one multi coder (male final year PhD researcher in design).

v. The outcomes; the definition and dimensions for psychosocial inclusivity in design, were created on the basis of data collection and methodological triangulation in an attempt to achieve the greatest potential validity in the results. However, the outcomes lack full validity somewhat due to not being applied, tested and assessed in practice, such as in academic or practical design projects. Hence, the limited validation of the research outcomes could be considered a study limitation. This is possibly mitigated by the fact that, as mentioned above, this PhD research is an early step in the investigation of the concept of psychosocial inclusivity in design and has an exploratory nature.

8.5 Recommendations for future research

This research has explored the concept of psychosocial inclusivity in design as a first step in providing a thorough understanding of the concept. Several recommendations for future research can be made based on the research limitations considered in the previous section, such as:

i. In field studies I and II (Chapter 5 and 6), mobility scheme users and older individuals' shopping experiences were selected in order to identify the possible dimensions for psychosocial inclusivity in design. However, considering the diverse contexts of inclusive design, additional contexts must be considered in order to expand, strengthen and enrich the definition and dimensions developed.
ii. Further research on how the definition and dimensions for psychosocial inclusivity in design influence potential users by using a comparative analysis i.e. the situation before and after using the definition and dimensions.
iii. In this research, correlations between themes and codes in the dimensions were identified. However, these correlations were not focused upon, considering this research is a first step in the exploration of the concept of psychosocial inclusivity in design. In future research, identification of these correlations could be considered in order to enhance the universal validity and practicality of the dimensions.

iv. Additional research is recommended for developing and transforming the dimensions to a practical form of application, such as a framework or model. In the evaluation study, several participants mentioned that the current form of the dimensions is somewhat general and theoretical. Therefore, further research is needed to enhance the validity and practicality of the results.

8.6 Chapter summary

The purpose of this research has been to explore the concept of psychosocial inclusivity in design. Through the whole research, several outcomes, including the definition and dimensions for psychosocial inclusivity in design ('Cognitive', 'Emotional', 'Social', and 'Value' dimensions), were identified and evaluated. In this chapter, an overall summary of this PhD research was presented. The chapter included key conclusions; contribution to knowledge; limitations; and recommendations for future research. The key conclusions were presented by answering three research questions: a) What is the importance in psychosocial inclusivity in design? b) What is the definition of "psychosocial inclusivity in design"? and c) What are the dimensions for psychosocial inclusivity in design? Additionally, several research limitations regarding the outcomes and methodology were discussed with specific details. Based thereon, recommendations were made for future research in order to enhance the validity and practicality of the definition and the dimensions.

The selected research topic and its broader field are rather complex considering that the notion of psychosocial inclusivity in design is underexplored and multidisciplinary. However, the outcomes of this research could benefit potential users by applying the definition and dimensions in their own fields. Furthermore, this research could enhance the understanding and knowledge of the concept of the psychosocial inclusivity in design.

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APPENDICES

Appendix A: Coding analysis results of psychosocial aspects in non-design fields

Main theme	Sub theme	Code	
Behavioural factors		Demonstrating in positive behaviour	Internalizing behaviours
		Demonstrating in adaptive behaviour	Retaining the ability to live independently
		Dispositional Optimism	To complete activities of daily living (e.g., housework, recreational activities)
		Externalizing behaviours	Work pace
		Improve behaviour	
		Improving patient's psychological behavioural functioning	
	Offensive behaviour	Morally inappropriate behaviour	Violence
		Neuroticism	Work related violence
Capacities		Ability to manage behaviour	Ability to work
		Ability to manage emotion	Functional abilities
		Ability to manage attention	Interpersonal skills
		Ability to manage social interactions coping	Optimal levels of activity
		Ability to participate in multiple social roles	Problem solving
			Use of information
Cognitive factors	Mental well-being	A lower risk of stress impact on health	Mental health
		Addressing mental Health needs/ problems	Provision of care for mental health problems
		Emphasizes psychological	Psychologically oriented
		External locus of control	Psychological management of psychosis
		Functional independence	Recognition
		Health beliefs	Reductions in mental functioning
		Improve cognitive skills	Satisfaction with leisure
		Include all psychological interventions	Satisfying relationships at one's expected level
		Intention to increase physical activity	Self-efficacy

		Job-satisfaction	Self-Satisfaction
		Life-satisfaction	Spirituality
		Meaning of work	Trust regarding management
		Maintaining a state of mental well-being	Quantitative demands
	Cognitive issues	Causing psychological harm	Posttraumatic stress disorder
		Dependency	Psychological distress
		Meaningfulness	Sense of control
		Mental disorder	Trauma
		Mental stress at work	Trust level
		No meaningful occupation	
	Cognitive process	Attitude	Influence
		Cognition	Locus of control
		Cognitive demands	Levels of control
		Cognitive functions	Motivation
		Cognitive ability	Optimism
		Empowerment	Perceptions
		High concentration	Predictability
		High responsibilities	Self-regulation
Emotional factors	Stress	Depression	Sadness
		Destress	Symptoms of depression
		Reducing daily stressors	Time pressure
	Emotional issues	Anxiety	Feeling unhappy
		Boredom	Hopelessness
		Decreased self-esteem	Hostility
		Demands for hiding emotions	Loneliness
		Emotional abuse	Sense of inferiority
		Emotional neglect	Self-report measures of loneliness Tiredness
		Fears	
		Fear of hypoglycaemia	
	Emotional well-being	A sense of hope	Improving mood
		Calming	Safety
		Emotional adjustment	Self-esteem
		Emotional demands	Self-confidence
		Emotional support	Reduction of emotional distress
		Feeling strong and energetic	

Personal resources / Profile	Individual state	Activity level Being health Being illness Gender Characteristics Disability and functional decline Home environment	Income condition Level of educational attainment Marital status Number of children Personal health Personal growth
	Economical state	Income Problems related to lack of income	Unpaid work
Physical factors		Causing physical harm physical health problems / Somatic problems Ergonomics climate Functional ability Few opportunities to take breaks Improving the health Influence health Making time for physical activity Maintaining physical activity through exercise Medical illness and injuries	Lack of clarity Level of cognitive exercise Level of leisure activities Low control Physical activity-related psychosocial factors Physical well-being Somatic symptoms Sleeping problems Sickness Impact Symptoms of the illness Work-life imbalance
Socio-cultural context	Social interaction	Connectedness Family intervention Feeling close to intimate with another person Interpersonal relationships Improved sexual intimacy Relationships Role clarity Role conflicts	Social activities Social engagement Social integration Social interventions Social isolation Social network Social roles Social support
	Social issues	Cause social harm Imbalances in effort–reward Lack of social support Lack of social contact Lack of social support Peer problems	Role difficulties Social changes Social exclusion Working atmosphere Work related bullying / harassment

	Social well-being	Caregiving Collaboration, Corporate culture Communication Improved communication Improving the patient's social behavioural functioning Mutual trust between employees Sense of community efficacy	Social community at work Social functioning Social needs Socially oriented Social resources Social satisfaction Socioeconomic aspects Quality of leadership
Support	Caring	Alternative therapies Case management Caregiving for a spouse with dementia Cognitive behavioural therapy Daily basis support Palliative care	Provision of routine support a wide range of highly specific clinical Interventions Significant reduction in the support network Standard care Support groups
	Scale of care and support	Behavioural therapy Educational therapy Emotional support Manualised treatments	Practical support Psychotherapy Recommended therapies
	Social support	Perceived social support. Personal support	Social support from colleague Support network
Miscellaneous		Better coping resources Child abuse Complex function Control over breaks and holidays Coping problems Death of a spouse or other loved one Inconsistency in psychosocial indicators Double presence Environment Evidence of sound psychometric properties Features of life Insecurity over employment	Insecurity over working conditionsJob control Leisure resources Life events Little autonomy Monotonous work Outcome expectancies Processes of change Possibilities for development Personal Models Problem solving Resisting relapse Substance abuse Variation

