What is Psychosocially Inclusive Design? A definition with constructs

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The world of design is fast moving beyond the physicality of experiences. The theory and practice of inclusive design, however, is still largely focused on considerations of physical aspects. This research attempts to fill the gap in understanding of psychosocial inclusivity in design by identifying a formal definition with constructs. Theoretical interrogation of literature (design and non-design fields) together with empirical investigations (semi-structured interviews, a creative workshop, and observations) are conducted within two distinct contexts i.e. older individuals' supermarket shopping and assisted mobility service users. The outcomes are evaluated using expert surveys. A formal definition and four evaluative constructs of psychosocial inclusivity in design are described: Cognitive, Emotional, Social and Value. The results provide first elements of an encompassing definition of psychosocial inclusivity, which is theoretically and empirically informed, and may serve as a guide for design in the future. The research enhances the knowledge of psychosocial inclusivity in design through devising a formal definition and constructs, and details the constructs within two specific contexts of supermarket shopping and assisted mobility.

Keywords: older people, disability, mobility, inclusive design, human-centred design, psychosocial inclusivity

Introduction

Inclusive design has conventionally (Coleman & Lebbon, 1999) focused on two significant cohorts considered as minorities, separate from the wider population: older and disabled individuals. However, the latest international trend for inclusive design involves an integration of the older and disabled populations into the mainstream of society (Clarkson & Coleman, 2015). Accordingly, the need for, and importance of, not only physical aspects but also non-physical aspects in inclusive design have been highlighted (Lim, 2018; Langdon, 2015; Frye, 2013; Hedvall, 2013; Nickpour et al., 2012; Demirkan, 2007; Imrie & Hall, 2003; Gaver & Martin, 2000). In this research, the inclusivity of non-physical aspects, such as

psychological, emotional, social, and ideological, are referred to as 'psychosocial inclusivity' (PSI).

Outside the inclusive design field, the wider world of design portrays a progressive trajectory in terms of interest in, and consideration of, psychosocial aspects. In the widest and most diverse sense these include: *Experience design* (Hassenzahl, 2013; Fokkinga & Desmet, 2013; Schifferstein & Hekkert, 2011; Hassenzahl et al., 2010; Desmet & Hekkert 2007; Pullman & Gross 2004); *Pleasurable design* (Pohlmeyer, 2014; Jordan, 2002); *Design for well-being* (De Couvreur et al., 2013; Desmet & Pohlmeyer 2013; Pohlimeyer, 2012; White & Pettit, 2007); *Emotional design* (Yoon et al., 2017; Ozakaramanli & Desmet, 2012; Mugge et al., 2008; Desmet, 2007; Norman, 2005); *Psychologically durable design* (Haug, 2019); *Meaning-centred design* (Giacomin, 2017; Verganti, 2009); and *Human-centred design* (Giacomin, 2014; Brown, 2009).

Despite this trend, the current theoretical understanding of psychosocial aspects in inclusive design is somewhat limited (Lim, 2018). This can be partially explained by the origins of inclusive design and its traditional focus on physical accessibility rather than on psychosocial experience (Lim, 2018; Steinfeld, 2013). Going forward, this gap could limit the theoretical scope and applied impact of inclusive design. Furthermore, in terms of facilitation, there are currently only a limited number of sources which present applications (e.g. frameworks, models, guidelines) of PSI in design (Lim, 2018) despite the fact that inclusive design has in recent years extended its scope to various contexts such as policy, regulation, economics, business, social environment, and technology (Lim, 2018; Clarkson & Coleman, 2015; Persson et al., 2015; Reed & Monk, 2011; Pullin, 2009; Hirsch et al., 2003; Hirsch et al., 2000).

The research described here aims to explore the concept of PSI in design by identifying and detailing its definition and key constructs. The following research questions are accordingly established:

a) What might be a logical and viable working definition of 'psychosocial inclusivity in design'?

b) What might be the individual measurable constructs within the overall working definition of psychosocial inclusivity in design?

To provide a response to these research questions, a systematic review (Burgess et al., 2006) of the research literature (over 300 articles from various fields including design, healthcare, psychology, and sociology) was conducted. After critical review, 139 papers (102 non-design and 37 design based) were selected for further analysis to create a working definition of "psychosocial inclusivity in design".

