

JACCES

JOURNAL OF ACCESSIBILITY AND DESIGN FOR ALL

ISSN: 2013-7087

VOLUME 9 ISSUE 1

2019

DOI: 10.17411/jacces.v9i1

www.jacces.org



Journal of Accessibility and Design for All

Editorial Board

Chief Editors

Daniel Guasch Murillo
Jesús Hernández Galán

Editorial support

Yolanda Guasch

Editorial Advisory Board

Julio Abascal
Colin Barnes
Hennie R. Boeije
Lin Chern Sheng
Alarcos Cieza
Patrick J. Devlieger
Satoshi Kose
Joan M. McGuire
Roger Slee
Nick Tyler
Simon Andrew Darcy
Konstantinos Votis
Nieves Navarro Cano

Office

Accessibility Chair

Universitat Politècnica de Catalunya · Barcelona Tech

Av. Víctor Balaguer, 1. 08800 Barcelona.

Telf. +34 93 896 78 31

jacces@catac.upc.edu

Twitter: [@Journal_JACCES](https://twitter.com/Journal_JACCES) LinkedIn: [JACCES page](https://www.linkedin.com/company/jacces)

www.jacces.org

Table of contents

Inspiring architects in the application of design for all: knowledge transfer methods and tools. *Erica Isa Mosca, Jasmien Herssens, Andrea Rebecchi, Stefano Capolongo. 1.*

The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Bonardo Prayogo Hasiholan, Indri Hapsari Susilowati, Chandra Satrya. 25.*

Inclusive hotel design in India : A User Perspective. *Senthilkumaran Piramanayagam, Partho Pritam, Bhakti Amit More. 41.*

Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Afnen Arfaoui, Geoffrey Edwards, Ernesto Morales, Patrick Fougeyrollas. 66.*

Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Camille Breault, Liliane Giroux, Audrey Gauvreau, Samuel Belanger, Marie-Eve Lamontagne, Ernesto Morales. 90.*

INSPIRING ARCHITECTS IN THE APPLICATION OF DESIGN FOR ALL: KNOWLEDGE TRANSFER METHODS AND TOOLS

Erica Isa Mosca¹, Jasmien Herssens², Andrea Rebecchi¹, Stefano Capolongo¹

¹ Department of Architecture, Built Environment and Construction Engineering,
Politecnico di Milano, Milano, Italy

² Faculty of Architecture and Arts, Hasselt University, Hasselt, Belgium

¹ ORCID: 0000-0002-8247-6234

¹ericaisa.mosca@polimi.it ²jasmien.herssens@uhasselt.be

Received: 2017-10-05 | Accepted: 2019-05-05 | Published: 2019-05-31

Abstract: Accessibility is often translated in design practice by means of a prescriptive approach, focusing on legislation's application, instead of understanding the real needs and wishes of users. On the contrary, the descriptive and performance-based approach of Design for All can help architects in designing inclusive environments. Therefore, it is fundamental to translate the existing knowledge into information that meets the architects' needs to link knowledge and practice. This study focuses on methods to inspire and support architects applying a Design for All strategy by gathering information and advice. In particular, the paper demonstrates a literature review to identify how to transfer design information to architects. Based on the analysis of the included papers, four criteria were defined to translate Design for All information from users' needs into design strategies for architects in a descriptive way. The current results will provide the basis for developing a tool to inspire and create awareness for architects on Design for All in architectural practice.

Keywords: Design for All, inclusion, knowledge transfer, tool, architecture, design criteria, prescriptive and descriptive approach

Introduction

In recent decades, the attention for design solutions in architectural practice moves from services' functionalities, to social aspects as safety, inclusion, well-being and comfort (Kapedani et al. 2017, Buffoli et al., 2014, Capolongo et al., 2014; Capolongo et al., 2016). At the same time, the concept of architectural barriers is gradually shifting to the design usable and enjoyable spaces that can be used independently from the greatest number of users as possible (EIDD 2004, Afacan et al., 2009). In line with this perspective, Design for All (DfA) was defined as "the design for human diversity, social inclusion and equality" (EIDD, 2004). The purpose is to provide the same experience of the space, even with various solutions, to different people, regardless their abilities, disabilities, age, sex and culture. The application of Design for All concerns the involvement of a plurality of stakeholders (both experts and final users) from the beginning of the design process (Buti, 2018).

In line with this, DfA is gradually being considered as a fundamental strategy by European policy makers, supported by the international federation *Design for All Europe (EIDD DfA Europe)*, which strives for a common goal: a common inclusive Europe for everyone. By the introduction of the *European Disability Strategy 2010-2020: A Renewed Commitment to a Barrier-Free Europe* (European Commission, 2010b), many European countries started to update their laws. These originated from the wider strategy to boost the European economy called *Europe 2020: A Strategy for smart, sustainable and inclusive growth* (European Commission, 2010a). At the same time, the *European Committee for Standardisation* (CEN) and the *European Telecommunications Standards Institute* (CENELEC) are working on standards to support European policies as different Mandates on accessibility, including DfA strategy. However, in the context of architectural practice, attention is often given to rules followed in a strict way by following a "prescriptive" approach, without necessarily considering the real interests and needs of users for issues related to sources, time and knowledge (Afacan and Erbug

2009, Froyen, 2012, Sanford 2012) On the other hand, Design for All is inherently categorized as “descriptive” approach, in other words, it is performance-based and requires an individual understanding, which is necessary for critically analyzing the situation and considering the requirements of a range of individuals with different ability levels (Sanford 2012; Froyen, 2012; Mosca et al. 2019a). If the prescriptive approach brings to the fore a mechanical application of codes and norms, the latter allows designers to find a proper solution for their own individual projects.

Whereas it is necessary to use legislation as a starting point in the design process, likewise it is imperative to look beyond the prescriptive approach, and shift focus towards descriptive information and performance-based approach of a DfA strategy (Preiser 2010 p. 38.4; Mosca et al. 2018; Mosca et al. 2019a).

In order to implement a DfA strategy together with the existing laws into architectural practice, the knowledge transfer process needs be improved (Ielegems et al., 2015, McGinley et al. 2015, Afacan et al., 2009). Indeed, while theoretical studies and knowledge in DfA are growing, ways to link knowledge and practice is still inadequate (Ielegems et al. 2015). There is a lack of methods and tools presented in the literature to identify and express user needs within the built environment (Afacan et al., 2009), supporting designers in the application of design solutions and space quality’ assessment (Bottero et al., 2015; Capolongo , 2016;; Mosca et al., 2018). Accordingly, in order to have insight in the gap between theory and practice, a literature review has been conducted in order to identify the currently existing methodologies that propose ways of transferring knowledge to practice.

Methodology

Review protocol

A literature review was conducted with the main aim to determine the most suitable way of transferring knowledge from users to architects. In particular, the analysis aims to address the following research questions:

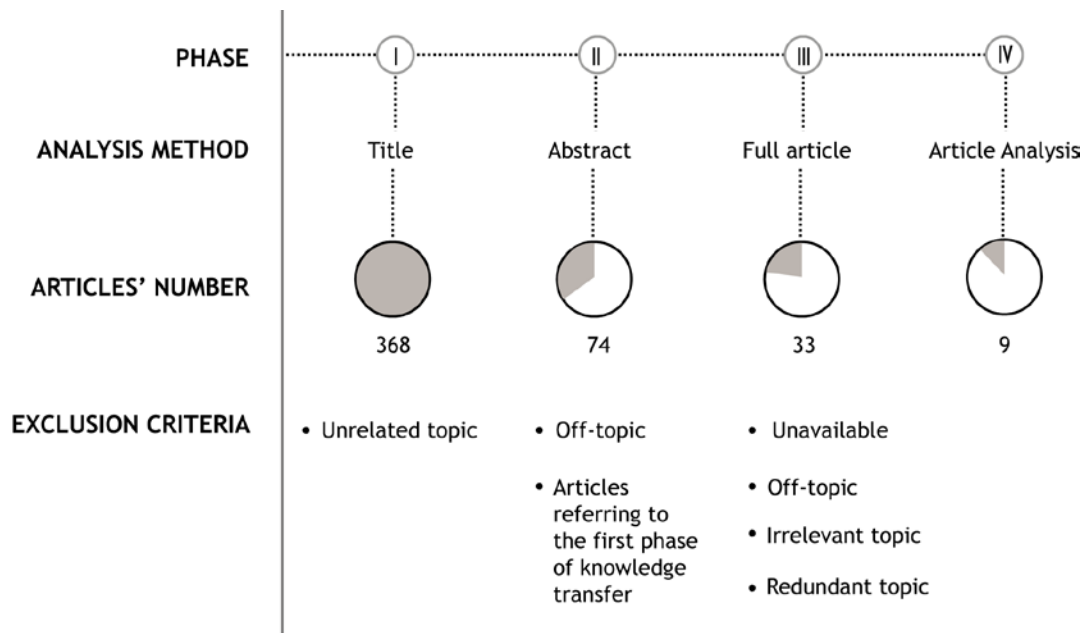
RQ1 Which methodologies and instruments in applying the DfA strategy to architectural practice can currently be identified?

RQ2 Which information should be considered in knowledge transfer to architects regarding the design of inclusive environments and users' needs?

RQ3 How is it possible to transfer descriptive knowledge stemming from the DfA strategy to designers?

By answering these three research questions, the current study strives to provide a meaningful contribution to the field in a three-fold manner. In order to provide an answer RQ1, the existing body of literature on the instruments used in applying DfA strategies to architectural practice is reviewed. In answering RQ2, new criteria are defined that are based on recurring items appearing in the studies reviewed. Finally, in an attempt to answer RQ3, the study seeks to understand the transfer of the DfA descriptive knowledge to actual use combined with legislation.

Figure 1. Phases of the literature review. Source: authors



At the first-level screening, on-line databases (Scopus and PubMed) together with grey literature were consulted. In the analysis, ad-hoc keyword strategy was adopted including the following terms: "Design for All," "Universal Design," "Inclusive Design," "knowledge transfer," "disability," "user," "design practice," "design guidelines," "design method," and "built environment." This search produced 368 articles, 322 from the keywords analysis and 74 from other sources, that underwent three different stages of study selection and for which different inclusion and exclusion criteria were devised.

Study selection process through title review

In the first phase of the study selection process, which is based on the analysis of article titles, the article relevance is determined by applying one exclusion criterion. The following criterion is applied to identify a study as irrelevant:

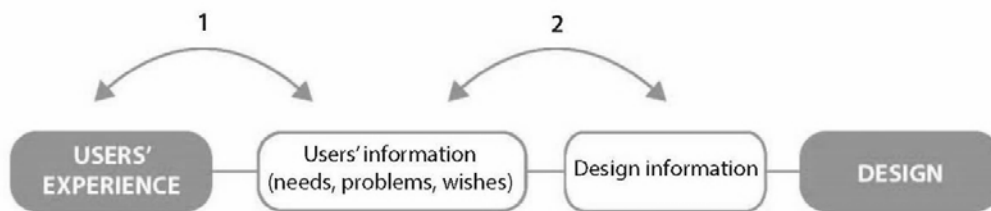
- **UNRELATED TOPIC:** This criterion excludes all articles with irrelevant topics (for example not related to Design for All, Universal Design or

Inclusive design), or articles that relate to a domain different than architecture, such as, medicine, education, or technology.

74 articles remained for the second stage of the selection process.

Study selection process through abstract review

*Figure 2. Knowledge transfer's phases from users' experience to the design.
Source: author*



After a first selection round, the papers are investigated in a more detailed manner, by means of analyzing abstracts. While examining different publications, it became clear that two phases in knowledge transfer can be identified (Fig.2). The first is the result of the experience of users, and it generates information relating to their problems, needs, and wishes. Moreover, this first group of articles primarily focuses on users with some forms of disability. The information presented in this type of research is obtained through a direct approach stemming from the observation of user involvement (Ielegems et al. 2015). These studies only summarize the needs, problems, and wishes of users in specific situations, but they do not include design information. The second phase of the knowledge transfer (Fig.2), on the other hand, enables the transformation of the information provided into design indications. The respective articles focusing on this phase, describe strategies, methods, or tools, which architects can use as inspiration and support in applying a DfA strategy. In this phase, therefore, the information is obtained indirectly, instead of through direct user involvement (Ielegems et al., 2015). Consequently, due to its relevance, the respective second group of articles deserves to be brought to the fore in the present literature review. Thus articles belonging to the first phase of knowledge transfer are

omitted from further analysis. The abstracts of the articles were analyzed further based on the following three exclusion criteria:

- **OFF-TOPIC:** studies investigating topics unrelated to the research objective. These topics include practical tools: practical tools/objects intended for disabled people and not for architects, and topics unrelated to Design for All, Universal Design, or Inclusive Design.
- **ARTICLES REFERRING TO THE FIRST PHASE OF KNOWLEDGE TRANSFER** (Fig. 2): articles whose topics belong to the first phase of knowledge transfer (i.e., articles explaining the ways of obtaining information from users, instead of ways of transforming user information to design information relevant for architects).

The abstract review resulted in excluding an additional 41 out of 74 articles.

Study selection process through article text review

Finally, the aim of the article text review was to identify those items considered useful in the development of a support tool for architects, one which would assist in developing design indications, based on user needs. Thirty-three articles were analyzed based on these exclusion criteria:

- **UNAVAILABLE:** the article is not available, or acquisition cost is prohibitive.
- **OFF-TOPIC:** studies investigating topics unrelated to the research objective. These topics include tools/objects intended for disabled people and not for architects, and topics unrelated to Design for All, Universal Design, or Inclusive Design.
- **IRRELEVANT TOPIC:** articles relating to Design for All, transfer of knowledge, or design practice, but lacking relevant information to the development of the research tool.

- REDUNDANT TOPIC: articles addressing similar topics to previously selected articles. The respective articles contain more detailed information on an existing topic and are often written by the same author.

Finally, 24 out of 33 articles were excluded, and nine articles were selected for further analysis.

Analysis of the selected articles

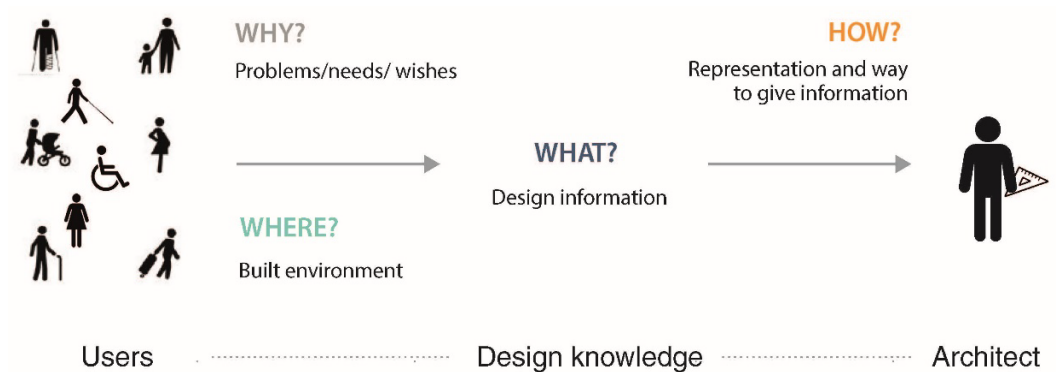
The present review is based on nine studies (Appendix 1) that include methodologies and tools useful in identifying the items fundamental in user-designer knowledge transfer and for the development of a tool that can inspire and sensitize designers to the application of the DfA strategy.

The nine studies selected for the present study are divided further into two categories: theoretical (3) and practical (6), with one study relating to both categories. On the one hand studies characterized by means of adopting a “theoretical” approach in a more speculative manner demonstrate theories, strategies, or methods in transferring design knowledge. On the other hand, the “practical” category includes studies that introduce practical proposals, such as tools, design indicators, and parameters, which are more closely related to the aim of the current study. Even so, the studies belonging to both groups are deemed essential, considering that theoretical articles assist in gaining a clearer understanding of the needs of architects and of the knowledge transfer process in finding design solutions.

In this last phase of the literature review, articles were analyzed in order to understand the common characteristics of both methodologies and tools that aim to transfer DfA knowledge to architects. The results of this investigation are described in what follows.

Results: the DfA knowledge transfer criteria

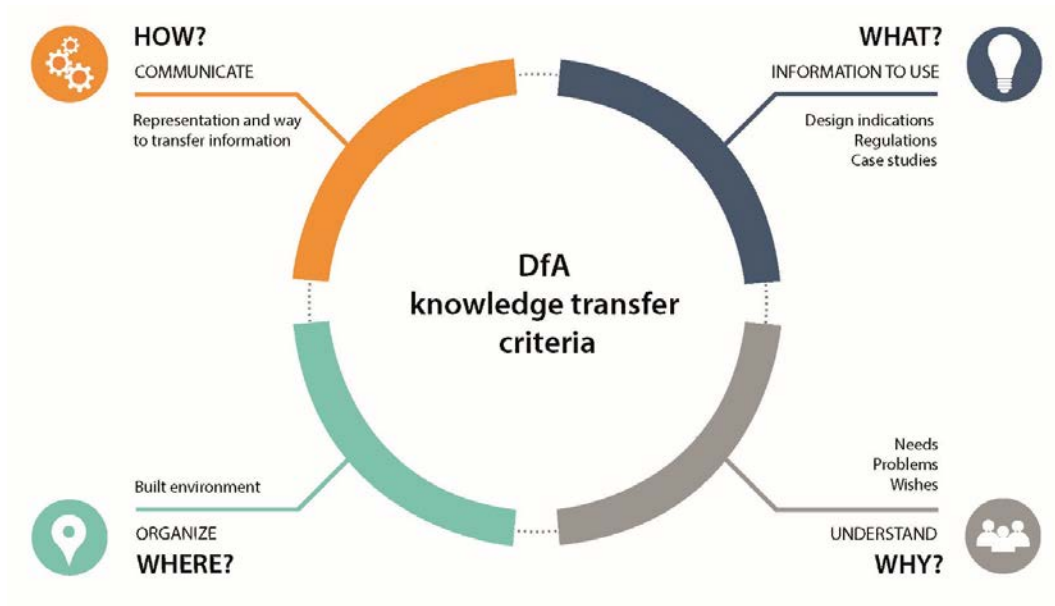
Figure 3. Main topics underlined by the literature review on knowledge transfer in inclusive and accessible design. Source: authors



Based on the literature review, four recurring topics and questions of knowledge transfer were identified (Fig. 3). For instance, design information transferred to architects can be deduced from the combination of user needs in specific circumstances of the built environment. Afterwards, it is fundamental to consider the way of transferring design indicators through representation methods suitable for the architectural design process.

Based on these findings, the current study proposes four criteria relevant to the development of tools aimed at inspiring and supporting architects in practically applying a DfA approach (Fig.4).

Figure 4. Scheme of the four criteria to develop a DfA tool able to transfer knowledge from users to architects. Source: authors



HOW? Effective communication

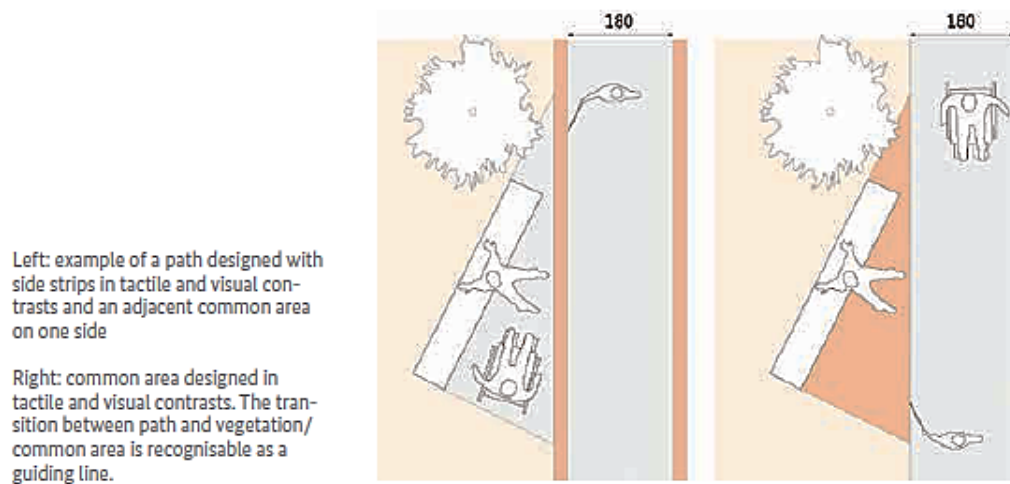
The development of a tool for transferring descriptive knowledge from users to designers requires insights in the way architects think and work in order to provide them with useful design indicators (Goodman et al., 2006). E. Lawson (2005) pointed out that designers draw not only in order to share information; drawing also constitutes a part of the thinking process, and consequently the design process is referred to as “design by drawing” (E. Lawson, 2005, p.26). Since drawing comprises a part of a designer’s way of working and thinking, graphic or visual representation methods should be considered as basic requirements in providing information to architects.

In relation to this, Goodman et al. (2008a) analyzed the representation methods used by designers in different phases of the design process, in order to develop a methodological framework for supporting designers in understanding user needs. According to this group of researchers, architects require, more affordable, light-weight and flexible methods (Goodman et al., 2008a; 2008b). At the same time, Ielegems et al. (2015) point out that designers prefer visual information and ‘Just-in-time’ data “which contains

all the necessary elements in a sufficient way without information overload" (Ielegems et al., 2015, p. 262). Time is identified as a constraint factor in the design process, which occasionally limits the possibilities for exploring different sources. McGinley et al. (2015) argue that "optimal tools for designers should be simple, intuitive, highly visual and fast, easy to learn and easy to work with" (McGinley, et al., 2015, p. 190). Similarly, the Framework of the Haptic Design Parameters (Herssens, 2011) aims to achieve flexibility and easy use in order to meet the needs of as many different architects .

Furthermore, designers appreciate when an empathic perspective is included in the information with which they are presented; this assists them in understanding user needs (Goodman et al., 2006). Thus, practical solutions are required to provide fast and easy information transfer together with a sufficient amount of content necessary in understanding user needs. This type of content could be obtained through user images (photographs, drawings and diagrams), which would cater to establishing more empathic comprehension rather than text (Alexander et al. 1977; McGinley et al., 2015). A practical example is the Innovative Solution for Universal Design (IsUD) developed by IDeA Center of Buffalo (IDeA, 2018), which provides a browser of design information associate to the Universal Design goals and case studies that can be accessed easily in an interactive way.

*Figure 5. Example of graphics. Source: Berlin Design for All. Accessible public buildings.
http://www.stadtentwicklung.berlin.de/bauen/barrierefreies_bauen/en/handbuch.shtml*



Detailed drawings can also be used to show technical information as detailed dimensions, while pictures should be used to provide inspirational examples for architects (Fig. 5).

According to Goodman et al. (2006; 2007) user involvement is considered useful in providing information. However, it also includes certain disadvantages from the designers' perspective, requiring extra time to be spent on user participation and involvement which incur extra costs for the design process. This claim further strengthens the need for developing a tool that would be an indirect resource, although users involvement is also highly recommended in many cases, above all at the beginning and at the end of the design process.

To sum up, based on the literature review, a proposed tool for architects should be: fast and easy to find and use, visual and empathic (in order to understand user needs). These characteristics describe the way of providing information to architects concerning the communication methods. This type of communication can be achieved through graphics, as they are appreciated and more effective than words of design information in delivering concepts to a designer (Goodman et al., 2006; McGinley et al., 2015).