Value	Development of psychological resources Psychosocial care (disaster relief and recovery) to protect or promote psychosocial well-being prevent or treat mental disorder Emotional well-being Eudemonic well-being Hedonic well-being	Justice Psychological well-being Quality of life of carers Quality of life of people with physical disabilities Quality of life of people with sensory disabilities Well-being

Appendix B: Coding analysis results of psychosocial aspects and related concepts in design field

Theme	Sub-theme	Code	
Behavioural factors		Attitudes	Effect of environmental variables on individuals and their subsequent behaviour
		Appraise	
		Expressing emotion	
Individual circumstance	Individual setting	Age	Language
		Gender	Personality
	Physical aspects	Aesthetic quality	Physio-pleasure
		Capability	Promote health
		Performance	Sensation
		Personal space	
	Knowledge/skills/experiences	Ability to participate	Competence
		Ability to adapt to activities of daily living	Expertise
		Ability to take advantage of opportunities	Skilfulness
Miscellaneous		Accessibility	Task Setting
		Acquisition	Territoriality
		Productivity	Type
Physical factors		Adequacy	Frequency
		Effectiveness	Functional quality
		Efficiency	Norms
		Flexibility	Usefulness
Psychological aspects	Cognitive factors	Confusion	Positive functioning of individuals
		Creating pleasure	Privacy
		Creativity	Security
		Expectations	Sense of control
		Eagerness to try new thing	Sense of power
		Independence	Satisfying experience
		Mental-pleasure	Self-efficacy
		Perceived benefits	Wellness factors
		Personal image	Willingness to take chances
		Resilience of individuals	
	Emotional factors	Anxiety	Frustration
		Attractiveness	Hopes
		Bliss	Joy

		Decreasing depressive symptoms Desires Embarrassment Enjoyment Fears Felicity	Pleasurable experience Positive emotion Possession of desirable State of contentment Self-confidence Thrill
Social factors	Cultural social setting	Country Crowding Pleasure derived from the interactions Possession of something good	Religion Social quality Socio-pleasure Social acceptance
	Social environment	Physical environment	Providing insights into how stimuli experienced at the urban setting
Value		Happiness Ideo-pleasure Increasing well-being Long-term health Overall patient safety	Safety Self-esteem State of well-being Successful aging Well-being

Appendix C: The complete set of personas for the Delphi Study

Practitioners - Product designer

Name: Beth / Age: 45 / Position: Head of design

"Better life by well designed product and service"

Life scenario

Beth is a head of the design department of a big product design company that had has launched several successful products such as a mobile phone, TV, washing machine and fridge. Her company have significant effects on the market with good design include high technology, so people in many countries love the product of her company. With this, she has passion and pride in her work. She believed that she is helping to make this world better by her products.
These days, she has a feeling of doubt about her belief of work. Wide range of customers demand different requirements based on their physical and non-physical issues. However, it is impossible to fill the requirements of all users. It seems that some people become disabled by her design, and by extension, by this society.

Goals

- Having a better quality of life
- Being promoted

Motivations

- Importance of her job as making a product has better quality
- Importance of product accessibility and inclusivity

Needs

- Clear key considerations for non-physical aspects

Practitioners - Urban designer

Name: Young / Age: 42 / Position: Project manager

"Urban design is making better places for every one"

Life scenario

Young is working for the urban design company as a project manager. The company he is working for aims to provide various services such as buildings, public spaces, public infrastructure, landscape and urban planning. With this aim, he and his team members focus on the better accessibility and inclusivity for users. However, it is not an easy job to concern different types of users together, and there are also many existing urban buildings, services or infrastructures that is lack of the accessibility and inclusivity for some users.

With those issues, he believes that various types of considerations such as users' physical and non-physical abilities, ages, races and genders should be taken into account to cover a wide range of users' needs.

Goals

- Achieving outstanding result in work
- Having high quality of life
- Providing better urban environment for all range of users

Motivations

- Urban related regulations and rule
- A trend of urban design
- Enthusiasm for his work

Needs

- Better application for designers
- Better accessibility and inclusivity for users
- Urban designers' multiple perspectives of users and urban environments

Practitioners – Design consultant

Name: Yana / Age: 44 / Position: CEO

"Designing restaurant is not only designing interior, it is also designing culture"

Life scenario

Yana's company is specially about restaurant design consulting. When other design consulting companies work on a consulting a restaurant, the designing interior of the restaurant is the most important part of the project. However, Yana has a different perspective that the restaurant is a cultural symbol, not only the place for eating. When designers design a restaurant, they should consider everything of the restaurant such as cuisine, original culture of the food, location and target customers.

With this perspective, there are not only designers in her company even though it is design consulting company, but there are also more people who are from different background such as study of sociology, food culture, cooking and economy. She believes that this mixture of team members provides multiple perspectives for each team member. Furthermore, this multiple perspectives will fulfil the desire of people who visit the restaurant.

Goals

- Achieving outstanding result in work
- Having high quality of life

Motivations

- Effect of multiple view points from different areas during the design consulting process
- The raising expectations of restaurant customers about restaurant experience
- Enthusiasm for her work
- Good customer feedback

Needs

- The awareness of her customers about multiple considerations of designing restaurant
- The better awareness of team members about importance of multiple considerations from other study areas

Practitioners – General practitioner

Name: Harry / Age: 58 / Position: Doctor

"There are still many people who is suffering from social exclusion"

Life scenario

Harry is a general practitioner in Grimsby, which is a small town at the north of England. The town is facing several social issues such as unemployment and lack of public welfare.

He loves this town because he has spent over 10 years in this town as a GP. With above social and economic issues, however, there is high number of aging population in the town. With this situation, he has organised several health related activities and educational programme for aging people. It has been successful, and the participants have enjoyed and satisfied the time.

He believes that the better public welfare or services can definitely improve the quality of aging life.

Goals

- Achieving well prepared later life
- Making the town he is living better place for the next generatior
- Supporting his family more

Motivations

- Lack of various view points to support aging people
- A sense of satisfaction from helping people
- A sense of duty about his role in the town
- Family responsibility

Needs

- More support from local government
- More social interest and awareness about aging people

Practitioners – Counselling psychologist

Name: Alina / Age: 54 / Counsellor

"People need psychosocial considerations in their daily life"

Life scenario

Alina has a many different types of clients who have various kinds of psychological issues. The one of client areas she is focussing on these days is office workers. Many office workers visit him because of their stress. Interesting thing is their stresses are mainly related to their psychological and social aspects such as working environment including relationship between their colleagues or supervisors rather than their salary or amount of work. She thinks that these types of issues are based on study of the psychosocial, and the issues could be resolved by considering psychosocial aspects.

Goals

- Providing better solutions for her clients
- Achieving well prepared later life
- Having a good quality of life psychosocially and physically

Motivations

- A sense of satisfaction from counselling
- Opportunities of psychosocial inclusion in various areas

Needs

- People' awareness of psychosocial aspects
- A positive view point about psychology consultation

Academics – Design educator

Name: Taehyun / Age: 43 / Position: Senior lecturer

"Designing product is not only about appearance or functions"

Life scenario

Taehyun is an expert in inclusive design. He is especially focusing on designing assistive devices for aging and people with disabilities. In this area, many considerations should be concerned according to a user's physical and non-physical conditions.

In his lecture, he argues that not only the product has physical benefits on users, but it also has social or some other benefits.

His students also have several brilliant ideas about designing products with non-physical aspects such as emotional, cognitive, environmental, social, psychological and cultural aspects.

Goals

- Providing better design educational environment for students
- Having a better quality of life
- Balancing of work and family

Motivations

- Lack of clear framework or model to consider non-physical aspects
- Needs social inclusion in product design education
- A sense of satisfaction from the result of teaching

Needs

- Clear framework or model to consider non-physical aspects for his class
- The awareness of social inclusion by product design
- Better communication with students
- More opportunities for students to have both academic and practical experiences.