After establishing a preliminary working definition, empirical activities (i.e. ethnographic activities: semi-structured interviews, a creative workshop, and observations which are well established human centred design tools that are widely used in design to detect users' needs, desire, and meanings [Giacomin, 2014]) were then performed to better focus the definition and to investigate the constructs which are involved in the concept. Given the scope of the concept of "inclusivity" and the temporal and capital constraints of any research activity, a purposeful sampling approach (Higginbottom, 2004; Marshall, 1996) was adopted in which the research team focussed on two key populations (older individuals and people with disabilities) and two core contexts (supermarket shopping and assisted mobility services).

The selection of these two key populations was made based on strong evidence around their inclusivity requirements (Clarkson & Coleman, 2015; Nickpour et al., 2012;

Coleman & Lebbon, 1999). While not covering the whole population of individuals who might benefit from inclusive design interventions, the two selected populations were nevertheless considered sufficient to interrogate and widen the needs and the views, so as to ensure that a first set of elementary constructs of "psychosocial inclusivity in design" emerged from the analysis.

The two core contexts selected for study were those of supermarket shopping and assisted mobility services. Shopping is one of the instrumental activities of daily living (IADL) and an overarching activity associated with other IADLs (Spector et al., 1987). Moreover, mobility has been claimed to be the most significant impairment among the physical and mental impairments (Department for Work and Pensions, 2019). While not covering the complete range of life situations in which matters of "psychosocial inclusivity in design" might prove decisive, the two core contexts were nevertheless considered sufficient to ensure a first set of elementary constructs could emerge from the analysis.

The emergent definitions and constructs from the literature review and the ethnographic investigations were used as the input for an experts survey aimed at validating and widening the constructs.

Methodology, methods, and study design

Methodology

Blessing and Chakrabarti's (2009) Design Research Methodology (DRM) and Robson and McCartan's framework for research design (2016) were adopted and adapted accordingly as research methodologies. In the research investigation described here, semi-structured interviews, a creative workshop, observations, and surveys were performed following a mixed-method empirical approach. In order to achieve the greatest degree of rigour and

confidence, methods were chosen which facilitated data triangulation (Robson & McCartan, 2016; Denzin, 1988; Jick, 1979). Figure 1 provides an overview of the adopted research methodology.
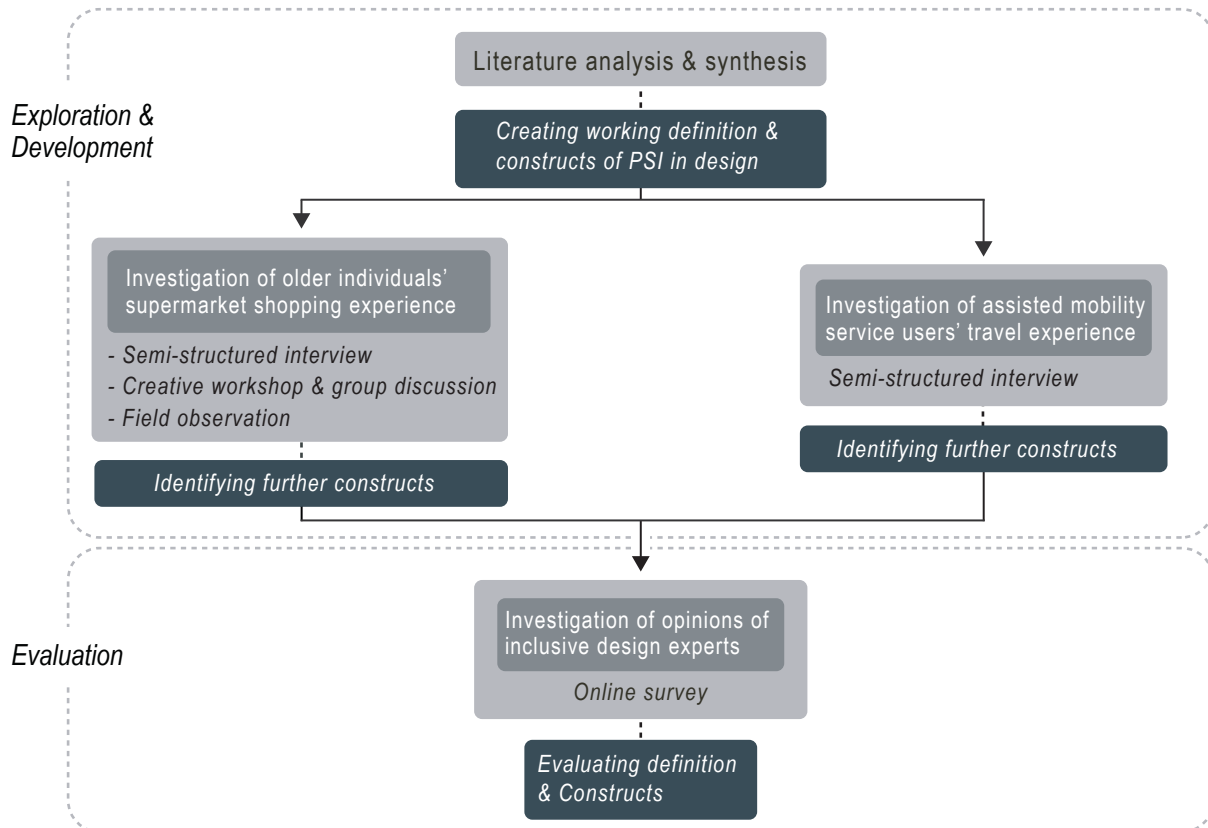