Mosca, E., Herssens, J., Rebecchi, A., & Capolongo, S. (2019). Inspiring architects in the application of design for all: knowledge transfer methods and tools. *Journal of Accessibility and Design for All*, 9(1), 1-24. doi:<http://dx.doi.org/10.17411/jacces.v9i1.147>

WHAT? Descriptive information

The studies selected in the review used a descriptive approach in transferring information to architects (Keates et al., 2003). In order to define the information as descriptive, it should exclude prescriptions regarding 'how things must be made' or 'how things must be', but instead focus on 'what it can do for/with people' (Froyen, 2012). In particular, descriptive information refers to performance indicators which focus on objectives to achieve (Bottero et al. 2015; Mosca et al. 2018). This approach overcomes fixed guidelines to follow, while the specific design solutions proposed to reach the result are decided independently by the architect. Designers need informal, descriptive, and empathically oriented information to comprehend fully the situation and discover the appropriate design solutions (Goodman et al., 2006). This theory is confirmed in the study conducted by Lawson (2005), who views design as a prescriptive enterprise because, this author claims, designers make decisions regarding how things *should* be done, or as he explains: "Unlike scientists who describe how the world is, designers suggest how it might be" (Lawson, 2005 p. 112).

Figure 6. Design Process scheme. Source: Accolla A., Bandini Buti L. (2016)



Similarly, Accolla and Bandini Buti (2016) advise designers and decision makers to think about the abilities, necessities, aspirations, and visions of users in obtaining appropriate performance indicators by asking the right

questions at the beginning of the design process and then looking for the answers by consulting literature and experts (Fig.6).

Thus, a support tool should transfer descriptive knowledge through design indicators, providing information, advice, or suggestions deduced from the relationship between user needs and the built environment. In fully accounting for the nature of design indicators, Alexander (1997) proposed a method regarding the domains of urban development, architecture, and construction, in order to structure the relationship between context, problem, and solution, called Design Patterns. In the context of the present study, the Universal Design (UD) Patterns approach developed by H. Froyen (2012) were based on the Design Patterns (Alexander, 1997) strategy. Indeed, UD Patterns provide “information about conflicts (problems definitions), experienced in handicap situations by users, whether they have specific and permanent situation or not and related to empirically supported resolutions, meaningful combination of design aspects (architectural/technological solutions)” (Froyen et al., 2009a, p. 201).

The WHAT criterion, therefore, emphasize the relevance of gaining a clearer insight into user problems and needs to facilitate more creative and innovative solutions for decision makers and designers. Unlike traditional guidelines, design indicators, based on this assumption, provide rational evidence. Indeed, design indicators assist in providing designers with descriptive knowledge stemming from the findings of case studies, information about user needs, and references to the legal framework of accessibility (Mosca et al. 2019a, 2019b). In this way, a joint consideration of the available information allows for an understanding of the circumstances in which user needs occur and for using design guidelines as support in developing more creative and efficient solutions for design projects.

WHY? Understanding user needs

In the context of ‘Design for All’ perspective, the “needs” do not only address primary physical needs (e.g. accessibility), but also to cognitive and

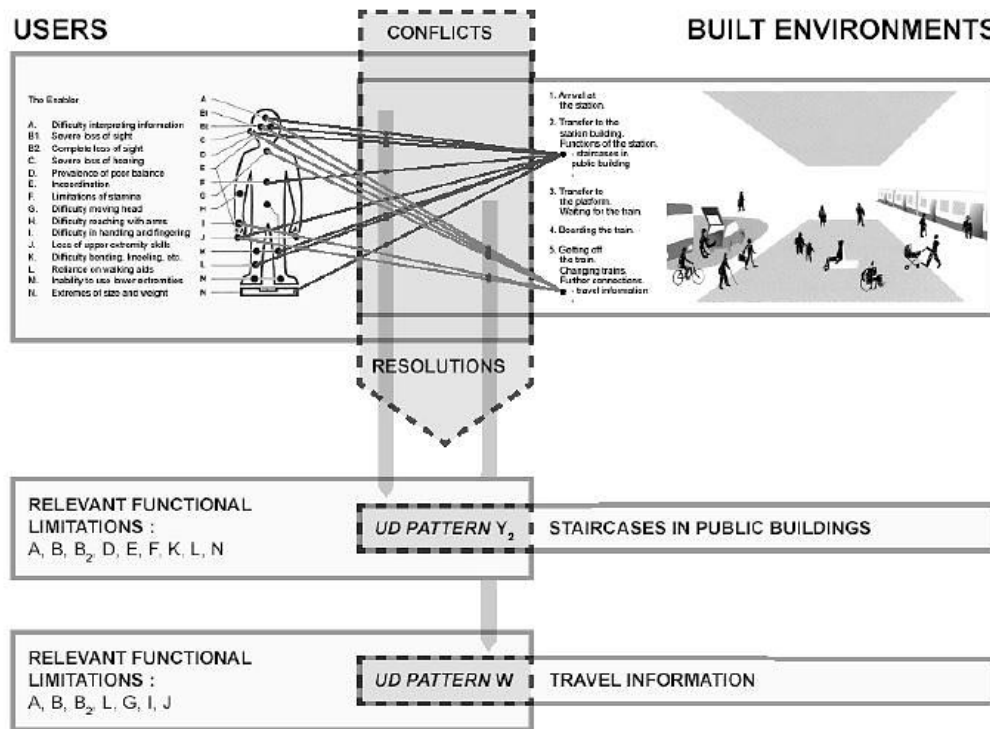
sensory needs (e.g. orientation) and social needs as security, comfort, well-being, privacy and inclusion, which refer to the needs of the widest diversity of people, with and without disabilities.

User needs and wishes should be considered and investigated during the entire design process in order to make the knowledge transfer efficient (Goodman et al., 2006 and 2007), since the main body of user-needs is usually tacit by nature (Ielegems et al. 2015).

Waller et al. (2015) propose a strategy for developing inclusive projects based on four phases that summarize the process of concept generation, which they dub Explore, Create, Evaluate, and Manage. These phases address four questions – What are the needs? How can the needs be met? How well are the needs met? and What should be done next? – essential for the designer to understand and satisfy user and business needs. Similarly, this topic is also addressed in the V-model introduced by Ielegems et al., (2015), who adopt a user-centred design approach, where the user input (needs) are related to the design output (the design process).

The UD Patterns developed by Froyen (2012) are logical design solutions to the conflicts between users and the built environment; more specifically, conflicts are defined as “an analysis of possible conflicts between human activity cycles and environmental elements, potential usage problems and disabling situations, the given socio-spatial setting is investigated in relation to the various user categories.” (Froyen, 2012, p. 153) (Fig.7). Regarding a support tool development, from the point of view of the information about user needs, architects can comprehend the situation in an ample way and then they can adapt the information provided in creating their own design solutions.

Figure 7. Graphical representation of the process of detecting and formulating UD Patterns. At the first stage the relation between users and built environment. Source: Froyen 2012 and Froyen et al., 2009b



To conclude, for the development of a support tool, user needs, problems, and wishes must be taken into account from the beginning of the design process as they assist architects in understanding why a specific design indicator is provided and what the situational circumstance is (Mosca et al. 2019b).

WHERE? Built environment

It is necessary to simplify information access for designers (Goodman, et al., 2006) by referring to concepts that are familiar and easy to use. The work of architects is interrelated with the built environment, as well as with user problems and needs. The criterion of the *built environment* is used to define a structure that organizes design information to facilitate the choice during the design process. Froyen (2012) organizes UD patterns in a hierarchical structure composed by entities, socio-spatial settings, objects, and elements.

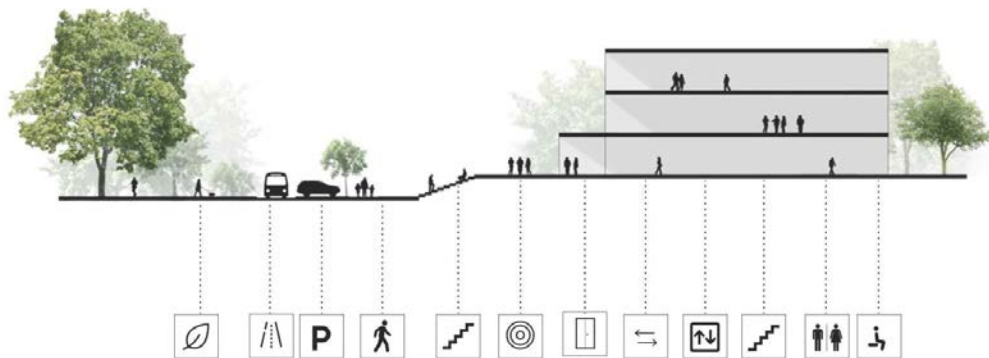
Mosca, E., Herzsens, J., Rebecchi, A., & Capolongo, S. (2019). Inspiring architects in the application of design for all: knowledge transfer methods and tools. *Journal of Accessibility and Design for All*, 9(1), 1-24. doi:<http://dx.doi.org/10.17411/jacces.v9i1.147>

The actions of people and their needs are constantly placed in relation to the built environment. Froyen (2012) defines settings as circumstances and as the socio-spatial backdrop in which an activity may occur. Similarly, guideline manuals, laws and regulations regarding accessibility should be organized by chapters so that different norms in relation to the elements of the built environment can be identified. This structure allows architects consulting the legislation to inform themselves on their content.

An example to refer can be the website of 'Flemish Agency for Accessibility and Universal Design' called Intern (n.d.), which considers the relation between the users' enabling and/or disabling impairments and the built environment through the so-called 'chain of accessibility' (to reach, enter, use, and understand a site, building, interior, and object). The website provides a database with both legislation and descriptive information in a manual together with case studies, similarly to IsUD (IDeA, 2018).

Consequently, in the process of knowledge transfer, it is fundamental to contextualize information in the built environment to simplify access and create understanding by the architects. It is, therefore, necessary to consider, in the development of a DfA tool, the way of providing design indicators in relation to the activities performed in that specific circumstance by users (Mosca et al. 2019b). For instance, a support tool should consider the space required to reach, approach, move in, and use, from outside to gradually move inside the building (Fig. 8). In this way, different elements of the built environment are included such as street, parking, path, stair, square, and entrance, hall, corridor, waiting area, toilet, rooms, and so on.

Figure 8. The illustration shows how can be considered the space in relation to a building. From the outdoor space to the indoor space (reach, approach, use). Source: authors



Conclusions

The purpose of the present study was to understand the process of knowledge transfer on DfA in order to allow for a practical use of this strategy during an architectural design project. A literature review was undertaken. Most of the analyzed articles consider a DfA strategy from a theoretical point of view or include studies about the direct participation of users in the design project. Conversely, few studies address the methodologies and practical tools used to inspire and support architects in applying a DfA strategy.

The literature review resulted in identifying nine studies that included recurring items on knowledge transfer of DfA strategies, which were then divided into two categories, *theoretical* and *practical* (RQ1). These studies are used as references in proposing four knowledge transfer criteria in designing inclusive environment (RQ2), more precisely: effective communication; descriptive information; understanding users' needs; built environment.

DfA information needs to be organized and it should result in considering different user needs, necessary in gaining understanding of DfA strategies. Furthermore, DfA information should be transferred by using graphic representation and indirect methods, as well as by referring to case studies,

which will jointly enable its understanding. The criteria described are devised to establish a descriptive transfer of knowledge in order to look beyond the descriptive approach of accessibility legislation and the reductive design adapted for disabled users (RQ3). are envisaged as useful instruments in the development of tools such as manuals, standards, and online databases aimed at the transfer of DfA knowledge. For this reason, they can be useful not only to researchers but also to public administrators and standard developers, in integrating DfA strategies into accessibility norms by means of a descriptive approach. The current study outlines the foundations for the development of an informative tool aimed at inspiring and sensitizing designers to the application of DfA strategies in a practical and reliable way (Mosca et al. 2019a, 2019b).

Acknowledgements

This research was supported by the Department of 'Architecture, Built Environment and Construction Engineering' of Politecnico di Milano and by the Faculty of Architecture and Arts at Hasselt University.

References

- [1] Alexande, C., Ishikawa, S., Silverstein, M. (1977) A Pattern Language: Towns, Buildings, Construction. USA, Oxford: University Press
- [2] Accolla, A. & Buti, L. B. (2016). Ask Yourself the Right Question. To know and understand the beauty of Human Diversity it is the first design step: a Design for All structured and autopoietic tool. *Proceedings of the AHFE 2016 International Conference on Design for Inclusion*, pp. 131-140.
- [3] Bottero MC, Buffoli M, Capolongo S, Cavagliato E, di Noia M, Gola M, et al. (2015) A multidisciplinary sustainability evaluation system for operative and in-design hospitals. in: Capolongo S, Bottero MC, Buffoli M, Lettieri E, editor. *Improving Sustainability During Hospital Design and Operation: A Multidisciplinary Evaluation Tool*. Cham: Springer; pp. 31-114.
- [4] Buffoli M, Gola M, Rostagno M, Capolongo S, Nachiero D. (2014) Making hospitals healthier: how to improve sustainability in healthcare facilities. *Ann Ig.* ;26(5) pp.418-25

Mosca, E., Herssens, J., Rebecchi, A., & Capolongo, S. (2019). Inspiring architects in the application of design for all: knowledge transfer methods and tools. *Journal of Accessibility and Design for All*, 9(1), 1-24. doi:<http://dx.doi.org/10.17411/jacces.v9i1.147>

- [5] Buti, L. B. (2018) Ask the Right Question. A Rational Approach to Design for All in Italy. Switzerland: Springer
- [6] Capolongo, S., Bellini, E., Nachiero, D., Rebecchi, A. & Buffoli, M. (2014). Soft qualities in healthcare: Method and tools for soft qualities design in hospitals' built environments. *Ann Ig* , 26 (4), pp. 391-399.
- [7] Capolongo S. (2016) Social aspects and well-being for improving healing processes' effectiveness. *Ann Ist Super Sanità*; 52(1): 11-14.
- [8] EIDD. (2004). *The EIDD Stockholm Declaration, Annual General Meeting of the European Institute for Design and Disability*. Retrieved from http://dfaeurope.eu/wp-content/uploads/2014/05/stockholm-declaration_english.pdf
- [9] European Commission. (2010a). *Europe 2020: A Strategy for smart, sustainable and inclusive growth*. Retrived from <http://eur-lex.europa.eu/legal/content/EN/TXT/PDF/?uri=CELEX:52010DC2020&from=en>
- [10] European Commission. (2010b). *European Disability Strategy 2010-2020: A Renewed Commitment to a Barrier-Free Europe*. Retrieved from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0636:FIN:en:PDF>
- [11] Froyen, H. (2012). *Universal Design, a methodological approach*. Boston: Institute for Human Centered Design.
- [12] Froyen, H., Verdonck, E., De Meester, D., & Heylighen, A. (2009a). Documenting handicap situations and eliminations through Universal Design Patterns. *AMJ* , 1 (12), pp. 199-203.
- [13] Froyen, H., Verdonck, E., De Meester, D., & Heylighen, A. (2009b). Mapping and documenting conflicts between users and built environments. *Proceedings of 5th International conference on Inclusive Design. Include 2009*. London: Royal College of Art.
- [14] Goodman, J., Langdon, P. J., & Clarkson, P. (2007). Designers' Perceptions of Methods of Involving and Understanding Users. *Proceedings of Universal Access in Human Computer Interaction. Coping with Diversity*.
- [15] Goodman, J., Langdon, P. J., & Clarkson, P. (2006). Equipping designers for inclusive design. *Gerontechnology* , 4 (4), p. 229-233.
- [16] Goodman, J., Langdon, P. J., & Clarkson, P. (2008a). User Involvement and User Data: A Framework to Help Designers to Select Appropriate Methods. *Designing Inclusive Futures*, pp. 23-34.
- [17] Goodman, J., Langdon, P. J., & Clarkson, P. (2008b). *Tools for Supporting Inclusive Design*. Retrieved from https://www-edc.eng.cam.ac.uk/~jag76/hci_workshop08/goodman.pdf

Mosca, E., Herssens, J., Rebecchi, A., & Capolongo, S. (2019). Inspiring architects in the application of design for all: knowledge transfer methods and tools. *Journal of Accessibility and Design for All*, 9(1), 1-24. doi:<http://dx.doi.org/10.17411/jacces.v9i1.147>

- [18] Herssens, J. (2011). Designing architecture for more: a framework of haptic design parameters with the experience of people born blind. Unpublished thesis, University of Hasselt, Leuven, Belgium
- [19] Ielegems, E., Herssens, J., Vanrie, J. (2015). A V-model for more. An inclusive design model supporting interaction between designer and user. *Proceedings of the 20th International Conference on Engineering Design*. ICED, 9 (DS 80-09), pp. 259–268.
- [20] Intern (n.d.). Handboek Toegankelijkge Bouw. Retrived from: <http://toegankelijkgebouw.be/Home/Toegankelijkheid/Ketenvantoegankelijkheid/tabid/162/Default.aspx>
- [21] Kapedani, E., Herssens, J., Verbeeck, G. (2017). Comfort in the Indoor Environment: A Theoretical Framework Linking Energy Efficiency and Universal Design. *Proceedings of the AHFE 2017 International Conference on Design for Inclusion*. Advance in Design for Inclusion. pp. 303-313.
- [22] Keates S, Clarkson P.J. (2003) Countering design exclusion: bridging the gap between usability and accessibility. *Universal Access in the Information Society*. Springer Nature 2 (3): 215-225
- [23] McGinley, C., Nickpour, F., Dong, H., & Cifter, A. S. (2015). Designing for designers: Insights into the knowledge users of inclusive design. *Appl Ergon* 2015, 46, p. 284-291.
- [24] Mosca, E. I., and Capolongo S. (2018) Towards a universal design evaluation for assessing the performance of the built environment. *Proceedings of the 2018 Universal Design and Higher Education in Transformation Congress, UDHEIT 2018*. Studies in Health Technology and Informatics. vol. 256, pp. 771-779
- [25] Mosca, E. I., Herssens, J., Rebecchi, A., Froyen, H., Capolongo S. (2018). "Design for All" Manual: From Users' Needs to Inclusive Design Strategies. *Proceedings of the 20th Congress of the International Ergonomics Association (IEA 2018)*. Advances in Intelligent Systems and Computing , vol. 824 pp. 1724-1734
- [26] Mosca, E. I., Herssens, J., Rebecchi, A., Strickfaden, M., Capolongo, S. (2019b) Evaluating a proposed design for all (DfA) manual for architecture. *Proceedings of the AHFE International Conference on Design for Inclusion*. Advances in Intelligent Systems and Computing, vol. 776, pp. 54-64
- [27] Lawson, B. (2005). How Designers Think: The Design Process Demystified. 4°ed. Oxford, UK: Elsevier.
- [28] Preiser. W. F. E. (2010). Toward universal design performance assessments. In: Preiser. W. F. E. Universal Design Handbook. 2° ed. New York: McGraw-Hill.

- [29] Sanford J. A. (2012). Universal design as a rehabilitation strategy: design for the age. Springer Publishing Company
- [30] University of Buffalo Center for Inclusive Design Environmental Access (IDeA) (2018) Innovative Solution for Universal Design (IsUD), <https://www.thisisud.com/>
- [31] Waller, S., Bradley, M., Hosking, I., Clarkson, P. J. (2015). Making the case for inclusive design. Applied Ergonomics. Vol 46 pp.297-303

Appendix 1

Selected articles in the last phase of the literature review divided in categories (Theoretical and Practical).

Authors	Title	Year	Source	Source details	Theoretical Category	Practical Category
Accolla A. Bandini Buti L.	Ask Yourself the Right Question. To know and understand the beauty of Human Diversity it is the first design step: a Design for All structured and autopoietic tool	2016	Conference paper	Conference: AHFE 2016 International Conference on Design for Inclusion	X	
Can G. F., Delice E. K.	A task-based fuzzy integrated MCDM approach for shopping mall selection considering universal design criteria	2018	Journal Article	Soft Computing		X
Froyen H. Verdonck E. De Meester D. Heylighen A.	Mapping and documenting conflicts between users and built environments	2009	Conference paper	Conference: 5th International conference on Inclusive Design		X
Goodman J. Langdon P.M. Clarkson P.J.	User Involvement and User Data: A Framework to Help Designers to Select Appropriate Methods	2008	Journal Article	Designing Inclusive Futures		X
Goodman J. Langdon P.M. Clarkson P.J.	Equipping designers for inclusive design	2006	Journal Article	Gerontechnology	X	

Mosca, E., Herssens, J., Rebecchi, A., & Capolongo, S. (2019). Inspiring architects in the application of design for all: knowledge transfer methods and tools. *Journal of Accessibility and Design for All*, 9(1), 1-24. doi:<http://dx.doi.org/10.17411/jacces.v9i1.147>

Herssens, J. Heylighen, A.	Designing architecture for more, a framework of haptic design parameters with the experience of people born blind	2011	PhD Thesis	University of Hasselt, Leuven, Belgium		X
Ielegems, E. Herssens, J. Vanrie, J.	V – Model for More An inclusive design model supporting interaction between designer and user	2015	Conference paper	Conference: 20th International Conference on Engineering Design		X
Keates S. Clarkson P. J.	Countering design exclusion: bridging the gap between usability and accessibility	2003	Journal Article	Universal Access in the Information Society		X
Waller, S. Bradley, M. Hosking, I. Clarkson P. J.	Making the case for inclusive design	2015	Journal Article	Applied Ergonomics	X	

THE CONFORMITY OF ANTHROPOMETRIC MEASUREMENTS OF BATHROOM AND BEDROOM DESIGNS FOR INDEPENDENT ELDERLY AT PANTI SOSIAL TRESNA WERDHA (PSTW)* BUDI MULIA I JAKARTA IN 2018

Bonardo Prayogo Hasiholan¹, Indri Hapsari Susilowati^{2*}, Chandra Satrya³

^{1,2,3}Department of Occupational Health and Safety

Faculty of Public Health, Universitas Indonesia, Indonesia

*(Corresponding author)

¹orcid.org/0000-0001-6320-0403, ²orcid.org/0000-0001-9903-5331

¹bonardo.prayogo@gmail.com, ²indri@ui.ac.id, ³chandra@ui.ac.id

Abstract: Nowadays, most of the facilities that are available for the elderly are no different from those available for most adults, although they already have different levels of capacity and limitation. In average, the elderly go through 1 cm anthropometric size decrease per decade. This study is a descriptive study with quantitative approach conducted in elderly care owned by local government, which is aimed to find out the conformity between the anthropometric size and the dimension of the facilities available in bathrooms and bedrooms. This research focuses on Catelya House for women and Edelweiss House for men. It is found that the beds, wardrobes, and toilet facilities are still not in conformity with the anthropometric of elderly. The heights of 3 different bed designs in 2 houses are not proportional. Most of the wardrobes shelves are not proportional with the elbow height of elderly, as they are either too high or too low for the elderly. But the bathrooms design in Catelya and Edelweiss is quite proportional. Only the handrails in Edelweiss house are too far for elderly,

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

which requires it to be redesigned in order to minimize the safety and health risks to the elderly.

Keywords: Anthropometric, Bathroom, Bedroom, Elderly's design, Wardrobe

Introduction

With age comes the process of ageing. This process changes different aspects of human life, from physical, psychological, social to economic (Suhadi, 2011). Physical changes are a tangible form of the aging process, which can be immediately observed when the functions of all body systems are deteriorating (Suhadi, 2011). According to Soejono, the elderly population typically suffers from chronic and degenerative health problems (Maryam, Ekasari, Rosidawati, Jubaedi, & Batubara, 2008).

However, this issue is often overlooked by most of the current life support facilities. They are generally designed to accommodate normal human conditions. Oftentimes, the elderly are regarded as having the same needs as most adults' (Kroemer, 2005). On the contrary, elderly people, as an "extraordinary" group undergoing many changes, from physical, psychological, social to economic, have a different set of needs from others'. Such disparity hinders most elderly people from being able to do activities on their own. A less ideal place of living leaves them particularly vulnerable to accidents, especially falls.