Academics – Design researcher

Name: Linda / Age: 48 / Position: Senior researcher

"Physical aspects are not only the consideration I take into account in my study"

Life scenario

Linda is a senior design researcher. Her specialism is service and environment design. In the past, considerations for the research on service and environment design were not particularly complicated. However, the needs and demands of clients and customers have expanded in several ways such as economical, political, physical, social and psychological aspects. Those areas require a variety of considerations. Existing applications mainly focus on physical design aspects, and non-physical design aspects are lacking. Due to these changes and issues, Linda emphasises various design aspects in her research.

Goals

- Having a better quality of life
- Achieving outstanding result from her research

Motivations

- The expanded needs and demands of users and customers
- Needs of the framework or model to cover various aspects
- A sense of satisfaction from the work

Needs

- Lack of clear application for non-physical aspects
- Clear application for taking variety of considerations into account in her study
- Better research environment

Academics – Psychology researcher

Name: Tina / Age: 57 / Position: Senior researcher

"Psychology is everywhere"

Life scenario

Tina's field of study is child psychology. Basically the psychology is a study of human mind, so it could be used in many different fields such as psychology, medical science, health care, physical science and design. Especially her research is about the behaviour of children in their environment such as home, school or hospital. It is helpful to solve the individual and group issues that are caused by non-physical aspects.

She believes that psychology is not only about the human mind, but it is also about effects on society we are living.

Goals

- Having a better quality of life

Motivations

- Importance of social and family inclusion for children
- Need of better supports for children as physically, psychologically and socially
- A sense of satisfaction from the work

Needs

- Better environment for children's personal and social life
- Better research environment

Government Official – Policy maker

Name: Kate / Age: 47 / Position: Minister of State for Disabled people

"I would like to provide better policy for public who has right to have better quality of life "

Life scenario

Kate is a policy maker. She is in charge of the policies that are related to people with disabilities, such as health, equality, employment and welfare.
In her experience, the policies were based on the mainly physical difficulties of people with disabilities in the past. These days, however, non-physical aspects are also considered as important factors for social inclusion with its equality and equity.
She agrees with this change, but it is not easy for policy makers to consider and measure the non-physical aspects such as social, emotional, psychological aspects. She needs batter application for this.

Goals

- Raising social interest and awareness about people with disabilities
- Raising interest and awareness about people with disabilities from governmental perspectives
- Having a better quality of life

Motivations

- Developed policies or regulations of other countries
- Demand for better quality of life
- Social exclusion

Needs

- More social interest and awareness about people with disabilities
- More interest and awareness about people with disabilities from governmental perspectives
- Enough budget

Government Official – TFL Official

Name: Rosy / Age: 51 / Position: Project manager

"Improving public transportation service is improving customers' quality of life"

Life scenario

Rosy is a project manager in Transportation For London (TFL). She in charge of several projects that aims to improve the accessibility of London underground for all types of users. The one of the projects is called Step Free Access that aims to provide ramps or lifts for users. With this aim, the users do not have to use the staircase or escalator. She thinks that it is a long term but valuable project for underground users especially people with physical and non-physical difficulties.

This project is about accessibility of underground based on mainly physical aspects of users. However, Rosy believes that there are more opportunities to improve the public transportation based on further aspects.

Goals

- Having a better quality of life
- Delivering high quality service to transportation users

Motivations

- Desire for better public transportation environment
- A sense of satisfaction from her work

Needs

- Better application for making better underground environment
- Enough budget

NGO Official – NGO Official

Name: Ben / Age: 56 / Position: Director of association of ageing

"It is time to consider the later life for your family and yourself"

Life scenario

Ben always loves to help other people since when he was young. Association of Aging is the organisation he is working for meets his interest and goal.
The organisation focuses on helping aging people to have a better social life with social support. With this goal, Ben and his colleague plan social events such as opportunities of activities, educations and visiting cares by volunteers and other organisations.
Ben thinks that working with people from other areas has both positive effects on both care receivers and care givers. They have deferent level of understanding and knowledge about aging people, so it is a good opportunity to share the information and experience.

Goals

- Providing better social supports for aging people
- Raising social interest and awareness about aging issues
- Having a better quality of life
- Achieving well prepared later life

Motivations

- Social exclusion of aging people
- A sense of satisfaction from helping aging people

Needs

- More social interest and awareness about aging issues
- Greater social inclusion of aging people

NGO Official – NGO Official

Name: Chen / Age: 46 / Position: Manager of local organisation for disabled people

"I feel happy when I see the smile of other people"

Life scenario

Chen is working for the local organisation for 13 year that supports people with disabilities and aging. His work is more like volunteering. The organization he is working for tries to help people with disability and aging in the local area. Therefore, the small scales of services, supports and activities are usually planed. He also does some volunteering work himself due to lack of volunteers from the local. These days, he is thinking that they are providing are one size fits all service and supports. However, people with disabilities have different conditions and issues physically and non-physically, so he feels that multiple ways of service and supports are needed according to people's different situations.

Goals

- Making his town better
- Providing better local service and support for people with disabilities

Motivations

- Local social development
- Lack of the proper applications for supporting people with disabilities
- Helping local people

Needs

- More social interest and awareness about disability issues from local people
- More support from local people and government
- Suitable application for supporting people with disabilities

Business people – Marketer

Name: Kyle / Age: 43 / Position: Team manager

"I am always trying to do my best to meet the desire and needs of customers"

Life scenario

Kyle is a Team manager of marketing team at a big healthcare product company. His role is making more profit by the public relations. It is one of crucial parts in the project process, so he and his team members take a serious view of their job.

In his working process, promoting the better function of product was the most important aspect, but the needs of users and customers have been diversified. They do not only care about the functions of the healthcare product, but they also care about emotional, psychological and social aspect and product appearance.

With those needs, his considerations in the task have also been increased and diversified.

Goals

- Achieving outstanding result in work
- Being happy with his family

Motivations

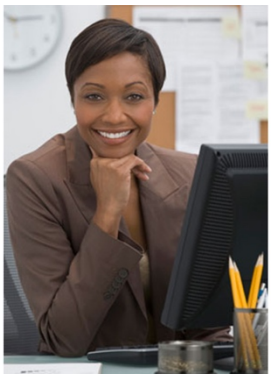
- Importance of his job in current social trend
- Relationship for business
- A sense of satisfaction from his work

Needs

- More communication with other teams for better results
- Suitable application to fulfil the needs of customers and users

Business people – Standard maker

Name: Lucy / Age: 46 / Position: Project manager



"Making a standard for product is like making a product has better quality"

Life scenario

Lucy is working for standard making company that makes all types of standards and regulations for various industries food, construction, manufacturing, product and service. The standard should be agreed in particular situations or processes within related stakeholders.

Her team is mainly focusing on the product industry. In this industry, the standard sometimes should cover the various types of people who have different physical and non-physical abilities. It is not easy job for her and her team to take various considerations into account for numerous different types of stakeholders.

Goals

- Having a better quality of life
- Being promoted

Motivations

- Importance of her job as making a product has better quality
- Importance of product accessibility and inclusivity

Needs

- Clear key considerations for non-physical aspects

People with lived experience – Older person

Name: Anne / Age: 74 / Occupation: Retired

"A sound mind in a sound body"

Life scenario

Anne is an out going person, who enjoys travel, swimming and social activities such as volunteering and participating dance class. With this characteristic, fortunately she is still healthy compare to her friends who has several physical issues even psychosocial issues as well.

She also feels some physical difficulties and emotional depression sometimes. However, she feels much better after swimming, volunteering or joining social activities. She believes that even though aging people have physical barriers, they need more steady exercise and social activities than young people need.

Anne moved from Alice Springs in Australia to Liverpool in the UK when she was a young girl. She has not had a chance to go back to her hometown to see her childhood friends. She wants to meet them while she is still healthy.

