

Université de Montréal

**Research and Industry Practices in Designing Clothes for
Optimal Participation of Persons with a Physical Disability**

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Résumé

Contexte : Les vêtements sont importants dans la société et favorisent la participation des personnes ayant des déficiences physiques. Il existe peu d'information indiquant si l'industrie de la mode comprend leurs besoins. **Objectifs :** 1) Examiner le rôle des vêtements sur la participation des personnes ayant une déficience physique. 2) Explorer les perspectives des représentants de l'industrie de la mode vis à vis la littérature ainsi que les facteurs influençant la mobilisation des connaissances. **Méthodologie :** 1) Un examen de la portée a été réalisé à partir de six bases de données scientifiques, Google et plusieurs consultations d'experts. 2) Des entretiens semi-structurés ont été menés auprès des représentants de l'industrie de la mode. **Résultats :** 1) Cinquante-sept articles et 88 sites Web ont été sélectionnés. Des problèmes vestimentaires affectant la mobilité et les soins ressortaient fréquemment ainsi que divers facteurs personnels. Quarante-neuf pourcent des articles décrivaient des caractéristiques essentielles à la conception de vêtements adaptés. 2) Cinq entrevues révèlent l'importance de l'acquisition des connaissances pour concevoir des vêtements adaptés. Des barrières de temps, de fabrication et de commercialisation ont été identifiées au sein de l'industrie. Plus de ressources, de visibilité, de consultation et d'engagement de l'industrie permettraient des avancées dans le domaine du vêtement adapté. **Conclusion :** Les vêtements influencent de façon multidimensionnelle la participation des personnes. Un meilleur partenariat entre les chercheurs, les cliniciens, les personnes ayant des déficiences et l'industrie de la mode pourrait améliorer la conception de vêtement adaptés.

Mots-clés : Vêtement, Mode, Participation, Réadaptation, Déficience physique

Abstract

Background: Clothing is important in human societies and could play a central role in optimizing participation of persons with physical disabilities. It is unclear whether the fashion industry understands the clothing needs of these individuals. **Objectives:** 1) Examine the role of clothing on participation of persons with physical disabilities, 2) Explore perspectives of representatives of the fashion industry vis à vis the literature and factors influencing uptake of this knowledge. **Methodology:** 1) A scoping review including six research databases, Google, and multiple expert consultations was performed. 2) Semi-structured interviews with fashion industry representatives were conducted. **Results:** 1) Fifty-seven articles and 88 websites were retrieved. Clothing-related issues impacting Mobility and Self-Care were frequently reported as were various personal factors. Forty-nine percent of articles reported essential clothing design features. 2) Five interviews found that acquiring knowledge for designing adapted clothing is important and time-, manufacturing-, marketing-, and purchasing-related barriers exist in the industry. Increased resources, exposure, guidance, and engagement within the fashion industry may help advance the field of adapted clothing. **Conclusion:** Clothing has a multidimensional influence on participation. Solidifying collaborations between researchers, clinicians, persons with disabilities, and the fashion industry may add credibility to future clothing designs.

Keywords: Clothing, Fashion, Participation, Rehabilitation, Physical Disability

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List of Acronyms

ICF: International Classification of Functioning, Disability and Health

ICIDH: International Classification of Impairments, Disabilities, and Handicaps

KTA: Knowledge to Action

WHO: World Health Organization

To those who support the synergy of Art and Science.

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Chapter 1. Introduction

Every day, billions of individuals wake up, get dressed, go to work, come home, cook dinner, spend time with friends or family, and go to bed. Outside of work, these individuals may participate in leisure activities, such as, playing sports, going to the cinema, going shopping or attending social gatherings. In nearly all human societies, clothing is an important aspect of participating in the above-mentioned activities. Besides performing a range of social and cultural functions, clothing can indicate social status and convey individual, occupational, and sexual differentiation. In many societies, clothing can act as a form of adornment, and provide an expression of self, personal taste, and style (Flugel, 1976). Physically, clothing serves many purposes, such as, providing protection from weather or a barrier between the skin and the environment for safety during hazardous or sporting activities (Watkins & Dunne, 2015). Examples of clothing for improving comfort and protection of the wearer include: space/diving suits, air conditioned clothing, armour, bee-keeper gear, motorcycle leathers, and high-visibility clothing. In recent decades, smart/intelligent textiles are enabling digital components and electronics to be embedded in their fabrics. This technology (i.e. wearables) is experiencing a rapid uptake in the sports sector in order to monitor important metrics while training (e.g. heart rate, respiration rate, temperature, activity, posture). Clothing is a crucial part of the environment in which life occurs and many advances have been made to clothing over the years. However, clothing and clothing-related activities can be challenging for many individuals.

There has been considerable rise in the number of older adults and persons with physical disabilities over the past decades. In Canada, 22.3% of individuals aged 15 years and older report having a disability that limits their daily activities (e.g. dressing, driving, cooking) (Canada, 2018). When further categorized by age group, the prevalence of disability rises considerably over the lifespan, from 13.1% among individuals aged 15-24 years to 47.4% for individuals aged 75 years or older (Canada, 2018). It is known that the global population is aging and life expectancy is increasing as the proportion of individuals over 60 years is expected to double (from 12% to 22%) between 2015 and 2050 and outnumber the proportion of children younger than five years old by 2020 (World Health Organization, 2018). This places even more

importance on the functioning of an older adult population, which has a larger risk of living with a disability. Furthermore, almost one in five (18.8%) Canadians of working age (15-64 years) present with a disability and have trouble finding employment depending on the severity of the disability (Canada, 2018). Undeniably, our society is faced with an increasingly disabled population and it is crucial to determine ways to optimize meaningful involvement of these individuals in everyday life activities and social roles. This type of involvement in life situations (i.e. fulfilling daily activities and social roles) can be defined as participation as outlined in the International Classification of Functioning, Disability and Health (ICF) (World Health Organization, 2001), a conceptual framework that will be described in further detail below. This research aims to contribute to the ultimate goal of optimizing participation of persons with a physical disability in order to support the development of a more inclusive society. In addition to the many avenues through which participation can be optimized, this research proposes clothing as an understudied area having the potential to influence participation of persons with a physical disability.

What happens when the same individuals above who wake up, get dressed, go to work, come home, cook dinner, spend time with friends or family, and go to bed, have a disability? What happens when they want to participate in leisure activities, such as, playing sports, going to the cinema, going shopping or attending social gatherings? Do clothes exist that allow to them participate as easily as an able-bodied individual participates in these meaningful activities? Indeed, taking extra considerations when dressing is necessary. Multiple factors come into play when choosing clothes to wear, such as, the effort it would take to don and doff the garment, the amount the garment would help or hinder activities throughout their day, the choice of fabric on their skin, and how they would look and feel in the garment. Although these considerations can affect everyone, a lack of adequate clothing choices may have a much more altering effect on participation for persons with a physical disability. The choice of suitable clothing that caters to common needs shared by persons with disabilities seems to be limited. In the context of a community of practice on improving rehabilitation, participation and inclusion for persons living with disabilities (Mazer et al., 2015), clothing and clothing-related activities (e.g.

shopping, dressing) were mentioned as barriers and were seen as important areas for future inquiry.

The clothing industry is largely composed of mainstream designers and manufacturers that cater to the general public and their shops populate our common streets and shopping malls, such as, Zara, Simons, Urban Outfitters, Victoria Secret, American Eagle, etc. Although clothing is a societal standard, a few studies have demonstrated that in fact, individuals with disabilities and the elderly still find it difficult to find clothing that fit their everyday needs (e.g. Chang, Zhao, Guo, Wang, & Gu, 2009; Na, 2007). Moreover, physical appearance (i.e. fabric, colour, style), physical performance (i.e. care instructions, convenience of donning and doffing), expressiveness (i.e. does it look good), and extrinsic aspects (i.e. price, brand) of the garment have all been identified as being important to consumers using wheelchairs (Abraham-Murali, 2001). Adapted clothing may be part of the solution to the challenges experienced by persons with a physical disability.

Adapted clothing can be defined as clothing, garments and footwear specially designed for people with physical disabilities (e.g. the elderly, the frail, post-surgery patients) who may have difficulty dressing themselves due to an inability to manipulate closures, such as, buttons and zippers, or due to a lack of a full range of motion required for self-dressing (World, 2015). Despite the existence of the term adapted clothing, there seems to be minimal uptake of adapted clothing considerations in the mainstream fashion industry. After the present research began, the research team became aware of the Runway of Dreams initiative (Sheier, 2017), which led Tommy Hilfiger to be the first mainstream brand to launch an adapted clothing line for children in 2016 and then for adults in 2018 (Morrill, 2018). However, this is only one example and even though others have since emerged, literature on the subject of clothing for persons with a physical disability appears sparse and inadequate to provide clear recommendations to clothing designers. For example, it is unclear whether these adapted clothes coming out on the market respond to the needs of persons with a physical disability, are perceived as aesthetically pleasing, are affordable and accessible, and more importantly, whether the products are sufficient to

enable persons with a physical disability to fully participate in meaningful work, school, and leisure-related activities. With regards to intelligent textiles and wearables, it is also unclear whether these products have been developed considering the specific needs of persons with a physical disability or if principles of universal design (Design, 2014; Lidwell, 2003) or accessible and inclusive design (Holmes, 2018; Treviranus, 1993) have been used, making them usable by anyone.

While it is essential to have more companies use an inclusive approach in their designs given the changing demographics globally, there may be a lack of understanding about the importance of clothing in the lives of persons with a physical disability and of their specific needs in terms of clothing design. The overall goal of this thesis is to contribute to a better understanding of the relationship between clothing, participation and persons with a physical disability to ultimately promote a more inclusive society. In Chapter 2, two specific objectives are presented followed by their respective conceptual frameworks described in Chapter 3. Chapter 4 outlines the scoping review methodology used to attain the first objective (Article 1) followed by the interview methodology used to attain the second objective. The results of the scoping review (Article 2) and interviews are presented in Chapter 5. Chapter 6 summarizes and discusses the results and future research, while the final chapter, Chapter 7, provides an overview and conclusion of the research.

Chapter 2. Objectives

The general objective of this research is to gain a better understanding of how clothing and clothing-related issues (e.g. adaptation, design, access) influence participation of persons with a physical disability. More specifically the first objective is to:

- 1) Examine the role of clothing on participation of persons with a physical disability as documented in the scientific and grey literature.

Initially, after objective one was completed, this study intended to explore perspectives of persons with a physical disability, caregivers, health professionals, and representatives of the fashion industry in regards to clothing for persons with a physical disability. However, results from work related to the first objective focused a need for future research to better understand realities within the fashion industry towards designing clothing for persons with a physical disability. Therefore, the second objective of this research is to:

- 2) Explore perspectives of representatives of the fashion industry vis à vis the documented literature and potential factors influencing uptake of this knowledge.