The World Health Organization's (WHO) data from 2018 shows that 80% of fall-related fatalities occur in low- and middle-income countries (World Health Organization, 2018). Moreover, regions of the Western Pacific and South East Asia account for 60% of these deaths (World Health Organization, 2018). The elderly are exposed to a greater risk of fall-induced injuries and restricted movement (Turana, 2013). A study in the United States of America finds that older people make up the largest proportion of falls, at

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

around 20-30%, due to cognitive decline (World Health Organization, 2018). Besides age and gender, other contributing risk factors include mobility, physiological conditions, and unsafe environments (World Health Organization, 2018). The three places with the highest risk of falls are bathrooms, kitchens, and bedrooms (Lök & Akin, 2013).

In brief, the supporting equipment at Panti Sosial Tresna Werdha (PSTW) Budi Mulia I Jakarta is unsuitable for elderly people amid the fact that their changing bodily functions require different life support equipment than they would in normal conditions. The bathrooms, kitchens, and bedrooms pose a substantial risk of falls. When compared with pre-survey findings, the elderly people spend more time every day inside their rooms, whether for sleeping, chatting, making crafts, etc. Therefore, this research seeks to assess the conformity of bathroom and bedroom designs in PSTW Budi Mulia I for elderly people to further find a solution for improvement.

Methodology

Population

The elderly homes in Jakarta can be put into two categories: government- and private-owned elderly homes. The government-owned elderly homes are mostly for displaced elderly. The purpose of the current study is to evaluate the conformity of the facility for the independent elderly who lived in PSTW Budi Mulia I. Anthropometric data for the elderly from the two houses were gathered and used to evaluate the current design of the bathrooms and bedrooms facilities. Anthropometric data were measured for a sample of a total size of 70 elderly (half being males) aged no less than 60 years old. The samples were randomly selected from Catelya House and Edelweiss House. Measurements were taken after getting permission from the officials of elderly house and all elderly voluntarily participated in the study.

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

Measures of facilities

1. Bed

Three bed dimensions will be evaluated in this study to see if they are compatible with the elderly's anthropometry. These three bed dimensions are bed height, bed width, and bed length.

2. Wardrobe

Several wardrobe dimensions will be evaluated depending on the type of the wardrobe to see if they are compatible with the elderly's anthropometry. There are several sections of the wardrobe.

3. Bathroom

Toilet and bathtub dimensions will be evaluated to see if they are compatible with the elderly's anthropometry. These dimensions are toilet height, toilet width, toilet length, and bathtub height by also considering the size of bath-scoop.

Results

Anthropometric Size

Table 1. Anthropometric Size of Elderly

No.	Anthropometric Dimension	Male				Female			
		5th %tile	50th %tile	95th %tile	SD	5th %tile	50th %tile	95th %tile	SD
1	Stature	149	160	167	5,123	135,4	144,5	161,6	7,546

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

2	Shoulder Height	122,25	131	152	10,917	108,55	120	131,5	6,594
3	Vertical grip reach	151,75	182,5	201,5	13,002	153	165,5	185,2	9,158
4	Elbow Height	86,5	100	111,25	7,121	80,85	90,5	104,65	5,731
5	Sitting Height	66,5	75,5	85,75	5,507	61,25	71,5	81	5,731
6	Sitting Shoulder Height	42,5	50	59,25	5,321	38,95	45	54,3	5,035
7	Shoulder breadth	35,75	42	49,25	3,406	27,75	38	48,6	6,042
8	Sitting Elbow Height	11,5	16	24,25	3,606	11,85	17	30,3	4,273
9	Hip Breadth	27,5	32	40	3,766	22,2	33	38,15	5,15
10	Sitting Knee Height	43	50	56	3,152	40	46	49,45	2,509
11	Popliteal Height	36,5	41	46	2,493	34,55	38	41,45	2,105
12	Buttock-popliteal Length	38	44	52,25	3,456	35,7	42	46,3	2,97
13	Forward Grip Reach	58,75	62,5	71,5	3,799	51,55	59	70,15	5,286
14	Span	138	153	182,5	11,221	125,4	141	157,2	9,655
15	Elbow Span	81,5	90	98,5	4,996	73,7	85	96	7,001
16	Hand length	13	18	19,25	1,804	14,7	16	18,15	1,188

Bed

Frameless Bed

A frameless bed is a bed without a bed frame made of either wood or iron. This type of bed is used in Catelya House, which houses elderly women. The

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

following is a comparison between the frameless bed's dimensions and the anthropometrics of elderly women, as shown in Table 2 below.

Table 2. Comparison between Frameless Bed's Dimensions and Anthropometrics of Elderly Women

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Bed Height	14 cm	50th %tile of Women's Popliteal Height	35.89 – 40.1 cm	No
2	Bed Length	193 cm	95th %tile of Women's Body Height	Minimum 169.146 cm	Yes
3	Bed Width	83 cm	95th %tile of Women's Shoulder Width	Minimum 54.642 cm	Yes

The measurements show non-conforming bed height for elderly women because it is too short. However, a worker said that these beds were only temporary because of additional residents coming in from another house that was under repair.

Low-Frame Bed

A low-frame bed is a bed with a wooden frame that has lower height than other bed frames'. This type of bed is used in Catelya House, which houses elderly women, and Edelweiss House, which houses elderly men. The following is a comparison between the frameless bed's dimensions [*sic*] and the anthropometrics of elderly men and women, as shown in Table 3 and Table 4 below.

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

Table 3. Comparison between Low-Frame Bed's Dimensions and Anthropometrics of Elderly Men

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Bed Height	43 cm	50th %tile of Men's Popliteal Height	38.5 – 43.49 cm	Yes
2	Bed Length	193 cm	95th %tile of Men's Body Height	Minimum 172.1 cm	Yes
3	Bed Width	83 cm	95th %tile of Men's Shoulder Width	Minimum 52.65 cm	Yes

Table 4. Comparison between Low-Frame Bed's Dimensions and Anthropometrics of Elderly Women

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Bed Height	43 cm	50th %tile of Women's Popliteal Height	35.89 – 40.1 cm	No
2	Bed Length	193 cm	95th %tile of Women's Body Height	Minimum 169.146 cm	Yes
3	Bed Width	83 cm	95th %tile of Women's Shoulder Width	Minimum 54.642 cm	Yes

The measurements show conformity between the low-frame bed's dimensions and the anthropometrics of elderly men. However, this type of bed is too tall for elderly women.

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

High-Frame Bed

A high-frame bed is a bed with an iron frame that has higher height than other bed frames'. This type of bed is used in Edelweiss House, which houses elderly men. The following is a comparison between the low-frame bed's dimensions [*sic*] and the anthropometrics of elderly men, as shown in Table 5 below.

Table 5. Comparison between High-Frame Bed's Dimensions and Anthropometrics of Elderly Men

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Bed Height	66 cm	50th %tile of Men's Popliteal Height	38.5 – 43.49 cm	No
2	Bed Length	187 cm	95th %tile of Men's Body Height	Minimum 172.1 cm	Yes
3	Bed Width	88 cm	95th %tile of Men's Shoulder Width	Minimum 52.65 cm	Yes

The measurements show non-conforming bed height for elderly men because it is too tall. They have to jump a little to get out of bed and use hands to support their body weight when climbing into bed.

Wardrobe

A wardrobe in this nursing home has several shelves. A shelf is a compartment of the wardrobe used to store clothes and tools. Edelweiss and Catelva Houses each have a different kind of wardrobe.

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

Wardrobe in Edelweiss House

A wardrobe in Edelweiss House has four shelves. The following is its comparison with the anthropometrics of elderly men, as shown in Table 6 below.

Table 6. Comparison between Wardrobe's Dimensions in Edelweiss House and Anthropometrics of Elderly Men

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Top Shelf Height	137 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	No
2	Upper-Middle Shelf Height	97.5 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	Yes
3	Lower-Middle Shelf Height	51 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	No
4	Bottom Shelf Height	10 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	50th %tile of Men's Elbow Height 92.87 -107.12 cm	No
5	Wardrobe Depth	43 cm	5th %tile of Men's Thumb Tip Reach	Maximum 54.9 cm	Yes

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

The measurements show that only the upper-middle shelves conform to the anthropometrics of elderly men. Meanwhile, other shelves are either too tall or too short.

Wardrobe in Catelya House

A wardrobe in Edelweiss House [sic] has three shelves. The following is its comparison with the anthropometrics of elderly women, as shown in Table 7 below.

Table 7. Comparison between Wardrobe's Dimensions in Catelya House and Anthropometrics of Elderly Women

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Wardrobe Height	140 cm	5th %tile of Women's Vertical Reach	Maximum 143.8 cm	Yes
			Wardrobe Depth: 5th %tile of Women's Palm Length	Maximum 13.51 cm	No
2	Top Shelf Height	91 cm	50th %tile of Women's Elbow Height	84.76 – 96.23 cm	Yes
3	Middle Shelf Height	52 cm			No
4	Bottom Shelf Height	12 cm			No
5	Wardrobe Depth	43 cm	5th %tile of Women's Thumb Tip Reach	46.26 – 56.83 cm	Yes

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

The measurements show that only the top shelves conform to the anthropometrics of elderly women. Meanwhile, other shelves are either too tall or too short.

Bathroom

Bathroom in Catelya House

Table 8. Comparison between Bathroom's Dimensions in Catelya House and Anthropometrics of Elderly Women

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Bathtub Height	85 cm	50th %tile of Women's Elbow Height minus bath scoop's size (7.5 cm radius)	77.2 – 88.73 cm	Yes
2	Toilet Height	40 cm	50th %tile of Women's Popliteal Height	35.89 - 40.10 cm	Yes
3	Toilet Width	36 cm	95th %tile of Women's Hip Width	33 – 43.3 cm	Yes
4	Toilet Length	47 cm	95th %tile of Women's Popliteal Rump Length	43.3 – 49.27 cm	Yes
5	Handrail Height	86 cm	5th %tile of Women's Elbow Height	75.11 - 86.58 cm	Yes

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

The measurements show that all facilities inside the bathrooms in Catelya House conform with the anthropometric measurements of elderly women. Thus, they are ideal from the anthropometric standpoint.

Bathroom in Edelweiss House

Unlike Catelya House, the bathrooms in Edelweiss House are non-en suite. Furthermore, they are divided into two types: Toilet Room for urinating and defecating and Bath Room for taking a bath. The following is their comparison with the anthropometrics of elderly men, as shown in Table 9 and Table 10 below.

Table 9. Comparison between Toilet Room's Dimensions in Edelweiss House and Anthropometrics of Elderly Men

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Room Width	108 cm	5th %tile of Men's Elbow Reach	76.5 – 86.49 cm	No
2	Toilet Height	40 cm	50th %tile of Men's Popliteal Height	38.5 – 43.49 cm	Yes
3	Toilet Width	37 cm	95th %tile of Men's Hip Width	36.24 – 43.76 cm	Yes
4	Toilet Length	49 cm	95th %tile of Men's Popliteal Rump Length	48.79 – 55.7 cm	Yes
5	Handrail Height	86 cm	5th %tile of Men's Elbow Height	79.37 – 93.62 cm	Yes

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

Table 10. Comparison between Bath Room's Dimensions and Anthropometrics of Elderly Men

No.	Dimension	Measurement	Anthropometric Dimension	Anthropometric Measurement	Conformity
1	Bathtub Height	85 cm	5th %tile of Men's Elbow Height minus bath scoop's radius	71.8 – 86.12 cm	Yes
2	Handrail Height	86 cm	5th %tile of Men's Elbow Height	79.3 – 93.62 cm	Yes

From the two tables above, we can see that anthropometric non-conformity is only found in Toilet Room width because both handrails are placed too wide apart from each other, making it difficult for elderly men to reach and use.

Discussion

When compared with the data of 47-year-olds collected from antropometriindonesia.org, the anthropometric measurements of elderly people are “shrinking”, as shown by an example in the table below.

Table 11. Anthropometric Changes When Reaching Old Age

No	Anthropometric Dimension	Age 47 (antropometriindonesia.org)	Factual Age	Decrease (%)
1	95th %tile of Men's Body Height	178.22 cm	161.6 cm	9.32
2	95th %tile of Women's Body Height	174.08 cm	167 cm	4.07

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

These changes are in line with what Stoudt (1981) and Barlow and Braid (1990) argue (Kroemer, 2005).

Losses of elasticity in movement, ability to walk, and ability to see are certain in elderly people, and with age, these functions and abilities will continue to deteriorate, as stated by Kroemer (Kroemer, 2005).

In terms of activities, the residents have “no choice” but to eat meals inside their rooms because no room is large enough to seat all of them. The current pantry cannot fit all residents. As a consequence, food remnants are scattered throughout the rooms, attracting pests such as insects and cats.

In terms of occupancy, particularly in Catelya House, *London Housing Design Guide* suggests a minimum room size of 7 m² for 1 occupant, and 12 m² for 2 occupants (Mayor of London, 2010). The current size of approximately 13.48 m² (2.85 m x 4.73 m) for 2 people is actually an ideal capacity. However, if a 3rd person is added, the room will exceed its acceptable capacity.

Meanwhile, the facilities that are designed too tall or too short are putting the elderly residents in significant danger because of a higher risk of falling. A fall may increasingly happen as elderly people lose their ability to maintain posture and balance (Kroemer, 2005). This accident is proven to be the “gateway” to and “catalyst” in more advanced degeneration due to the pain syndromes, functional limitations, dislocations, serious tissue injuries, and fractures that follow - leading to higher treatment costs and mortality rates (Karlsson, Magnusson, Schewelov, & Rosengren, 2013).

Also, all the elderly in this nursing home were homeless brought by the Jakarta Provincial Social Bureau from the city road. Therefore, they don't complain about the facilities because the current place is better than the previous one. But this research can help the management as a reference to procuring the bathroom and bedroom facility with resident conformity. On

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

the basis of this research's result, socialization will also be carried out for the elderly to use the facilities safely.

Conclusion

Not all facilities, such as beds, wardrobes, and bathrooms, conform with the prescribed anthropometric measurements for elderly people living in PSTW Budi Mulia I. The beds are too tall; the wardrobe's top and bottom shelves are difficult to reach, making them practically unusable; and the bathroom's handrails are too wide apart to be comfortably reached. All these design flaws increase the risk of falls for the elderly people living there. In addition, there needs to be further research in both government and private elderly home institutions because of different environmental and facilities condition

Acknowledgement

This work is supported by 2018 overseas research partnership grant, funded by the Indonesian Ministry of Research and Higher Education, No. 120/SP2H/PTNBH/DRPM/2018.

References

- [1] Karlsson, M. K., Magnusson, H., Schewelov, T. von, & Rosengren, B. E. (2013). Prevention of falls in the elderly—a review. *Osteoporosis International*, 24(3), 747-762. [https://doi.org/https://doi.org/10.1007/s00198-012-2256-7](https://doi.org/10.1007/s00198-012-2256-7)
- [2] Kroemer, K. H. E. (2005). *"Extra-ordinary" ergonomics: How to accommodate small and big persons, the disabled and elderly, expectant mothers, and children. "Extra-Ordinary" Ergonomics: How to Accommodate Small and Big Persons, The Disabled and Elderly, Expectant Mothers, and Children.* <https://doi.org/10.1201/9780203025246>

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

- [3] Lök, N., & Akin, B. (2013). Domestic environmental risk factors associated with falling in elderly. *Iranian Journal of Public Health*.
- [4] Maryam, R. S., Ekasari, M. F., Rosidawati, Jubaedi, A., & Batubara, I. (2008). *Mengenal Usia Lanjut dan Perawatannya*. Jakarta: Salemba Medika.
- [5] Mayor of London. (2010). London Housing Design Guide. *Greater London Authority*.
- [6] Suhadi. (2011). *Analisis Faktor-Faktor Yang Mempengaruhi Di Wilayah Puskesmas Srandol Kota Semarang Universitas Indonesia*. Universitas Indonesia.
- [7] Turana, Y. (2013). Stimulasi Otak Pada Kelompok Lansia di Komunitas. *Buletin Jendela Data & Informasi Kesehatan Semester I*, 19.
- [8] World Health Organization. (2018). Falls. Retrieved March 20, 2018, from <https://www.who.int/news-room/fact-sheets/detail/falls>

Hasiholan, B., Susilowati, I., & Satrya, C. (2019). The conformity of anthropometric measurements of bathroom and bedroom designs for independent elderly at Panti Sosial Tresna Werdha (PSTW)* Budi Mulia I Jakarta in 2018. *Journal of Accessibility and Design for All*, 9(1). 25-40. doi:<http://dx.doi.org/10.17411/jacces.v9i1.200>

INCLUSIVE HOTEL DESIGN IN INDIA : A USER PERSPECTIVE

Senthilkumaran Piramanayagam¹, Partho Pratim Seal², Bhakti More³

^{1,2}Manipal Academy of Higher Education, Manipal, India

³Manipal Academy of Higher Education, Dubai, United Arab Emirates

¹ORCID: orcid.org/0000-0001-6746-0421

²ORCID: orcid.org/0000-0001-6867-8713

³ORCID: orcid.org/0000-0003-0751-9190

¹senthil.kumaranp@manipal.edu, ²partho.seal@manipal.edu,

³bhakti.more@manipaldubai.com

Received: 2018-08-28 | Accepted: 2019-03-10 | Published: 2019-05-31

Abstract: This paper examines the barriers concerning access to hotel facilities in India, which leads to the physical exclusion of tourists with some form of physical disability. This research aims to analyse the existing facilities available in a hotel as experienced by these users with regard to mobility, circulation, and access to services in all categories of hotels in India. People with disabilities (PwD) have the same motivation to travel and experience tourism as other tourists but are impeded owing to the challenges that they experience in hotels. This study focuses on PwD's perspectives on the concept regarding barrier-free hotel design and planning in India, which encourages 'accessible tourism'. Furthermore, this research employs a quantitative analysis from the users' perspective pertaining to differently abled tourists with respect to the concepts of 'barrier-free' and 'accessible tourism'. The users' experiences have been rated for hotels ranging from budget to 5-star categories. Moreover, the research findings indicate that although barrier-free tourism is emerging as a concept in India, many hotels are yet to implement universal standards concerning accessibility. While the Ministry of Tourism, Government of India, has taken several initiatives to provide barrier-free tourism in 4- and 5-star hotels to make their facilities accessible for PwD, this research recommends that such facilities should be upgraded in budget hotels as well, in order to develop

affordable and inclusive hotel design. In addition, this study emphasizes the relevance of universal design and proposes a new paradigm to establish inclusive hotels, which can further encourage domestic and international tourists to experience the rich culture and heritage of India.

Keywords: People with Disability (PwD), hotel design, accessible tourism

Introduction

People with disabilities (PwD) are vulnerable because of the many barriers they face: attitudinal, physical, and financial. Addressing these barriers is within our reach, and we have a moral duty to do so. Most importantly, addressing these barriers will unlock the potential of numerous people who have so much to contribute to the world. Governments worldwide can no longer overlook the hundreds of millions of PwD who are denied access to health, rehabilitation, support, education, and employment and never get the chance to shine, Stephen Hawking (Ministry of Statistics and Program Implementation, Government of India, 2016).

Major barriers that PwD experience are factors of the physical environment that restrict their societal participation. These barriers can have a huge impact on the experience of disabled users and exacerbate their disability, as asserted by the *World Report on Disability* (WHO & World Bank, 2011). Modifications implemented to improve accessibility to transport systems or public infrastructure can reduce such barriers and foster inclusivity. Hammel et al. (2015) agree that environmental factors, which include the built and natural environment, assistive technology, and transportation are most relevant in providing accessibility in the form of physical, cognitive, sensory, and social communication, which can improve societal inclusion.

Furthermore, PwD have the motivation to travel (Shi, Cole, & Chancellor, 2012), with a desire to be independent, even though their accessibility needs may vary. Accessibility remains as one of the 'pull factors' of one's motivation to travel. United Nations (2003), and Yau, McKercher and Packer (2004) state that PwD have the same motivations to travel and experience

leisure activities as the rest of the population. Allan (2013) posits that the motivation of these travellers relates to their interest in visiting historical or cultural sites as well as for enjoyment, and this enhances engagement in tourism.

The Concept of Accessible Tourism

The definitions of 'accessible tourism' are dynamic and change with the context. Gillovic, McIntosh, Darcy, and Cockburn-Wootten (2018) suggest that there is successive movement in the usage of the term to 'barrier-free tourism', 'disabled tourism', 'easy-access tourism', 'inclusive tourism' and 'tourism for all' to the more recent and updated concept of 'accessible tourism'. Recommendations as well as best practices for 'accessible tourism' have been put forth globally by collaborative stakeholders, which state that governments, international agencies, tour operators, and end-users, including PwD and their organisations, can ensure successful tourism (United Nations Enable, 2018).

'Accessible tourism enables people with access requirements, including mobility, vision, hearing, and cognitive dimensions of access, to function independently and with equity and dignity through the delivery of universally designed tourism products, services, and environments', Darcy and Dickson (2009). This definition addresses those travelling with children in prams, PwD, and senior citizens. According to Darcy and Dickson (2009), accessible tourism creates a destination experience that is socially sustainable and considers the needs of all individuals. The said concept has been discussed in detail in the *Manual on accessible tourism for all: Principles, tools and best practices* (World Tourism Organization, 2016). Accessible tourism is a form of tourism that enables every individual, irrespective of their physical, social or cultural conditions, to engage in leisure and tourism activities and has a process that allows them to function independently through universal tourism products, services, and environments.

Devi, Goyal, and Ravindra (2013) define accessibility as physical access as well as accessibility to transportation. The five components considered to be

environmental barriers by Whiteneck, Harrison-Felix, Mellick, Charlifue, and Gerhart (2014) are accessibility, accommodation, resource availability, social support, and equality. The first component accessibility relates to transportation, road infrastructure, and mobility within the city, which should be user-friendly. Rahman and Ohmouri (2014) have considered accessibility or public transport as one of the primary barriers to the development of an accessible environment. Moreover, accommodation as an environmental aspect can restrict one's activities. Resources availability refers to medical facilities, whereas social support represents a community's attitude towards integrating PwD. In addition, equality refers to policies and regulations adopted by governments and organisations to provide equal opportunities. Of the five barriers listed above, accessibility and accommodation were considered as the barriers that affected wheelchair users the most. Hence, the primary constraints for tourists with disabilities are transportation and hotel accommodation.

To provide inclusive and barrier-free tourism, various aspects are important, of which transportation and accommodation should be addressed for the designing and planning of hotels, so that they can provide their users the opportunities concerning accessibility. The role played by urban planners, architects, and local authorities is vital in the creation of awareness regarding accessibility.

Hotel accommodation as a barrier in tourism

Certain authors (Poria, Reichel & Brandt, 2011; Tantawy, Kim, & Pyo, 2004) are of the opinion that deficiencies in hotel design can create barriers for tourists with disabilities and believe that hotel managements should overcome these barriers with the help of best practices through various measures to ensure a valuable experience for their users. Darcy (2007) points out that very limited research has been conducted on accessible tourist accommodation and the accessible tourism market, which is a global phenomenon involving tourists who have various issues in terms of mobility, vision, hearing, and cognitive abilities.

In general, the accommodation provided by hotels rarely meets the desired criteria, and existing hotels need to remodel their infrastructure and facilities to provide barrier-free tourism (Bisschoff & Breedts, 2012). While evaluating tourist sites for differential users, Israeli (2002) describes seven accessibility attributes for wheelchair users or those using crutches as walking aids. These attributes include staircases, elevators, parking areas, sidewalks, access ramps, paths, and restrooms. Further, these attributes can be studied with regard to details such as the height and the width of the access point to a hotel, for the comfort of all users. There is always an apprehension among differently abled users about using these facilities at tourist sites, which creates barriers. Israeli (2002) concludes that serving all users is not something that comes naturally to most people. Therefore, special accommodation must be considered to serve PwD well.