Figure 1 Research methodology adopted

Methods, study design, and protocol

Investigation of older individuals' supermarket shopping experience

Older individuals (aged 60 or over) and their supermarket shopping habits – which are linked with other IADL such as housework, preparing meals, taking medication, mobility, managing money, and communication (Spector et al., 1987) – were chosen. Medium-cost supermarkets (i.e. Tesco, Sainsbury's, and Morrisons) that more than 95% of UK households use (Pechey & Monsivais, 2015) were focused upon.

Three empirical investigations – semi-structured interviews, creative workshop and group discussion, and field observations with a total of 58 older individuals – were selected as data collection methods to identify the constructs of PSI in the context of the supermarket shopping experience of older individuals. To achieve this, 1) any constructs already identified from the literature review were confirmed, and 2) any new constructs in the older individuals' supermarket shopping experience were identified.

Semi-structured interview protocol: 31 older individuals were recruited to conduct semi-structured interviews in order to identify possible psychosocial factors based on the participants' supermarket shopping experiences.

The participants were asked about their general life including their background, diet and health, and supermarket shopping habits. Each interview was conducted in under 30 minutes, and the voice recorder was used to record participants' responses, which were transcribed to text by a professional transcription team.

Creative workshop & group discussion protocol: A creative workshop was conducted with 19 older individuals; 17 product design students were recruited as assistants. The students helped to organise the discussions and conduct note-taking during the workshop. Several discussion sessions about participants' shopping experiences were conducted in order to identify what psychosocial related issues they experienced during supermarket shopping.

Field observation protocol: The non-participant observations were conducted with eight older individuals (four individuals and two couples). The participants were asked to choose a regular shopping schedule and supermarket branch so as to observe their usual shopping experience. Medium-cost supermarkets (one Sainsbury's and two Tesco branches) in Hillingdon, UK were recruited.

As a familiarisation stage, pre-interviews about the participants' general backgrounds and shopping behaviours were conducted at their homes. After the interviews, two compact digital action cameras were equipped in the researcher's backpack and one in the participant's backpack to record each participant's shopping experience including the journey to and from home. Note-taking was also used as a method during the observations.

After conducting the observations, final interviews regarding relevant feelings and thoughts in the observed situations (e.g. finding way or items; talking to known/unknown people including supermarket staff) were conducted. The recorded videos were shown for the participants so as to remind them of each particular situation.

Investigation of assisted mobility service users' travel experience

In the UK, 49% of impairments are related to personal mobility: the most significant impairment (Department for Work and Pensions 2019). A total of 37 mobility assisted service users (i.e. Adapted car users [n=24]; Driver with mobility impairment [n=3]; Mobility scooter users [n=3]; Passenger with mobility impairment [n=3]; Powered wheelchair user [n=2]; Wheelchair accessible vehicle users [n=2]) were recruited as participants.

A semi structured interview was designed to identify the constructs of PSI in the context of personal mobility. To achieve this, 1) any constructs already identified from the literature review were confirmed, and 2) any new constructs in personal mobility experience were identified.

Semi-structured interview protocol: The investigation was designed as semi-structured interviews. The questionnaire was prepared with several pre-set questions, but several prompts based on possible responses were also prepared to lead possible discussions. The participants were asked about their general life and mobility experiences so as to identify

any possible psychosocial related factors. Each interview took approximately 60 minutes and the interview responses were recorded using an audio recorder. The recorded interviews were transcribed to text by a professional transcription team.