Results stemming from the research related to both objectives are essential for developing tangible recommendations for future innovations in clothing designs, and ultimately, for contributing to a more inclusive society.

Chapter 3. Conceptual Frameworks

International Classification of Functioning, Disability and Health (Objective 1)

The International Classification of Functioning, Disability and Health (ICF) is a multipurpose classification system put forth by the World Health Organization (WHO) in 2001, designed to serve various disciplines and sectors. This classification was created as a response to some shortcomings experienced from the International Classification of Impairments, Disabilities, and Handicaps (ICIDH), such as, its insufficient attention to the role of the environment (Gray & Hendershot, 2000). The ICIDH classified the consequences of diseases and was rooted in a more medical model of disability whereby there is an emphasis on diagnosing, preventing, or curing an individual's 'condition' (Marks, 2009). However, in recent decades, a social model of disability has come to the forefront arguing that "many restrictions imposed on disabled people are not a natural consequence of their impairment, but are a product of a social environment which fails to take account of their differences" (p.88) (Marks, 2009). Although medical and social models of disability are often presented as dichotomous, the WHO presents the ICF as a bio-psycho-social model promoting a balanced approach between both models and different aspects of disability (World Health Organization, 2011).

The ICF is organized in two parts: 'Functioning and Disability' and 'Contextual Factors', which are then divided further to create five main health components: Body Functions, Body Structures, Activities and Participation, Environmental Factors, and Personal Factors. Briefly, body functions refer to the physiological and psychological functions of body systems while body structures refer to the anatomical parts of the body (e.g. organs, limbs). Activities are the execution of a task or action by an individual (e.g. extending one's arm) and these activities become participation when the individual is involved in a life situation (e.g. reaching for a cupboard). Environmental factors are described as a collection of the physical, social, and attitudinal environments in which people live and conduct their lives. Finally, the ICF does not provide a detailed classification for personal factors as it does for the other health components,

however, these factors are globally defined as the particular background of an individual's life and living. For example, gender, race, age, habits, and behavioural patterns are all considered personal factors which may play a role in disability at any level.

The ICF suggests a dynamic interaction between these health components and aims to provide a standard language and framework for improved communication between different users (i.e. health care professionals, researchers, policy-makers, and the public, including people with disabilities) (World Health Organization, 2001). Since this research concerns persons with a physical disability and involves researchers from the health and textile sectors as well as fashion industry representatives, the ICF was chosen as a conceptual framework for objective 1 of this research, primarily for its openness across sectors in terms of the language used and its consideration for environmental factors, such as clothing. More specifically, the ICF helped to operationalize concepts, such as participation, and to categorize information retrieved from the literature. For example, clothing, was categorized as a product used by people in daily activities, including those adapted or specially designed, located on the person (ICF classification code e115).

The Knowledge to Action Cycle (Objective 2)

Results from research related to the first objective (i.e. the scoping review) identified a potential knowledge translation gap between the documented literature and practices within the fashion industry. Therefore, the second objective was situated within the Knowledge to Action (KTA) cycle (Graham et al., 2006). The KTA cycle is presented in two parts: knowledge creation and action. The knowledge creation part refers to the process of creating and collecting primary, secondary, and tertiary forms of knowledge from documented sources while allowing for the knowledge to be tailored to specific targeted user groups at any point along the way. Stemming from this knowledge creation process, the action part is a process of applying the knowledge. This process is presented as the following eight steps performed in an iterative manner: 1) Identify a problem that needs addressing, 2) Identify, review, and select the knowledge or

research relevant to the problem (e.g. practice guidelines or research findings), 3) Adapt the identified knowledge or research to the local context, 4) Assess barriers to using the knowledge, 5) Select, tailor, and implement interventions to promote the use of knowledge (i.e. implement the change), 6) Monitor knowledge use, 7) Evaluate the outcomes of using the knowledge, and 8) Sustain ongoing knowledge use.

The results from the scoping review, situated both within the knowledge creation and action parts of the KTA cycle, allowed us to identify, review, select and synthesize knowledge and research relevant to the problem of clothing for persons with a physical disability. Therefore, the second objective of this research (to explore perspectives of representatives of the fashion industry) is situated within steps 3-5 of the action part of the KTA cycle. As expressed in the cycle, starting with this exploration will allow us to better understand realities within the fashion industry and consequently, better select, tailor, implement, and sustain usage of research knowledge in daily practices of fashion/design companies.

Chapter 4. Methodology

Scoping Review (Objective 1, Article 1)

A scoping review was chosen as the method to accomplish the first objective of examining the role of clothing on participation of persons with a physical disability as documented in the scientific and grey literature. A protocol detailing the methodology used for this scoping review has been published in BMJ Open and appears below as Article 1 (Esmail et al., 2018). After initial publication, I found an error in Figure 1- Overview of the Methodology and notified the publisher. The final corrected version of the paper follows. All co-authors have consented to the use of the article in this thesis. This is an open access journal; therefore, obtaining additional permissions were not required. Details related to my contribution to this article are outlined on page 20.

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The role of clothing on participation of persons with a physical disability: a scoping review protocol

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ABSTRACT

Introduction: Clothing is an important aspect of nearly all human societies from performing social and cultural functions to indicating social status, a form of protection and a way for self-expression. It can help or hinder the ability to fulfill everyday activities and social roles and with the rising industry of wearable technologies, smart textiles are adding health-monitoring functions to clothing. The influence that clothing can have on the life of someone with a physical disability is significant and further research is needed to understand it better. To achieve this, a scoping review will be performed with the aim of understanding the role of clothing on participation (i.e. at home, in the community, etc.) of individuals with a physical disability. This paper presents the protocol and procedure to be adopted.

Methods and analysis: An in-depth iterative analysis of the scientific literature from six databases (MEDLINE, Embase, CINAHL, Scopus, PsycINFO and ERIC) as well as a hand-search of grey literature and reference lists will be performed. After an abstract and full-text review of references by three reviewers independently, data from the selected articles will be tabulated and synthesized with a qualitative and quantitative approach using the International Classification of Functioning, Disability and Health (ICF) as a unifying conceptual framework. A multidisciplinary consultation group of experts from various stakeholder groups will be involved in multiple steps to ensure validation and relevance of the data.

Ethics and dissemination: As this is a review involving analysis of data available in the public domain and does not involve human participants, ethical approval was not required. Results will be presented in a co-constructed format with the expert consultation group to ensure validity and maximize its practicality moving forward. Our dissemination plan includes peer-reviewed publication, presentations and stakeholder meetings.

Strengths and Limitations of this study

- Experts from each stakeholder group are actively engaged in the conception and validation of the study's method and results.
- The search strategy will include six databases covering the domains of rehabilitation, medicine, psychology and education as well as a wide range of grey literature sources.
- This study will be limited to publications in English and French and published within a specified period.
- As in other scoping reviews, there is no formal assessment of the quality of studies included.

INTRODUCTION

To wear clothing (i.e. fiber/textile material) is a custom of nearly all human societies. Besides fulfilling a range of social and cultural functions, clothing can be used to indicate social status and convey individual, occupational, and sexual differentiation. In many societies where individuals have the choice of what they wear, clothing can act as a form of adornment, and provide an expression of self, personal taste, and style. (1) More recently, the rise of technological industries has induced many innovative ideas towards modifying and adding function to everyday apparel. For example, wearable technology (i.e., smart/intelligent textiles) is now being used for sports training data acquisition and health monitoring of vital signs of the wearer (e.g., heart rate, respiration rate, temperature, activity, and posture). (2) In parallel to this emerging technological field, ideas within rehabilitation have also advanced whereby service providers and service users can play equally important roles in finding solutions or methods for persons with a disability to experience a more positive day-to-day life. Furthermore, society also has a role in optimizing social inclusion and participation for people with a physical disability (e.g. changing attitudes, eliminating barriers, enhancing acceptance). Undeniably, clothing is important in everyone's life; it can help or hinder the achievement of an individual's everyday activities and the fulfillment of social roles. With this understanding, the influential role clothing can have is significant in the life of someone with a disability.

The World Health Organization defines disability as an umbrella term for impairments, activity limitations, and participation restrictions. (3) Numerous health conditions, diagnosed or self-reported, can arise from mental, physical, cognitive, and other impairments in either a temporary or permanent state. One in seven people worldwide experience a disability, and with the aging population, as well as an increase in chronic conditions, this number continues to rise. (4) One of the many challenges in rehabilitation is that “living with disability is a process of constant change and constant adjustment”. (5) Although independently, clothing design, wearable technologies and rehabilitation are fields that have grown immensely over the years, there is a dearth of research at the point where they intersect. The application of textile enhancements or modifications has been well documented particularly in sports garments, however, it is unclear to what extent clothing can play a role on participation of persons with a physical disability. Moreover, the existing literature at the intersection of clothing and participation (defined below) appears to be too scattered to obtain a comprehensive portrayal of the underlying issues. Therefore, the authors propose using a scoping review as a systematic approach to address this topic.

Scoping studies have been presented as a way to comprehensively review the available literature covering a broad area of research (6), such as clothing, participation and persons with a physical disability in this case. Furthermore, it is a quick and accessible way to study an under-researched domain with the function of keywords. The aim of this scoping review is to map, using the conceptual framework described below, the state of the knowledge (scope, depth, key themes and gaps) of the role of clothing (e.g., facilitators, barriers) on participation of people with a physical disability, as reported in the scientific and grey literature.

Conceptual Framework

The aim of the International Classification of Functioning, Disability and Health (ICF) published by the WHO in 2001 is to provide a unified and standard language and framework, and to describe health and health-related states such as education and labour. Moreover, this framework highlights the “interactive relationship between health conditions and contextual

factors” (p.6), (7) and allows professionals of varying disciplines (i.e., occupational therapy, fabrication industries, policy makers, researchers, general public, etc.) to communicate using a shared understanding and common language surrounding the field of functioning, disability and health. As our global health conditions increase in complexity, the ICF can facilitate more efficient and effective cross-discipline and cross-continent collaboration. The ICF is comprised of two parts: 1) Functioning and Disability, and 2) Contextual Factors, each of which have two components 1a) Body Functions and Body Structures and, 1b) Activities and Participation and 2a) Environmental Factors and, 2b) Personal Factors. The first three components have several chapters and alphanumerical reference codes to assist in creating a systematic coding scheme across sectors, practices and countries. However, Personal Factors (i.e., gender, race, lifestyle, behavior, style) is “not classified in ICF because of the large social and cultural variances associated with them” (p.8). (3) Body Functions and Structures focus on the physiological functions and anatomical part of the body and its systems while Activities and Participation refer to the execution of a specific task or action in a standardized environment or the involvement of the individual in a life situation, respectively, from both an individual and societal perspective. The intended accent of this scoping review is to evaluate the category of Participation. This includes, for example, dressing, driving, cooking, etc., in one’s natural (current) environment (i.e. home, community etc.). Although criticisms and ongoing propositions to improve the ICF exist, (8-10) the bio-psychosocial approach in the ICF is a step forward and serves as a promising and inclusive conceptual framework for research in rehabilitation. (11) For these reasons, the ICF will be used to provide structure (12) to the results of this scoping review. Consideration will also be given to other models or frameworks (e.g. Social Model of Disability) as deemed appropriate.