The physical barriers to hotel accommodation were studied by Poria, Reichel, and Brandt (2011). Their study differentiates difficulties and barriers linked to the types of environments (human or physical) as well as emotions. Furthermore, it evaluates the barriers in hotel accommodations, with a focus on hotel rooms, hotel public areas, hotel restaurants, and staff attendance. Most of the findings indicate that the dimensions of the furniture in hotel rooms and hotel public areas were not comfortable for wheelchair users, and they experienced difficulties in using them. Though their experience with hotel staff was satisfactory, these users found most hotel staff to be overprotective, trying to assist even when they did not require help. The concept of 'accessibility' is relative, and the hotel staff considered certain areas of the hotel as 'accessible', although according to the users there were barriers.

Other research works (Popiel, 2014; WTO, 2016) also found that accommodation is a challenge for travellers with disabilities. Comfort and safety are the primary criteria in design, and as per the standards of universal design criteria, accommodation facilities must adhere to the specified standards on accessibility. Therefore, there is a need to consider design and planning principles for hotel accommodations that cater to the

requirements of all tourists. The concept of universal design has been discussed in the following section, which emphasises an inclusive design approach.

The Concept of Universal Design

‘Universal Design is defined as products and environments created to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design’, according to the Centre for Universal Design, 2007 (City of Calgary Community Neighbourhood Services (CNS), 2010). Moreover, Burgstahler (2009) describes the features of the seven principles of universal design as follows:

Equitable use for people with diverse abilities, flexibility to accommodate individual preferences and abilities, simple and intuitive so that design is easy to understand for all irrespective of knowledge, and language skills, perceptible information to communicate necessary information to the user, tolerance for error to minimise hazards, low physical effort to access design which is comfortable to the user with minimum fatigue, size, and space for approach, reach, manipulation, and use regardless of the user’s body size, posture, or mobility.

These principles of universal design have been adopted in the tourism sector and in hotels to minimise the barriers faced by PwD. Darcy, Ambrose, Schweinsberg, and Buhalis (2010) studied the relevance of the concept concerning universal design for the provision of accessible tourism environments. Moreover, they analysed its role in supporting the operational management of facilities and reduction of operational costs. Moreover, these principles of universal design are recommended by the *Accessibility Design Guide: Universal design principles for Australia’s aid program* (2013), which focus on physical accessibility to the built environment in order to meet the requirements of as many users as possible. World Tourism Organization (2016) discusses the relevance of universal design for buildings, stating that hotels with a single entrance and staircase may create barriers for people

who carry luggage and could also act as a threat for wheelchair users while accessing the hotel space.

Tourism in India

India is a land with a rich cultural heritage and traditions, which attract domestic and international tourists, given the country's diversity pertaining to historical and ancient monuments, palaces, forts, museums, wildlife sanctuaries, and various scenic destinations. Over the past few years, the tourism industry in India has flourished and is becoming an important sector of the Indian economy (Malik & Nusrath, 2014; Vijayaragavan, 2014), although many challenges for the tourism industry are still prevalent, including building and providing sufficient infrastructure, accessibility, and amenities (Dayananda & Leelavathi, 2016). As the number of travellers with differential abilities increases, the potential market of the tourism industry keeps increasing, and the Indian Government has been implementing several measures to provide accessible tourism (Shanimon & Hameedu, 2013).

In their survey on accessible tourism in India, the Ministry of Tourism, Government of India, (2015) studied the scope of accessible tourism among domestic and international tourists. It concluded that there is a lack of necessary facilities in hotel rooms for tourists, with reduced mobility, higher tariffs for adaptable rooms, and a lack of understanding of special needs among hotel staff. Many initiatives have been taken by the Government of India to encourage the notion regarding barrier-free cities. As specified in the guidelines of the Government of India, drafted by the Ministry of Urban Development (2016), the concept of a barrier-free city that follows universal design principles has been put forth. These principles include retrofitting existing old buildings to comply with accessibility standards and creating modes of ingress and egress to emphasise the dignity and independence of PwD.

ITC hotel division has adopted the concept of universal design based on international best practices. *A Guide to Universal Design in Built Environments* (ITC Hotels, 2014) discusses inclusive environments in hotels,

which incorporate design for structural needs that include circulation areas such as parking, building entrances, corridors, lifts, stairs, ramps, handrails, and all common facilities such as restaurants, business and conference centres, spas, health clubs, guest rooms, and shower rooms. Furthermore, the guidelines address finishes and materials to be used for hotels, signage, and lighting that incorporate the principles of universal design in their planning.

When it comes to inclusiveness, it seems to be a one-sided argument in India, wherein very few stakeholders are interested in adopting, investing, and implementing an accessible design to build infrastructure. The majority of the available literature does not address the perspective of PwD. Research conducted in this area is very scarce, which acts as a deterrent for policymakers to encourage further growth of inclusiveness in the country. Hence, this study aims to provide an overview of users' perspective on inclusiveness in various categories of hotels in India. The said perception is defined as the way people receive, select, organise, and attribute meanings to objects, individuals, and events through their five senses. Moreover, this research aims to provide guidelines for policymakers and hotel promoters to ensure inclusiveness and barrier-free access to hotels, which will enhance the performance of hotels and tourism in India. The findings of this research further the knowledge on inclusive design requirements of PwD, which directly influences accessible tourism in India.

Research Questions

- What are the perceptions of travellers with disabilities regarding the level of inclusiveness among existing hotels of various categories in India?
- Is inclusiveness independent of the hotel type?

Methodology

The key research objective was to evaluate the perceptions of PwD during their stay at a hotel who are local tourists. The study adopted a descriptive

research design. The target population comprised domestic travellers with mobility disability, who stayed in hotels when they travelled to a destination for work or recreation., In our study, a survey was conducted among PwD to analyse their perspectives on the inclusive nature of the existing hotels in the country. The respondents of the survey were identified through a registered non-government organisation located in Mumbai, India, which works for the welfare of PwD. The sampling was carried out with the intention to cover all respondents with mobility disabilities. A non-probability sampling technique, Snowball sampling, was employed to collect the relevant data.

A survey instrument in the form of a questionnaire was developed, adopting the seven principles of universal design. Data was collected using a structured questionnaire with 25 statements in the form of five-point Likert scale. Moreover, the questionnaire has two sections, wherein the first focuses on the demographic profile of the respondents and the second contains various statements related to the respondents' perceptions on measuring inclusiveness in hotel design. The perception of the respondents was collected using a questionnaire that contains statements related to accessibility, circulation, guest room experience, and the common facilities available. In addition, inclusiveness of the hotel design was measured as per the design standards based on anthropometric application. 'Anthropometrics' is the study of human body measurements and is an interface between the human body and the components of interior space (Panero & Zelnik, 1979). Anthropometrics vary for PwD. Hence, considering the application of anthropometrics to the hotel design can make it inclusive.

The questionnaire, which was developed as a Google form, was sent to 83 respondents, and 45 filled-in questionnaires were received. The data was coded in SPSS v25, following which it was captured and analysed. Appropriate statistical techniques were applied, and at each turn, both the statistical significance and practical significance were considered. To describe the data, the measure of the central tendency and variation has been used. Furthermore, one-way ANOVA has been used to identify and infer

the significant difference in the respondents' perceptions on the level of inclusiveness in business and various star category hotels in India. The reliability of the variables in this construct is measured using Cronbach's alpha. The overall value of the questionnaire is $\alpha = 0.884$, and the value of Cronbach alpha denotes the high reliability of the measurement scale.

Results

The respondents are aged between 19 to 71 years, with a mean age of 39 years, among which 24 were male and 21 were female. All the respondents (55) in the survey were wheelchair bound. To elaborate further, 35% of the respondents stayed in budget hotels, 20% stayed in 4-star hotels, while only 12.5% stayed in 5-star hotels during their last travel to a destination. However, five respondents did not reveal their choice of hotel category during their last stay. Moreover, 29.3% travelled independently once in three months, whereas 36.6% never travelled independently. On the other hand, the percentages of those who travelled independently biannually and annually were 14.6% each, for a cumulative total of 29.2%.

Table 1: Demographic Profile of the Respondents

Category	Range	Frequency	Percentage
Gender	Male	24	53.3
	Female	21	46.7
Age	Average	39	NA
	Minimum	19	
	Maximum	71	
Categories of Hotel for stay while travelling by PwD	Budget Hotel	14	35.0
	3 Star	13	32.5
	4 Star	08	20.0
	5 Star	05	12.5
Frequency of independent travel by PwD	Never	15	36.6
	Once a month	02	4.9
	Once every 3 months	12	29.3
	Once every 6 months	06	14.6
	Once every year	06	14.6

The first research question sought to evaluate the level of inclusiveness across different hotel types. To answer this research question, the

respondents were asked to rate their perception on the inclusive design of various facilities, space for circulation, accessibility from the entrance to exits, design of furniture in a hotel room, design and layout of a guest room, design and layout of guest bathroom, fittings in the bathroom, and the design of common spaces such as restaurants, public toilets, and landscape area of a hotel.

Their responses were measured on a five-point Likert scale, with 1 representing poor and 5 representing excellent. The cut-off point between poor and excellent was 3.0, and the results have been summarised in Table 2.

Table 2. Descriptive Statistics on the Level of Inclusiveness among Hotels of Various Categories in India

	Budget Hotel	3-Star	4-Star	5-Star
Support is given to for PwD by all the hotel facilities	2.08	2.69	2.13	4.00
Entry and exit access points are designed for PwD	1.86	2.69	2.25	4.20
Specific parking spaces are available for PwD	1.64	2.25	1.25	3.20
Entry from parking to the entrance is at the same level or is accessible with the help of a ramp	2.07	2.50	1.75	3.60
Various signage are present in the hotel to guide all the guests	2.29	2.62	1.43	3.60

	Budget Hotel	3-Star	4-Star	5-Star
Sufficient natural and artificial lighting is available in all areas	2.73	3.17	3.38	4.75
Tactile strip identification is applicable	2.33	2.00	1.86	3.00
Hotel guest rooms have designs that support PwD	1.71	2.09	2.00	2.80
Beds are designed to support PwD	1.93	2.23	1.88	3.20
All furniture in hotel rooms are designed keeping in PwD in mind	1.57	2.17	1.88	2.80
There is a provision of a shower chair or bench in toilets	1.36	1.58	1.50	3.00
The flooring of the guest room and toilet is at the same level	1.86	2.42	2.63	4.20
Sanitary fittings in the toilet are accessible to PwD	1.57	2.17	2.50	4.00
Hotel guest room toilets have supportive handrails	1.64	1.67	1.50	3.80
Mirrors of wash basins are at a	1.93	2.17	2.00	4.00

	Budget Hotel	3-Star	4-Star	5-Star
height comfortable to use				
Mobility options inside the hotel are designed keeping PwD in mind	2.14	2.45	2.25	3.40
Facilities are designed to keep the body in a neutral position	1.92	2.17	2.13	3.75
Facilities are designed to tolerate accidental and unintended actions by users	2.14	1.92	2.25	3.75
Corridor sizes in the hotel premises are comfortable for movement	2.79	3.25	3.25	4.40
Lift size is comfortable for movement and circulation	2.71	2.92	3.00	4.60
The emergency exit is accessible to PwD in case of emergency	1.43	2.25	1.63	3.50
The outdoor landscaped areas are easily accessible to PwD	1.93	1.83	2.00	3.40
Dining tables are suitable for PwD	2.15	2.50	2.50	4.00

	Budget Hotel	3-Star	4-Star	5-Star
Buffet and service counters are suitable for PwD	2.64	2.62	2.38	3.75
Hotel staff are experienced in assisting PwD	2.50	2.85	2.13	4.40

This table shows that for budget hotels, most of the items were rated negatively, wherein all the statements on inclusiveness are rated with the mean value being less than 3.0. The mean value denotes extremely poor accessibility in the design and layout of budget hotels. For 3-star hotels, only two items had mean ratings greater than 3.0, whereas the rest had ratings less than 3.0, which suggests a relatively poor level of inclusiveness. For 4-star hotels, just as in 3-star hotels, the majority of the items were rated poorly. The size of corridors in the hotel premises and the availability of natural and artificial light were rated average, similar to that of 3-star hotels. Unlike the other star category and budget hotels, many items of 5-star hotels were rated positively for their inclusive design. Moreover, 5-star hotels are ahead of all the other categories in terms of the design of guest rooms, bathrooms, and sanitary fittings provided. No remarkable difference was observed regarding guest room design, beds, furniture, and fittings provided between the different categories of hotels.

Inclusiveness Based on Hotel Types

The second research question evaluates if the level of inclusiveness was dependent on the hotel type. A hypothesis has been proposed to test the relationship between hotel type and inclusive design. The hypotheses for this research question are as follows:

- H_0 : Inclusiveness is independent of hotel type.
- H_1 : Inclusiveness is dependent on hotel type.

Since the dependent variable, inclusiveness, was a scale variable, and the independent variable, hotel type, was an ordinal variable one-way ANOVA analysis was optimal to consider the same. In this regard, the test was conducted at 95% confidence level, and the key assumption for the use of ANOVA as well as the homogeneity of variances between different groups of hotels have been presented in Table 3.

Table 3: Test of Homogeneity of Variances

Inclusive Tourism	Levene's Statistic on Homogeneity	df1	df2	Sig.
Based on Mean	1.434	3	36	0.127
Based on Median	1.204	3	36	0.322
Based on Median, with Adjusted df	1.204	3	24.339	0.329
Based on Trimmed Mean	1.228	3	36	0.134

From the results, the computed p-values were noted to be greater than 0.05. It follows the observation that the variances were homogeneous, thus validating the use of ANOVA. The result of one-way ANOVA has been presented in Table 4.

Table 4: ANOVA Test: Inclusive Tourism and Hotel Type

	Sum of Squares	Df	Mean Square	F	Significance
Between Groups	11.443	3	3.814	8.199	0.000
Within Groups	16.748	36	0.465		
Total	28.191	39			

From the aforementioned table, it can be note that $F(3,36) = 8.199$; $p = 0.00 < 0.05$. To this effect, with the p-value being less than 0.05, we reject

the null hypothesis and conclude that enough statistical evidence was present at the 99.9% confidence level such that the ratings of inclusive tourism differed from one hotel type to another. Furthermore, this was also confirmed using the Welch and Brown-Forsythe robust tests of equality with regard to the means presented in Table 5.

Table 5: Robust Tests of the Equality of Means: Inclusive Tourism and Hotel Type

	Statistics	df1	df2	Significance
Welch	4.257	3	13.462	0.026
Brown-Forsythe	6.785	3	12.393	0.006
a. Asymptotically F distributed				

Again, from the preceding analysis, it can be ascertained that both statistics had p-values of $0.026 < 0.05$ and $0.006 < 0.01$, respectively. This affirms that the mean ratings of the aggregate inclusive tourism score differed significantly with the hotel type. To further establish the key hotel types that were significantly different from one another in terms of the ratings, the Bonferroni post-hoc test was conducted, as proposed by Field (2016). The related output has been presented in Table 6.

Table 6: Post-Hoc Test - Inclusive Tourism and Hotel Type

(I) Hotel Type	(J) Hotel Type	Mean Difference (I-J)	Significance
Budget Hotel	3-Star	-0.41363	0.745
	4-Star	-0.12301	1.000
	5-Star	-1.71269*	0.000
3-Star	Budget Hotel	0.41363	0.745
	4-Star	0.29063	1.000
	5-Star	-1.29906*	0.005
4-Star	Budget Hotel	0.12301	1.000
	3-Star	-0.29063	1.000
	5-Star	-1.58968*	0.001
5-Star	Budget Hotel	1.71269*	0.000
	3-Star	1.29906*	0.005
	4-Star	1.58968*	0.001

Piramanayagam, S., Pratim, P., & More, B. (2019). Inclusive hotel design in India : A User Perspective. *Journal of Accessibility and Design for All*, 9(1), 41-65. doi:

<http://dx.doi.org/10.17411/jacces.v9i1.185>

In the preceding analysis, the highest mean difference (MD) was observed between budget hotels and 5-star hotels (MD = -1.71269; $p < 0.05$), followed by the mean difference between 4-star hotels and 5-star hotels (MD = -1.58968; $p < 0.05$), and the least significant difference was found between 3-star hotels and 5-star hotels (MD = -1.29906; $p < 0.05$). It should be noted that no statistically significant difference was observed between the level of inclusive tourism between budget hotels and 3-/4-star hotels ($p > 0.05$). The same applies between 3-star hotels and budget/4-star hotels ($p > 0.05$). Again, no difference in the ratings of inclusive tourism was noted between 4-star hotels and budget/3-star hotels ($p > 0.05$).

Discussion

The primary aim of this study is to identify the perceptions of travellers with disabilities regarding inclusiveness in the design of various hotels in India. Understanding such perceptions will serve as a great source of knowledge for service providers to decide on the design and planning of hotels. Furthermore, it will help policymakers take the necessary action that supports inclusiveness and promotes accessible tourism in India. The results of this study disclose that in budget hotels, there is an inadequate provision for necessary shower chairs, and the design of sanitary fitting and furniture in the hotel guest room was considered inappropriate. Moreover, PwD perceive that accessibility is poor due to lack of accessible emergency exits and parking spaces. In other words, it can be argued that the overall level of inclusiveness was poor in budget hotels. In addition, the availability of artificial and natural lighting and the size of corridors in these hotels were rated in average by the PwD. In 3-star hotels, lack of provisions for shower chairs, handrails, and accessibility to outdoor landscape areas were rated poor for inclusiveness. In 4-star hotels, parking areas for disabled individuals and inadequate signage were rated poor. The mobility options available for hotel guests are comparatively better in 5-star hotels, which include the size and space of lifts, mobility options within the hotels, and access to the landscape. The assistance provided by the hotel staff was satisfactory only for the users of the 5-star hotel category. The guests who opted for 5-star

hotels reported better mobility as compared to those of other hotels. In these hotels, the dining infrastructure is also more accessible and comfortable.

In answer to the question concerning independence between inclusiveness and the hotel type, the results show that the former is independent of the latter. In terms of the inclusiveness of hotels, only the 5-star hotels were considered to be inclusive. Budget hotels, 3-star, and 4-star hotels were not fully inclusive for all respondents. The level of inclusiveness in budget hotels, 3-star, 4-star hotels was reported to be very poor and invariably the same. However, 5-star hotels received positive ratings for inclusiveness, and this was invariably different from that of the other hotels. This study's results strongly conclude that 5-star hotels offer more inclusive facilities to travellers with disabilities in comparison to other hotels.

All hotels, irrespective of their star category, should be inclusive, barrier-free and accessible. The concept of universal design, if followed by hotel managements for their design and planning, can help to reduce barriers for domestic and international tourists with disabilities who are motivated to travel in order to experience the rich cultural heritage of India.

Most travellers with disabilities want to travel independently (Shi et al., 2012). Thus, reducing barriers in hotels would encourage and motivate their travel. Furthermore, the employment of trained staff can address the barriers pertaining to communication with users to ensure that they experience comfort. From the perspective of hotel managements, guest satisfaction can be enhanced if the hotel design, as well as services correspond to users' requirements. The fact that the majority of tourists did not travel independently indicates that such barriers are the causes that impeded their travel.

Moreover, this research asserts that the notion of 'grey tourism' associated with elderly people is becoming popular in India. As stated by Persson, Henrik, Yngling, and Gulliksen (2014), designing accessible interfaces for older people, with increased requirements for accessibility, is similar to and

as important as addressing the cognitive, physical, and sensory functions of travellers with disabilities. Encouraging accommodation service providers to adopt an inclusive design and plan their hotels will offer great opportunities for a new tourism market in India. Sibi (2017) observes that efforts to make travel destinations accessible to all will encourage local economies and impact the travel market.

Policy Implication for Inclusive Hotel Design

The Ministry of Tourism, Government of India, (2015) has taken various initiatives to promote tourist facilities, which are barrier-free, thereby encouraging the concept of new accessible tourism. As specified by the said ministry, the conditions for making hotels accessible to differently abled individuals have been included in the guidelines for approval and classification of only 4- and 5-star category hotels. One of the aims of this study is to propose a set of guidelines for policymakers and service providers. The guidelines suggested below are based on the literature review as well as the results of the quantitative analysis conducted by this study. The researchers of this study propose seven strategies to make all the categories of hotels in India inclusive and barrier-free, which are as follows:

- The concept of universal design should be made mandatory for all new hotels, so that they are accessible for all persons with or without any disability, old age travellers, and those with special needs.
- Remodelling of existing hotels that lack inclusiveness should be encouraged to make them barrier-free. For example, installation of foldable ramps at entrances or replacement of the existing furniture of a reserved hotel room for PwD.
- Policymakers may introduce an incentive scheme for existing hotels in the form of a reduction on taxes and subsidised credits to renovate existing infrastructure.
- Policymakers should come up with an incentive program to train employees to give support to PwD. Hotels themselves may formulate a reward system to motivate and recognize the staff who support PwD.

- The Ministry of Social Justice and Empowerment must provide a set of guidelines for hotel designs of all hotel types.
- A design audit of hotels for inclusive design should be performed on a regular basis for all hotel types.
- Collection of feedback from tourists with disabilities, both local and international, during check out will help service providers ensure continuous improvement in terms of inclusive design.

Design Implications for Inclusive Hotel Design

This research recommends that designs of not only rooms, but entrances, parking, lobbies, lifts, corridors, restaurants etc., should adhere to the principles of 'ergonomics' in addition to anthropometric data to fit human dimensions.

Ergonomics is a scientific discipline related to the understanding of interactions between humans and other elements or systems, and to the application of theories, principles, data and methods to design in order to optimise human well-being and overall system performance. (Dos Santos & De Carvalhob, 2012)

The overall space planning shall provide an opportunity for barrier-free movement in the hotel premises to all users and encourage them with respect to independent accessibility. The entry and exits should have comfortable slopes with ramps and handrails. Moreover, the existing budget hotels can develop cost-effective solutions with temporary ramps to ensure accessibility and can remodel existing spaces through spatial design intervention. The width of corridors, size of lifts, detail design of furniture in hotel rooms, design of toilets, design of various amenities such as restaurant, swimming pool, and other recreational facilities should follow accessibility standards. Hotels should also allocate funds in their budget progressively to manage the substantial cost for renovation.

The choice of materials for hotels contributes to users' comfort, and non-slippery flooring solutions will be the best fit for all in this regard. Hotel rooms should be designed in such a way that they are spacious for all guests

and can be used with ease and comfort for any movement, including turning radii of wheelchairs and any other specialised requirements. An inclusive hotel design is flexible as well as adaptable and permits ease and comfort to all users regarding every detail concerning furniture and accessories for usage. Consideration of human factors such as arm strength and maximum reach of hand in the hotel design creates an inclusive environment for hotels to have more agility in satisfying the requirements of all guests (Wazzan, 2015). Therefore, the research recommends that an inclusive hotel design should be adopted, irrespective of the category of hotels, in order to accommodate and satisfy the needs of all users.

Conclusion

Current research supports fostering an understanding among all categories of hotels about the needs of travellers with disabilities. This study contributes towards building an understanding regarding the level of inclusiveness of the existing hotels in India as perceived by PwD. Furthermore, its findings are important for policymakers and service providers with regard to the designing and planning of inclusive hotels, which can be made available to PwD irrespective of the category of hotels. Affordability is an essential factor for tourists. Hence, the hotel industry should provide an inclusive hotel design for budget hotels in order to encourage the tourism sector of India.