Inclusive design expert opinion

An online questionnaire survey was adopted in order to develop and evaluate the refined definition and synthesised constructs from the previous investigation. To achieve this, 1) reliability and completeness of the definition and constructs, and 2) any suggestions for the development of the definition and constructs were identified from the survey.

Survey protocol: Design practitioners from various areas (product design, industrial design, UX design, design management, and architecture etc.) and design academics (researchers or lecturers) with over three years of experience in inclusive design were chosen as the target audience. LinkedIn (a well-established business-oriented social networking service) was mainly used as a recruiting method. The career record and the professional groups relevant to inclusive design were considered as recruiting criteria. Invitation emails were sent to the list of participants and chosen group in LinkedIn with the online questionnaire link so as to raise participants' understanding and interest in the survey. The participants were asked to pass the invitation to any relevant experts in their contacts. A total of 47 participants (24 design practitioners and 23 design academics) were recruited.

The survey consisted of four parts: I-introduction; II-definition; III-constructs; IV-participants' information. The questions were designed as a mixture of both closed- and open- ended questions based on Kirkpatrick's four levels of evaluation model: reaction, learning, behaviour and results (Kirkpatrick & Kirkpatrick, 2016; Ahmed, 2000; Phillips, 1990). The participants were asked regarding the overall reliability of the working definition and constructs of PSI in design. They were also asked to develop the working definition and

constructs based on three categories: *Refine* (anything to be changed); *Remove* (anything to be removed); *Add* (anything to be added).

Data analysis and key findings

Investigation of older individuals' supermarket shopping experience

Data analysis protocol

Considering that the collected data from the three investigations were based on the verbal form (interviews and discussions), thematic coding analysis methods (Domain and Taxonomic coding and Process coding [Saldaña, 2015]; NVivo software; The six phases of thematic analysis [Braun & Clarke, 2006]) were used for the data analysis. Six design researchers participated as coders in the analysis process.

Participants' comments were extracted and categorised based on their meanings and implications. The initially analysed results (working structure) were adopted into the NVivo software to analyse the rest of the interview transcripts. The extracted codes from the remaining transcripts were placed under, or combined with, the existing sub-themes or codes of the working structure based on their meanings and implications. There were also newly identified codes which were placed as new sub-themes or codes. A complete set of constructs was reviewed employing Braun and Clarke's (2006) '15-point checklist of criteria for good thematic analysis'. The constructs were repeatedly reviewed and revised until full agreement was achieved by the coders.

Findings and discussion

Four possible psychosocial constructs – *cognitive*, *emotional*, *social*, and *value* themes including sub-themes and codes – were identified through three investigations of older

individuals' supermarket shopping experiences. Table 1 presents the confirmed code which were already identified from the literature and newly identified code from the three investigations.

Table 1 Data analysis results from the three investigations

Theme	Confirmed code	Newly identified code	
Cognitive	N/A	- Affordances - Cognitive judgement - Familiarity - Helpfulness	- Preference in lifestyle, social, public, etc. - Self-awareness of health& age
Emotional	N/A	- Enjoyment - Embarrassment - Feelings of pleasure	- Frustration - Self-consciousness
Social	- Socialising - Social service & support - Socio-economic status - Support from others	- Cultural differences - Entertaining & hosting - Generational differences - Hobbies - Interaction with others in the supermarket	- Public attitude - Public awareness and language - Social activity - Support & service - Volunteering activities
Value	- Long-term health incl. mental health - Safety - Self-confidence	- Fairness - Happiness - Life-satisfaction	- Reliability & Trust - Self-esteem - Sense of independence

Cognitive theme: Psychosocial aspects are crucial determinants for older individuals in their supermarket shopping habits such as the choice of the supermarket product, service, or even branch. For example, one of the participants made a choice of supermarket based on her health condition (*self-awareness of one's health*).

Emotional theme: In the existing literature, emotional factors have been used for mainly marketing purpose by supermarkets (Ambler et al., 2004). However, the results from the investigations implied that emotional factors such as *feelings of pleasure*, *self-consciousness*, and *frustration* affect older individuals' shopping experiences. For example, a

participant mentioned that complexity in supermarket facilities such as self-checkouts or mobility scooters often make her feel uncomfortable, embarrassed, and self-conscious.

Social theme: The results implied that such social factors also strongly affect older individuals' shopping experiences. For example, people shopping for their friends or neighbour who are unable to go to the supermarket due to health issues; meeting/seeing people in the supermarket; shopping with their family/partners.