METHODS AND ANALYSIS

This scoping review will follow the five-step methodological framework outlined by Arksey and O'Malley (6) and will add the optional sixth step proposed by Levac (13) primarily for methodological rigour. The six steps are defined as follows: 1) Identifying the research question, 2) Identifying relevant studies, 3) Study selection, 4) Charting the data, 5) Collecting,

summarizing and reporting the results, and 6) Consultation. The specifics of how each step will be undertaken in the context of this research topic are explained below.

Step One: Identifying the Research Question

Although the explorative nature of a scoping review allows the research question to be modified throughout its subsequent steps, a well-defined starting point is necessary. The following research question was established: What is the role of clothing on participation among persons with a physical disability? This research question will continue to be refined as the authors become more informed on the state of the literature and as potential nuances arise.

Step Two: Identifying Relevant Studies

This research topic spans multiple areas of interest such as, rehabilitation, education, psychology, and design. In order to map a comprehensive picture of this multidisciplinary literature, the research strategy will remain inclusive. As a result, six databases were identified (MEDLINE, Embase, CINAHL, Scopus, PsycINFO and ERIC) with the help of a university librarian with expertise in the field of rehabilitation and will be searched for relevant scientific articles. Adapted clothing and wearable technologies are relatively new concepts and have only recently made it into the research and societal vocabulary. Moreover, technological advances quickly outdate their predecessors. Therefore, a restriction of literature dating between 1990 and 2017 will be applied to allow for ample room in finding past studies whilst staying relevant to the needs, challenges and resources available to today's society. In addition to the six research databases, a hand search of grey literature and reference lists will also be performed. Grey literature will be collected by specifying a date on which a Google search will be performed using similar keywords as used with the scientific databases. The first four pages of this search, as well as any materials collected from team members up until a pre-determined date, will be considered. Both English and French publications will be retained as inclusion criteria since the authors are proficient in both languages. Nevertheless, we acknowledge that filtering out other languages will be a limitation of the study. Clothing choices and dressing of younger children may also involve parents, which could be subject for another review. Therefore, our study

targets individuals 14 years and older and literature involving children (<14 years) will be omitted. This decision was also made for logistical reasons and to maintain consistency across all components of a larger project (involving interviews) that includes this scoping review. Keywords covering variations of “physical disability” and “clothing” will be used. In the event that an unreasonable amount of non-pertinent articles are retrieved, the keywords will be re-assessed and modified accordingly. Although ‘participation’ is in the ICF nomenclature, the scientific literature has not yet completely adopted this terminology. As such, and in order to be more inclusive and to avoid excluding pertinent articles, this keyword will not be included in the initial database searches but introduced in steps four and five of the scoping review. The specific search strategy for each database will be defined in accordance with the above inclusion criteria and with the assistance of the same university librarian. All terms will be searched in the title, abstract, and keywords (where applicable) fields for each database.

Step Three: Study Selection

The process of selecting articles to include in the final results of the scoping review will take place over three stages: duplicate management, title and abstract review, and full-text review. In accordance with the iterative nature of a scoping review, if any clarifications made at one of the three study-selection stages have an effect at a later stage, the authors will return and re-review as necessary to ensure compliance. Firstly, all references will be imported and merged using reference managing software (Endnote X7.7.1). After flagging and removing duplicates, A.E., B.S. and F.P (co-authors) will each review one third of all titles and abstracts for relevance. In the case of any uncertainties, a discussion amongst authors will be conducted until a consensus is reached. After all titles and abstracts are either accepted or rejected, a process of retrieving and reviewing the full texts will be undertaken. At the full text review stage, ten to 20 articles at a time will be distributed to each author in a way that two authors review each article. Similar to the abstract review stage, each author will independently rate the article as accepted, rejected or unsure if it aligns or does not align with the research question and the defined selection criteria. Once completed, the authors will meet and discuss their choices, clarify any discrepancies, and adjust the inclusion and exclusion criteria as necessary. Before discussions, a kappa (κ) statistic will be calculated for each pair of the authors’ reviews to statistically

estimate inter-rater agreement. This process of reviewing articles and group discussions will continue until the authors are confident in the selection criteria and a mean $\kappa > .75$ is reached ($.40 < \kappa < .59 =$ fair, $.60 < \kappa < .74 =$ good, $\kappa > .75 =$ excellent agreement). (14) After which, A.E. will be the sole reviewer on the remaining full-text articles.

Step Four: Charting the Data

Data from the accepted articles after the full-text review stage will be extracted and tabulated into categories that best reflect the important information in relation to the research question. An initial data extraction form will be developed using the concepts, language, and when useful, codes determined from the ICF. Basic categories such as, authors and year of publication, type of study, aim of study, type and number of participants, and type of clothing will also be included. Borrowing from step three of the scoping review, this data extraction form will be used by two authors independently commencing with a proportion (about 10%) of the articles followed by group discussions which will allow for an evaluation and validation of the data extraction methods, or more specifically, the data extraction form. The extraction form is anticipated to evolve as articles are read and categories will be added, removed and/or adjusted as necessary.

Step Five: Collecting, Summarizing and Reporting the Results

Aggregating and conveying findings is the crux of a scoping review whereby the results are linked to broader implications and have tangible meaning for future research, policy and practice (13). As specified in the aim of this study, the scope, depth, key themes and gaps in the literature about the role of clothing on participation of persons with a physical disability will be the main focus of this step. Inspired by Arksey and O'Malley (6), a framework with both quantitative and qualitative metrics will be presented. Quantitative analyses will include a numerical description of the year of publication, study designs, study populations, type of clothing (e.g. footwear, undergarments, winter coats), targeted (or not) ICF categories, and others. By looking at these frequencies alone, certain gaps in the literature can be determined, however, it may be inadequate for understanding the complete picture. Therefore, a thematic analysis using the ICF

as a basis will be a qualitative addition and enable us to illustrate the multi-directional relationship between health and health-related domains and clothing design. Furthermore, it will provide a better understanding of the dynamic interaction that exists at the junction between contextual factors (i.e., environment and personal) and their influence on clothing. By presenting the scoping review results through quantitative and qualitative means a faithful overview of the literature will be reported.

Step Six: Consultation

The consultation team used in this study is comprised of twelve professionals spanning various sectors (i.e., health, design, manufacturing industry, health technology, rehabilitation, psychology). The team brings together six researchers, three representatives from the fashion industry (new technology, design, business development, innovation), two post-doctoral fellows, and an active person living with a spinal cord injury. The team's expertise covers research in occupational therapy, physiotherapy, capturing end-user needs related to rehabilitation technology, knowledge of scoping reviews, psychology and behaviour, understanding of social participation and quality of life of all age groups, innovative design processes and product development, smart textiles, and intervention evaluation. Experience with a variety of research methods also exists within the team, namely, qualitative, quantitative, personal experience and use of the ICF. In addition, each individual was brought together for his or her unique stakeholder perspective related to this research topic.

Although Levac (13) proposes the consultation step as a necessary final step, when designing this study the authors considered it imperative for the expert consultation team to be integrated at multiple points throughout the process due to the originality of the subject and limited research performed to date. A schematic overview of the methodology for this scoping review can be seen in Figure 1. Three time points were pinpointed for consultation: Step One- Identifying the Research Question, Step Four- Charting the Data and Step Six- Consultation. The goal of the first consultation was to create an initial research question that could be understood by and respond to all sectors involved (i.e., rehabilitation, industry, customer). The

goal of the second consultation will be to validate the correct placement of data extracted from articles into the ICF categories in the data extraction form. The final step of the scoping review is a synthesis of knowledge either as recommendations or another suitable format for future research, for clinical practice and/or for design principles. The goal of the last consultation will be to validate the results and co-construct the final document for dissemination. This integrated study design will enable the results to be translated into a worthwhile medium for all stakeholders surrounding this specific research question. For example, these results could inform the design of future clothing and ultimately improve the participation of persons with a physical disability.

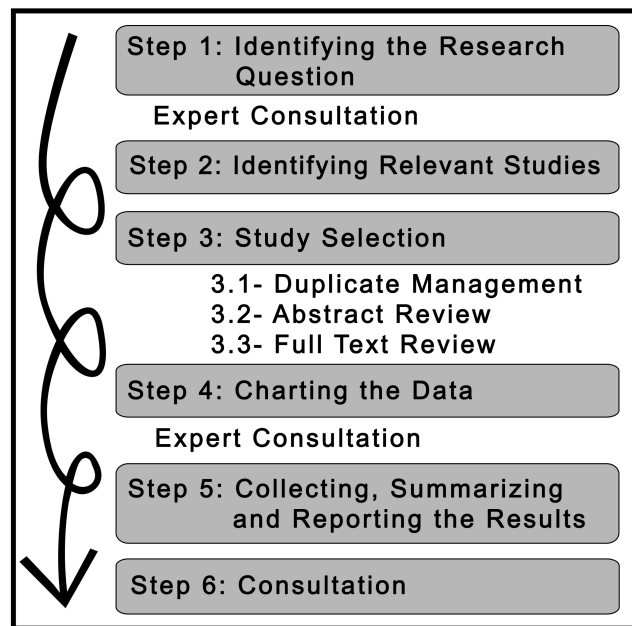


Figure 1. Overview of the Methodology

ETHICS AND DISSEMINATION

Institutional ethics approval is unnecessary for the secondary analysis of published literature and consultations will occur by means of informal exchanges in person and electronically within the research team. The scoping study results will be disseminated in the context of local, national and international activities. These activities may include but are not limited to, conferences,

published articles, events in academic and non-academic settings, and by means of the multidisciplinary research/consultation team to the appropriate knowledge users (e.g., clinicians, clothing designers, etc.).

CONCLUSION

The scoping review protocol outlined in this paper will bring together various sources of knowledge about the role of clothing on participation of persons with a physical disability. The standardized language and conceptual framework provided by the ICF will tie together the sparse and varied literature and help identify the scope, depth, key themes and gaps that exist. This meaningful synthesis dissemination of the literature will pave the way for future research and establish next steps in each of the stakeholder groups for this emerging and underrepresented field.

Authors' Contributions

A.E. drafted the manuscript. F.P., A.R., C.A., C.B., E.d.G., I.D., E.K., D.L., N.D-O., I.L., O.V. and B.S. conceived and designed the study and read and approved the final manuscript. A.E, F.P. and B.S. will perform Steps 1-3 of the scoping review. A.E., A.R., C.A. and B.S. will perform Steps 4-5. All authors will contribute to the consultations in Step 6.

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Competing Interests

The authors declare no conflicts of interest.