However, this study is not free from certain limitations, similar to any cross-sectional study. Its comparatively small sample size coupled with non-disclosure of income and occupation by several respondents are a few limitations, which restrict the development of better understanding about the role of income and occupation on their choice of hotels. Non-control of the confounding impact of the economic reasons that are likely to influence the travel choices of PwD is another limitation of this study. However, this study is the first of its kind, which measures the perceptions of travellers with disabilities specific to various types of hotels in India. Though the paper focuses on hotel design and planning, the concept of accessible tourism is

important for catering to the overall mobility and independence of disabled individuals in every aspect of the built environment, which includes travel to tourist destinations and infrastructure that is accessible to all.

This study opens many new avenues for further research through its findings. Existing hotels in India, which include budget, three and four star hotels are lacking in implementing mandatory requirements of PwD, which was introduced in the year 2010 itself by Hotel and Restaurant Approval and Classification Committee (HRACC). It reveals the existence of some barriers in implementing inclusive hotel design by the service providers, execution and auditing by the HRACC. It is imperative to undertake a study on various issues and the barriers met by both the service provider and the government to augment the barrier-free hotels in India.

Acknowledgements

We acknowledge the participants of the survey conducted in this study. We thank Sunita Sancheti and Harshad Shinde for their valuable insights and support. Further, we would like to thank the two anonymous reviewers for their valuable suggestions to improve the quality of this research.

References

- [1] AusAID (2013). Accessibility Design Guide: Universal design principles for Australia's aid program. Registration Number 13.
- [2] Allan, M. (2013). Disability tourism: Why do disabled people engaging in tourism activities. *European Journal of Social Sciences*, 39(3), 480-86.
- [3] Bisschoff, C. A., & Breedts, T. F. (2012). The need for disabled friendly accommodation in South Africa. *African Journal of Business Management*, 6(41), 10534-10541.
- [4] Burgstahler, S. (Ed.). (2009). *Universal design in higher education: Promising practices*. Seattle, WA: DO-IT, University of Washington.
- [5] Darcy, S. (2007). A Methodology for Testing Accessible Accommodation. *CAUTHE 2007 Conference*. Sydney, Australia.

- [6] Darcy, S., & Dickson, T. J. (2009). A whole-of-life approach to tourism: The case for accessible tourism experiences. *Journal of Hospitality and Tourism Management*, 16(1), 32-44.
- [7] Darcy, S., Ambrose, I., Schweinsberg, S., & Buhalis, D. (2010). Conclusion: Universal approaches to accessible tourism. In D. Buhalis, & S. Darcy (Eds.), *Accessible tourism concepts and issues*. Bristol, England: Channel View Publications.
- [8] Dayananda, K. C., & Leelavathi, D. S. (2016). Tourism development and economic growth in India. *IOSR Journal of Humanities and Social Science*, 21(11), 43-39.
- [9] Devi, S., Goyal, S., & Ravindra, S. (2013). Evaluation of environmental barriers faced by wheelchair users in India. *Disability, CBR and Inclusive Development*, 24(3), 61-74.
- [10] Dos Santos, L. N., & De Carvalhob, R. J. (2012). Ergonomics and accessibility for people with visual impairment in hotels. *Work*, 41, 1417-24.
- [11] Gillovic, B., McIntosh, A., Darcy, S., & Cockburn-Wootten, C. (2018). Enabling the language of accessible tourism. *Journal of Sustainable Tourism*, 26(4), 615-30.
- [12] Government of India, Ministry of Urban Development. (2016). *Harmonised guidelines and space standards for barrier free built environment for persons with disability and elderly persons*. New Delhi, India: Government of India, Ministry of Urban Development.
- [13] Hair, J., Black, C., Babin, B., & Anderson, R. (2010). *Multivariate data analysis* (7th ed.). NYC, New York: Pearson.
- [14] Hammel, J., Magasi, S., Heinemann, A., Gray, D. B., Stark, S., Kisala, P., & Hahn, E. A. (2015). Environmental barriers and supports to everyday participation: A qualitative insider perspective from people with disabilities. *Archives of Physical Medicine and Rehabilitation*, 96, 578-88.
- [15] Israeli, A. A. (2002). A Preliminary Investigation of the Importance of Site Accessibility Factors for Disabled Tourists. *Journal of Travel Research*, 41, 101-104.
- [16] ITC Hotels. (2014). *A guide to universal design in the built environments*. New Delhi, India: ITC Hotels.

- [17] Malik, M. M., & Nusrath, A. (2014). A review of tourism development in India. *International Multidisciplinary Research Journal*, 3(11), 1-11.
- [18] Ministry of Statistics and Program Implementation, Government of India. (2016). *Disabled persons in India: A statistical profile 2016*. New Delhi, India: Government of India, Ministry of Statistics and Program Implementation.
- [19] Ministry of Tourism, Government of India. (2015). *New accessible tourism*. Retrieved from <http://tourism.gov.in/new-accessible-tourism>
- [20] Panero, J., & Zelnik, M. (1979). *Human dimension and interior space: A source book of design reference standards*. London, England: The Architectural Press.
- [21] Persson, H., Henrik, A., Yngling, A. A., & Gulliksen, J. (2014). Universal design, inclusive design, accessible design, design for all: Different concepts—one goal? On the concept of accessibility—historical, methodological and philosophical aspects. Heidelberg, Germany: Springer-Verlag.
- [22] Popiel, M. (2014). Paving the way to accessible tourism on the example of Krakow. *European Journal of Tourism, Hospitality and Recreation, Special Issue*, 55-71.
- [23] Poria, Y., Reichel, A. & Brandt Y., (2011). Dimensions of hotel experience of people with disabilities: An exploratory study. *International Journal of Contemporary Hospitality Management*, 23(5), 571-91.
- [24] Rahman, M., & Ohmouri, N. (2014). Barrier-free design for unhindered access for pedestrian and public transportation: A case study on Dhaka city. *Journal of Modern Science and Technology*, 2(2), 19-35.
- [25] Shanimon, S., & Hameedu, S. (2013). Foreign direct investment and accessible tourism in India. *International Journal of Scientific and Research Publications*, 3(12), 1-8.
- [26] Shi, L., Cole, S., & Chancellor, C. H. (2012). Understanding leisure travel motivations of travelers with acquired mobility impairments. *Tourism Management*, 33, 228-31.
- [27] Sibi, P. S. (2017). Grey tourism: An opportunity for new tourism market in Puducherry. *International Journal of Current Engineering and Scientific Research*, 4(12), 65-75.

- [28] Tantawy, A., Kim, W. G., & Pyo, S. (2004). Evaluation of hotels to accommodate disabled visitors. *Journal of Quality Assurance in Hospitality & Tourism*, 5(1), 91-101.
- [29] The City of Calgary Community Neighbourhood Services (CNS), Social Policy and Planning Division. (2010). *Universal design handbook-building accessible and inclusive environments*. Calgary, Canada: The City of Calgary.
- [30] United Nations Enable. (2018). *Promoting accessible tourism for all*. Retrieved from <https://www.un.org/development/desa/disabilities/issues/promoting-accessible-tourism-for-all.html>
- [31] United Nations. (2003). *Barrier-free tourism for people with disabilities in the Asian and Pacific Region*. NYC, New York: United Nations.
- [32] Vijayaragavan, T. (2014). Impact of tourism in Indian economy. *International Journal of Development Research*, 4(12), 2835-39.
- [33] Wazzan, W. (2015). My Accessible Room is Not Accessible, Applying Human Factors: Principals to Enhance the Accessibility of Hotel Rooms. *6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the Affiliated Conferences*, pp. 5405-10. Jeddah, Saudi Arabia: Procedia Manufacturing.
- [34] Whiteneck, G. G., Harrison-Felix, C. L., Mellick, D. C., Charlifue, S. B., & Gerhart, K. A. (2004). Quantifying environmental factors: A measure of physical, attitudinal, service, productivity, and policy barriers. *Archives of Physical Medicine and Rehabilitation*, 85, 1324-35.
- [35] World Health Organization, & World Bank. (2011). *World report on disability*. Malta, Europe: World Health Organization. Retrieved from http://www.who.int/disabilities/world_report/2011/report.pdf
- [36] World Tourism Organization (WTO). (2016). *Manual on accessible tourism for all: Principles, tools and best practices*. Madrid, Spain: UNWTO.
- [37] Yau, K., McKercher, B., & Packer, T. (2004). Travelling with a disability: More than an access issue. *Annals of Tourism Research*, 4(31), 946-60.

UNDERSTANDING RISK IN DAILY LIFE OF DIVERSE PERSONS WITH PHYSICAL AND SENSORY IMPAIRMENTS

¹Afnen Arfaoui, ²Geoffrey Edwards, ³Ernesto Morales, ⁴Patrick Fougeyrollas

^{1,2,3,4}Laval University, Quebec, Canada

¹ ORCID: orcid.org/0000-0003-4219-2031

¹afnen.arfaoui.1@ulaval.ca, ²geoffrey.edwards@scg.ulaval.ca,

³ernesto.morales@fmed.ulaval.ca, ⁴patrick.fougeyrollas@cirris.ulaval.ca

Received: 2018-08-08 | Accepted: 2019-04-09 | Published: 2019-05-31

Abstract: Managing risk of injury in daily life is a task common to all humans. However, people with impairments face significantly greater challenges in both assessing and managing risk of injury. To find out more about how individuals with impairments understand risk, we developed a qualitative study design based on semi-structured interviews. Seven people with a broad range of impairments were recruited for the study. The interviews were analyzed and organized into a codification tree subdivided into four main sections: safety and risk management, risk situation portrayal, perceptions of safety measures and finally loss of control and strong sensations. The study revealed that the difficulties related to managing risk in day-to-day situations are much higher than for people without impairments and, indeed, are possibly under reported in the literature. The realization that risk is ever present in the daily lives of people with impairments has led us to reconsider how we move forward on the remainder of our study.

Keywords: people with impairments, risk perceptions, decision-making process, risk management and assessment.

Introduction

As part of a broader project seeking to determine a process for designing immersive and interactive installations that address issues of disability, we sought to understand how people with impairments perceive risk of injury. Part of our logic was both to accommodate the needs of people with impairments in terms of risk management when designing safe installations, but also with the additional perspective of designing installations that focus on the experiences of people with impairments. The problem of understanding risk and personal safety is itself a complex issue. Although other studies have suggested ways of ensuring safety from a functional perspective, few have focused on the perceptions of risk experienced by people with impairments themselves. Such studies may also potentially have benefits for designing services that better serve people with disability, as well supporting the process of rehabilitation and the training requirements following a sudden change in life situation.

Managing risk of injury in daily life is a task common to all humans. Children are taught to be aware of such risks and to develop management strategies. Because the task involves executive function (planning, judgement, decision-making), mastery of safety management strategies often occurs later than other functions - sometimes significant learning in this area is still going on in mid to late adolescence (Fänge et al., 2002). The process requires a form of environmental scanning, knowledge of the self and our own limitations, memories of past experiences (Cree & Kelloway, 1997; Greening, 1997), and often involves lifestyle choices (Edwards, 1961). Personal perception of risk plays a key role in the development of an effective strategy, which will likewise vary significantly from one individual to the next (Slovic, 2016). Thus, it is largely subjective (Landry, 2006). Furthermore, Flin et al noted that cultural, social, physical, political, and psychological factors each contribute to how an individual perceives risk and behaves in response to it. In other words, risk perception is multidimensional (Flin et al., 1996; Landry,

2006). Researchers from different fields have focused on understanding human behavior in the face of hazards and how it can influence the day to day decision-making process (Edwards, 1961). Decisions are contingent on many factors (Edwards, 1954), indeed, they occur normally in sequences in response to changing circumstances and situations.

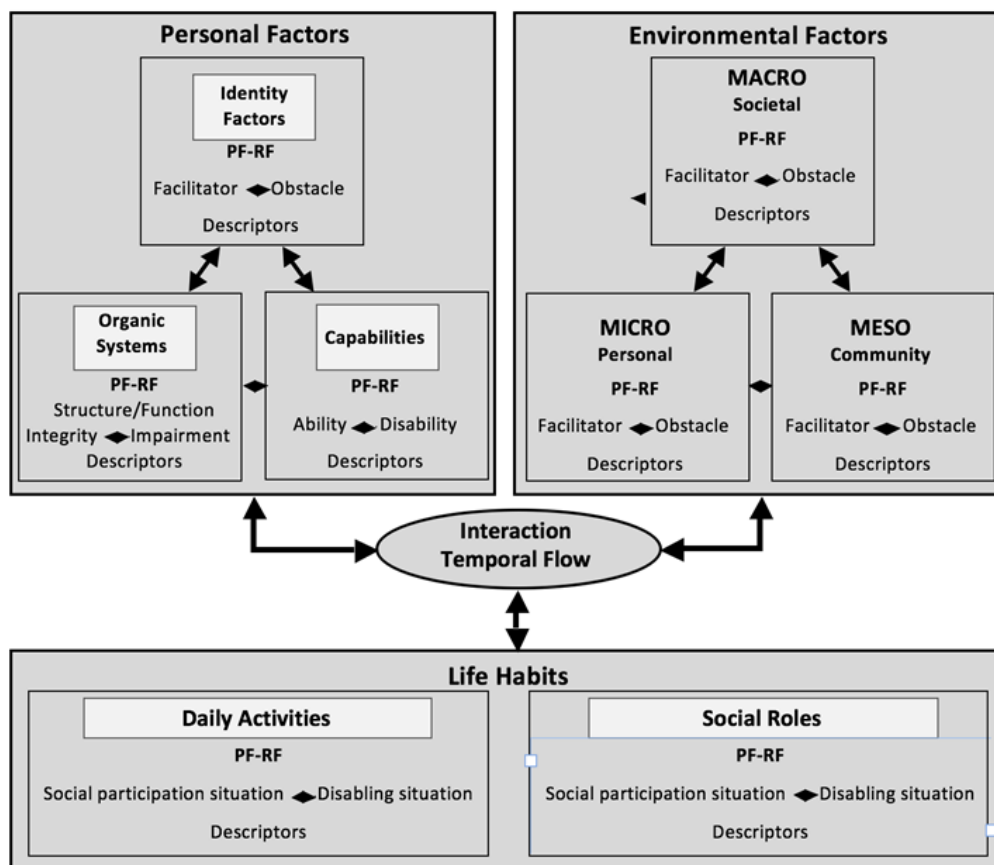
However, people with impairments face significantly greater challenges in both assessing and managing risk of injury. An everyday task such as crossing the street may seem easy for many people but it can become a complex and dangerous task for people living with impairments. Indeed, studies indicate that visually impaired (Cheong et al., 2008) or fully blind (Ashmead et al., 2005) pedestrians are more likely to make unsafe decisions compared to sighted pedestrians (Hassan, 2012). The ability to carry out this task is dependent on both impairments of the individual as well as the risk situation itself (Landry, 2006). People with disability are more often confronted with high risk situations and their reactions to risk are mediated by many factors. However, the literature on how people with disability handle risk management is inadequate - much of the work described above addresses the processes carried out by people without significant impairments. We hope this paper will encourage others to pursue this area of inquiry.

In this paper, we present a study which sought to better characterize the perception of safety risks across a broad range of impairments. We adopted a qualitative research methodology. Seven individuals were recruited to provide information about their daily struggles with risk and risk management strategies. The outcomes of this exploratory study will feed into the design of a series of immersive and interactive installations (Genest, 2014). Furthermore, we draw on the Disability Creation Process (DCP) model as a way of framing our study. The Disability Creation Process (DCP) (Fougeyrollas et al., 1998; 2019) offers a robust model for understanding disability and its relationship to personal aptitudes and environmental factors. It does so in a way that is formulated differently than the International Classification on Functionality, Health and Disability (ICF)

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

(WHO, 2001; Levasseur et al., 2007; Whiteneck & Dijkers, 2009; Fougereyrollas, 2010). In particular, the DCP formulates the relationship between the person and the environment as a function of their Life Habits. Within the DCP model, the notion of Life Habits refers to the social activities that a person engages on a daily basis, along with the social roles that he or she adapts in a particular sociocultural context and according to his or her characteristics (age, gender, identity, etc.) (Fougereyrollas et al., 1998 ; 2019). The concept of Life Habits is one of the significant features of the DCP model, in fact it is the bridging concept that brings together its different elements (see Figure 1).

Figure 1. Human Development Model and Disability Creation Process (HDM-DCP 2) (Fougereyrollas, 2010)



Legend :

PF-RF : Protective Factor - Risk Factor

© INDCP 2010

www.ripqh.qc.ca

Arfaoui, A., Edwards, G., Morales, E., & Fougereyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

It appears directly evident, based on the interviews we undertook, that risk management is articulated in terms of a person's Life Habits, and therefore the DCP model appears to provide a particularly suitable framework for this work. Furthermore, the mismatch frequently observed between personal capabilities and environments highlights the situation whereby poorly designed environments may exacerbate risk of injury for people with impairments (Fougeyrollas, 2010). The aims of the present paper are therefore to examine the perception of risk and the decision-making process involved in accommodating such risk among people with impairments, using the DCP model to provide a structuring theoretical framework.

Methodology

We began by recruiting and interviewing a broad range of people with impairments, using a set of structured questions to elicit relevant information. We then analyzed the interviews in order to identify risk factors (Short 1984) affecting people with impairments and then situate these within the DCP model. Against this background, we explored in more detail how people with impairments experience risk (Taylor & McKeown, 2013). Rather than focus on a particular disability profile, we explored this question across a broad range of disabilities, using a qualitative study design based on semi-structured interviews (Denzin & Lincoln, 1994). The study size was limited because of the exploratory nature of the work. We originally aimed to select nine participants - three people each with motor, sensory and cognitive disabilities. However, due to difficulties with recruitment, seven people were ultimately interviewed.

Participants were recruited using a variety of means: the different clinical programs of the Institut de réadaptation en déficience physique de Québec (IRDPO) -- that is, the motor, visual and hearing impairment clinics - and via the Regroupement des organismes de promotion 03 (ROP 03) which is the official association for the promotion and defense of the rights and the

interests of people with impairments in the Quebec City region. Additional inclusion criteria were that the participants be able to engage in verbal exchanges. Of the seven persons who took part in the study, five had reduced mobility (walker, manual wheelchair or motorized wheelchair), one was visually impaired and one was hearing-impaired. All were aged between 30 and 59 years. Tables 1 and 2 present in summary form, the pathologies of the participants and their demographic characteristics.

Table 1. The pathologies of the participants

Impairments	#
Visual impairment	1
Hearing impairment	1
Ehlers-Danlos	1
Osteogenesis imperfecta	1
Congenital limb deformation	1
Spinal cord injury	2
Total	7

Table 2. The demographic characteristics

Sex	Men	4 (57%)
Sex	Women	3 (43%)
Age	30-39 years	2 (29%)
Age	40-49 years	2 (29%)
Age	50-59 years	3 (43%)
Civil status	Single	6 (86%)
Civil status	Cohabitation	1 (14%)
Civil status	Married	0 (0%)
Civil status	Divorced	0 (0%)

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

Civil status	Widowed	0 (0%)
Children	Yes	4 (57%)
Children	No	3 (43%)
Education	Primary school	0 (0%)
Education	High school	1 (14%)
Education	College	2 (29%)
Education	University	4 (57%)
Annual family income	0 - 19 999\$	3 (43%)
Annual family income	20 000 - 39 999\$	3 (43%)
Annual family income	40 000 - 59 000\$	0 (0%)
Annual family income	60 000\$ - +	1 (14%)

Interviews, as indicated earlier, followed a semi-structured format. This allowed us to present a series of targeted questions designed to explore issues of personal safety, risk-taking and risk perception. The interviews varied in duration between 90 and 120 minutes. Socio-demographic information (see Tables 1 and 2) was first collected via a separate form. The rest of the interview was subdivided into three sections: (a) Safety and risk management; (b) Loss of control; and (c) Experiences of vertigo. The questions regarding vertigo were related to a particular feature in the proposed design of the interactive installations. To assist participants to understand the context of the study, two videos were presented, one at the beginning of the first section and one at the beginning of the last section.

The principal questions addressed in the first section of the questionnaire, were: What does risk mean to you? Do you consider yourself to be someone who takes risks? How do you expose yourself to risk? How do you react in a situation where you are exposed to danger? What are some of the challenges in daily life as a person with impairments that can expose you to risk? Do you consider being attached (e.g. via the arms or legs), a measure of safety or a

removal of your freedom of movement? For the second section, dealing with loss of control, typical questions included: What does loss of control represent for you? How interested are you in thrill-seeking and strong sensations (such as a roller coaster, skydiving, bungee jumping, even descending a steep slope in a wheelchair)? And for the final section, concerned with vertigo: Do you encounter vertigo in your day to day life? Have you ever experienced situations that involved adrenaline reactions and feelings of vertigo? Note that the interviews were carried out in French.

All sessions were audio recorded and then transcribed verbatim. To facilitate analysis, the transcripts were systematically coded (Denzin & Lincoln, 1994) and then analyzed with the NVivo software (Gibbs, 2002; Chowdhury, 2015). The collected data were sorted qualitatively and categorized within a range of analytical strategies (Tracy, 2010; Maxwell, 2012). This categorization produced a rich description of the study themes and was used to generate a set of codes related to the different sections of the questionnaire, as mentioned earlier. To refine the coding process, several meetings of the study team were held to discuss the code, sub-codes and the coding tree.

The diversity and the richness of the answers during the interviews generated more data than originally expected, which fed the coding process. In fact, defining the main codes was the hardest step of the analysis process. We introduced assessment criteria based on efficiency and relevance to determine whether or not the codes contributed to the understanding of the issues addressed. In addition to the selection criteria that we predefined - such as the singularity of the experience (Edwards et al., 2014), its diversity and the body-environment relationship (Kennedy, 2012) we added more specific criteria such as past experiences and how this can affect the decision-making process, to avoid duplication and improve clarity.

For the final coding tree, we identified four main codes; each of these was later further divided into sub-codes. In the initial stage, more than ten sub-codes were identified for each main code, so we had to eliminate less

important data and focus on the most meaningful categories to ensure the study results were robust and contributed to the understanding of the decision-making process of people with impairments. Table 3 presents the resulting codification tree which summarizes the different themes of the study, each of which will be presented in more detail in the following section.

Table 3. The coding tree

Codes	Sub-codes
Safety and risk management	Assessment phase Adapting the lifestyle Avoiding the errors of the past
Risk situation portrayal	Inaccessible environment Exceeding physical limits Living with an impairment
Perception of safety measures	Increasing the risk of injury Essential elements to ensure safety
Loss of control and strong sensations	Adrenalin Stress and anxiety Vertigo

Results of the coding exercise

The final four main codes were: (a) Safety and risk management, illustrating how people with impairments manage risk - especially on a daily basis; (b) Risk situation portrayal, which describes specific situations confronted by people with impairments that could lead to serious injuries or unsafe decisions; (c) Perception of safety measures, which seeks to determine whether or not people with impairments accept to be overprotected and how they interpret safety measures; and (d) Loss of control and the

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

development of strong sensations, including a range of reactions occurring when people with impairments lose control or face an unusual situation.

Code #1: Safety and risk management

The issue of personal safety is a matter of urgent necessity in the daily encounter with challenging situations for people with impairments. In fact, all of the female participants said that it is difficult to manage, in addition to the risk of injury itself, also the stress caused by it. This problem of dual management appears to be the primary reason why all the participants developed a structured decision-making process to ensure their own safety. Furthermore, the process thus determined varies from one person to another. For some people, this process had become concrete through simple daily actions. All participants agreed that the first step must be an assessment phase. This consists of measuring the risk and determining appropriate responses in the most efficient manner. During the assessment phase, a variety of factors needs to be taken into account, including physical boundaries, the nature of the environment, the available time, the person's pathology and their past experience. These factors vary from one person to another and lead to different decisions and prioritizations of issues.