Value theme: The participants emphasised certain satisfaction with their society or life via shopping experiences. For example, purchasing fair trade or local products make them feel that they were contributing to society (*self-esteem, self-satisfaction*, and *sense of belonging*). The participants added that various events (e.g. meeting people including supermarket staff, seeing a sunset, or taking pictures of flowers on the way to the store) make them feel *happy* and thereby enhance their *life-satisfaction*.

Investigation of assisted mobility service users' travel experience

Data analysis protocol

The interview transcriptions were analysed using thematic coding analysis methods: 'domain and taxonomic coding' and 'process coding (action coding)' which are effective tools in the early stage of interview data analysis (Saldaña, 2015) based on Braun and Clarke (2006) 'six phases of analysis'. Five random transcripts were initially analysed as a familiarisation stage by two design researchers (with respectively over three years and 15 years of experience).

The researchers extracted as many psychosocial related comments or codes as possible at this stage. The extracted codes were classified as groups, names, and meanings. Such collated groups are called themes (patterns). Barry et al. (1999) suggested that multiple coding analysis provides an objective viewpoint and a degree of confidence in the results.

Hence, four design researchers, one postdoctoral (female) and three PhD (two females and one male) researchers, were recruited to conduct card sorting activities. The participants were given a set of over 100 cards that contain identified codes and were asked to categorise them. The results from the activities were reviewed and used to create a working structure.

The working structure from the above process and the rest of the transcripts were imported into NVivo software, which is a well-known qualitative data analysis tool (Edhlund & McDougall, 2012). Results were reviewed by means of the '15-point checklist of criteria for good thematic analysis' as suggested by Braun and Clarke (2006).

Findings and discussion

Several sub-themes and codes were identified. Table 2 highlights the confirmed and newly identified codes from the interviews with mobility assistive device users.

Table 2 The data analysis results from the interviews

Theme	Confirmed code		Newly identified code	
Cognitive	- Information - Stress		- Being independent - Circumspection - Empowerment	- Reliance - Self-consciousness
Emotional	- Anxiety - Loneliness		- Embarrassment - Frustration - Lack of confidence	- Satisfaction/dissatisfaction - Vulnerability
Social	- Family support - Financial support - Public attitude - Social awareness	- Social engagement - Social interaction - Social participation - Social service	- Public service - Social isolation - Support & service - Support from surrounding people	
Value	- Happiness - Safety	- Security	- Equality - Freedom	- Self-confidence

Cognitive theme: The participants implied that there was a link between their mobility impairments and cognitive factors. As an example, one of the participants mentioned that she prefers to go out with others rather than alone due to her mobility impairment (reliance).

Emotional theme: As an example of both lack of confidence and embarrassment, the participants mentioned that they feel these negative feelings when they use their mobility scooter in public.

Social theme: The participants emphasised that their mobility experiences are strongly affected by social factors, e.g. a feeling of social isolation due to a negative pubic attitude and a need for an appropriate social and public service due to the high cost of the mobility assistive device.

Value theme: As an example, interviewees commonly mentioned that they feel that they can enjoy freedom and have equal life opportunities to able-bodied people thanks to their mobility equipment.

Inclusive design expert opinion

Data analysis protocol

Two design researchers (a final year PhD researcher [male] and a researcher with over 15 years of experience [female]) carried out the data analysis protocol. Frequency distribution analysis (Neuman, 2007) was adopted for questions 1–6 in parts II and III (closed-ended type questions) considering the survey was a descriptive investigation. Means and standard deviation (SD) were calculated by means of 'Statistical Package for the Social Sciences' (SPSS) software and Google Forms. For the analysis of questions 7–9 in parts II and III (open-ended type questions), 'In Vivo' coding (Saldaña, 2015) was adopted to capture the actual language from the participants' comments.

Findings and discussion

Definition

The working definition of PSI in design created from the literature analysis is:

> *Provision of equal opportunity for a better quality of life for as many people as*
>
> *possible by considering both psychological and social factors.*

The participants emphasised that the word *better* is broad and general so as to be open to interpretation. Also, the terms *quality of life* and *psychological and social aspects* are broad and multidisciplinary concepts spanning various fields. Furthermore, the word *equal* is inappropriate considering that it means the same in value, size, or number. Such meaning may not meet the definition of inclusive design which attempts to include *as many people as possible*. Several participants mentioned that the term *design* is missing although the definition has been created for design. Based on these comments, the working definition was revised and is presented in the next section 'Results and Discussion'.