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Fashion Industry Interviews (Objective 2)

An exploratory qualitative study was chosen to accomplish the second objective of exploring the perspectives of fashion industry representatives vis-à-vis the documented literature and the potential factors influencing uptake of this knowledge. Using a constructivist paradigm (Patton, 2002), individual semi-structured interviews were conducted whereby the lived experiences of fashion industry representatives served to help the research team better understand the realities of the fashion industry with regards to designing clothing for persons with a physical disability. Exploring perspectives of fashion industry representatives regarding adapted clothing design from the lens of rehabilitation research appears to be an untouched area of research. Therefore, the exploratory nature of this part of the thesis also allowed us to gauge the receptiveness of fashion industry representatives to researchers' inquiries, and subsequently should assist in better identifying appropriate methods and objectives for future research in this area (Trudel, 2007). The COREQ guidelines for reporting qualitative research (Tong, 2007) were consulted for presenting the following details.

Participant Selection Criteria

Inclusion criteria:

- 1) Individuals currently involved in designing, manufacturing or marketing clothing for persons with a disability, or having an interest in doing so, and are willing to share their perspectives with the research team.
- 2) Have the ability to speak either English or French.

Exclusion criteria:

There were no specific exclusion criteria for this study.

Recruitment

A purposeful sampling technique (Patton, 2002) was used to recruit participants by using information found in the grey literature component of the scoping review. Given our desire to speak with individuals involved in the adapted clothing design process, particular focus was given to contacting retailers rather than associations or blog writers. If contact information about potential participants was found either online or through referrals, an email invitation was sent to them including a brief summary of the study, the inclusion criteria, and the nature of their participation. In addition, a snowball sampling recruitment strategy was used whereby participants were asked to suggest others who fit the inclusion criteria and might be interested in participating (Patton, 2002). This study was exploratory in nature, therefore, a strict sample size was not enforced and there was no expectation of achieving a saturation of themes in the data collected (Saunders et al., 2018). The final sample size was influenced by time constraints.

If a positive response was received to the email invitation, an interview was scheduled at a time convenient for both the interviewer and the participant. Initially, two of five interviews were planned to be conducted in person but due to scheduling difficulties, and the desire to reach individuals across multiple time zones and countries, telephone interviews (or video-conferences when possible) were conducted with all participants. Participants received an information and consent form by email in advance and any questions were addressed on the phone before the interview began. To elicit spontaneous responses, interview questions were not sent to participants prior to the telephone call and all interviews were audio-recorded with participants' permission.

Interviews

In consultation with the research team, a semi-structured interview guide (Kallio, Pietila, Johnson, & Kangasniemi, 2016) consisting of predominantly open-ended questions regrouped under specific topics was developed. The guide was created with the goal of addressing some of the gaps in the research identified from the results of the scoping review (Esmail et al.,

submitted). Topics related to these gaps included: better understanding the clothing design process in the fashion industry, perceived barriers and facilitators when designing for persons with a physical disability, attitudes of the fashion industry towards adapted clothing, how consumers access adapted clothing on the market, where universal design can play a role in the design process, and visions for the future of adapted clothing design. Questions collecting basic socio-demographic data, such as, age, gender, level of education, and years of industry experience were also included in the guide. The final version of the interview guide was piloted by the interviewer (A.E.) and a team member (B.S.) to ensure the clarity of each question. Only minor modifications were made to the interview guide after the pilot, however, the pilot improved the overall flow and mental agility of moving from one question to another. See Appendix II for the final version of the interview guide.

Each interview lasted between 45 to 60 minutes and journal notes were written by the interviewer immediately after each interview concerning any general impressions or technical issues experienced during the call.

Data Analysis

Descriptive statistics were used to describe the sample, and given the exploratory nature of the interviews, a broad 6-phase thematic analysis (inspired by Braun and Clarke, 2006) with an inductive approach (Patton, 2002) of the verbatim was performed. Although the process is presented below in a linear fashion, each phase (particularly phases 2-5) was subject to an organic and iterative flow.

Phase 1: Getting familiar with the data

Interviews were transcribed verbatim into a Word document while paying attention to notable silences (Poland & Pederson, 1998) or audible punctuation, and coded with the participant's number to ensure confidentiality. As the interviewer and transcriber, A.E. quickly achieved a level of familiarization with the data.

Phase 2: Generating initial codes

Each transcription was printed and coded manually by A.E. with paper and pen (and post-it notes, highlighters, etc.). Although a data-driven (i.e. inductive) approach was taken to let certain patterns or themes emerge from the data (Patton, 2002), topics previously established to structure the interview guide from the results of the scoping review (see page 25) were considered when coding the data. For example, data-driven codes were devised for different types of barriers mentioned, idem for facilitators, etc.

Phase 3: Searching for themes

After a list of initial codes was created, similar codes were collated to create groupings that could act as themes relating to the previously determined topics listed above used to structure the interview guide.

Phase 4: Reviewing themes

The themes determined from phase 3 were reviewed by going back to the original transcribed extractions to ensure verbatim indeed represented the chosen theme. Groupings were refined accordingly if in the end extractions did not seem to represent the chosen theme. The suggested second level of reviewing/refining themes by re-reading and coding the entire data set for missed data (Braun & Clarke, 2006) was not performed in view of the exploratory nature of this analysis. However, at this stage, B.S. reviewed the initial code list and their groupings while using the list of extractions to help validate the choice of themes.

Phase 5: Defining and naming themes

Once the groupings were reviewed in phase 4, A.E. renamed some of the themes to better reflect the essence of extracted verbatim relating to each theme. These final theme names were also reviewed and validated by other team members (B.S., A.R., F.P., D.L.).

Phase 6: Producing the report

A report of the final themes is presented below in the results section. Extractions of verbatim used to support themes were translated to English by A.E. when necessary.

Ethical Considerations

This study posed no major risks to participants and was approved on June 27th, 2017 by the Research Ethics Board of the Centre for Interdisciplinary Research in Rehabilitation of Greater Montréal (CRIR-1241-0417). A renewal was obtained on June 27th, 2018. Another approval was given on February 18th, 2019 for a minor modification to conduct individual interviews instead of focus groups with fashion industry representatives (see Appendix II for all three approval certificates). All participants were asked to sign an informed consent form and to send a copy of the signed form by email to the interviewer (see Appendix III for final English and French versions). It was not expected that participants would receive any personal benefits through their participation in the study, however, they would contribute to the advancement of science in the field of fashion and disability. Furthermore, participants were informed that the results from the study could assist in sensitizing the fashion industry about the importance of adequate adapted clothing.

Chapter 5. Results

Scoping Review (Objective 1, Article 2)

The scoping review was completed over 22 months with over four iterations during the article selection process. These iterations consisted of returning to previous steps in the methodology to refine certain definitions and processes using the knowledge shared from frequent discussions among the consultation team and that gleaned from reading literature identified using the search strategies. A description of these updates as well as a recount of the results of this scoping review are presented in the manuscript below (Article 2). This manuscript follows PRISMA-ScR Checklist Standards (Tricco et al., 2018) which is the updated extension for scoping reviews. It was submitted for publication in the journal “Applied Ergonomics” and has been sent for peer review. All co-authors have consented to the use of the article in this thesis. The final published version of this manuscript may differ slightly from the one presented here. Although the grey literature resource list was not presented with the submitted manuscript, nor was a summary of the retrieved articles from scientific databases, these resources can be found in Appendix IV and Appendix VI, respectively. Details related to my contribution to this article are outlined on page 56.

Esmail, A., Poncet, F., Auger, C., Rochette, A., Dahan-Oliel, N., Labbé, D., Kehayia, E.,

Billebaud, C., de Guise, É., Lessard, I., Ducharme, I., Vermeersch, O. & Swaine, B.

(submitted). The role of clothing on participation of persons with a physical disability: a scoping review. *Applied Ergonomics*.

The role of clothing on participation of persons with a physical disability: a scoping review

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ABSTRACT

Determining ways to facilitate participation of persons with a physical disability is crucial and clothing may play a central role. This review aims to examine the role of clothing on participation of persons with a physical disability. Six research databases and grey literature were searched following Arksey & O'Malley's six steps, including multiple expert consultations. English or French articles contributing to how clothing affects participation were included and tabulated based on the International Classification of Functioning, Disability and Health. Fifty-seven articles and 88 websites were included. A variety of stakeholder perspectives, diagnoses, and types of clothing were represented. Clothing mostly influences mobility and self-care, as well as various personal factors. Forty-nine percent of articles reported essential clothing design features to consider. Clothing, as an Environmental Factor, interacts with all ICF health domains, including participation. Future research should identify if the textile/design industry is aware of and is using this knowledge.

KEYWORDS

Clothing, Participation, Disability

HIGHLIGHTS

- This is the first review on the topic that includes scientific and grey literature.
- Clothing is an Environmental Factor that interacts with other health domains.
- Many articles focused on Mobility and Self-Care related activities.
- Forty-nine percent of included articles report essential clothing design features.
- There seems to be sufficient information to design appropriate clothing.

1. Introduction

1.1 Background and Rationale

In Canada, 22.3% of individuals aged 15 years and older report having one or more disabilities that limit their daily activities (e.g. dressing, cooking)¹. The prevalence of disability tends to rise considerably with age from 13% among individuals aged 15-24 years to 38% for individuals aged 65 years or older¹. In our aging society, disabilities are more prevalent and it is thus crucial to determine ways in which individuals with disabilities can experience meaningful involvement in everyday life activities and social roles. Clothing is an important aspect in our lives that help us fulfill social or cultural roles, and can indicate social status or convey individual, occupational or sexual differentiations². In societies where individuals have the choice of what they wear, clothing can also be an important aspect of self-expression and personal style³. Physically, clothing serves many purposes, such as, providing protection from weather or acting as a barrier between the skin and the environment for safety during hazardous or sporting activities. In recent decades, smart textiles enable digital components and electronics to be embedded in their fabrics and there has been rapid uptake of this type of textile in the sports sector in order to monitor important metrics while training (e.g. heart rate, respiration rate, temperature, posture)⁴.

The clothing industry, once populated by numerous tailors, appears to now be largely composed of fast-fashion manufacturers and retailers that cater principally to mass consumerism⁶, that is to say, mass-produced ready-to-wear garments designed to fit ‘most’ of the population⁷. However, research has reported^{8, 9} that individuals with different or changing morphologies secondary to aging or a physical disability find it difficult to find clothing that facilitates optimal participation. In rehabilitation, studies have identified challenges associated with dressing among older adults or individuals with a physical disability with the focus of improving performance and independence. For example, Singh (10) found that energy expenditure required in upper body dressing in post-stroke patients was significantly higher than in controls at-risk from stroke, and so was the perceived difficulty of the task. Similarly, Poole (11) showed that the presence of chronic diseases affecting joint motion, hand strength, and dexterity resulted in

altered dressing routines. Furthermore, Mann (12) emphasized the upper- and lower-extremity dressing difficulties in frail elderly, particularly in men. The recommendations following these studies focused on the importance for clinicians to have increased awareness of the needs of individuals with a physical disability and make appropriate considerations for devices to assist in dressing. In addition to this research in rehabilitation, it would be important to know if there is also literature that describes the essential features that must be incorporated in the design of clothing to enable optimal participation of individuals with a physical disability.