Goals

- Being happy
- Keeping her body in good condition
- Having a better quality of life

Motivations

- Desire for better quality of life
- Self-esteem in her health
- Pleasure of having social life by volunteering and activity

Needs

- Better social welfare
- Better medical support
- Continuous social activity
- Meeting her old friends of her hometown

People with lived experience – Person with disability

Name: Mark / Age: 56 / Occupation: Software developer

"It seems the journey by train to central London is the most difficult task in my life"

Life scenario

Mark got a car accident when he was 14 years old. He lost the use of his both legs in the accident. After this, he has been using a wheelchair.

Mark just moved to Twickenham where is located at west London three month ago, and the company is in central London. Reason why he is living in this town is that he could rent a bigger house with lower rent compare to the place he lived before. He is a wheelchair user, so he needed enough space for using the wheelchair. Furthermore, this area is not busy as central London, and also there is a huge park and river Thames. He loves to go to park or riverside for refreshment.

Mark does not need to go to the company everyday due to his role. He can work at home and go to company once or twice a week. When he goes to the company, he uses the train. Taking the train at peak time is always burden to him. Getting on and off the train, taking a lift, passing a gate with crowd make him embarrassing every time.

Goals

- Having a bigger house
- Achieving a better quality of life

Motivations

- Desire for better quality of life
- Being with people who understand and do not care his disability
- Support from his family and friends

Needs

- A better infrastructure in public spaces for wheelchair users and people with disabilities
- A better social welfare service
- A simple journey to go to work

People with lived experience – Person with disability

Name: Victor / Age: 56 / Occupation: Musician

"I know that my guide dog is lovely, but people should not bother her"

Life scenario

Victor is a blind. The guide dog Phoebe is always with him when he goes somewhere.
When he in public space such as park, street or bus, many people try to touch and feed Phoebe. He understands that they just do because Phoebe is lovely. However, it is actually dangerous and annoying. When blind people are with a guide dog, they communicate each other from the movement of the guide dog. Blind people feel even the little movement. Therefore, when other people touch or take the Phoebe's attention, it could be cause of injury to Victor.
One day, furthermore, the cab driver refused him due to Phoebe. Because of this, he waited another cab for half an hour.

Goals

- Being happy with his family
- Being famous as a musician
- Achieving a better quality of life

Motivations

- Desire for better quality of life
- Family support
- Enthusiasm for music
- Disability discrimination

Needs

- Better social welfare
- Better infrastructure in the city for blind people
- Better public transportation system that he can trust
- Stronger regulations of disability discrimination
- More social interest and awareness about people with disabilities

Appendix D: Questionnaire type A for non-designers

NON-PHYSICAL FACTORS IN INCLUSIVE DESIGN;

A DELPHI STUDY ON IMPORTANCE AND FUTURE ROLE

This is the first round questionnaire for a Delphi study aiming to explore and collect experts' opinions on the importance and future role of non-physical factors in inclusive design. Please fill each answer box based on your expertise and insight.

Personal details

Name

Field of profession and current role

Years in current profession

1. Inclusive design

1.1. Have you heard about inclusive design?

- **If yes, please tell us what your understanding of inclusive design is in the white box below. (Feel free to check the below link for definition and some examples.)**
- **If no, please see the definition and examples via links below:**

Definition:

http://www.inclusivedesigntoolkit.com/betterdesign2/whatis/whatis.html

Examples:

http://www.inclusivedesigntoolkit.com/betterdesign2/case_studies/case_studies.html

Your understanding of Inclusive design	

1.2. Based on your expertise and insight, how important do you think inclusive design is? Why? (Please highlight the number)

Not important				*Very important*
○	○	○	○	○

Why?	

1.3. At present, what do you think the key areas of application of inclusive design are?	
Applications	

1.4. What do you think the key challenges and opportunities facing inclusive design are, at present and in the next 10 years?		
	Now	*In 10 years*
Challenges		
Opportunities		

1.5. In the next 10 years, where do you think inclusive design is heading? And what role do you think it could play?	
Direction/Trends	
Future role	
1.6. Based on your expertise and insight, <u>besides physical aspects of inclusion</u>, are there <u>any other aspects</u> that should be considered in inclusive design? And why?	
Other aspects	
Why?	

2. Non-physical aspects in your area of expertise

2.1. Despite the physical aspects being mostly considered as crucial in many design areas, are you aware of any important non-physical aspects in your area?

- **If yes, please tell us what they are, and why.**
- **If no, please tell us what non-physical aspects you think need to be considered, and why.**

Yes ◯	No ◯

What?	
Why?	

2.2. Based on your expertise and insight, do you think the non-physical aspects you mentioned are as important as physical aspects in your area? How important and Why? (Please highlight the number)

Not important		*Neutral*		*Very important*
◯	◯	◯	◯	◯

Why?	

2.3. Can you think of two or three situations during your professional career where non-physical aspects/issues were really important? And if so, can you name the contexts and explain which aspects/issues you felt were important?		
Example1	*Context*	
	Aspects/Issues	
Example2	*Context*	
	Aspects/Issues	
Example3	*Context*	
	Aspects/Issues	

2.4. Are you aware of any non-physical related definition, framework, model or guideline in your area? Please mention them below.	
Definition	
Framework/model	
Guideline/standard	

2.5. Have you used any of the above in your area?

- **If yes, how have you applied them?**
- **If no, would you be interested in applying them, and how?**

Yes ◯	*No* ◯

How	

2.6. What do you think the key challenges and opportunities facing non-physical aspects in your area are, at present and in the next 10 years	
Challenges	
Opportunities	
2.7. In the next 10 years, where do you think these non-physical aspects are heading in your area? And what role do you think they could play?	
Direction/Trend	
Future role	

3. Non-physical aspects in inclusive design

3.1. Based on your expertise and insight, how important do you think are non-physical aspects in inclusive design? Why? (Please highlight the number)

Not important		*Neutral*		*Very important*
○	○	○	○	○

Why?	

3.2. Based on your expertise and insight, what non-physical aspects/issues you think should be considered in inclusive design?

Aspects/issues	

3.3. Based on above thought, could you suggest your own definition and key considerations for non-physical aspects in inclusive design?

Definition	
Key considerations	

3.4. Can you think of one best and one worst example for non-physical inclusive design you encountered? Can you explain what the non-physical aspects/issues were in each example, and why this was a particularly good/bad example? (Feel free to add more examples below.)		
Best	*Example*	
	Aspects/Issues	
	Why?	

More examples	*Example*	
	Aspects/Issues	
	Why?	

Thank you very much for your time and expert input!

After receiving all responses from the 15 experts and first round of data analysis, we will contact you with the second round of questions based on the key findings form this questionnaire.

Appendix E: Questionnaire type B for non-designers

PSYCHOSOCIAL FACTORS IN INCLUSIVE DESIGN;

A DELPHI STUDY ON IMPORTANCE AND FUTURE ROLE

This is the first round questionnaire for a Delphi study aiming to explore and collect experts' opinions on the importance and future role of psychosocial factors in inclusive design. Please fill each answer box based on your expertise and insight.

Personal details

Name

Field of profession and current role

Years in current profession

1. Inclusive design

1.1. Have you heard about inclusive design?

- **If yes, please tell us what your understanding of inclusive design is in the box below. (Feel free to check the below link for definition and some examples.)**
- **If no, please see the definition and examples via links below:**
  Definition:
  http://www.inclusivedesigntoolkit.com/betterdesign2/whatis/whatis.html
  Examples:
  http://www.inclusivedesigntoolkit.com/betterdesign2/case_studies/case_studies.html

Your understanding of Inclusive design	

1.2. Based on your expertise and insight, how important do you think inclusive design is? Why?

Not important		*Neutral*		*Very important*
○	○	○	○	○

Why?	

1.3. At present, what do you think the key areas of application of inclusive design are? And why? (you can choose more than one)

◯ *Products*	◯ *Environment*	◯ *Service*
◯ *Fashion*	◯ *Others (Please provide details)*	
Why?		

1.4. What do you think the key challenges and opportunities facing inclusive design may be, at present and in the next 10years?