- [...] you just go with your instincts on finding the way. Crossing the street may look like an easy thing to do, but not for me. I have to think about everything, my steps, the people and the cars around me. I have to trust my intuition. (Man: Visually impaired; free translation)
- [...] To grab something from the fridge, I have to think through all my actions otherwise I can find myself (my wheelchair) caught between the kitchen table and the dishwasher. (Woman: Congenital limb deformation; free translation)

People with impairments adapt their lifestyle and their body to their level of functioning to avoid being in risk situations. In fact, according to the five individuals with motor impairments, it is important to have their wheelchair

customized to better suit their mobility needs and their lifestyle, whether they live in the city or in the country, and regardless of the type of wheelchair used. Indeed, the choice of the wheelchair (e.g. powered or not) is also usually a result of this decision-making process. These decision-making processes accompany what we call the risk assessment phase. People with reduced mobility think through, logically, possible risks and ways of tackling them as well as potential consequences, then make their decisions based on this assessment in order to choose the right wheelchair and even particular lifestyle choices:

- [...] This year is going to be my 20th in a wheelchair. I used to live in the suburbs of Quebec where I chose to use a manual instead of a motorized wheelchair. I only needed to move around my area, to run errands. Once I moved to Quebec City, I had to change my wheelchair and get a motorized one to get around safely. (Man: Spinal cord injury; free translation)

People with impairments manage to ensure control over high-risk situations generally as a result of being conscious of their functional limitations as well as relying on their ingenuity and survival instincts. Indeed, the female participants of the study reported that a lack of self-confidence could lead to a lack of independence in certain situations and hence increase dependency on others. They, therefore, learned to “listen to their bodies” and to adjust to their functional limitations.

- [...] I used to go to the park for a walk every Sunday for an hour. It may seem that an hour is not that much time, but believe me time passes slowly and it feels like forever. Don't get me wrong I enjoy spending that time, but sometime I regret even going out. Managing my walker and walking in the same time drains my energy. I found myself exhausted, incapable of thinking about my own safety [...]. I know now that I can't go alone, and that my body has its limits that I have to respect. (Woman: Ehlers-Danlos syndrome; free translation)

Arfaoui, A., Edwards, G., Morales, E., & Fougereyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

Also, people typically learned from past experience to avoid repeatedly being in a similar risk situation. Ensuring that problematic situations did not re-occur was a high priority. Both men and women declared that they succeeded in preventing dangerous situations by avoiding repeating the same mistakes they made in the past. This memory scanning process appears to be part of the assessment phase:

- [...] When I was young, I used to go often to the swimming pool with my brother to play with him. I used to get into the pool via stairs until I learned that my little brother jumps into the pool, so I had to do it too. What I forgot is that jumping without seeing where to land can be dangerous, which it was. I did it, I jumped without knowing where I was going to fall and I got injured in my legs. Since that day, I learned that what I had done wasn't safe and I never did it again. (Man: Visually impaired; free translation)

Code #2: Risk situation portrayal

The interviewees identified their impairments as one of the main causes for being in risk situations. Based on their experiences, they associated risk in everyday life with their impairments combined with their interaction with the environment. Indeed, the majority of participants mentioned how every time they went beyond their physical limits, they found themselves in a vulnerable situation. These were usually situations in which they had to overcome obstacles in relation to their impairments.

- [...] Every time I go to the park with my two disabled kids is a challenge. Both of my kids use manual wheelchairs, so I have to assist them throughout the day which is no simple task, since I use a walker myself. It is difficult for me to manage my own safety as well as that of my kids. Pushing my children's wheelchairs and moving at the same time exceeds my limits and exhausts me physically. (Woman: Congenital limb deformation; free translation)

- [...] When I was younger, I used to go to the swimming pool from time to time for relaxation, a few lengths or maybe an aqua gym class, the pool was the perfect place to spend my free time. Today, I'm aware that spending that much time in the swimming pool can be dangerous. [...]. Going beyond my physical limits is a risk that can cost me my life. (Woman: Ehlers-Danlos syndrome; free translation)

Based on these observations, we may posit that the second phase of risk management is the development of a structured decision-making strategy. Some people do this consciously, and others rely on spur of the moment contexts to develop appropriate decision-making practices.

Regardless of whether people with impairments manage their lives by adopting a decision-making strategy or constantly assessing every movement and situation, they still find themselves frequently in high-risk situations - situations that are beyond their control or limits, often causing severe injuries and emotional disturbance. All the interviewees considered that living with an impairment cannot be completely controlled and because of this, it is impossible to predict what the future holds and what can happen when encountering obstacles or even waking up every morning to go to work. Simple activities such as eating or getting dressed are normally taken for granted, but for a person living with an impairment, having to adjust her movements constantly involves some risk of getting injured or harmed.

- I don't think that living is a risk [...], however, I am aware that even if the environment is adapted to my needs and let's just say that there is no way that I can get hurt, I will still get myself into a highly risky situation. (Man: Osteogenesis imperfecta; free translation).

A third stage of risk management is, therefore, the process of adapting responses to challenges thrown up by the environment, and a fourth appears to be the management of strong feelings aroused by the challenges faced. Environmental challenges constitute an essential part of our overall understanding of risk and its perception (Sparf, 2016). In fact, inaccessible

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

environments exacerbate the impact of disability and make it difficult for individuals with impairments to make decisions to ensure their safety. Despite the fact that each of the participants was characterized differently, either woman or man, young or old, motor, visual or hearing impaired, they all highlighted the importance of the environment and how it plays a major role in determining whether they feel safe and secure. It was noted that environmental factors are closely linked to the encounter with accidents and the problems of social inclusion.

- [...] The environment has to be an adapted safe living space. For more than 10 years, we kept noticing the state of road and sidewalks in Quebec, there is no doubt that getting around town with a wheelchair has become more difficult and dangerous. [...] Leaving my apartment to do my grocery shopping at the local supermarket can cause me injuries. (Woman: Ehlers-Danlos syndrome; free translation)

For people with limited mobility, choosing to live in a city and learning to adjust their life habits to feel safer poses a challenge. Every day, these people must adopt a decision-making strategy, trust their instincts and decide which route to take to get to the grocery store without getting hurt. Every decision needs to be carefully considered in order to avoid the risk of injury and harm.

- [...] Do you know how much time it takes me to get from my place to the corner coffee shop? It is around 20 minutes; I have to take the same path every time I want to have a coffee. It may seem easy to make the right decision and choose the fastest path to the coffee, but not in my case. I have to go with the most secure path, the one on which I have never been hurt. My lucky path. The only path I feel able to take without fearing being run down by a car, or slipping and falling. (Woman: Congenital limb deformation; free translation)

Some participants commented that although the lack of planning increases the risk of getting injured, it is still hard to anticipate every possible

situation. Indeed, living with impairments forces you to be attentive to everything and to take time processing all situations. The slightest detail counts and can make a huge difference in the decision-making process for ensuring their own safety.

Code #3: Perception of safety measures

People with impairments are often protected by family members or physiotherapists who are involved in their everyday life. Finding the right balance between appropriate protection and overprotection can, however, be difficult. Safety measures have always been present in their lives, whether through the use of assistive devices or via access to adapted means of transportation. Security measures are taken as precautions to avoid the risk of injuries. Social and health care services try to increase the quality of care and patient safety, whether by running public awareness campaigns or articulating risk within professional organizations (Taylor & McKeown, 2013). Although such measures are usually appropriate, they carry their own risks and not just benefits. For example, many of these measures are sometimes also responsible for causing injuries. Some wheelchair users prefer not being attached to their device rather than being “Unsafely attached”, because they may have already been injured in the past in such situations.

- I hate being attached to my wheelchair. On my way home, I once took the wrong path and I found myself caught in a large hole in the road. I tumbled off my wheelchair but since I was attached, I got stuck. This accident caused me multiple fractures (arms, ribs). (Man: Osteogenesis imperfecta; free translation).

Other participants feel that safety measures are essential to assist them in their activities and to increase their sense of personal security. Without such measures, these individuals feel threatened and they tend to isolate themselves, hence limiting their possibilities for social inclusion.

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

- [...] For the last couple of years, I stopped taking the public transport for one reason: I don't feel safe travelling without being attached. My wheelchair kept moving every time the bus driver turned. Now with paratransit (special transportation services for people with impairments) I feel more comfortable travelling around the city. (Man: Spinal cord injury; free translation).

Code #4: Loss of control and the experience of strong sensations

The absence of a sense of wellbeing and safety both reduces mobility and increases the occurrence of accidents and injuries, so we explored issues of loss of control and the strong sensations this might elicit. Indeed, five individuals pointed out that on a daily basis, they face a range of stressful and potentially dangerous situations: Crossing the street, cooking, getting out of the wheelchair, travelling to new cities, meeting new people, tackling a steep slope in a wheelchair, etc. In addition, we asked about extreme sports such as skydiving and bungee jumping in an attempt to illustrate the kinds of experiences that might involve the loss of control. We were looking for situations in which people with disability might go voluntarily beyond their limits and lose control over their bodily functions.

Despite the fact that most risk situations are a part of their daily existence and their ongoing routines, they still find it difficult to successfully carry out these tasks while managing feelings of fear, anxiety, and stress. For example, two of the female participants indicated that they suffer from vertigo or dizziness.

- [...] I normally don't feel dizzy but to be honest with you, lately I noticed that every time I leave my place to go out, I start sweating with my heart racing and I even experience sometimes panic attacks which can end with losing consciousness. But this won't stop me from living my life normally. (Woman: Ehlers-Danlos syndrome; free translation)

Discussion and conclusion

These interviews suggest that people with widely different impairments experience similar levels of risk in their everyday lives, and that these risk levels are significantly higher than those experienced by people who don't have to deal with an important functional limitation. We believe the issues of risk assessment, risk management and both the perception and experience of risk need to be studied more systematically than they have been dealt with in the past. Indeed, the fact that several of those interviewed report difficulties managing the intense emotional reactions that result from encountering high-risk situations suggests that the impact of dealing with higher levels of risk has been underestimated. This may have import for the ways people who have acquired impairments are trained to adapt their lives to accommodate the challenges this imposes, and for those experiencing a decline in mobility, for example, with age.

At the same time, despite the high levels of risk, both as perceived and as actually experienced, the people interviewed had all, regardless of their particular functional limitation, found creative ways to manage the risk of physical injury in order to carry out their lives. Much of this was, however, based on previous experiences where functional limitations had been tested - many reported having had "close calls" or even situations in which serious injury resulted from misjudging the risk involved in a particular context. For example, one woman spoke about her "lucky path", the one and only route along which she had never been at risk. Hence this person chose a strategy of avoiding making changes, for fear of increasing the probability of being hurt.

However, managing risk under these circumstances is revealed to tax a person's resources over the long term. Several among our study group felt confined by the constraints around risk avoidance and risk management that they had had to deal with over many years. For example, for a person born with osteogenesis imperfecta, falling out of the wheelchair could cause

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

painful fractures and hence the person must be alert for risk situations constantly - any relaxation of this awareness may result in further injury. The woman with the “lucky path” noted that an excessive focus on lessons from the past prevented her from living her life fully in the present. Hence dealing with these high levels of risk over long periods of time often leads to conflicting constraints. This complexity in risk management is also not widely acknowledged as being a part of the experience of disability - obviously, however, risk management will be more complex for some forms of impairments than for others.

The results of our study also show that all the participants, regardless of the nature of their impairments, managed risk in approximately four stages: (1) an assessment phase; (2) the adoption of a structured decision-making strategy; (3) adapting decisions actually taken due to unexpected events; and (4) managing the sometimes intense feelings elicited by these challenges. As indicated above, the latter raises important issues for clinical programs and occupational therapy, which should ensure individuals are prepared emotionally to manage such feelings or have recourse to counselling or support.

As mentioned earlier, people living with impairments learn to respect their physical limits in a defined process, to avoid high-risk situations. Life habits are adjusted according to specific characteristics such as past experiences and body limitations. Disability is fundamentally singular (Fougeyrollas, 2010). People experience disability differently, and develop ways of living and life habits that best represent their own character and survival skills. Disability, like race, ethnicity, gender and sexual orientation contribute to defining the person and their identity (Thomson, 1997). Such personal factors necessarily influence the decision-making process, especially when interacting with environmental factors that act as obstacles and which therefore generate disabling situations (Fougeyrollas et al., 1998).

In addition to dealing with the risk of injuries and the complications of finding the right decision-making process, people with impairments are confronted with other challenges such as managing their own feelings every time they face a risk situation. The feelings of insecurity and anxiety that arise when risky situations are perceived may lead to a feeling of vulnerability, e.g. whenever a person loses control over their situation. In an attempt to explore these feelings, we asked participants about extreme sports and situations involving loss of control that may require an efficient assessment of feelings. Participants had different ideas about what constitutes a situation involving loss of control: some noted they experience loss of control when they feel stressed, anxious or even lost faced with an unknown situation. Others considered extreme sports such as bungee jumping or skydiving to be inaccessible for almost all people with impairments, not least because they already deal with “extreme” situations in their daily lives.

All participants highlighted the vital role played by their occupational therapists. Their occupational therapists helped them develop their daily routines and their creative and technical skills, guiding them toward a healthy lifestyle. Learning to acknowledge their past while looking towards their future, allowed participants to embrace their current fears and to face up to the fact that their lives will always be risky but that with an appropriate decision-making process they can manage risk effectively. The conscious assessment and planning process carried out by people with impairments contrasts markedly with the automated, unthinking scanning process undertaken by most people without impairments.

This study has been extremely pertinent for our broader effort to develop a series of immersive and interactive installations for people with impairments. The identification of the four phases of the risk management process provides the basis for how we plan to organize the installations. The purpose of the qualitative study was both to narrow our understanding of the kinds of experiences that people with impairments may be looking for in an

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

immersive environment, and also to ensure that we understand how to manage safety issues within the installation design process. However, given the limited size of the study, we are aware that the results may be representative but not conclusive. Also, the fact that our youngest participant was 32 years old meant that the experience of younger people was not studied. Typically, the group with ages 20 to 30 takes more risk than older people due to their lack of experience and the nature of their personality. At this range of ages, we expand our life choices. Indeed, a willingness to take risks and develop a sense of adventure, are essential to the creation of a healthy adult lifestyle. On the other hand, young people with impairments often experience higher levels of social isolation than do their able-bodied peers (Strax, 1991). Hence there is a need to study risk-taking and its perception in the context of personal isolation as well. Our study improved our understanding of how the risk of injury in daily life is managed by people with disabilities, but the small size of the population studied limits our ability to generalize from our conclusions. Measures are being taken to ensure that more participants between 20 and 30 years old will be included in the other stages of the project.

A focus group including a range of people with incapacities, including several of the original participants, was organized to report on our preliminary findings and to validate an initial installation proposal. As a result of the reassessment that followed the study reported here, we are now developing an immersive experience that offers unusual experiences of comfort rather than high degrees of risk as we had initially planned. Our installations hence integrate the four phases of risk management in order to provide a rich, safe and liberating experience for people with a wide range of impairments.

Ethical approval

The ethical approval for the study was sought and obtained in June, 2016, from the Research Ethics Board of the IRDPQ. All study subjects were given

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

an anonymous code and these were used during discussions about the participants. The collected data were locked away to protect participant identities. A detailed interview guide was prepared and distributed by email before the interview. Before starting the interview, participants were invited to sign a consent form and a declaration they had been informed about the study. They were informed that they could drop out of the study at any time without penalty. Whether or not they continued with the interview, they received a small monetary compensation (50\$ if they came to the Institute, 30\$ if they were visited at home).

Acknowledgements

Our thanks to the participants of the study and to the Regroupement des Organismes des Personnes handicapées de la région 03 (ROP03) who provided support for this project from its inception.

References

- [1] Ashmead, D. H., Guth, D., Wall, R. S., Long, R. G., & Ponchillia, P. E. (2005). Street crossing by sighted and blind pedestrians at a modern roundabout. *Journal of Transportation Engineering*, 131(11), 812-821. doi: 10.1061/(asce)0733-947x(2005)131:11(812)
- [2] Cheong, A. M., Geruschat, D. R., & Congdon, N. (2008). Traffic gap judgment in people with significant peripheral field loss. *Optometry and vision science*, 85(1), 26-36. doi: 10.1097/OPX.0b013e31815ed6fd
- [3] Chowdhury, M. F. (2015). Coding, sorting and sifting of qualitative data analysis: Debates and discussion. *Quality & Quantity*, 49(3), 1135-1143.
- [4] Cree, T., & Kelloway, E. K. (1997). Responses to occupational hazards: Exit and participation. *Journal of Occupational Health Psychology*, 2(4), 304.
- [5] Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

- [6] Edwards, G., Noreau, L., Boucher, N., Fougeyrollas, P., Grenier, Y., McFadyen, B. J., ... & Vincent, C. (2014). Disability, rehabilitation research and post-Cartesian embodied ontologies-has the research paradigm changed? In *Environmental Contexts and Disability* (pp. 73-102). Emerald Group Publishing Limited.
- [7] Edwards, W. (1954). The theory of decision making. *Psychological bulletin*, 51(4), 380.
- [8] Edwards, W. (1961). Behavioral decision theory. *Annual review of psychology*, 12(1), 473-498.
- [9] Fänge, A., Iwarsson, S., & Persson, Å. (2002). Accessibility to the public environment as perceived by teenagers with functional limitations in a south Swedish town centre. *Disability and Rehabilitation*, 24(6), 318-326.
- [10] Flin, R., Mearns, K., Gordon, R., & Fleming, M. (1996). Risk perception by offshore workers on UK oil and gas platforms. *Safety Science*, 22(1-3), 131-145.
- [11] Fougeyrollas, P. (2010). *La funambule, le fil et la toile: transformations réciproques du sens du handicap*. Québec: Les Presses de l'Université Laval.
- [12] Fougeyrollas, P., Boucher, N., Edwards, G., Grenier, Y., & Noreau, L. (2019). The Disability Creation Process Model: A Comprehensive Explanation of Disabling Situations as a Guide to Developing Policy and Service Programs. *Scandinavian Journal of Disability Research*, 21(1), 25-37.
- [13] Fougeyrollas, P., Noreau, L., Bergeron, H., Cloutier, R., Dion, S. A., & St-Michel, G. (1998). Social consequences of long term impairments and disabilities: conceptual approach and assessment of handicap. *International journal of rehabilitation research. Internationale Zeitschrift fur Rehabilitationsforschung. Revue internationale de recherches de readaptation*, 21(2), 127-141.
- [14] Genest, V. (2014). *L'Infini : Réflexions Sur L'installation Immersive Interactive*. Mémoire de maîtrise inédit. Québec: Université Laval.
- [15] Gibbs, G. (2002). *Qualitative data analysis: Explorations with NVivo (Understanding social research)* (p. 100). Buckingham: Open University Press.

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

- [16] Greening, L. (1997). Risk perception following exposure to a job-related electrocution accident: The mediating role of perceived control. *Acta Psychologica*, 95(3), 267-277.
- [17] [Hassan, S. E. (2012). Are normally sighted, visually impaired, and blind pedestrians accurate and reliable at making street crossing decisions? *Investigative ophthalmology & visual science*, 53(6), 2593-2600.
- [18] Kennedy, G. (2012). *An Ontology of Trash: The Disposable and Its Problematic Nature*. New York: State University of New York Press.
- [19] Levasseur, M., Desrosiers, J., & Tribble, D. S. C. (2007). Comparing the disability creation process and international classification of functioning, disability and health models. *Canadian Journal of Occupational Therapy*, 74(3), 233-242.
- [20] Landry, L. G. (2006). Preventing occupational injuries: Women's perception of risk from musculoskeletal exposures. *AAOHN journal*, 54(2), 75-83.
- [21] Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* (Vol. 41). Thousand Oaks, CA: Sage Publications.
- [22] Short, J. F. (1984). The social fabric at risk: toward the social transformation of risk analysis. *American sociological review*, 49(6), 711-725.
- [23] Slovic, P. (1987). Perception of risk. *Science*, 236(4799), 280-285.
- [24] Slovic, P., Fischhoff, B., & Lichtenstein, S. (1977). Behavioral decision theory. *Annual review of psychology*, 28(1), 1-39.
- [25] Sparf, J. (2016). Disability and Vulnerability: Interpretations of risk in everyday life. *Journal of Contingencies and Crisis Management*, 24(4), 244-252.
- [26] Strax, T. E. (1991). Psychological issues faced by adolescents and young adults with disabilities. *Pediatric Annals*, 20(9), 507-511.
- [27] Taylor, B. J., & McKeown, C. (2013). Assessing and managing risk with people with physical disabilities: the development of a safety checklist. *Health, Risk & Society*, 15(2), 162-175.

Arfaoui, A., Edwards, G., Morales, E., & Fougeyrollas, P. (2019). Understanding Risk in Daily Life of Diverse Persons with Physical and Sensory Impairments. *Journal of Accessibility and Design for All*, 9(1), 66-89. doi:<http://dx.doi.org/10.17411/jacces.v9i1.183>

- [28] Garland-Thomson, R. (1997). *Extraordinary bodies: Figuring physical disability in American literature and culture*. New York: Columbia University Press.
- [29] Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative inquiry*, 16(10), 837-851.
- [30] World Health Organization. (2001). *International classification of functioning, disability and health: ICF*. Geneva: World Health Organization.
- [31] Whiteneck, G., & Dijkers, M. P. (2009). Difficult to measure constructs: conceptual and methodological issues concerning participation and environmental factors. *Archives of physical medicine and rehabilitation*, 90(11), S22-S35.

ACCEPTABILITY OF THE PROCESS OF OBTAINING A DRIVER'S LICENSE BY YOUNG PEOPLE WITH AND WITHOUT DISABILITIES

¹Camille Breault, ²Liliane Giroux, ³Audrey Gauvreau, ⁴Samuel Belanger, ⁵Marie-Eve Lamontagne, ⁶Ernesto Morales

^{1,2,3,4}Département de réadaptation, Faculté de médecine, Université Laval, Québec, Canada

^{5,6}Centre interdisciplinaire de recherche en réadaptation et intégration sociale (CIRRIS), Université Laval, Québec, Canada

¹camille.breault.1@ulaval.ca, ²liliane.giroux.1@ulaval.ca, ³audrey.gauvreau.1@ulaval.ca, ⁴samuel.belanger.3@ulaval.ca, ⁵marie-eve.lamontagne@fmed.ulaval.ca, ⁶ernesto.morales@fmed.ulaval.ca

Received: 2018-10-14 | Accepted: 2019-05-12 | Published: 2019-05-31

Abstract: Context and objective. Although there are more than 600 driving schools in Quebec (Canada), only one offers fully adapted services to young people with disabilities. To ensure that these services correspond to best practices in the field, they must be aligned with scientific knowledge and the opinions of experts and users regarding driver's education. This literature review fills a gap concerning the opinions and expectations of young people with and without disabilities and their parents.

Methodology. A search of publications in CINAHL, PubMed, ERIC, Social Sciences Full Text, Ergonomics Abstracts, Academic Search Premier, Web of Science, PsychInfo and Current Contents Connect was done on November 2, 2017, with 118 keywords, and another search was conducted on November 8, 2017, in Sociological Abstracts with 68 keywords. After selection, 25 articles were analyzed.

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Results. Most youths report that the process of obtaining a driver's license is stressful, anxiety-provoking and sometimes too expensive to initiate at the minimum legal age (16 years in Quebec). Youths with disabilities say that they do not have adequate information on how the process works. They appear to feel less self-efficacy than their peers without disabilities and to have more difficulties with theoretical and practical learning. Nevertheless, obtaining a license conforms with most young people's values, whether or not they have a disability.