We have also become aware of the most recent media break from 2016 with Tommy Hilfiger launching an adaptive clothing line for children and in 2018 for adults¹³. However, it is unclear if the design choices were evidence-based. While it is essential to have more companies use an inclusive approach to design given the changing demographics globally, there may be a lack of information on the perceptions of the importance of clothing in the lives of persons with a physical disability and of their specific needs in terms of clothing design. Do clothing designers have sufficient information to design appropriate clothing that people want to wear? To answer this question, a synthesis of existing literature covering the broad topic of clothing and persons with a physical disability from multiple sectors could be beneficial. Moreover, to our knowledge, there is only one grey literature review addressing solutions for special needs clothing design⁹ and no review of empirical studies seems to exist. To ultimately facilitate the design of clothing to promote meaningful involvement in everyday life activities and social roles of persons with a physical disability, a scoping review to examine the knowledge about the role of clothing on participation of persons with a physical disability was conducted.

2. Methodology

This scoping review followed the six-step methodology proposed by Arksey and O'Malley (14). In addition to including the optional expert consultation (Step Six) at the end of the study as suggested by Levac (15), multiple consultations with 12 professionals spanning various sectors including health, design, clothing manufacturing, health technology, rehabilitation, and psychology and an active person living with a spinal cord injury, as a part of our research team

were integrated throughout this scoping review process. The objectives, inclusion criteria, conceptual framework, and methods of analysis for this review were specified in advance and documented in a published protocol (see Esmail, Poncet (2)).

The International Classification of Functioning, Disability and Health (ICF)¹⁶ was used as a conceptual framework throughout this review. As described in the protocol, the World Health Organization put forth the ICF as a unified and standard language to describe health and health-related states. The framework also denotes the existence of a dynamic interaction between different health components, highlighting that “disability is a compound phenomenon in which social and individual elements are both integral” (p.570)¹⁷. The ICF is comprised of two parts: 1) Functioning and Disability, and 2) Contextual Factors, each of which have two components 1a) Body Functions and Body Structures and, 1b) Activities and Participation and 2a) Environmental Factors and, 2b) Personal Factors.

We provide below an overview of the different steps of the methodology and modifications to the original protocol.

2.1 Step One: Identifying the Research Question

After initial consultation among the experts of our team, this scoping review aimed at answering the research question: What is the role of clothing on participation among persons with a physical disability? The definitions of the terms clothing, participation and physical disability evolved over the scoping review process but are presented here to facilitate the comprehension of the methods used and subsequent results.

Clothing is defined by multiple reputable dictionaries¹⁸⁻²² in similar broad ways as ‘something that is worn’ and narrowly distinguishes between the terms clothing, apparel, garment and attire. Given this definition, the team wondered whether glasses were considered as clothing since they are worn on the body. We consulted the Apparel Search Company, a self-acclaimed online guide

to the Apparel and Textile Industry, that distinguished between clothing, accessories, decorations, and ornaments and suggests that clothing is worn for functional and/or social reasons²³. Our definition was then changed to include these distinctions and the final definition was the following: things you wear to cover, protect or decorate your body (trunk, limbs, hands, feet, and head) for functional and/or social reasons. Our definition excluded accessories (e.g. purses, umbrellas), ornaments (e.g. jewellery, glasses), devices inserted in or strapped to clothing (e.g. belts, armbands, pockets), and assessment tools (e.g. devices/clothing worn for the sole purpose of collecting data in a laboratory setting). For the purpose of this review, the terms apparel, garment and attire were considered synonymous.

With regards to participation, we used the definition provided by the ICF. Participation refers to the individual's involvement in a life situation¹⁶, which includes, but is not limited to, activities such as working, driving, dressing, and cooking in one's natural environment (i.e. home, community).

In the context of this study, a working definition of physical disability as a permanent, temporary or episodic impairment of body functions or body structures that influences participation was used²⁴⁻²⁷. Physical disabilities can be complex, and in order to reduce this complexity for the purpose of this paper, we did not include literature focusing on individuals experiencing secondary conditions or co-morbidities, such as ulcers, obesity and pain²⁸ without the presence of a physical disability. For example, we excluded articles on compression stockings for patients with deep vein thrombosis²⁹ and on silk in the management of vulvar lichen sclerosus^{30, 31} or atopic dermatitis³².

2.2 Step Two: Identifying Relevant Research

Since the role of clothing on participation is a broad area of research and involves multiple sectors, as per our protocol, six research databases (MEDLINE, Embase, CINAHL, Sociological Abstracts, PsychINFO, and ERIC) were searched from 1990 to February 2017 for relevant scientific literature with the assistance of a university librarian with expertise in rehabilitation.

The search strategy used variations of the keywords “physical disability” OR “disabled persons” AND “clothing” OR “textile” and was initially created in MEDLINE then adapted as necessary for the subsequent databases (see Supplemental File for MEDLINE research strategy). Consultations with our industry partners throughout this scoping review process highlighted *Apparel* as an important and frequently used term missing from our research strategy. This was not anticipated in our original protocol; therefore, an update was performed in May 2018 with each database and this keyword was added. As a complementary search strategy, a research assistant manually searched bibliographical references of accepted articles and any additional pertinent articles were included in Step Three.

In addition, a research assistant used Google to perform a grey literature search both in English and French on June 7th, 2018 from Montreal, Quebec, Canada, using a modified strategy stemming from the scientific databases’ search strategy (see Supplemental File for Google research strategy). The URLs identified on the first ten pages of each language’s search results were retrieved, as suggested by Libraries (33), as opposed to the first four pages, as reported in the original protocol. These URLs were copied into a Word document and reviewed by A.E. based on the same inclusion criteria as for the scientific literature. In addition to the searches performed on that specific day, a list of grey literature (e.g. designer websites, blogs, news articles) collected up until June 7th, 2018 from the team and their extended networks was added to the same Word document.

2.3 Step Three: Study Selection

Inclusion criteria were globally defined in the scoping review protocol, however, through several iterations of title, abstract and full-text reviews of the literature and regular discussions among authors, more precise selection criteria were defined during the scoping review process. After each iteration, A.E. ensured that previously accepted or rejected articles complied with the selection criteria as they evolved over time.

Finally, articles were included if they were written in either English or French, indexed in a database between 1990 and May 2018 and contributed to the understanding of how clothing affects participation for persons with a physical disability. Literature concerning persons with a physical disability aged 14 years and older was included due to the association between the results of this scoping review and complementary ongoing research with this age group. Furthermore, although there may be a higher prevalence of persons with a physical disability in older adult populations, information documented from a broader age range may still be informative. For reasons of feasibility (time and resources available), dissertations, conference abstracts, editorials, books, and book chapters were excluded. In the case of study protocols, a hand-search for a publication of their results was performed and included if retrieved; otherwise, protocols alone were excluded. Literature reviews were excluded to avoid duplicate representation of studies; however, their bibliographical references were screened and any un-retrieved articles that met the selection criteria were added.

The study selection process consisted of three parts. Scientific references were imported and managed using Endnote X7.7.1 software. First, duplicates were removed. Then, three independent reviewers (A.E., F.P., B.S.) reviewed the titles and abstracts. Next, the same three reviewers assessed the full-texts for eligibility in rounds of 10 articles at a time. After an inter-rater agreement of $\kappa > .75$ was reached, A.E. was the sole reviewer for the remaining articles.

2.4 Step Four: Charting the Data

A data extraction table was created using the International Classification of Functioning, Disability and Health (ICF)¹⁶ as a framework. A preliminary table and instruction guide created in accordance with the coding process suggested by Cieza, Fayed (34) was piloted with five articles by A.E., B.S., C.A. and A.R. Minor adjustments were made to the table and a more detailed instruction guide was distributed to reviewers with the table for a first round of extraction. Seven authors (C.A., A.R., B.S., D.L., N.D-O., E.K., F.P.) acted as reviewers and individually tabulated the results, discussion, and conclusion sections of articles during three rounds. They were instructed to attribute the most detailed ICF code possible to the text whilst

staying faithful to the information given in each article. Challenges encountered with this task required us to hold a 3-hour working session between each round to establish a consensus among the reviewers on which code(s) to attribute. For example, text discussing the cut and design of the crotch of trousers for ease of dressing and undressing was coded with e115- Products and Technology for Personal Use in Daily Living but also d540-Dressing.

The grey literature could not be easily charted using the ICF framework due to the variety of information mainly targeted towards the consumer. Therefore A.E. created and populated a separate extraction table with pertinent information from these results.

2.5 Step Five: Collecting and Summarizing the Data

The extraction tables used by each reviewer were collated for ease of analysis and all codes were validated during two in-person 3-hour consultation sessions with five authors (A.E., A.R., N.D-O., F.P., B.S.). After the two sessions, a level of confidence was reached for A.E. to continue as the sole validator. Following validation, an analysis was performed.

3. Results

3.1 Scientific Literature

Results from each step described above are reported in the flowchart of the study selection process (see Figure 1 for an adapted PRISMA flow diagram), including reasons for exclusions at different steps. It is noteworthy to mention that although footwear was part of the initial definition of clothing, the authors decided to include footwear-related articles in a separate scoping review and these papers were excluded hereinafter. Finally, a total of 57 articles were included in this scoping review^{8, 35-90}.