	Now	*In 10 years*
Challenges		
Opportunities		

1.5. In the next 10 years, where do you think inclusive design is heading? And what role do you think it could play?	
Direction/Trends	
Future role	
1.6. Based on your expertise and insight, besides physical aspects of inclusion, are there any other aspects that should be considered in inclusive design? And why?	
Other aspects	
Why?	

2. Psychosocial aspects in your area	
2.1. Have you come cross the term 'psychosocial'? • If yes, in what context? Then, please see question 2.1.1. • If no, please see question 2.1.2.	
Context	
2.1.1. What is the definition of this term in your field? (If there is no existing definition in your field, please tell us what you think it means.)	
Definition/ meaning	
2.1.2. The term psychosocial is defined as below: - "Relating to the interrelation of social factors and individual thought and behaviour" (Oxford English dictionary) - *"Having both psychological and social parts" (Cambridge English dictionary)* In your professional field, do you refer to the term psychosocial? Why?	
Why?	

2.2. Based on your expertise and insight, how important are the psychosocial aspects you mentioned in your area? Why?				
Not important		*Neutral*		*Very important*
○	○	○	○	○
Why?				

2.3. Can you think of two or three situations during your professional practice where psychosocial issues were really important? And if so, can you name the contexts and explain which issues/aspects you felt were important?		
Example1	*Context*	
	Aspects/Issues	
Example2	*Context*	

	Aspects/Issues	
Example3	*Context*	
	Aspects/Issues	
2.4. Are you aware of any psychosocial related framework, model, guideline or principles in your field?		
Definition		
Framework/model		
Guideline/standard		

2.5. Have you used any of the above in your field?

- **If yes, how have you applied them?**
- **If no, would you be interested in applying them and how?**

Yes ◯	*No* ◯

How	

2.6. What do you think the key challenges and opportunities facing the psychosocial aspects in your area, at present and in the next 10 years?

Challenges	
Opportunities	

2.7. In the next 10 years, where do you think those psychosocial aspects heading in your area? And what role do you think they could play?	
Direction/trend	
Future role	

3. Psychosocial aspects in inclusive design

3.1. Based on your expertise and insight, how important do you think psychosocial aspects are in inclusive design? Why?

Not important		*Neutral*		*Very important*
○	○	○	○	○

Why?	

3.2. Based on your expertise and insight, what psychosocial aspects/dimensions you think should be considered in inclusive design?	
Aspects/dimensions	
3.3. Based on your expertise and insight, are there any other non-physical aspects that should be considered in inclusive design beside psychosocial aspects? And why?	
Other non-physical aspects	
Why?	
3.4. Considering the above, could you suggest your own definition and key considerations for psychosocial aspects in inclusive design?	
Definition	
Key considerations	

3.5. Can you think of one best and one worst example for non-physical inclusive design you encountered? Can you explain what the non-physical aspects/issues were in each example, and why this was a particularly good/bad example? (Feel free to add more examples below.)		
Best	*Example*	
	Aspects/Issues	
	Why?	

Worst	*Example*	
	Aspects/Issues	
	Why?	

More examples	*Example*	
	Aspects/Issues	
	Why?	

Thank you very much for your time and expert input!

After receiving all responses from the 15 experts and first round of data analysis, we will contact you with the second round of questions based on the key findings form this questionnaire

Appendix F: The results of coding analysis from the questionnaire part III

**NPA: Non-physical aspects*
**PSA: Psychosocial aspects*
**ID: Inclusive design*

Type-A: Q3. Non-physical aspects in ID	**Type-B: Q3. Psychosocial aspects in ID**
3.1. Importance of NPA in ID	3.1. Importance of PSA in ID
Very important: n=4 / Neutral: n=1	Very important: n=5
Diverse demographic categories (n=1) Importance of communication (n=1)	Fulfilment of individual's (diverse population) need (n=5)
3.2. NPA in ID	3.2. PSA in ID
Cultural & Social aspects (n=3)	Diversity (n=8)
Behaviour & preference (n=2)	Age (n=2)
Safety (n=2)	Cultural appropriateness (n=2)
Weather (n=2)	Ethnic background (n=1)
Economical aspects (n=1)	Inclusion (n=1)
Educations (n=1)	Health beliefs (n=1)
	Lifestyle (n=1)
	Safety and confidence (n=1)
	Understanding of other's physical and mental limitations (n=1)
	Environmental sustainability thinking
	Equality
3.3. Own definition & considerations for NPA in ID	3.3. Own definition & considerations for PSA in ID
Diverse demographic category (n=1)	Applicability (n=2) Inclusivity of diverse population (n=2) self-esteem (empower & value) (n=1)
3.4. Best & Worst examples	3.4. Best & Worst examples
Adjustability for sizing (n=1)	Support &Service (n=5) Diverse populations (n=4) Changing social role (n=1) Cultural meanings (n=1)

Appendix G: The complete set of questions for the interviews with people with mobility impairments

Question number	Questions
Q1	Can you tell me a bit about yourself? Prompts: Working/Volunteering Routine Weekly activities
Q2	Can you tell me a bit about how you manage to get around in your home? Prompts: Equipment/Technology (pull cords/things to open the front door) How did you find out about that? (Mobility centre/mobility scheme) What is working well for you? (Attractiveness/function) (Prompt for a specific example – a time you remember) What are the challenges? (Attractiveness/function/pet hates) (Prompt for a specific example – a time you remember) Do you have any ideas about what sort of equipment could help you to overcome these challenges? Support (Partner/Families/Personal Assistant/Environment) What is working well for you? (If needed) (Prompt for a specific example – a time you remember) What are the challenges? (Attractiveness/function/pet hates) (Prompt for a specific example – a time you remember) Do you have any ideas about what sort of support could help you to overcome these challenges?
Q3	Please could you describe the area you live in and the areas you may visit (Wales/England/Scotland/Northern Ireland and countryside/town/city/etc.)? Can you tell me a bit about how you manage to get out and about? Prompts: Public transport (trains/buses/taxis/Dial-A-Ride/planes) Equipment/Technology (WAV/ wheelchair/Powered wheelchair/passenger/adapted car) How did you find out about that? (Mobility centre/mobility scheme) What is working well for you? (Attractiveness/function) (Prompt for a specific example – a time you remember) What are the challenges? (Attractiveness/function/pet hates)

	(Prompt for a specific example – a time you remember) Do you have any ideas about what sort of equipment could help you to overcome these challenges? Support (Partner/Families/Personal Assistant/Environment) What is working well for you? (If needed) (Prompt for a specific example – a time you remember) What are the challenges? (Attractiveness/function/pet hates) (Prompt for a specific example – a time you remember) Do you have any ideas about what sort of support could help you to overcome these challenges? We have talked about some really interesting examples of what you enjoy or find challenging in going out and about. Have you ever been unable to do something that you wanted to do? What do you think could be done to change or improve this?
Q4	Can you tell me a bit about how you might manage if you were going away? (Example) Prompts: Public transport (trains/buses/taxis/Dial-A-Ride/planes/ferries/tram) Equipment/Technology (WAV/wheelchair/Powered wheelchair/passenger/adapted car) How did you find out about that? (Mobility centre/mobility scheme) What is working well for you? (Attractiveness/function) (Prompt for a specific example – a time you remember) What are the challenges? (Attractiveness/function/pet hates) (Prompt for a specific example – a time you remember) Do you have any ideas about what sort of equipment could help you to overcome these challenges? Support (Partner/Families/Personal Assistant/Environment) What is working well for you? (If needed) (Prompt for a specific example – a time you remember) What are the challenges? (Attractiveness/function/pet hates) (Prompt for a specific example – a time you remember) Do you have any ideas about what sort of support could help you to overcome these challenges? We have talked about some really interesting examples of what you enjoy or find challenging in going away. Have you ever been unable to go somewhere that you wanted to go? What do you think could be done to change or improve this?