Constructs

There were various positive comments regarding the reliability and completeness of the constructs. However, some participants emphasised that the constructs are somewhat general, and the several sub-themes and codes overlap in the current presentation form. The notion of PSI is a broad concept, so the constructs can be formed in different ways according to the research purpose. Therefore, considering that there are no major arguments, the constructs remain in the original form. The details of each theme are presented below:

> **Cognitive theme:** The participants suggested to add several new cognitive factors such as *affordances*, *cognitive capability* (executive function, intelligence, and memory), *self-efficacy*, and *sensorial factors*.

Emotional theme: Some participants argued that both sub-themes *positive* and *negative emotions* should be more specific considering that the concept of emotion is broad. The participants also added that several codes overlap with other codes or sub-themes.

Social theme: A participant suggested using the term *social opportunity* rather than *social activity* because social activities are a part of social opportunities. Furthermore, several additional codes or sub-themes such as *socio-cultural context*, *bandwagon effect*, *environmental and economic factors* were suggested by the participants.

Value theme: The participants emphasised that several sub-themes and codes, e.g. *social satisfaction* and *life-satisfaction,* overlap with other sub-themes and codes. Again, several new codes were suggested by the participants: *economic values*, *meaning*, *personal values*, *political values*, *purpose*, *religious values*, *self-actualisatio*n, *social values*, and *stages of life*.

Results and discussion

Definition of psychosocial inclusivity in design

The working definition from the literature analysis was developed based on the design experts' responses in the expert survey. This research suggests a definition of PSI in design as:

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

Constructs of psychosocial inclusivity in design

Four constructs of PSI in design were identified including 'cognitive', 'social', 'emotional', and 'value' themes. Figure 2 presents the main themes and sub-themes. Further details including codes are presented in each section below. The number of occurrences for each code was not presented in the outcome to avoid confusion over potential importance of each code.
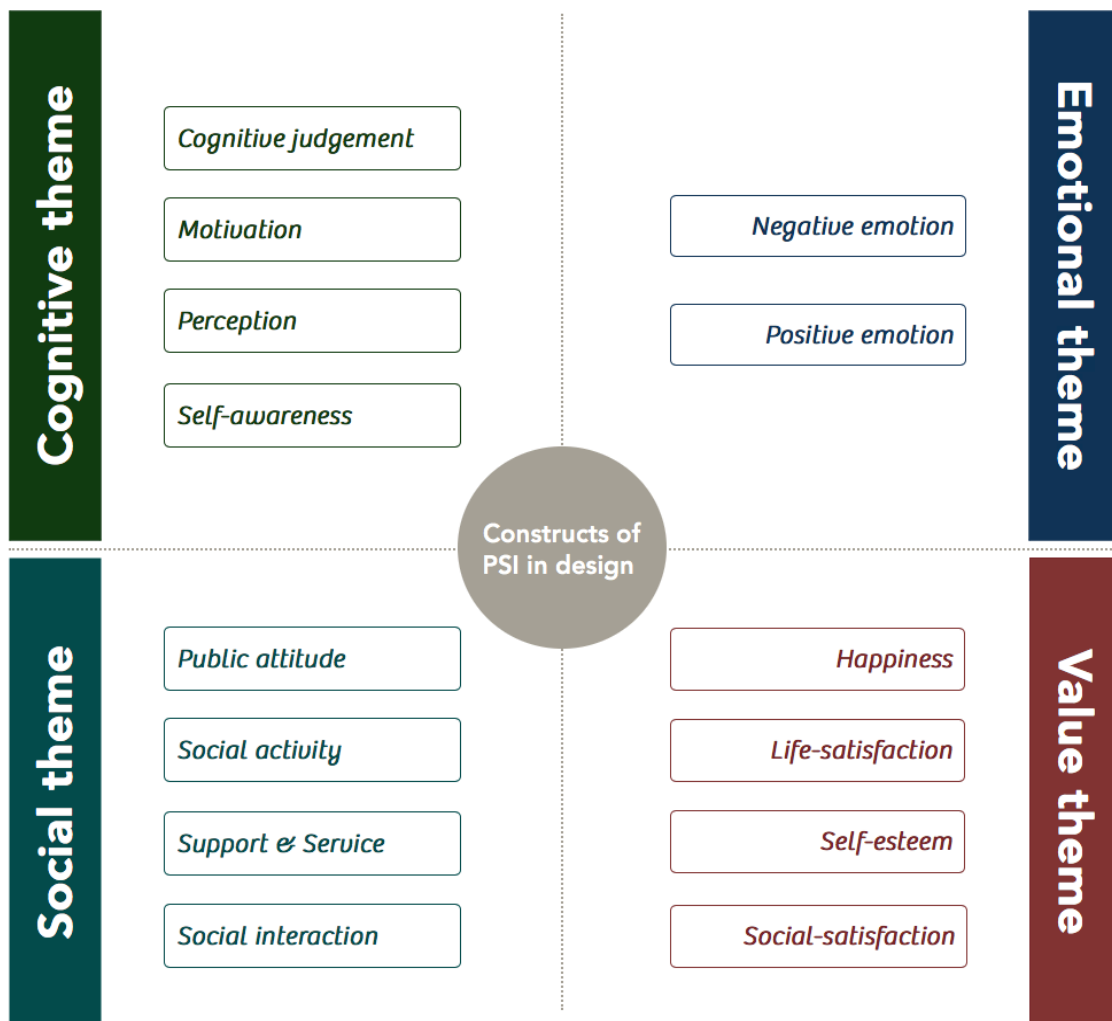