Conclusions. Adapted driving schools, and particularly their instructors, need more knowledge of users' expectations. The results justify the importance of improving and developing more adapted driver's education for young people with disabilities, ultimately promoting equitable access to the process of obtaining a license.

Keyword: Opinions, expectations, young adults, parents, typically developing, disability, driver's education

Introduction

Statement of the problem

The concept of mobility refers to an individual's ability to move from one place to another, including by using methods of transportation (Office québécois de la langue française, 2011). The automobile is widely used in industrialized societies to travel quickly and effortlessly. It is known to improve occupational engagement in the areas of productivity, recreation and social and community participation (Bell, Young, Salzberg, & West, 1991; Ekelman, Stav, Baker, O'Dell-Rossi, & Mitchell, 2009; Masclet, 2002).

According to a survey by the Institut de la statistique du Québec (2014), 70% of Quebecers aged 15 to 24 years held a driver's license. Thus, many young

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

people in that age bracket undertake the necessary steps to obtain a first driver's license. Driving a car is a complex task that requires psychomotor, perceptual and cognitive abilities (Mazer, Gélinas, & Benoit, 2004). Thus, learning to drive can be more difficult for some people, particularly youths with disabilities (Durkin, Toseeb, Pickles, Botting, & Conti-Ramsden, 2016; Falkmer & Gregersen, 2000; Gagnon-Roy, Jasmin, & Camden, 2016). These young people may have certain characteristics that do not meet the health-related requirements (e.g., vision problems or a degenerative condition) or difficulties specific to learning to drive. For example, young people with cerebral palsy may have problems that affect information processing, visual memory and attention, all of which are important prerequisites for safe driving (Lafrance, Benoit, Dahan-Oliel, & Gélinas, 2016).

According to the Institut de la statistique du Québec (2014), the proportion of individuals aged 15 and older who had a driver's license in Quebec in 2010 was 86%, whereas it was just 76% in individuals with disabilities. In Quebec, article 15 of the Charter of Human Rights and Freedoms has stipulated since 1975 that mobility and access to public spaces are vested rights (Légis Québec, 2017). Given that driving promotes autonomy and mobility in the community, services are needed to support youths who have disabilities and who want to obtain a driver's license.

In Quebec (Canada), one adapted driving school exists within the automobile driver training and evaluation program (known by its French acronym of PEECA) given by the Centre intégré universitaire de santé et de services sociaux de la Capitale Nationale at the Institut de réadaptation en déficience physique de Québec. This school, which opened in 2013, makes it easier for individuals with a variety of disabilities to acquire a first driver's license thanks to a course that is adapted to users' specific needs and to the integration of rehabilitation professionals in the various phases of driver's education. Although there are more than 600 licensed driving schools in

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Quebec (AQTr, 2015), the PEECA school seems to be the only one in the province that offers fully adapted services to youths with disabilities.

From the perspective of setting up adapted driver's education programs elsewhere and thus supporting more young people with disabilities in their attempts to obtain a first driver's license, it is essential to ensure that the quality of the services offered corresponds to best practices in the field. Service quality is reflected in all the attributes contributing to the process of learning to drive and must correspond to the knowledge generated by the scientific literature, experts, and users themselves (Conseil de la santé et du bien-être, 2005). At the PEECA driving school in Quebec City, scientific evidence and expert opinion regarding driving skills and prerequisites are now known, thanks to the work of Lafrance et al. (2016). However, little is known regarding the opinions and expectations that users with disabilities bring to driver's education, as no synthesis exist of the current literature about this subject. This knowledge is essential to improve the quality of adapted driver's education services, and the current work aims to address this gap by consolidating published evidence of opinions and expectations of users with disabilities about drivers' education.

The purpose of this literature review is to identify the opinions and expectations of young people with disabilities and their parents regarding the acquisition of a first driver's license by comparing typically developing youths with youths with disabilities.

Methodology

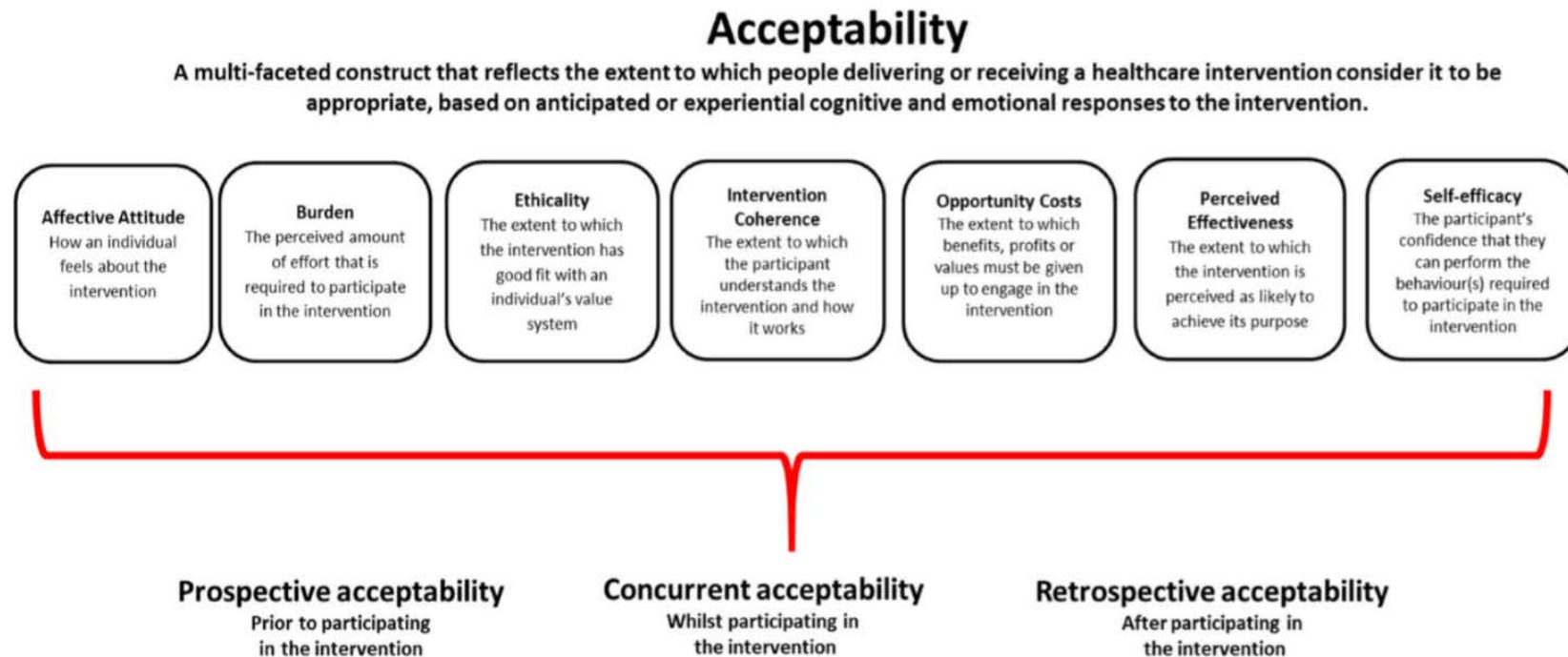
Theoretical foundations

The Theoretical Framework of Acceptability (TFA) was used to structure this review (Figure 1) (Sekhon, Cartwright, & Francis, 2017). The TFA is the first and, up to now, the only model to provide a definition of acceptability.

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Ilustración 1. Theoretical Framework of Acceptability (TFA) with its seven component concepts.



Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117. doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

According to Sekhon et al. (2017), acceptability is composed of seven concepts: affective attitude, burden, ethicality, intervention coherence, opportunity costs, perceived effectiveness and self-efficacy. These concepts are defined more precisely in Appendix A.

Method

The study population included young people with and without disabilities who wanted to obtain, were in the process of obtaining, or had obtained a driver's license. The parents of these young people were also included in the population. The variables of interest in the systematic review were the target population's opinions and expectations. An opinion refers to "a judgment, view, or feeling that an individual or a group expresses about a topic or facts, what they think about it" (Larousse, n.d., our translation), whereas an expectation is defined as "what one hopes for, expects, or wishes or hopes to obtain" (Office québécois de la langue française, 2006, our translation).

A search of publications in the CINAHL, PubMed, ERIC, Social Sciences Full Text, Ergonomics Abstracts, Academic Search Premier, Web of Science, PsychInfo, Current Contents Connect and Sociological Abstracts databases was done in November 2017. The keywords used to search these databases are presented in Appendix B. The process of selecting the publications is illustrated in Figure 2. The articles were selected based on reading their titles and abstracts and on the inclusion and exclusion criteria presented in Appendix C. Rayyan software (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016), which allows for blind selection, was used in this step. Then all of the articles were read in their entirety by two evaluators. This made it possible to eliminate other articles, by consensus, based on the exclusion criteria shown in Figure 2 and to obtain the final number of articles included in this literature review.

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

A quadruple evaluation of two articles was done as an interrater agreement exercise (Almberg et al., 2017; McGill & Vogtle, 2001) in order to standardize the rating method.

Assessment of scientific quality

Three scoring systems were used to assess the articles' scientific quality based on their research design. The qualitative articles' quality was assessed with the system devised by Cesario, Morin, and Santa-Donato (2002). Mixed-design articles were assessed with the Mixed Methods Appraisal Tool (MMAT) (Pluye et al., 2011). And the scientific quality of quantitative articles was assessed using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies of the National Institutes of Health (NIH, n.d.).

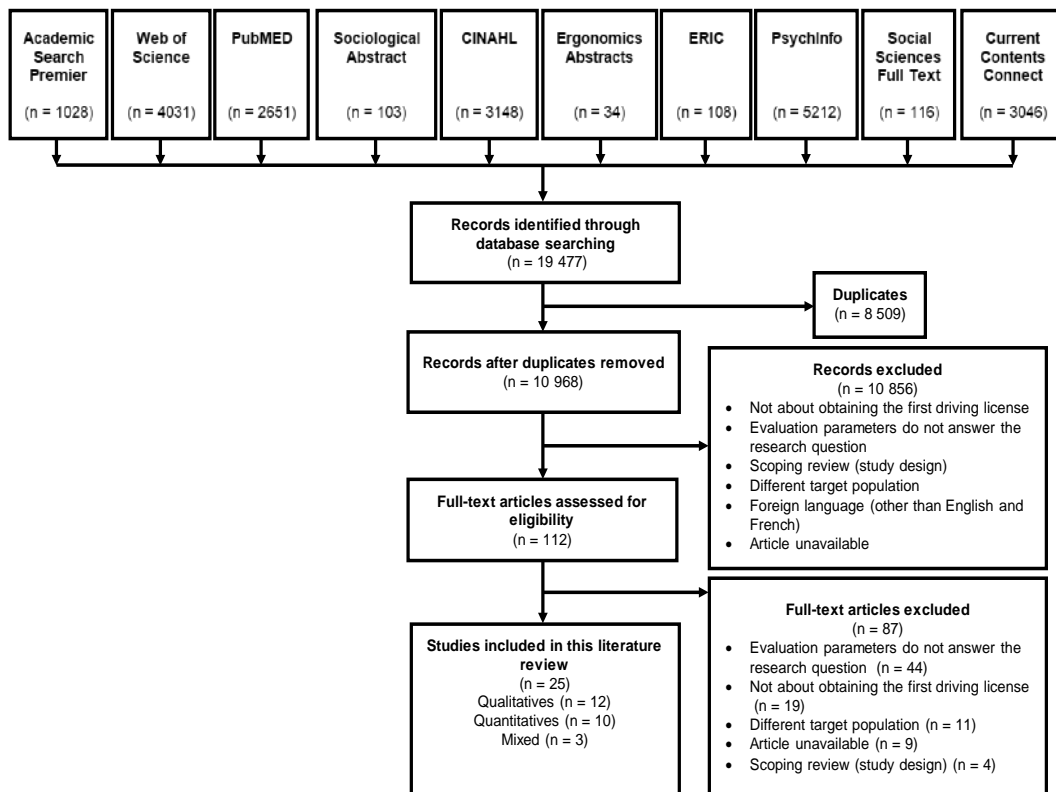
A quadruple-blind assessment was done for the first two articles analyzed (see Table D1, Appendix D). Double-blind assessments were then done by pairs of evaluators for the other articles (see Table D1, Appendix D). Assessments of the scientific quality of all articles are presented in Table D1 (see Appendix D).

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Results

Figure 2 illustrates the article selection process.



Overall, 19,477 articles were screened in 10 databases. After removing duplicates, 10,968 articles were assessed for eligibility, according to their title and abstract. The result was that 112 scientific papers were read and assessed in light of the inclusion and exclusion criteria (Appendix C). After a rigorous examination, 25 articles were selected. Table B2 (see Appendix D) describes the study population, the research design, the results (classified according to the TFA model), the scientific quality and the strength of the design of the 25 selected articles.

Main characteristics and scientific quality of articles

This literature review analyzed qualitative (n = 12), quantitative (n = 10) and mixed-design (n = 3) articles. The characteristics of the articles are

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

presented in Table B2 (see Appendix D). Almost half of the studies retained concerned typically developing youths ($n = 13$) and their parents ($n = 5$), while the rest investigated young people with disabilities ($n = 10$) and their parents ($n = 2$). The 25 studies were conducted in different countries, mainly the United States ($n = 11$) and Australia ($n = 5$). Different methods were used to obtain results, but most involved interviews in person or by phone ($n = 11$), and/or surveys or questionnaires ($n = 13$). The results of the various articles in the sample highlighted the seven categories in the TFA: ethicality ($n = 20$), self-efficacy ($n = 13$), affective attitude ($n = 13$), opportunity costs ($n = 12$), perceived effectiveness ($n = 9$), burden ($n = 8$) and intervention coherence ($n = 5$). Regarding the quality of the qualitative and quantitative articles examined, the majority ($n = 14$) were of good quality. As for the three mixed-design articles, two of them were of moderate quality and the other was of very low quality. More information on the quality of the articles is presented in Table B1 (see Appendix D).

Summary of results

The results are structured according to the seven categories in the TFA model and divided according to opinions and expectations before the person had a driver's license, during the process of obtaining a driver's license, and after the person had obtained a license. Results not tied to a specific point in the process are described generally.

Ethicality

Regardless of the point in the process of obtaining a driver's license, most young people with and without disabilities considered that driving is an important activity that fosters independence and facilitates engagement in productive occupations and social participation (Audrey & Langford, 2014; Begg et al., 2009; Carrabine & Longhurst, 2002; Chee et al., 2014; Delbosc & Currie, 2014; McGill & Vogtle, 2001; Mullholand Behm, 2014; Sacks &

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Rosenblum, 2006; Scott-Parker, King, & Watson, 2015; Simms, 1991). Most of the typically developing youths reported that they preferred driving over using public transit (Chee et al., 2014; Falkmer et al., 2015). However, this opinion was not shared by all the youths with disabilities. Although some of them also said they preferred to drive (Falkmer et al., 2015), others said they preferred to drive only when it was necessary, to walk or to take public transit (Chee et al., 2014; Mullholand Behm, 2014). Among the young people with disabilities, no preference emerged regarding the type of instructor. In fact, whether their instructor was a person with a disability, a professional (e.g., occupational therapist), a parent or a teacher (McGill & Vogtle, 2001), they only wanted someone who would understand their individual issues. Regarding the legal age for obtaining a learner's permit, most typically developing youths preferred age 16 (Williams, 2011). For their parents, age was not considered as the sole sufficient factor to guarantee obtaining a driver's license, since in their view this is a privilege rather than a right (Mirman & Kay, 2012). Nevertheless, the main reason for obtaining a driver's license mentioned by parents of typically developing youths was quite simply that their child wanted one (McCartt, Hellinga, & Haire, 2007). As for restrictions on driving, most parents of typically developing young people agreed that the rules in effect in their region should be made stricter (McCartt et al., 2007; Williams & Chaudhary, 2008). Mothers were generally more likely to hold this view than fathers (McCartt et al., 2007; McKay, Coben, Larkin, & Shaffer, 2008; Williams & Chaudhary, 2008). A ban on distractions, such as cell phone use at the wheel, was one of the restrictions parents of typically developing youths felt was most critical (McCartt et al., 2007; Mirman & Kay, 2012).

Before the process of obtaining a driver's license, young people with or without disabilities who did not want to start lessons did not do so because they were not interested or because they felt no need (Cox, Reeve, Cox, & Cox, 2012; Delbosc & Currie, 2014; Kirby, Sugden, & Edwards, 2011).

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Typically developing youths who wanted to start the process often chose to do so to facilitate the organization of family life and promote their independence (Audrey & Langford, 2014; Carrabine & Longhurst, 2002).

During the process of learning to drive, one of the most important reasons for obtaining a license for typically developing young men and women alike was the feeling of freedom it provided (Begg et al., 2009; Scott-Parker et al., 2015). Almost all of these young people wanted to practice driving with their parents (Sherman, Lapidus, Gelven, & Banco, 2004), which corresponded to the wishes of their parents, who likewise wanted to be involved in their children's driving lessons and practice (Guttman, 2013; Hartos & Huff, 2008; Sherman et al., 2004).

After obtaining a license, some young people with disabilities considered that it had helped them to find a job and/or go to school (Begg et al., 2009; Simms, 1991).

Self-efficacy.

Overall, the young people did not have the same level of confidence in their driving skills. About half of the young people with disabilities who felt confidence in their ability to drive did not find it complicated (Chee et al., 2014; Sacks & Rosenblum, 2006). Among typically developing young people who did consider driving complicated, most still did not avoid driving (Chee et al., 2014). As for parents, some of them had doubts about their children's ability to drive, whether or not they had a disability (Cox et al., 2012). Some of the parents of typically developing youths believed that adolescents were not sufficiently aware of the dangers related to driving (Guttman, 2013; Mirman & Kay, 2012; Sherman et al., 2004). Thus, believing that their children needed more guidance, some of these parents helped to teach their children to drive (Guttman, 2013). Parents who got involved in that way felt competent, committed and available in supervising their children's driving (Sherman et al., 2004). However, half of these parents said they believed

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

that most parents did not feel able to influence their children to drive safely (Guttman, 2013).

Before obtaining their driver's license, all the young people with and without disabilities reported that they lacked self-confidence (Audrey & Langford, 2014; Cox et al. 2012; Kirby et al., 2011). However, the young people with disabilities also had some fears about their ability to drive (Cox et al. 2012; Kirby et al., 2011).

After passing the driving test, all the youths with and without disabilities reported an increase in their self-confidence and in their satisfaction and pride (Kirby et al., 2011; Mullholand Behm, 2014; Törnqvist, Thulin, Segnestam, & Horowitz, 2009). In addition, typically developing youths who had felt a feeling of security and an atmosphere of trust during their lessons self-assessed their driving skills more positively (Tronsmoen, 2011). Young people with and without disabilities and their parents all reported a rise in self-confidence with increased experience following the first year of possessing a driver's license (Guttman, 2013; Simms, 1991).

Affective attitude.

In general, youths with disabilities considered the experience of driving to be negative, anxiety-provoking and associated with various kinds of frustration (failure of other drivers to respect the Highway Safety Code or inability to get a license) (Almberg et al., 2017; Chee et al., 2014; McGill & Vogtle, 2001; Mullholand Behm, 2014; Sacks & Rosenblum, 2006). However, passing the driving test and obtaining a driver's license made the young people with disabilities feel triumphant, proud, accomplished and independent (Kirby et al., 2011; Törnqvist et al., 2009). Several reactions were reported on the part of parents of youths with disabilities. Some of the ones who had worried about their children's skills felt nervous while others had tried to be encouraging and supportive (Cox et al., 2012; McGill & Vogtle, 2001). According to the same authors, parents felt frustrated about the waiting

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

periods for driver's education classes and the lack of adapted driving equipment. The parents of typically developing youths, on the other hand, tended to worry about their child's safety, lack of maturity, and ability to anticipate dangers and distractions, as well as the way other people drive (Audrey & Langford, 2014, Guttman, 2013; Mirman & Kay, 2012).

Before the process of obtaining a license, some youths with disabilities felt afraid of driving and anxious about the classes and their disabilities, which was not the case in typically developing youths (Chee et al., 2014; Cox et al., 2012; Kirby et al., 2011). The latter were more frustrated by the social exclusion caused by not yet having a car (Carrabine & Longhurst, 2002).

During the driver's education, typically developing young people reported feeling anxious during on-road practice, frustrated while driving under their parents' supervision and triumphant after they passed their driving test (Kirby et al., 2011; Scott-Parker, 2015). For the parents of these youths, being involved in supervising their driving made them feel enthusiastic, nervous and impatient (Sherman et al., 2004).

Opportunity costs

Overall, one of the most frequently mentioned advantages of not having a driver's license, in the view of youths with disabilities, was not having to pay for gasoline, insurance and a car (Chee et al., 2014; Sacks & Rosenblum, 2006). Most of the typically developing youths reported that they had found it difficult to pay for their driver's education classes, which may have delayed their acquisition of a license (Carrabine & Longhurst, 2002; Simms, 1991).

Before beginning the process of obtaining a license, young people with and without disabilities were restricted by a lack of money (Audrey & Langford, 2014; Delbosc & Currie, 2014; Kirby et al., 2011; Scott-Parker, 2015; Williams, 2011). In addition, the greater importance of the role of student

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

versus the role of driver was mentioned by youths with disabilities and their parents as limiting their ability to get a license (Kirby et al., 2011; McGill & Vogtle, 2001). For typically developing young people, the effort to fit driving lessons into their schedule was the main cause of problems (Audrey & Langford, 2014; Williams, 2011). Other typically developing youths mentioned that the possibility of using other satisfactory, accessible modes of transportation reduced their need to get a driver's license (Delbosc & Currie, 2014; Scott-Parker, 2015).

Perceived effectiveness.

In general, according to the parents of youths with disabilities, being emotional and providing too much information or too many instructions at once were ineffective strategies for teaching driving (Cox et al., 2012). Again according to these authors, remaining calm and patient during the class, talking about the route before heading onto the road, teaching in steps, practising, repeating, providing varied driving experiences, and starting the lessons in safer contexts were effective strategies for driver's education. For the parents of typically developing youths, the strategies favouring learning to drive included experience, practice, and driving in varied conditions; listening to their children's needs; providing a model of safe, calm driving; and the possibility of getting information from a variety of sources (Mirman & Kay, 2012).

During the process of obtaining a driver's license, driving instructors were perceived as insufficiently well trained, skilful and understanding, according to youths with disabilities (Kirby et al., 2011; McGill & Vogtle, 2001). Typically developing youths found that the feedback given by instructors was not always clear (Scott-Parker, 2015).

After getting their license, both youths with disabilities and typically developing youths mentioned that their driving instructors had been helpful during the process of learning to drive (Simms, 1991).

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Burden. Regardless of the point in the process of obtaining a license, the young people with disabilities had difficulties with the theoretical and practical driving lessons, meaning that it took them longer than average to master driving (Almberg et al., 2017; Kirby et al., 2011; Mullholand Behm, 2014; Simms, 1991). Most of the typically developing youths did not report any difficulty learning to drive (Simms, 1991) except during the very first practical classes, when the cognitive burden was higher and harder to manage (Scott-Parker, 2015). The parents of typically developing youths felt a heavy burden related to their role as mentor and their responsibility for imposing restrictions on their children's driving (Guttman, 2013; Mirman & Kay, 2012).

After learning to drive, some young people with disabilities were still not driving even though they had obtained their license, according to Mullholand Behm (2014).