Q5	Thinking forward to the future, in about 10 years time, what would you like to see designed?
Q6	You've given us lots of really interesting ideas, if you could pick your top one to be designed, which one would you pick?
Q7	From our conversation, I can see that you have a lot of experience. As a final question, please could you give us your top tip or advice to someone else who is starting to face the challenges you have spoken about?
Q8	I am now going to ask you two questions, one is about your social mobility experiences now and in the future, and the other one is about your individual / psychological mobility experiences now and in the future:
Q8-1	In SOCIAL settings (when you are with friends and family or somewhere public), what three words would you use to: describe how you feel about your equipment (Adapted car /WAV/Scooter/Powered wheelchair) and the experience of using it [note for interviewer: focus here is on current experience] describe how you WOULD LIKE to feel about your equipment [Adapted car /WAV/Scooter/Powered wheelchair] and the experience of using it [note for interviewer: focus here is on ideal experience]
Q8-2	When you are on your own (focusing on yourself and your individual experiences), what three words would you use to: describe how you feel about your equipment (Adapted car /WAV/Scooter/Powered wheelchair) and the experience of using it [note for interviewer: focus here is on current experience] describe how you would like to feel about your equipment (Adapted car /WAV/Scooter/Powered wheelchair) and the experience of using it [note for interviewer: focus here is on ideal experience]
Q9	And one final question about the financial side of your mobility. How do you think your financial situation affects your mobility in social settings and on a personal level (individual experiences)

Appendix H: "A 15-point checklist of criteria for good thematic analysis" (Braun and Clarke, 2006)

Phase	No. / Criteria
Transcription	1) The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the tapes for 'accuracy'.
Coding	2) Each data item has been given equal attention in the coding process.
	3) Themes have not been generated from a few vivid examples (an anecdotal approach), but instead the coding process has been thorough, inclusive and comprehensive.
	4) All relevant extracts for all each theme have been collated.
	5) Themes have been checked against each other and back to the original data set.
	6) Themes are internally coherent, consistent, and distinctive.
Analysis	7) Data have been analysed -/interpreted, made sense of -/rather than just paraphrased or described.
	8) Analysis and data match each other - the extracts illustrate the analytic claims.
	9) Analysis tells a convincing and well-organized story about the data and topic.
	10) A good balance between analytic narrative and illustrative extracts is provided.
Overall	11) Enough time has been allocated to complete all phases of the analysis adequately, without rushing a phase or giving it a once - over - lightly.
Written report	12) The assumptions about, and specific approach to, thematic analysis are clearly explicated.
	13) There is a good fit between what you claim you do, and what you show you have done - ie, described method and reported analysis are consistent.
	14) The language and concepts used in the report are consistent with the epistemological position of the analysis.
	15) The researcher is positioned as active in the research process; themes do not just 'emerge'.

Appendix I: Ethnographic interview questions

Phase	Question
Phase 1: Warm-up questions	- Could you briefly introduce yourself (and your partner) in terms of your family, previous career, friends, social activities, habits and lifestyle? - How many grocery shopping trips have you had in the last 2 weeks? How many different shops have you visited for your groceries in that time? Why did you choose to visit these stores? (e.g. supermarket shop, convenience store, local grocer, baker, butcher, and discounters) - If you could change one thing about the supermarket what would it be?
Phase *2:* Lifestyle and habits	- Do you enjoy cooking? - What do you eat on a typical day? (breakfast, lunch, dinner, snacks) - Have you eaten out in the last fortnight? If so, how many times? (e.g. lunch club, restaurant, invited to friend/family)
Phase *3:* Health and well-being (+ cognitive age)	- How has your health in general been in the last year? - You suggested before that you have no long-term illnesses or disabilities, is this correct? OR You told the other researcher that you have (arthritis, high blood pressure etc.), how does this affect your daily life? - How old do you feel at the moment? - How old do you think others perceive you to be? - What age do you think you are most like based on the activities you do and how active you are? - How old do you think you are based your interests? - If you could be any age, what age would you most like to be?

Appendix J: Initial and supporting interview questions

Phase	Question
Phase 1: Initial interview	- Could you please briefly introduce yourself in terms of your family, previous career, social activities and relationships, habits and lifestyle? - Which supermarket do you usually go for shopping and why? - Could you please briefly describe your shopping journey?
Phase 2: Supporting interview	*Questions based on the observations:* - e.g. While you were in the supermarket, the supermarket was quite crowd and noisy. Did it affect your shopping? If yes, how and why? - e.g. You used self-checkout machine at the end of the shopping. Please tell me anything you thought or felt about the using self-checkout machine. *Common questions:* - Could you please tell me top three things you do not like from the shopping journey today? And why? - Could you please tell me top three things you like from the shopping journey today? And why

Appendix K: Physical aspects: synthesised results of three investigations regarding supermarket shopping

Theme (number of occurrence)
Convenience (179) / Usability (161) / Efficiency (incl. Practicality) (132) / Accessibility (111) / Visibility (14)

Appendix L: Shopping related factors: synthesised results of three investigations regarding supermarket shopping

Theme	**Code (number of occurrence)**		
Facilities	Trolley (25) Checkout (9) Shelves (9)	Disability facilities (8) Self-checkout (8) Aisle (5)	Sign (4) Induction loop (1) Lift (1)
Items	Variety (58) Price (incl. value of items) (46) Quality (46)	Locating items (21) Portability (17) Labels (10) Portion and item size (8)	Packaging (2) Fairness (4) Expiry date (2)
Service	Staff (43) Information (35) Offer (12)	Queueing (7) Disability service (6) Hours of use (5)	Delivery (4)
Store environment	Interior & Layout (20) Atmosphere (8)	Distance to supermarket (8) Cleanliness (5)	Crowd (5) Temperature (1)
Surrounding facilities	Car park (11) Public transportation - Bus & Taxi (10/3)	Other shops (bakery, butcher shop, etc.) (8) Café (7) Toilets (4)	Parking machine (2) Seats (2) Location of supermarket (1)
Weather	Bad weather (4)		

Appendix M: General background: synthesised results of three investigations regarding supermarket shopping

Theme	Sub-theme	Codes (number of occurrence)	
Family contexts	Family relationship (53)		
	Family support (19)		
Personal characteristics	Shopping behaviour	Price comparison (52)	Online shopping (8)
		Frequency of visit (30)	Size comparison (4)
		Diet behaviour (8)	Hours of visit (2)
	Behaviour	Diet behaviour (52)	
		Eating out (12)	
		Others (26)	
	Personal activity (54)		
	Physical condition	Health detail (29)	
		Mobility (26)	
	Sociability (49)		
	Knowledge and Experience (9)		
	Ability or skill (4)		

Appendix N: Complete set of questions

Evaluation of initial DEFINITION and DIMENSIONS for Psychosocial Inclusivity in Design

The purpose of this questionnaire is to evaluate the initial findings regarding psychosocial inclusivity in design.

The findings include 1) Working definition and 2) Key dimensions for psychosocial inclusivity. This survey consists of three parts :

Part A : Questions regarding initial definition
Part B : Questions regarding core dimensions for psychosocial inclusivity
Part C : Background information

This survey will not take more than 20 minutes!
Please support us by completing it.

Key terms

Term	Definition in this study
Inclusive design	"The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible ... without the need for special adaptation or specialised design" (British Standards Institute, 2005)
Psychosocial	"The close relation between psychological factors (emotion, behaviour, cognition) and the socio-cultural context" (Psychosocial Working Group, 2003)

NEXT

Page 1 of 6

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A: QUESTIONS REGARDING INITIAL DEFINITION

The aim of this section is to evaluate the definition of psychosocial inclusivity in design.

Psychosocial inclusivity in design is defined as:

"provision of equal opportunities for better quality of life to as many people as possible by considering both psychological and social factors"

A-1

Do you think that the definition is rational based on your knowledge, experience or expertise?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

A-2

Does the definition help you to understand what the concept of psychosocial inclusivity in design is?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

A-3

Do you think the definition addresses the core non-physical aspects that should be considered in inclusive design?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

A-4

Would you like to apply the definition to your current or future work?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

A-5

Would you like to introduce the definition to other designers or researchers?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

A-6

Do you think that applying the definition will benefit and improve your work?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

A-7

Are there any wordings or phrases to be REFINED in the definition? If yes, WHAT are they and WHY? Also, please REFINE them base on your knowledge and expertise.