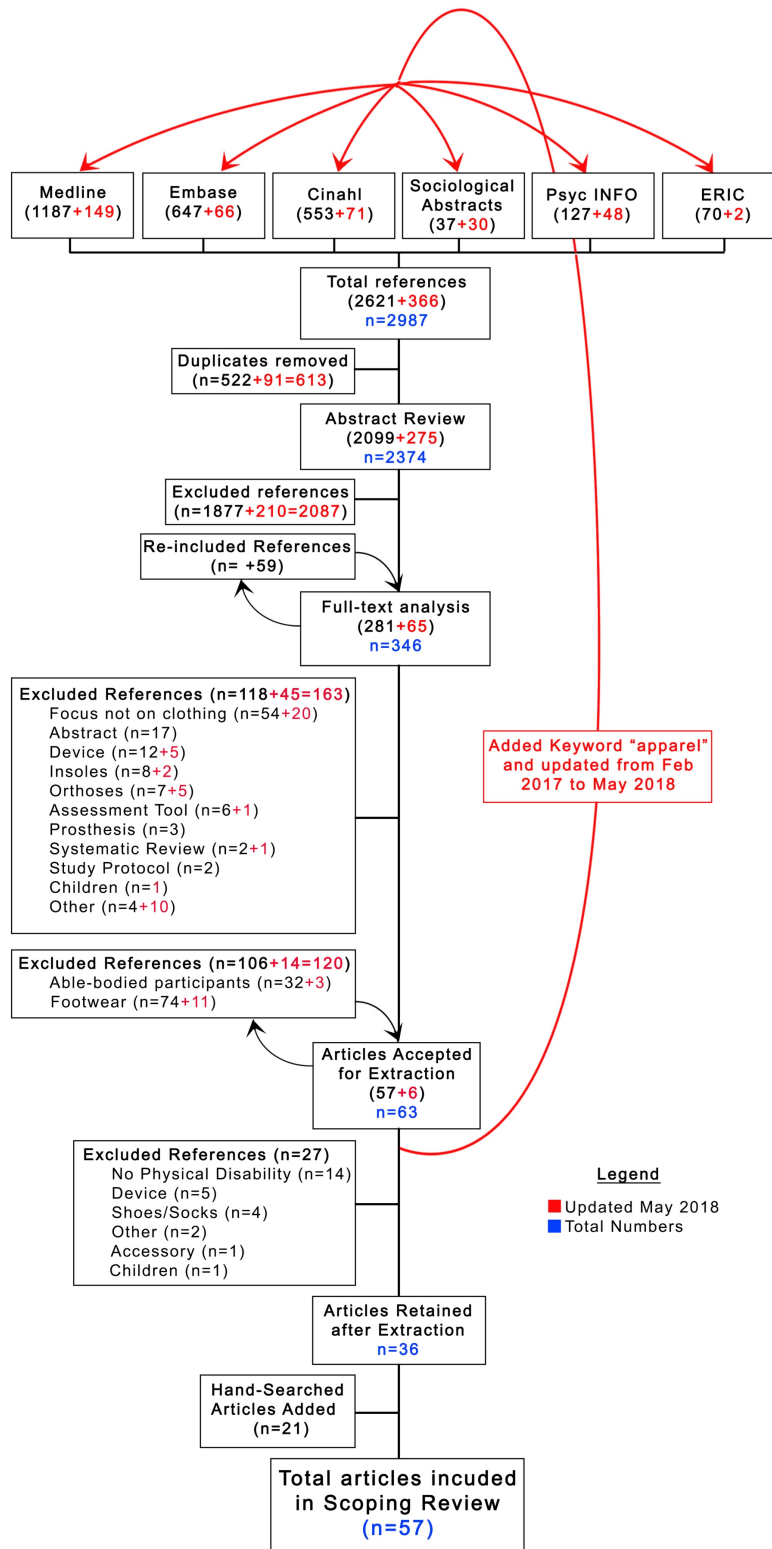


Figure 2. Flowchart

The majority of included literature represented research from North America (40.4%, n=23), Europe (26.3%, n=15), and Asia (26.3%, n=15) with minimal representation from Australasian (3.5%, n=2) and African (1.8%, n=1) countries. One article's location was undefined. There were articles published throughout our entire timeline of interest (1990-2018), with 47.4% (n=27) of articles being published after 2009. Determined by the authors' affiliations, most articles were from the fields of rehabilitation (31.6%, n=18) or fashion/apparel studies (29.8%, n=17), however, engineering (10.5%, n=6), kinesiology (7.0%, n=4), medicine (14.0%, n=8), economics (1.8%, n=1), and other (5.3%, n=3) sectors were also invested in the topic. No specific age group or gender seemed to be predominant among the study participants. A variety of stakeholder perspectives were reported including those of persons with a physical disability (some of whom were highly trained athletes), able-bodied control participants, caregivers with and without physical disabilities, managerial personnel, inclusive design manufacturers, health professionals, and researchers. Persons with a physical disability had a variety of conditions/diagnoses (neurological, musculoskeletal or sensory) resulting in mobility and visual impairments and included those using or not using assistive devices, such as wheelchairs. In most cases, the type of clothing discussed (adapted and/or ready to wear) included formal/business wear, casual/loungewear, undergarments or sportswear, while in other instances, a specific garment (e.g. hijab, cooling vest, compression stockings) or the textile itself (e.g. wool, thermo yarn, Lycra) was under investigation.

A mapping of the raw data, conducted using the D3 JavaScript library (see Figure 2), illustrates the number of articles found related to each ICF chapter. The size of the circle infers the frequency of articles for each code; larger circles indicate a larger number of articles for that particular code. As per the extractor's instruction guide, the most detailed ICF code was attributed to the text, however, since ICF codes are structured hierarchically, each code was also included in the count for the preceding level for which it belongs (e.g. an article attributed to d540 was also included in the count for d5 and for Activities and Participation). Furthermore, the codes were not mutually exclusive, meaning, in many cases, within the scope of one article more than one ICF code was attributed. However, if the same code was attributed more than once within the same article, it was only counted once.

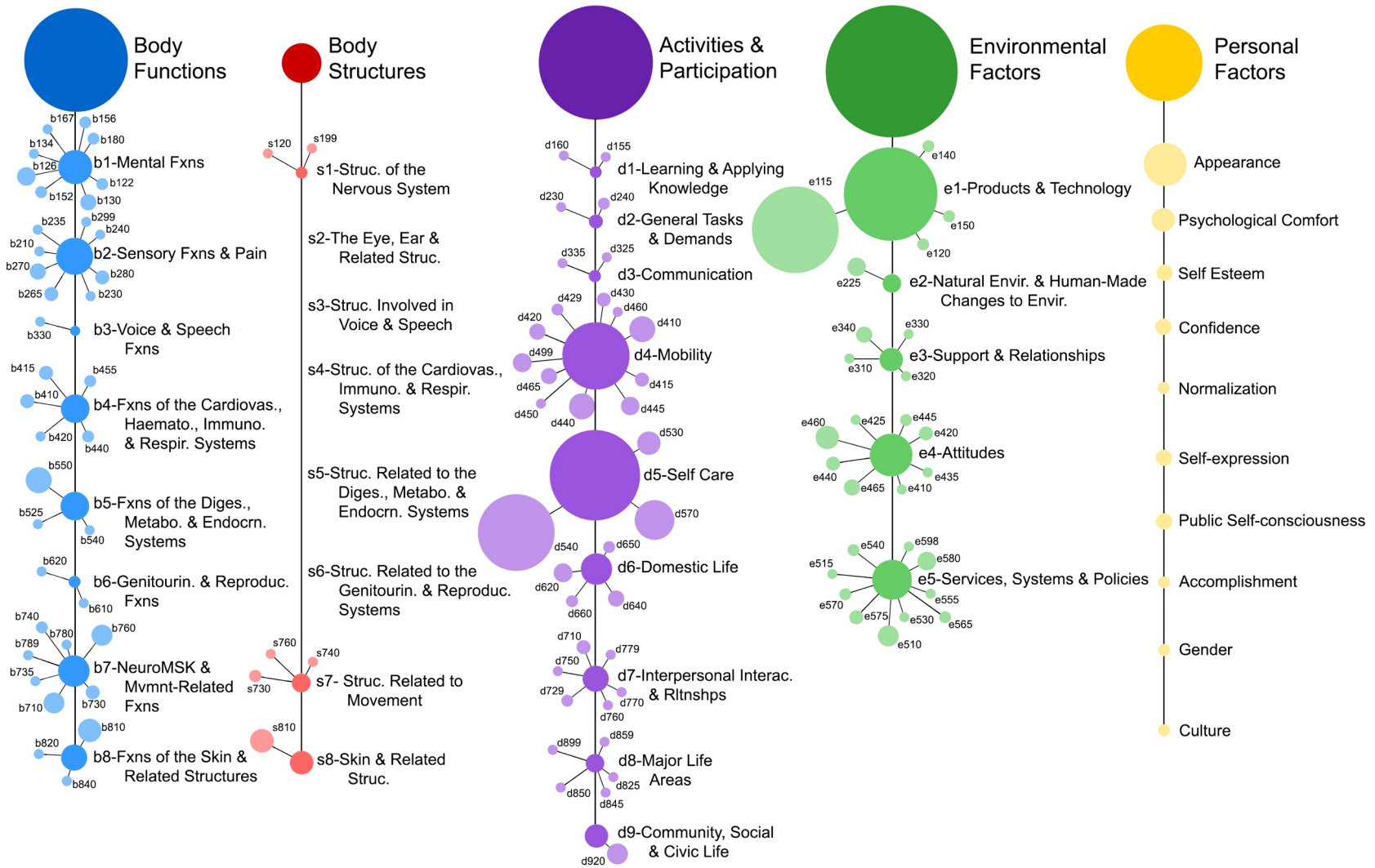


Figure 3. Mapping of the Raw Data

Literature identified in this review spans the entirety of the ICF chapters, with the exception of gaps where there were no articles pertaining to the following chapters: *s2-The Eye, Ear and Related Structures*, *s3-Structures Involved in Voice and Speech*, *s4-Structures of the Cardiovascular, Immunological and Respiratory Systems*, *s5-Structures Related to the Digestive, Metabolic and Endocrine Systems*, and *s6-Structures Related to the Genitourinary and Reproductive Systems*. Body Functions, Activities and Participation and Environmental Factors were all frequently discussed in the literature with 57.9% (n=33), 63.2% (n=36) and 71.9% (n=41) of the articles reporting each domain, respectively. There was particular focus on chapters: *d4-Mobility* (38.6%, n=22), *d5-Self Care* (50.9%, n=29), and *e1-Products and Technology* (52.6%, n=30). When we look closer at Mobility, multiple aspects of mobility were reported in relation to clothing, such as, *d410-Changing Basic Body Position* (36.4%, n=8), *d420-Transferring Oneself* (18.2%, n=4), *d430-Lifting and Carrying Objects* (13.6%, n=3), *d445-Hand and Arm Use* (22.7%, n=5), *d440-Fine Hand Use* (36.4%, n=8), and *d465-Moving Around Using Equipment* (18.2%, n=4). With respect to Self-Care, the literature touched upon *d540-Dressing* (86.2%, n=25), *d570-Looking After One's Health* (44.8%, n=13), and *d530-Toileting* (24.2%, n=7). In contrast, 93.3% of articles reporting Products and Technology, and 49.1% of articles overall, focused on *e115-Products and Technology Use for Personal Use in Daily Living* (n=28), defined as “equipment, products and technologies used by people in daily activities, including those adapted or specially designed, located in, on or near the person using them”¹⁶. This code (e115) is the only ICF code where clothing is referenced. Articles coded in this section described essential features that could be incorporated in the design of clothing for people with a physical disability. Articles containing an e115 code are specified in Appendix VI.