Figure 2 Constructs of psychosocial inclusivity in design including themes and sub-themes

Table 3 presents a full set of combined constructs of PSI in design includes themes, sub-themes, and codes.

Table 3 Combined constructs of PSI in design

Theme	Sub-theme	Code	
Cognitive	Cognitive judgement	- Circumspection - Familiarity - Helpfulness	- Locus of control - Misconception - Preference in lifestyle, social, public, etc.
	Motivation	- Attitude	
	Perception	- Affordances	
	Self-awareness	- Personal image - Self-awareness of Health	- Self-awareness of age
Emotional	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	Public attitude	- Cultural difference - Discrimination - Generational difference	- Public opinion - Social changes
	Social activity (Incl. 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	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 theme: Messick's (1994) definition of cognitive style; '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', was used to explain the cognitive theme in this research. Any types of human behaviour, thinking, and attitude relevant codes were categorised in this theme.

There are four sub-themes including *cognitive judgement*, *motivation*, *perception*, and *self-awareness* in the cognitive theme. *Motivation* and *perception* have already been identified in the literature. Such identified items were reconfirmed and discussed through the empirical investigations in this research. However, *cognitive judgement* and *self-awareness* were additionally discovered in this research.

Emotional theme: According to the literature (Mulligan & Scherer, 2012; Cole, et al., 2004; Kleinginna & Kleinginna, 1981; Chaplin & Krawiec, 1979), there are various definitions of the term 'emotion' but a consensus definition is limited because it is a broad and also overarching concept. Therefore, any feelings based on one's mood, circumstance-relevant codes, or emotion-related codes caused by other people were categorised in this theme.

There are two sub-themes: *positive* and *negative emotions*. There are no newly identified sub-themes because the two sub-themes are general and broad, but several new codes (*comfort, optimism, embarrassment, frustration,* and *self-consciousness*) were added throughout the ethnographic investigations. It was identified that the emotional changes of participants involved in the investigations were mostly affected by other factors, i.e. public attitudes or social interactions. This correlation between the emotional theme and other themes was also emphasised in the expert survey.

Social theme: There are various social factors including the 'physical environment, external stressors, family environment, interpersonal relationships, social support, isolation, role models, social expectations, value system, sociocultural factors, and culture' (Kaslow et al., 2007). Hence, any external factors such as public attitude support, service, or activities which can influence individuals were categorised in this theme.

There are four sub-themes *public attitude*; *social activity*; *service*; and *social interaction*. The sub-themes of *social activity*, *support*, and *social interaction* were already identified in the literature analysis in this research. *Public attitude*, *service* and their codes were additionally identified through the ethnographic investigations. Such were emphasised when the participants were in particular situations within their society, community, or relationship with other people. The sub-theme and codes in this theme mostly affect and are affected by the other three themes.

Value theme: In order to describe this theme, the general definition of 'principles or standards of behaviour; one's judgment of what is important in life' (Oxford English Dictionary, 2017), was used due to its broad and diverse use in various areas such as music, chemistry, mathematics, physics, marketing, business, and ethics. 'Continuous choice', 'judgement of satisfaction', and 'judgement with reference to cultural norms or a value system' are the three bases when individuals identify what is valuable or not (Diener & Suh, 1997). Therefore, based on the above definition of the term value, the codes which are related to the three bases were categorised in this theme.