Your answer

A-8

Are there any wordings or phrases to be REMOVED in the definition? If yes, WHAT are they and WHY? Please REMOVE them base on your knowledge and expertise.

Your answer

A-9

Are there any additional wordings or phrases to be ADDED in the definition? If yes, WHAT are they and WHY? Please ADD them base on your knowledge and expertise.

Your answer

BACK NEXT

Page 2 of 4

B: QUESTIONS REGARDING CORE DIMENSIONS FOR PSYCHOSOCIAL INCLUSIVITY

The aim of this section is to evaluate the core dimensions for psychosocial inclusivity in design. Please go to the link below to see the core dimensions and their definitions.

https://yonghunlim83.wixsite.com/dimensions

B-1

Do you think that these dimensions are rational based on your knowledge, experience or expertise?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

B-2

Do these dimensions help you to understand what the concept of psychosocial inclusivity in design is?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

B-3

Do you think these dimensions address the psychosocial aspects that should be considered in inclusive design?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

B-4

Would you like to apply these dimensions to your current or future work?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

B-5

Would you like to introduce the dimensions to other designers or researchers?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

B-6

Do you think that applying the dimensions will benefit and improve your work?

	1	2	3	4	5	6	7	
Strongly disagree	○	○	○	○	○	○	○	Strongly agree

B-7

Are there any main themes or sub-themes to be REFINED? If yes, WHAT are them and WHY? Also, please REFINE them base on your knowledge and expertise.

Your answer

B-8

Are there any main themes or sub-themes to be REMOVED? If yes, WHAT are them and WHY? Please REMOVE them base on your knowledge and expertise.

Your answer

B-9

Are there any additional main themes or sub-themes to be ADDED? If yes, WHAT are them and WHY? Please ADD them base on your knowledge and expertise.

Your answer

BACK NEXT Page 3 of 4

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C: BACKGROUND INFORMATION

C-1

Gender

- ○ Female
- ○ Male
- ○ Not willing to share

C-2

Age

- ○ 19 – 24
- ○ 25 – 29
- ○ 30 – 34
- ○ 35 – 39
- ○ 40 – 44
- ○ 45 – 49
- ○ 50 – 54
- ○ 55 – 59
- ○ 60 – 64
- ○ 65 and over
- ○ Not willing to share

C-4

How long have you worked in this area?

Your answer

C-5

How long have you considered the concept of inclusive design in your area?

Your answer

C-6

Contact for thanks and keeping further in touch (email)

Your answer

THANK YOU VERY MUCH FOR PROVIDING YOUR INPUT!

BACK SUBMIT Page 4 of 4

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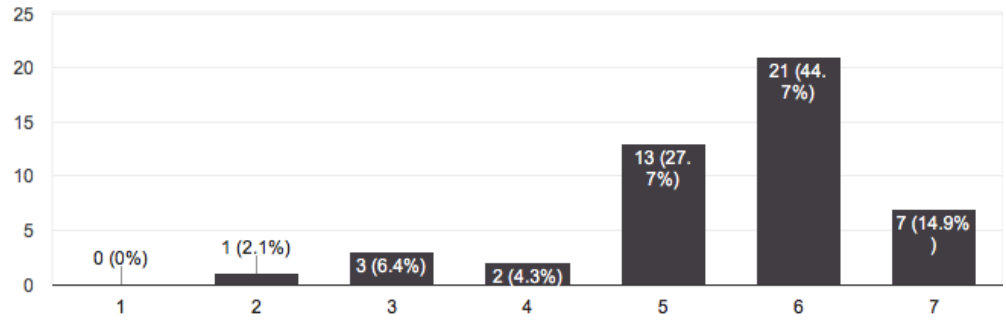
Appendix O: The results of each questions

Question A-1

Do you think that the definition is rational based on your knowledge, experience or expertise?

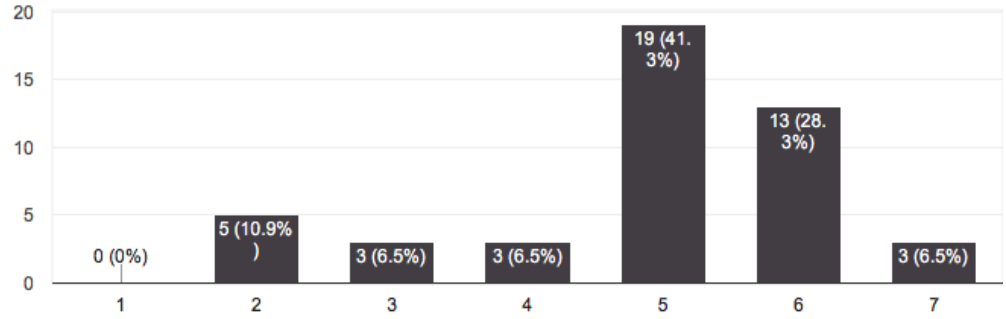
47 responses



Question A-2

Does the definition help you to understand what the concept of psychosocial inclusivity in design is?

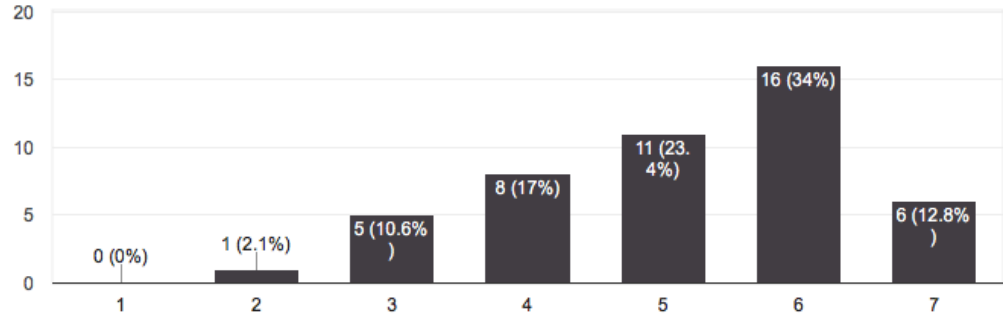
46 responses



Question A-3

Do you think the definition addresses the core non-physical aspects that should be considered in inclusive design?

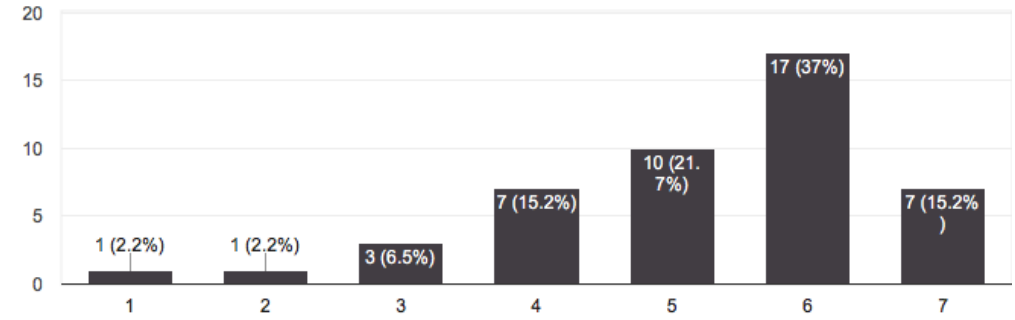
47 responses



Question A-4

Would you like to apply the definition to your current or future work?