Two other frequently reported Environmental Factors worth mentioning were *e4-Attitudes* (24.6%, n=14) and *e5-Services, Systems & Policies* (22.8%, n=13). With regards to attitudes, many people choose their clothing depending on what social role they are playing. For example, formal clothes are chosen to demonstrate the capacity to be professional and ready for employment or to honour religious traditions, whilst a dress may demonstrate being young, fun, and ready to socialize⁸¹. Therefore, one could argue that individuals without appropriate attire

are unable to engage meaningfully in their everyday life activities and social roles (i.e. working, going to church, socializing with friends). Along the lines with societal attitudes, two articles highlighted how industry perceptions towards adapted or inclusive clothing design approaches may also be a barrier to the uptake of this knowledge^{82, 83}. With regards to services, systems, and policies, articles included in this scoping review report that the shopping environment, such as retail spaces are not conducive to persons in wheelchairs^{61, 67} and that retail personnel are unable to provide adequate assistance^{61, 76}. Furthermore, returning to the idea that tailors now seem to play a less important role in western society, a lack of alteration facilities⁷⁶ is also reported as a barrier to those who need to adapt ready-to-wear clothing. The price-point of these products was also discussed^{57, 73}. Broader policy implications seem to also play a role, for example, when disabled and non-disabled Muslim women are unable to abide by the team uniform requirements in Western sports organizations due to the Islamic dress code that requires them to wear modest clothing⁵⁸. As a result, they are banned from taking part in World and Olympic-style events.

Personal Factors are not coded in the ICF, however, personal factors such as self-esteem, confidence, appearance, and looking “normal” were frequently mentioned in the articles. As a result, these key themes relating to personal factors created by A.E. were linked to the relevant text and were added to Figure 2. Examples of article extractions relating to most frequently reported chapters (*d4-Mobility, d5-Self Care, e1-Products & Technology, e4-Attitudes, and e5-Services, Systems & Policies*) as well as some examples of Personal Factors can be seen in Table 1. This table also highlights the absence of mutual exclusivity among the attributed codes.

Table I. Examples of Extractions from the Five Most Frequently Reported ICF Chapters and Personal Factors

| Chapter (% of articles) | Examples of Extractions | All Attributed ICF Codes | Type of Participant |
|---|---|---|---|
| e1-Products and Technology (52.6%, n=30) | <i>Dress and pant length was important as one responded, 'I want long pants, but not too long because sitting down pants kind of crop up. They have to be longer than normal but not too long or they would be dragging, so they must have a certain length.'</i> (Abraham-Murali & Kane, 2001) | e1150, d4103 | Wheelchair- using female consumers |
| | <i>During the period when the patients used wool in this study, they reported they were able to carry heavy loads, were able to stay in the same position for a longer period, and were able to perform repetitive movements and physical activities more easily.</i> (Kiyak et al., 2009) | e1150, d430, d415, b760 | Female with fibromyalgia |
| | <i>Carers reported that the garments were difficult to keep clean as they often needed washing every night but could not be tumble dried, so ideally a second suit should be available.</i> (Nicholson et al., 2001) | e1150 | Caregivers of children with Cerebral Palsy |
| | <i>The athletes emphasised that having freedom of movement is important and, as the cut and design of the tops is standard, there is not much give in the fabric. Hence, they suggested that having stretch within the back would be beneficial.</i> (Bragança et al., 2018) | b760, e1150, e115, e510, d540 | Wheelchair Rugby Athletes |

The participants said that the major problem with the gloves is that they are not sport-specific, which means they are not adapted to the sport's need. As such, athletes have to use different types of gloves ("I use cold storage gloves (...) a lot of guys wear gardening gloves or building gloves") and use tape to secure them. This process, besides being inconvenient and time consuming (it cannot be done individually, someone else has to tape the gloves for them), it involves significant costs too. (Bragança et al., 2018)

The trousers were also another item that was more thoroughly discussed. The athletes showed interest in having a solution that is robust and tough, but light and breathable at the same time. One of the athletes mentioned 'For a wheelchair user like myself, who can't put trousers on normally, something robust that you can pull up whilst lying on a bed would be great. However, you want them to be tough but you also want them to be light'. (Bragança et al., 2018)

The results of the focus group in the fastenings and closures category included such suggestions as: use velcro fasteners to replace buttons and some forms of zippers; use elastic shoelaces; use front openings to replace hard to reach rear access hooks and zippers on brassieres, blouses, and dresses; provide stronger fastenings, such as zippers, to replace snaps or buttons in areas of greater stress. Larger and/or decorative pull rings on zippers were also recommended. (Garner & Douglas, 1991)

e115, d540, Service
e1150, e580 providers to
Older Adults
and
Researchers
in
Gerontology
or Apparel

The category labeled ease of access and removal was one which elicited a multitude of responses. Beyond the basic request for easy to put on and take off, the suggestions ranged from larger neckline openings on garments which go over the head, to dresses which opened totally down the back for those in wheelchairs or bedridden. (Garner & Douglas, 1991)

Design and
Manufacturin
g

The category labeled aesthetics generated requests for more bright and colorful fabrics, rather than the ubiquitous white and blueprinted fabrics found in hospital wear. They recognized the need for soft, easily washed fabrics for tender, thinning skins and accidents; but indicated the goal was to counter the institutional appearance of hospital wear whenever possible. (Garner & Douglas, 1991)

70% of the respondents agreed that access routes to the shops are unusable while 61% felt that the parking lots are unsuitable for use by disabled people; 69% of the respondents complained about the fact that most stores have no lifts available; 66% of the respondents agreed that display racks are usually too high while 63% felt that spaces between racks are too narrow for disabled people who use assistive devices. A total of 59% of the respondents agreed that there is usually no assistance for them in the clothing shops; 65% of the respondents experienced major problems with the availability of adequate space in fitting rooms. (de Klerk & Ampousah, 2002)

e1500,
e1501

Physically
Disabled
Adult
Women

| | | | |
|-------------------------------|---|-----------------|--|
| d5-Self Care (50.9%, n=29) | <i>'We want clothes that are easy to live in as sweatsuits, but that look better. We want clothes that look like yours, but make them so that they are easy to put on, live in, and take off.'</i> (Stancliff, 1999) | d540 | Adults with Disabilities and Elderly Persons |
| | <i>Comparing with the normal clothing, it could be seen that the newly designed clothing facilitated the activity of going to toilet. The total time required for taking off and putting on the crotch when going to toilet in the normal clothing was 35s. However, it was only 19s when the newly designed clothing was worn, reduced by 45.7%. Furthermore, when wearing the newly designed functional clothing, the wheelchair users could manage to take off and put on the crotch all by themselves without the help of their personal helpers.</i> (Wang et al. 2014) | d540 | Adult Wheelchair Users |
| | <i>'It still pulls down. It's not tight enough. And if you get it tight like you can't really—you've got to safety pin it while it's on her body so that you know how far to do it. But if you're really going to pull it tight enough for it to stay up, then she's going—you're going to stick her, for one thing. The clothes will rip and then she's in—she doesn't manipulate zippers and snaps yet. She can do zippers, although I don't know if she could on pants. So when she goes to the bathroom, you know...a lot of those things are elastic, and if you pull them too tight then there's no elastic. And so we find that the safety pins snap out, pop off.'</i> (Kabel et al., 2016) | d5400, d5401 | Caregiver of a child with Down's Syndrome |

| | | | |
|------------------------------|--|-------------|--|
| | <i>Comfort considerations were related to poor fit and excessive fabric bulk when sitting. Comfort was expressed by one participant who used a wheelchair. She stated: 'It is hard to have the fabric pulling on your back or just having all that fabric bunched behind your back'. While this comment addressed an issue with long coats, the same would be true of any long garment. Specific styles of pants were also preferred for comfort. 'I like bootcut jeans especially if they are stretchy because they are fashionable but are also more comfortable than skinny jeans or straight leg jeans', explained one participant. (Stokes & Black, 2012)</i> | d5700 | Adolescent Girls with Disabilities |
| d4-Mobility (38.6%, n=22) | <i>Fabric concerns related to softness of fabric, its durability, and quality. One comment was "quality is important, I am brash on things transferring in and out of wheelchairs; I snag things." (Abraham-Murali & Kane, 2001)</i> | e1150, d420 | Wheelchair- using female consumers |
| | <i>Athletes in the current study propelled differently based on glove type during steady-state conditions. For example, those using solids, on average, used less impulse to propel faster at steady-state speeds. That is, athletes propelled slightly faster as a function of glove type despite the target speed designation. (Rice et al., 2016)</i> | d465 | Elite Wheelchair Racers |
| | <i>Through observations and in-depth interviews the researcher found significant problem areas that participants were facing in finding clothes that did not constricting them and would give them the freedom to move and the ease to manage fastenings. [...]. Velcro fasteners are highly preferred for quick and fast manipulation. (Azher et al., 2012)</i> | d410, d4402 | Adult Females with Rheumatoid Arthritis |

| | | | |
|---|--|---------------|--|
| | <i>Poor muscular movements of fingers created problems while 'fastening/unfastening of placket fasteners', 'cuff fasteners of functional arm', 'string of lower garments', 'belt and zipper of pants'. (Pruthi et al., 2003)</i> | d4402 | Hemiplegic Men |
| e4-Attitudes (24.6%, n=14) | <i>Melanie's description demonstrates her knowledge of how dress can mark her status in society. When she wants to appear as a professional person who is capable of performing a job, she would wear "formal clothes" to a job interview. When she wants to look like she is a person who is young, fun, and ready to socialize with others, she thinks it is appropriate to wear a "cute dress." (Chang, et al. 2014)</i> | e460 | Female College- Student Consumers with Disabilities |
| | <i>As a result, their clothing also deviates from the norm and reinforces the perception of negative characteristics associated with deviance from physical norms. The manipulation of clothing cues to create a more consistent image in the mind of the perceiver may lead to the assignment of more positive traits. If clothing is appropriate, normative, and attractive, it may draw attention away from the disability. (Christman & Branson, 1990)</i> | e465 | Interviewers of Prospective Employees |
| e5-Services Systems and Policies (22.8%, n=13) | <i>Due to physical or mental constraints, disabled people need more convenient ways to shop for clothing. Thus, a potential research avenue to explore is that of disabled consumers' use of technology-based shopping environments. (Chang et al., 2014)</i> | e510 d6200 | Female College- Student Consumers with Disabilities |

| | | | |
|--------------------------------------|--|---|--|
| | <i>When items were located, retail spaces were not accommodating enough for people with disabilities to try them on. (Kabel et al., 2017)</i> | d6200 e515 | Persons or Caretakers with Disabilities |
| | <i>The policy implication of these findings is that the role of clothing in the rehabilitation process needs to be emphasized. [...] Health-service providers must be willing to receive clothing information from all sources and pass it on, not just to clients and their families but to apparel manufacturers and retailers. (MacDonald et al., 1994)</i> | e510 e580 | Rehabilitatio n Clients |
| Personal Factors (43.8%, n=25) | <i>The category, "looks good on me," refers to how the dress looked on the participant [...] However, in this study the participants did not like Velcro and a typical comment was 'I would be so conscious that the Velcro would open up and I would be all exposed.' It seems obvious that consumers in wheelchairs do not like to be viewed as needed specialized garments that would set them apart from others. (Abraham-Murali & Kane, 2001)</i> | Appearance Normalizati on | Wheelchair User |
| | <i>Research demonstrates that people with limb disabilities have a greater requirement for aesthetic consideration in apparel design than the non-disabled. Their social experience creates a thirst for a fashionable and unprejudiced appearance. (Chang et al., 2009)</i> | e460 Appearance Public Self- Consciousn ess | Persons with Limb Disabilities |