There are four sub-themes: *happiness*, *life-satisfaction*, *self-esteem*, and *social-satisfaction*. In the evaluation study, the participants argued that the sub-themes and codes of the value theme have a strong relationship with those of other themes because the sub-themes and codes in this theme are based on individuals' emotions, beliefs, and thoughts. It can be

explained that such themes and codes are the results of individuals' thoughts or emotions as to what is important or not in their life. Therefore, it can be argued that the sub-themes and codes in this theme are the particularly crucial factors that determine the individuals' quality of life.

Similarities to frameworks describing customer perceived value, brand value, and meaning

Given the nature of psychosocial inclusivity, several similarities can be noted between the constructs identified in the current study and those of existing popular frameworks of customer perceived value, brand value, and meaning.

While formulated for a different purpose and from a mostly individual perspective, frameworks of customer perceived value such as those of Richins (1994) and Holbrook (1999) contain entries which capture concepts of sensory experience, emotion, social interaction and life goals in a manner similar to the results of the current research. The results of the current study are thus approximately in-line with the core elements of the most frequently reviewed, and most widely deployed frameworks of customer perceived value.

While formulated to describe the characteristics of branded organisations, branding frameworks such as that of Olins (2008) usually contain elements which resemble the constructs or sub-constructs which were identified in the current research, with that of Gad (2001) providing a particularly strong resemblance to the current results in terms of structure and semantics.

Finally, popular frameworks which attempt to describe human meaning such as Sinek's (2011) golden circle, Scheler's (1973) value pyramid, Maslow's (1943) hierarchy of needs and Giacomin's (2017) design for meaning framework contain numerous elements

which approximate the constructs identified in the current research, with perhaps the closest resemblance being Maslow's frequently cited framework.

Limitations

It can be argued that the sample size of 58 older individuals and 37 Assisted mobility service users are somewhat insufficient. However, Robson and McCartan (2016) stress that there is a limited consensus regarding the sample size for a qualitative study, so researchers should carefully consider it in the research design stage according to the nature of the study.

The participants' gender ratio imbalance in the investigation of older individuals' supermarket shopping (Male/Female: 18/40) should be discussed. It may be argued that supermarket shopping is traditionally considered as a more important activity for females than males (Mortimer & Clarke, 2011).

The sample size of the expert survey was limited to 47 participants and the recruitment strategy was limited to LinkedIn and participants' contacts. However, the typical number of participants for a questionnaire study is 30 to 50 (Bernard, 2017). Furthermore, a purposive sampling (Robson & McCartan, 2016) of experienced designers was adopted considering this research was a first attempt to identify the definition and constructs of PSI in design. Hence, the critical sampling helped enhance the reliability and quality of the responses.

Conclusion

Summary

Although the importance of psychosocial inclusivity in design has been stressed, a systematic review on the existing literature identified a limited understanding of psychosocial aspects in

inclusive design. Psychosocial aspects are perceived as not particularly explicit or visible, hence seen as a 'soft' issue. Hence, definition, measurement, improvement, and assessment prove challenging and complex.

Subsequently, a thorough range of both theoretical and empirical investigations with appropriate numbers of participants was conducted in order to answer two research questions. First, PSI in design has been defined as: *The provision via design interventions of equal or equitable opportunities for a better quality of life for as many people as possible, considering both psychological and social factors*. Second, in order to support the identified definition, four constructs have been identified as *Cognitive*, *Emotional*, *Social* and *Value*. Additionally, several sub-themes and codes have been outlined for each construct in the context of assistive mobility and personal shopping.

Contribution to knowledge

By proposing a new definition and the associated constructs of PSI in design, this research lays the foundation for the study of PSI in design. There are two research contributions to knowledge in this research. First, the research enhances the knowledge of PSI in design by devising a formal definition and the evaluated constructs of PSI in design, informed by theoretical and empirical investigations. Second, this research details the constructs of PSI in design, within two specific contexts of supermarket shopping and assisted mobility. Both data and methodological triangulation were applied and qualitative and quantitative methods including semi-structured interview, creative workshop, observation, and survey were used in order to ensure the validity and reliability of the contributions.

Future research

The current research was based on empirical investigations focussed on two key populations (older individuals and people with disabilities) and two core contexts (supermarket shopping and assisted mobility services). Considering the diverse contexts of inclusive design, however, there are still additional audiences and contexts to be investigated to expand the current definition and constructs. One or more toolkits will be developed to capture the current contextually dependent knowledge in a form which can facilitate design discussions and decisions in the field of design education and practice. Furthermore, design ethnography will be performed in additional important social contexts to clarify the generalisability of the existing framework.

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