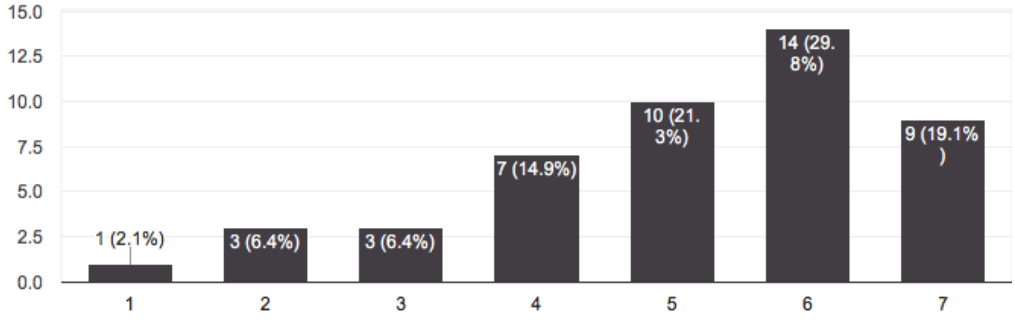
46 responses



Question A-5

Would you like to introduce the definition to other designers or researchers?

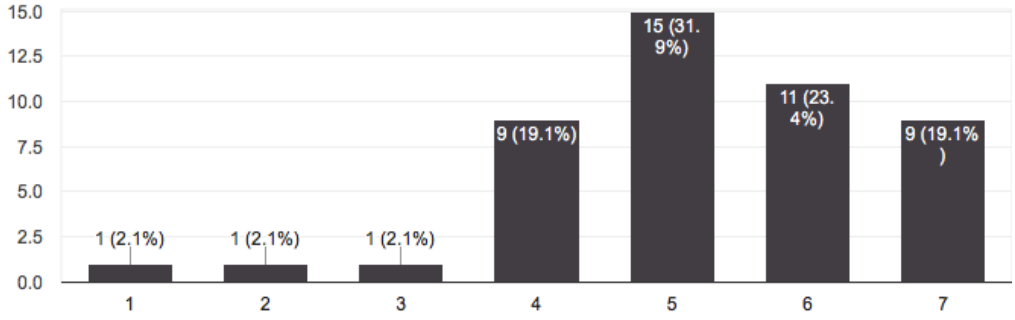
47 responses



Question A-6

Do you think that applying the definition will benefit and improve your work?

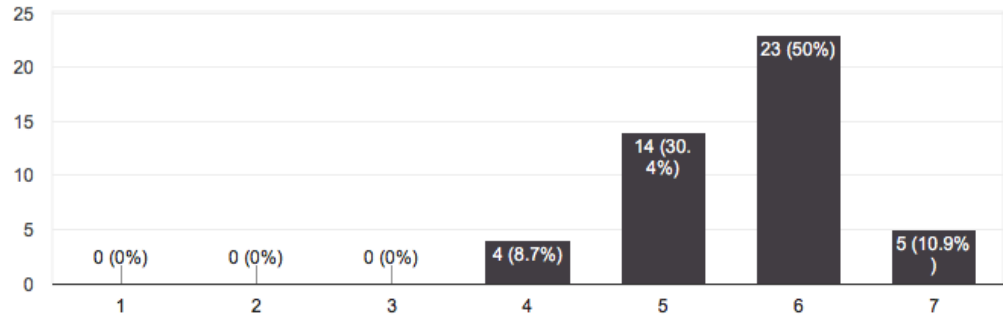
47 responses



Question B-1

Do you think that these dimensions are rational based on your knowledge, experience or expertise?

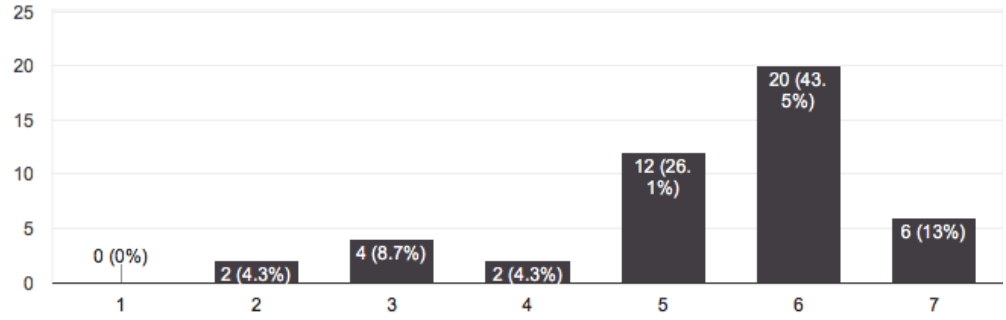
46 responses



Question B-2

Do these dimensions help you to understand what the concept of psychosocial inclusivity in design is?

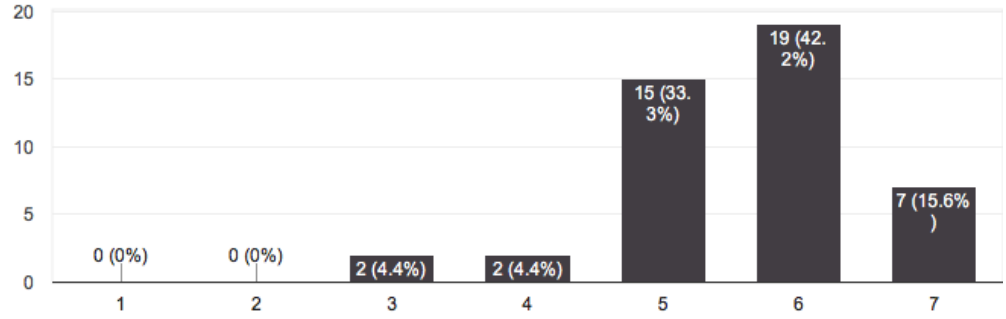
46 responses



Question B-3

Do you think these dimensions address the psychosocial aspects that should be considered in inclusive design?

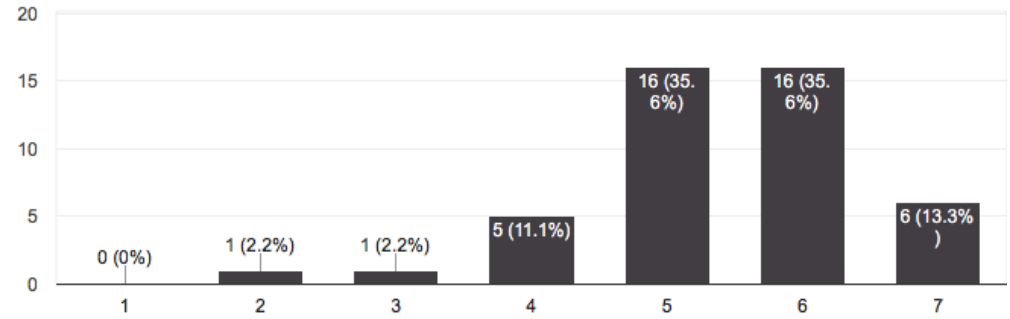
45 responses



Question B-4

Would you like to apply these dimensions to your current or future work?

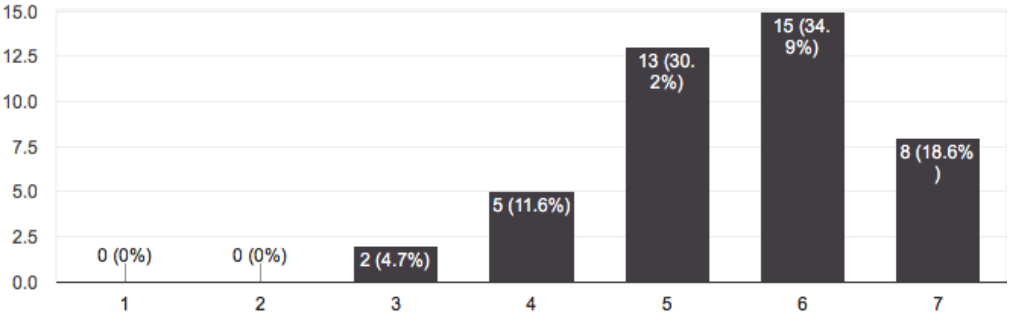
45 responses



Question B-5

Would you like to introduce the dimensions to other designers or researchers?

43 responses



Question B-6

Do you think that applying the dimensions will benefit and improve your work?

45 responses