Intervention coherence

In general, the young people with disabilities did not get enough information regarding the process of obtaining a driver's license and the options for driving with their disability (McGill & Vogtle, 2001; Sacks & Rosenblum, 2006). On the other hand, the parents of typically developing youths mostly felt they were well informed about the minimum age to obtain a license, the duration of the process, and the restrictions on night driving (McCartt et al., 2007; Williams & Chaudhary, 2008).

Discussion

This review of the literature highlights the similarities and differences between the opinions and expectations of young people (with or without disabilities) and their parents regarding the acquisition of a first driver's license. These comparisons now make it possible to better understand the

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

acceptability of the process for the two populations, based on the seven components of the TFA.

On the subject of **ethicality**, most young people with and without disabilities considered that driving fostered independence, engagement in productive occupations and social participation, which is supported by a substantial body of literature on the subject (Bell et al., 1991; Ekelman et al., 2009; Masclet, 2002). The fact that young people agree so strongly on this view of driving regardless of their disability status seems to indicate that the belief is well anchored in popular culture. However, following the acquisition of a license, a tendency was noted among young people with disabilities to continue to use transportation methods other than cars (e.g., walking, public transit), which was not the case among typically developing youths. The significant opportunity costs associated with driving may explain why youths with disabilities who have obtained a driver's license do not always use cars to travel about. People with disabilities represent 41% of people with low income in Canada, which suggests that their income level constitutes a major obstacle to purchasing a vehicle and paying the associated costs; this applies less often to typically developing young people (Wall, 2017). More specifically, people with disabilities may be more likely to have a low income if their disability prevents them from continuing their education or entering the job market (Wall, 2017). These problems can be aggravated when the young person does not have a driver's license, since his/her low income makes it more difficult to embark on the costly process of getting a driver's license, which in turn can limit access to services and resources. The possibility of providing government financial support programs for people with disabilities, such as Quebec's vehicle adaptation program for people with disabilities (Office des personnes handicapées du Québec, 2011), represents an interesting possibility for solving this dilemma.

By definition, **opportunity costs** are always a limitation on the acceptability of the process of obtaining a driver's license. Indeed, before starting the

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

process, young people with and without disabilities were restricted by a lack of money. Because adapted driver's education courses are more expensive than regular courses, government measures could be put in place to promote access to adapted courses and offer them for the same cost as a regular one, or approximately \$1,000 for the classes and obtaining the license (Radio Canada, 2018; SAAQ, 2018b). In addition, integrating the driver's education classes into the schedules of youths in both populations proved to be another factor limiting access to a driver's license (Audrey & Langford, 2014; Delbosc & Currie, 2014; Kirby et al., 2011; McGill & Vogtle, 2001; Scott-Parker, 2015; Williams, 2011). To enhance the acceptability of this process, driving schools might find it advantageous to take this variable into consideration, regardless of the customer base they serve. This could be done with more of a focus on young people, namely by taking their schedules, preferences, and busiest seasons (e.g., school exam periods) into account. In addition, to make classes more accessible, it would be a good idea to teach them at strategic times and places, for example, in classrooms after school. This would be a familiar environment that teens would appreciate as a place for learning (McGill & Vogtle, 2001).

Regarding the concept of **self-efficacy**, it first appears that driver's education classes had a positive impact on the confidence in their own abilities felt by youths with and without disabilities. Although the young respondents said that they had lacked self-confidence at the outset of the process, this feeling generally changed for the better, including in the year following the acquisition of a license. Reassuring youths and their parents about their abilities is essential to promoting their success since, among typically developing youths, the ones who had experienced a feeling of security and confidence during their classes rated their driving skills as better. To make a concrete suggestion, a mentorship program involving peers with disabilities who have obtained their driver's license would be an interesting possibility. The literature shows that mentorship programs in

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

schools, using similar-aged peers, give young people who are experiencing problems psychological and emotional support in a more natural context, and also facilitate the creation of a close, supportive social network (Heaney & Israel, 2008). This kind of mentoring provides psychological security for the young person and thereby favours learning, self-efficacy and the desired change in behaviour (Smith, 2011).

Affective **attitude** seems to be closely related to self-efficacy. For example, the young people reported negative emotions at the beginning of the process when their level of confidence in their driving skills was low. The more experience they had, the more positive emotions they expressed, until the point when they got their driver's license and felt very proud. The same was true of the parents: those who expressed doubts about their ability to influence their child's driving behaviour often reported negative emotions. In response to these tendencies, it would be interesting to set up strategies designed to improve self-efficacy and thus promote a more positive affective attitude, in youths and parents in both groups. More specifically with regard to adapted driving schools, professionals such as occupational therapists could capitalize on their role as experts in occupational enablement to help driving instructors by creating strategies customized for individual users (CAOT, 2012). Affective attitude was also affected by other aspects that could be addressed in driver's education, particularly organizational ones. To remedy this, governments could promote the establishment of additional adapted driving schools that are more accessible and better equipped.

As for **perceived effectiveness**, it is clear that driving instructors play a crucial role in driver education. For young people with disabilities, the most important issue was for the instructor to understand their individual difficulties. On the other hand, once they had obtained a license, most of the young respondents, with or without disabilities, reported that their driving instructors had been helpful. Despite that, they all considered that the instructors (whether they were professionals or parents) provided

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

imprecise feedback and were not sufficiently understanding during the process of obtaining a driver's license. In light of this generalized dissatisfaction, it would be valuable for occupational therapists, who have expertise in the analysis of the components (physical, cognitive, affective, social) of activities (Ordre des ergothérapeutes du Québec, 2008), to become involved in training instructors and parents about the impact of young people's disabilities on the activity of driving a car, and thereby improve the quality of services provided in all driving schools. Such involvement would also improve the experience of practical learning between parents and children, whether or not the latter had a disability. Getting an occupational therapist involved to help parents and instructors better understand students' individual difficulties could promote positive ethicality among youths and their parents, most of whom want to practice driving together (Guttman, 2013; Hartos & Huff, 2008; Sherman et al., 2004).

On the topic of **burden**, typically developing youths reported few learning problems, unlike young people with disabilities, who said they had had difficulties during both the theoretical and practical driving lessons. This is consistent with the existing literature on this subject (Durkin et al., 2016; Falkmer & Gregersen, 2000; Gagnon-Roy et al., 2016) and may be explained by the fact that young people with disabilities have physical and/or cognitive issues that interfere with the skills needed to drive a car. Our work clearly shows the importance of offering driving courses for people with disabilities that are adapted at various levels. Indeed, contrary to what one might believe, on-road practice is not the only aspect that has to be adapted, even though it often accounts for the majority of time spent in driver's education classes. The theoretical classes provided for this population also need to take account of the strengths and weaknesses related to each individual's disabilities, and this is where occupational therapists could contribute, as discussed above. In addition, it might be a good idea for a specialized educator to be present at all times during the theoretical classes to support

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

the youths' learning process; this is currently being done at the PEECA driving school.

Finally, intervention coherence differs significantly between the populations with and without disabilities. Unlike typically developing youths, youths with disabilities appear to know very little about the options available to them for adapted driver's education classes, even assuming any exist in their region. To mitigate this disparity, information on the process and on adapted schools could be provided by health care professionals working with youths with disabilities, particularly occupational therapists, as they approach the typical age for learning to drive.

Limitations of this literature review

All of the results presented here are rich in opinions and expectations but their interpretation is limited by the weak designs of most of the articles selected. Most of them involved cohort studies or case-control studies and thus reflect a local problem set with a group of individuals who were chosen non-randomly. Such designs do not allow one to make connections between the samples and the target population, which impairs the external validity of their results. Moreover, most studies used small samples to represent individuals with disabilities, whereas the samples of typically developing individuals were much significant. This means that the opinions and expectations of typically developing youths were better represented and more generalizable than those of youths with disabilities, even though the former corresponded to a smaller proportion of the general population they represented.

In addition, the articles selected cover a 17-year period (2001 to 2017). The process of obtaining a driver's license may have changed during this time, which would mean that the expressed opinions and expectations were not all based on the same process. Furthermore, the articles were produced in

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

different countries where the legal systems and processes for obtaining a driver's license may vary in relation to Quebec. There is also a cultural bias because the TFA documents the subjective experience of an intervention, whether past or anticipated.

The articles selected for this review covered the opinions and expectations of young people with a wide variety of disabilities of different kinds. These different types of disabilities may be confounding variables that could have an impact on results. For example, a person with autism spectrum disorder might be more likely to feel anxious than someone who has had an amputation. It would therefore be relevant to classify the studies based on the type of disability for more precise and accurate results. Along the same lines, this literature review includes several variables, all of which could affect outcomes, such as whether young people, with or without disabilities, or their parents were considered, the point when the data were collected, and the category in the TFA model. All of these factors mean that it is impossible to cover the issue exhaustively, even though the most relevant connections were explored.

Conclusions

This literature review studies expectations and opinions regarding driver's education classes in populations with and without disabilities. It shows that, although obtaining a driver's license can appear stressful, anxiety-provoking and sometimes too expensive to begin at the minimum legal age (16 years in Quebec), getting a license is undeniably crucial to most young people, whether or not they have disabilities. Nonetheless, youths with disabilities seem to have a lower sense of self-efficacy than their peers without disabilities, and also more difficulties with theoretical and practical learning. These results open up some avenues for solutions to improve the services provided by schools like the PEECA driving school and expand the

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

role of occupational therapists in such schools. It would now be interesting to measure the gap between current knowledge of the accessibility of adapted driver's education and the PEECA school's acceptability to users. That would make it possible to identify the limitations of the current program and establish strategies to align the services with real-world evidence. Ultimately, this will make it easier to implement adapted driver's education programs elsewhere, reducing the chasm separating youths with disabilities from access to quality services that foster their occupational engagement and social participation.

References

- [1] Association Québécoise des transports (AQTr). (2015). Écoles de conduite - Notre mandat. Accessed at <https://aqtr.com/ecoles-conduite/notre-mandat>
- [2] Almberg, M., Selander, H., Falkmer, M., Vaz, S., Ciccarelli, M., & Falkmer, T. (2017). Experiences of facilitators or barriers in driving education from learner and novice drivers with ADHD or ASD and their driving instructors. *Developmental Neurorehabilitation*, 20, 59-67. doi:10.3109/17518423.2015.1058299
- [3] Audrey, S., & Langford, R. (2014). Dying to get out: Young drivers, safety and social inequity. *Injury Prevention*, 20, 1-6. doi:10.1136/injuryprev-2013-040756
- [4] Begg, D., Langley, J., Brookland, R., McDowell, A., Ameratunga, S., & Broughton, J. (2009). The opinions of newly licensed drivers in New Zealand on the minimum car driver licensing age and reasons for getting a license. *Journal of the New Zealand Medical Association*, 122(1306), 63-77.
- [5] Bell, K. E., Young, K. R., Salzberg, C. L., & West, R. P. (1991). High school driver education using peer tutors, direct instruction, and precision teaching. *Journal of Applied Behavior Analysis*, 24, 45-51. doi:10.1901/jaba.1991.24-45

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117. doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

- [6] Canadian Association of Occupational Therapists (CAOT). (2012). Profile of practice of occupational therapists in Canada. Accessed at <https://www.caot.ca/document/3653/2012otprofile.pdf>
- [7] Carrabine, E., & Longhurst, B. (2002). Consuming the car: anticipation, use and meaning in contemporary youth culture. *The Sociological Review*, 50, 181-196. doi:10.1111/1467-954X.00362
- [8] Cesario, S., Morin, K., & Santa-Donato, A. (2002). Evaluating the level of evidence of qualitative research. *JOGNN: Journal of Obstetric, Gynecologic and Neonatal Nursing*, 31, 708-714. doi:08842170212900535310.1177/0884217502239216
- [9] Chee, D. Y. T., Lee, H. C. Y., Falkmer, M., Barnett, T., Falkmer, O., Siljehav, J., & Falkmer, T. (2014). Viewpoints on driving of individuals with and without autism spectrum disorder. *Developmental Neurorehabilitation*, 18, 26-36. doi:10.3109/17518423.2014.964377
- [10] Conseil de la santé et du bien-être. (2005). Un cadre d'évaluation globale de la performance des systèmes de services de santé: Le modèle EGIPSS. Accessed at http://www.csbe.gouv.qc.ca/fileadmin/www/Archives/ConseilSanteBienEt re/Rapports/200509_EGIPSS_resume.pdf
- [11] Cox, N. B., Reeve, R. E., Cox, S. M., & Cox, D. J. (2012). Brief report: Driving and young adults with ASD: Parents' experiences. *Journal of Autism and Developmental Disorders*, 42, 2257-2262. doi:10.1007/s10803-012-1470-7
- [12] Daly, J., Willis, K., Small, R., Green, J., Welch, N., Kealy, M., & Hughes, E. (2007). A hierarchy of evidence for assessing qualitative health research. *Journal of Clinical Epidemiology*, 60, 43-49. doi:10.1016/j.jclinepi.2006.03.014
- [13] Delbosc, A., & Currie, G. (2014). Impact of attitudes and life stage on decline in rates of driver's license acquisition by young people in Melbourne, Australia. *Transportation Research Record* (2452), 62-70. doi:10.3141/2452-08
- [14] Durkin, K., Toseeb, U., Pickles, A., Botting, N., & Conti-Ramsden, G. (2016). Learning to drive in young adults with language impairment.

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

Transportation Research Part F: Traffic Psychology and Behaviour, 42, 195-204. doi:10.1016/j.trf.2016.07.015

- [15] Ekelman, B.A., Stav, W., Baker, P., O'Dell-Rossi, P., & Mitchell, S. (2009). Chapter 14 - Community mobility. In B. R. Bonder & V. D. Bello-Haas (Eds.), *Functional performance in older adults* (pp. 332-385). Philadelphia, PA: FA Davis Co.
- [16] Falkmer, M., Barnett, T., Horlin, C., Falkmer, O., Siljehav, J., Fristedt, S., . . . Falkmer, T. (2015). Viewpoints of adults with and without autism spectrum disorders on public transport. *Transportation Research Part A - Policy and Practice*, 80, 163-183. doi:10.1016/j.tra.2015.07.019
- [17] Falkmer, T., & Gregersen, N. P. (2000). The prevalence of learner drivers with cerebral palsy who are in need of highly specialized driver education. *Journal of Traffic Medicine*, 28, 23-31.
- [18] Gagnon-Roy, M., Jasmin, E., & Camden, C. (2016). Social participation of teenagers and young adults with developmental co-ordination disorder and strategies that could help them: Results from a scoping review. *Child: Care, Health and Development*, 42, 840-51. doi:10.1111/cch.12389
- [19] Guttman, N. (2013). "My son is reliable": Young drivers' parents' optimism and views on the norms of parental involvement in youth driving. *Journal of Adolescent Research*, 28, 241-268. doi:10.1177/0743558411435853
- [20] Hartos, J., & Huff, D. C. (2008). Parent attitudes toward integrating parent involvement into teenage driver education courses. *Traffic Injury Prevention*, 9, 224-230. doi:10.1080/15389580801996521
- [21] Heaney, C. A., & Israel, B. A. (2008). Social networks and social support. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (pp. 189-207). San Francisco, CA: Jossey-Bass.
- [22] Institut de la statistique du Québec. (2014). Tableau statistique: proportion de la population québécoise détenant un permis de conduire selon certaines caractéristiques sociodémographiques. Accessed at <http://www.stat.gouv.qc.ca/statistiques/conditions-vie-societe/logement-equipement-transport/transport/permis.htm>

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

- [23] Kirby, A., Sugden, D., & Edwards, L. (2011). Driving behaviour in young adults with developmental co-ordination disorder. *Journal of Adult Development*, 18, 122-129. doi:10.1007/s10804-011-9120-4
- [24] Lafrance, M.-E., Benoit, D., Dahan-Oliel, N., & Gélinas, I. (2016). Development of a driving readiness program for adolescents and young adults with cerebral palsy and spina bifida. *British Journal of Occupational Therapy*, 80, 173-182. doi:10.1177/0308022616672480
- [25] Larousse. (n.d.). Opinion. Accessed at <http://www.larousse.fr/dictionnaires/francais/opinion/56197>
- [26] Légis Québec. (2017). Chapter C-12: Charter of human rights and freedoms. Accessed at <http://legisquebec.gouv.qc.ca/en/showdoc/cs/C-12>
- [27] Masclet, O. (2002). Passer le permis de conduite: La fin de l'adolescence. *Agora Débats/Jeunesses*, 28, 46-56.
- [28] Mazer, B., Gélinas, I., & Benoit, D. (2004). Evaluating and retraining driving performance in clients with disabilities. *Critical Reviews in Physical and Rehabilitation Medicine*, 16, 291-326.
- [29] McCartt, A. T., Hellinga, L. A., & Haire, E. R. (2007). Age of licensure and monitoring teenagers' driving: Survey of parents of novice teenage drivers. *Journal of Safety Research*, 38, 697-706. doi:10.1016/j.jsr.2007.10.002
- [30] McGill, T., & Vogtle, L. K. (2001). Driver's education for students with physical disabilities. *Exceptional Children*, 67, 455-466. doi:10.1177/001440290106700402
- [31] McKay, M. P., Coben, J. H., Larkin, G. L., & Shaffer, A. (2008). Attitudes of teenagers and their parents to Pennsylvania's graduated driver licensing system. *Traffic Injury Prevention*, 9, 217-223. doi:10.1080/15389580802005660
- [32] Mirman, J. H., & Kay, J. (2012). From passengers to drivers: Parent perceptions about how adolescents learn to drive. *Journal of Adolescent Research*, 27, 401-424. doi:10.1177/0743558411409934
- [33] Mullholand Behm, K. (2014). Transitional experiences of 16 to 26 year olds with Turner Syndrome. Doctoral dissertation, Rush University. Accessed at

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.
doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

<http://proxy.library.mcgill.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=109751885&site=ehost-live>

- [34] National Institutes of Health (n.d.). Study quality assessment tools. Accessed at <https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools>
- [35] OCEBM Levels of Evidence Working Group. (2011). Oxford Centre for Evidence-Based Medicine 2011 levels of evidence. Accessed at <https://www.cebm.net/wp-content/uploads/2014/06/CEBM-Levels-of-Evidence-2.1.pdf>
- [36] Office des personnes handicapées du Québec. (2011). Guide des programmes d'aide pour les personnes handicapées et leur famille: Aide financière, équipements et fournitures. Accessed at https://www.ophq.gouv.qc.ca/fileadmin/documents/Guides/Guide_des_Programmes_Acc.pdf
- [37] Office québécois de la langue française. (2006). Fiche terminologique: Attentes. Accessed at http://gdt.oqlf.gouv.qc.ca/ficheOqlf.aspx?Id_Fiche=502353
- [38] Office québécois de la langue française. (2011). Fiche terminologique: Mobilité. Accessed at http://gdt.oqlf.gouv.qc.ca/ficheOqlf.aspx?Id_Fiche=26507041
- [39] Ordre des ergothérapeutes du Québec. (2008b). L'activité: L'outil privilégié de l'ergothérapeute. Accessed at https://www.oeq.org/DATA/CHRONIQUE/2~v~activite_outil_privilegie.pdf
- [40] Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan - A web and mobile app for systematic reviews. *Systematic Reviews*, 5(210), 1-10. doi:10.1186/s13643-016-0384-4
- [41] Pluye, P., Robert, E., Cargo, M., Bartlett, G., O'Cathain, A., Griffiths, . . . Rousseau, M. C. (2011). Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. Montreal, QC: Department of Family Medicine, McGill University.
- [42] Radio Canada. (2018). Hausse anticipée du prix des cours de conduite au Québec. Accessed at <https://ici.radio->

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.
doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

canada.ca/nouvelle/1097115/hausse-prix-cours-conduite-quebec-gel-indexation-ministre-transport-andre-fortin

- [43] Sacks, S. Z., & Rosenblum, L. P. (2006). Adolescents with low vision: Perceptions of driving and nondriving. *Journal of Visual Impairment and Blindness*, 100, 212-222.
- [44] Scott-Parker, B. (2015). Experiences of teen drivers and their advice for the learner license phase. *Traffic Injury Prevention*, 16, 109-115. doi:10.1080/15389588.2014.909594
- [45] Scott-Parker, B., King, M. J., & Watson, B. (2015). The psychosocial purpose of driving and its relationship with the risky driving behaviour of young novice drivers. *Transportation Research Part F: Psychology and Behaviour*, 33, 16-26. doi:10.1016/j.trf.2015.06.004
- [46] Sekhon, M., Cartwright, M., & Francis, J. J. (2017). Acceptability of healthcare interventions: An overview of reviews and development of a theoretical framework. *BMC Health Services Research*, 17, 88. doi:10.1186/s12913-017-2031-8
- [47] Sherman, K., Lapidus, G., Gelven, E., & Banco, L. (2004). New teen drivers and their parents: What they know and what they expect. *American Journal of Health Behavior*, 28, 387-396.
- [48] Simms, B. (1991). The car use of young drivers with spina bifida and hydrocephalus. *European Journal of Pediatric Surgery*, 1(Suppl. 1), 31-34.
- [49] Smith, L. H. (2011). Cross-age peer mentoring approach to impact the health outcomes of children and families. *Journal for Specialists in Pediatric Nursing*, 16, 220-225. doi:10.1111/j.1744-6155.2011.00286.x
- [50] Société de l'assurance automobile du Québec (SAAQ). (2018b). Accompanying rider's guide: Passenger vehicle. Quebec, QC: Gouvernement du Québec.
- [51] Törnqvist, M. C., Thulin, S., Segnestam, Y., & Horowitz, L. (2009). Adult people with language impairment and their life situation. *Communication Disorders Quarterly*, 30, 237-254. doi:10.1177/1525740108326034

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.

doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

- [52] Tronsmoen, T. (2011). Differences between formal and informal practical driver training as experienced by the learners themselves. *Transportation Research Part F: Psychology and Behaviour*, 14, 176-188. doi:10.1016/j.trf.2010.11.009
- [53] Wall, K. (2017). Low income among persons with a disability in Canada. Accessed at <https://www150.statcan.gc.ca/n1/pub/75-006-x/2017001/article/54854-eng.htm>
- [54] Williams, A. F. (2011). Teenagers' licensing decisions and their views of licensing policies: A national survey. *Traffic Injury Prevention*, 12, 312-319. doi:10.1080/15389588.2011.572100
- [55] Williams, A. F., & Chaudhary, N. K. (2008). Views of Connecticut parents of teens and other adults about graduated licensing upgrades. *Traffic Injury Prevention*, 9, 503-507. doi:10.1080/1538958080233084

Breault, C., Giroux, L., Gauvreau, A., Belanger, S., Lamontagne, M., & Morales, E. (2019). Acceptability of the process of obtaining a driver's license by young people with and without disabilities. *Journal of Accessibility and Design for All*, 9(1), 90-117.
doi:<http://dx.doi.org/10.17411/jacces.v9i1.198>

JACCES

ISSN: 2013-7087

www.jacces.org

Twitter: [@Journal_JACCES](https://twitter.com/Journal_JACCES)

LinkedIn: [JACCES page](#)

©© Journal of Accessibility and Design for All, 2019 (www.jacces.org)



This work is licensed under an Attribution-Non Commercial 4.0 International Creative Commons License. Readers are allowed to read, download, copy, redistribute, print, search, or link to the full texts of the articles, or use them for any other lawful purpose, giving appropriated credit. It must not be used for commercial purposes. To see the complete license contents, please visit <http://creativecommons.org/licenses/by-nc/4.0/>.

JACCES is committed to providing accessible publication to all, regardless of technology or ability. Present document grants strong accessibility since it applies to WCAG 2.0 and PDF/UA recommendations. Evaluation tool used has been Adobe Acrobat® Accessibility Checker. If you encounter problems accessing content of this document, you can contact us at jacces@catac.upc.edu.