| | | |
|--|--|---|
| <p><i>Therefore, [they] will be able to enjoy a higher sense of well-being and an improved quality of life. They will be able to choose their desired style, look, and feel with higher freedom and to present a balanced image between the upper and lower parts of the body, resulting in a significant boost of self-esteem. [...] The freedoms of choice that these developed solutions have provided, and the possibility to dress in new type of products, have lead to a feeling of well-being with both aesthetic appeal and comfort. (Carvalho, et al., 2009)</i></p> | <p>Appearance Self-Esteem</p> | <p>People with Special Motor Needs</p> |
| <p><i>Caregivers believe that clothing can also provide emotional protection for persons with severe and profound intellectual disabilities. Caregivers, however, have used clothing to express personality, choosing styles that help communicate nonverbal messages about their identities to others [...] Several caregivers believed that this positive attention could in turn foster feelings of happiness and self-esteem. (Watson et al., 2010)</i></p> | <p>Self- Expression Self-Esteem Normalizati on b126, d335, b152,</p> | <p>Caregivers for People with Severe and Profound Intellectual Disabilities</p> |
| <p><i>Clothing, grooming, and overall appearance positively influence the normalization process and perception of persons with severe and profound intellectual disabilities if they are considered well dressed, well groomed, and are wearing coordinating or matching outfits. Clothing, grooming, and overall appearance negatively influence the normalization process and perception of persons with severe and profound intellectual disabilities if they are considered disheveled,</i></p> | <p>b1800, d5404, e465</p> | |

badly groomed, and/or are seen wearing clothing that is old, mismatched, or does not fit.(Watson et al., 2010)

Note: b126- Temperament and personality functions; b152- Emotional functions; b1800- Experience of self; b760- Control of voluntary movement functions; d335- Producing nonverbal messages; d4103- Sitting; d410- Changing basic body position; d415- Maintaining a body position; d420- Transferring oneself; d430- Lifting and carrying objects; d465- Moving around using equipment; d4402- Manipulating; d540- Dressing; d5400- Putting on clothes; d5401- Taking off clothes; d5404- Choosing appropriate clothing; d5700- Ensuring one's physical comfort; d6200- Shopping; e115- Products and technology for personal use in daily living; e1150- General products and technology for personal use in daily living; e1500- Design, construction and building products and technology for entering and exiting buildings for public use; e1501- Design, construction and building products and technology for gaining access to facilities inside buildings for public use; e460- Societal attitudes; e465- Social norms, practices and ideologies; e510- Services, systems and policies for the production of consumer goods; e515- Architecture and construction services, systems and policies; e580- Health services, systems and policies.

3.2 Grey Literature

Web links retrieved were primarily of adapted clothing retailers. Content could not be easily extracted into ICF categories so instead, the company name, purpose, specialization (if applicable), country, contact information (email, phone numbers), and key people's names (i.e. CEO, founder, owner, designer) were extracted into a separate Excel table to create a comprehensive resource list. Overall, approximately 258 URLs were identified and consulted, of which about 120 (46.5%) were deemed irrelevant to the research question (e.g. pdf presentations or web pages on disabilities that do not mention clothing), roughly 22 (8.5%) were broken links, and 28 (10.9%) ultimately pointed to duplicate retailers. Another specific Google search was performed with keywords from each broken link in efforts to find the information through other functional sites.

Clothing-related resources spanned three continents (Europe (55.42%), North America (42.17%), and Australasia (2.41%)) and nine countries (France=39.77%, Canada=21.59%, United States=18.18%, United Kingdom=5.68%, Switzerland=3.41%, Australia=2.27%, Germany=1.14%, Italy=1.14%, Sweden=1.14%, Undetermined=5.68%). The included links (n=88) pointed to relevant retailers/brands presenting adapted products that one could find online (68.18%), community associations/blogs sharing, promoting or talking about adapted clothing (18.18%), tailors, designers or manufacturers focused on adapted clothing (10.23%), or others (inclusive model agency, research and development group, museum exhibit) (3.41%) concerned with clothing for persons with a physical disability. Some sites/companies specialized in products for the elderly, wheelchair users and/or persons with an amputation, while others catered to anyone with reduced mobility. A company primarily focused on using magnetic fastenings was found, as well as others promoting specific textiles such as denim or Braille-friendly labels. Two designers who specialize in designing dresses, including wedding dresses, for persons with a disability were also located. A detailed list of the resources retrieved is not included in this paper but will be disseminated through a community of practice that focuses on inclusive society⁹¹ (available upon request).

4. Discussion

The objective of this scoping review was to examine the knowledge about the role of clothing on participation of persons with a physical disability, as reported in the scientific and grey literature. In this review, we identified 57 articles from scientific journals addressing this topic between 1990 and 2018, and 88 URLs promoting adapted clothing to meet a variety of needs. Our findings indicate a surprisingly extensive array of knowledge that covers the majority of ICF domains: Body Functions, Activities and Participation, and Environmental Factors, as well as Personal Factors.

Although the ICF framework is structured with mutually exclusive codes, the absence of mutual exclusivity among the attributed codes of each article supports an interaction between clothing, as an Environmental Factor (e115), with Body Functions, Activities and Participation, and Personal Factors. In fact, our results align well with the ICF model's principles that "a person's functioning and disability is conceived as a dynamic interaction between health conditions (diseases, disorders, injuries, traumas, etc.) and contextual factors" (p.8)¹⁶. To provide a concrete example of this multidimensional dynamic interaction, one can think of a woman who is paralysed waist down following a spinal cord injury (body function) who does not go to her best friend's wedding (participation) because she does not have acceptable clothing, and it results in feelings of isolation (personal factors) and long-lasting negative repercussions on their relationship (environmental factors).

There seems to be enough documented literature for clothing designers and manufacturers to sufficiently understand the complexity of the needs of persons with a physical disability, and many online adapted clothing resources exist. As such, we are left with more questions than answers. If the role of clothing on participation of persons with a physical disability has been studied since (at least) 1990 and with the well-known changing demographics of the population, why are there not more universally designed clothes in the mass-market? Do clothing designers know that this information exists and if so, is it being used? One could perhaps argue that the

mass market may not need to cater to persons with a physical disability since there appears to be a surprisingly large number of independent designers that seem to be targeting these needs on a smaller scale. However, we could still question if these independent designers are sufficient to meet the needs of persons with a physical disability. Like Tommy Hilfiger, we are also unaware what the design choices of independent designers are based on. Moreover, are persons with a physical disability or rehabilitation health professionals aware of these designers? Can they readily access information on these independent designers? Is the process of buying online a facilitator or barrier for persons with a physical disability? If mainstream mass-market companies offered products designed with a more universal design approach, would that change the online and/or in-store purchasing experience for persons with a physical disability?

This scoping review, similar to other research⁹², has also highlighted other broader issues like societal attitudes and systems, services, and policies that may also be contributing factors to the role of clothing on participation of persons with a physical disability. Although in Canada specially designed clothing may be eligible for tax exemption when prescribed by a medical practitioner⁹³, it remains unclear if persons with a physical disability are aware of this and if a tax exemption would cover universally designed clothing.

Indeed, the results from this scoping review call attention to the importance of clothing and the need for implication of numerous sectors in order to facilitate the participation of persons with a physical disability. As discussed by MacDonald (54), an active implication from all perspectives of the rehabilitation process (clients, health-service providers, textile and clothing researchers, private and public funders) may be necessary to assist in enticing the fashion industry into designing with consideration for persons with a physical disability.

4.1 Strengths and Limitations

This is the first scoping review on the role of clothing on participation among persons with a physical disability including both scientific and grey literature. This review may not have encompassed the full breadth of literature available due to the date and language restrictions in

the initial search strategies. Also, tacit knowledge from the fashion industry may be unpublished and thus, underrepresented in this review. A few notable challenges were encountered in performing this review, such as, the terms “physical disability” and “clothing” are not clearly defined in the literature and only one code in the ICF (e115) mentions clothing, making it difficult to assess and extract the literature. Regardless of these limitations, using the ICF and a common language across disciplines and sectors may assist in knowledge uptake/mobilization among stakeholder groups.

4.2 Implications for Future Research

The many important questions emerging from this scoping review suggest avenues for future research. For example, different stakeholders, such as persons with a physical disability, caregivers, and even health professionals, could be consulted with respect to the quality of products currently on the market to see if they are being easily accessed and fulfilling the needs and priorities of persons with a physical disability. This would also help determine if there is a knowledge translation gap between the literature and the fashion industry. If a gap exists, research should focus on how to facilitate knowledge uptake, including investigating the perceptions, facilitators, and barriers of the fashion industry towards adapted or inclusive design processes.

5. Conclusion

As the first scoping review about the role of clothing on participation among persons with a physical disability including both scientific and grey literature, the results align with the ICF model in showing that clothing has a multidimensional influence on participation and through clothing design, it may be possible to facilitate optimal participation for a more inclusive and sustainable society.

Authors' Contributions

A.E. conducted and coordinated all steps of the scoping review with assistance from all co-authors. A.E. drafted the manuscript and created the tables and figures. All authors conceived and designed the study and read and approved the final manuscript.

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Declaration of Interest

The authors declare no conflicts of interest.

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Fashion Industry Interviews (Objective 2)

Interview participants: Thirteen invitation emails were sent to potential participants identified during the search of the grey literature, and of these, four refused to participate with reasons of having no available time or conflicts with their communications departments, four did not answer and five responded positively. Recruitment slowed down and eventually ceased once positive responses to recruitment invitations started coming in. This was done in order to manage the workload and not incur a delay between an individual accepting to participate and conducting the interview with them. Therefore, five telephone interviews were conducted in February and March 2019, two of which were conducted using video-conferencing. Video technology was not possible for the remaining three interviews due to technical difficulties. Participants were female, their ages spanned four decades (20s-50s, mean= 40.8 years \pm 11.4), and the majority (4 out of 5) were Anglophones. Three participants resided in the United States, one in Canada, and one in France. All participants were highly educated (mean=15.4 years of schooling \pm 0.9) in the disciplines of fashion technique and design, fashion business, or apparel design and manufacturing, with the exception of one participant whose formal education was in history and political science. Two participants were in the early stages of working in fashion (\leq 6 years), one was well experienced in the fashion industry (10-15 years), and two participants had established careers in fashion ($>$ 20 years). Participants were either independent designers (n=3) or working in partnership with a fashion company (n=2) and one participant lives with a physical disability.

As mentioned in the methodology (page 23), the results are structured using predetermined topics that guided different parts of the interview. Under each topic there are multiple themes that emerged from verbatim and are presented below. At times, the same theme appeared under more than one topic. An illustration of these topics and corresponding themes can be seen in Figure 4.

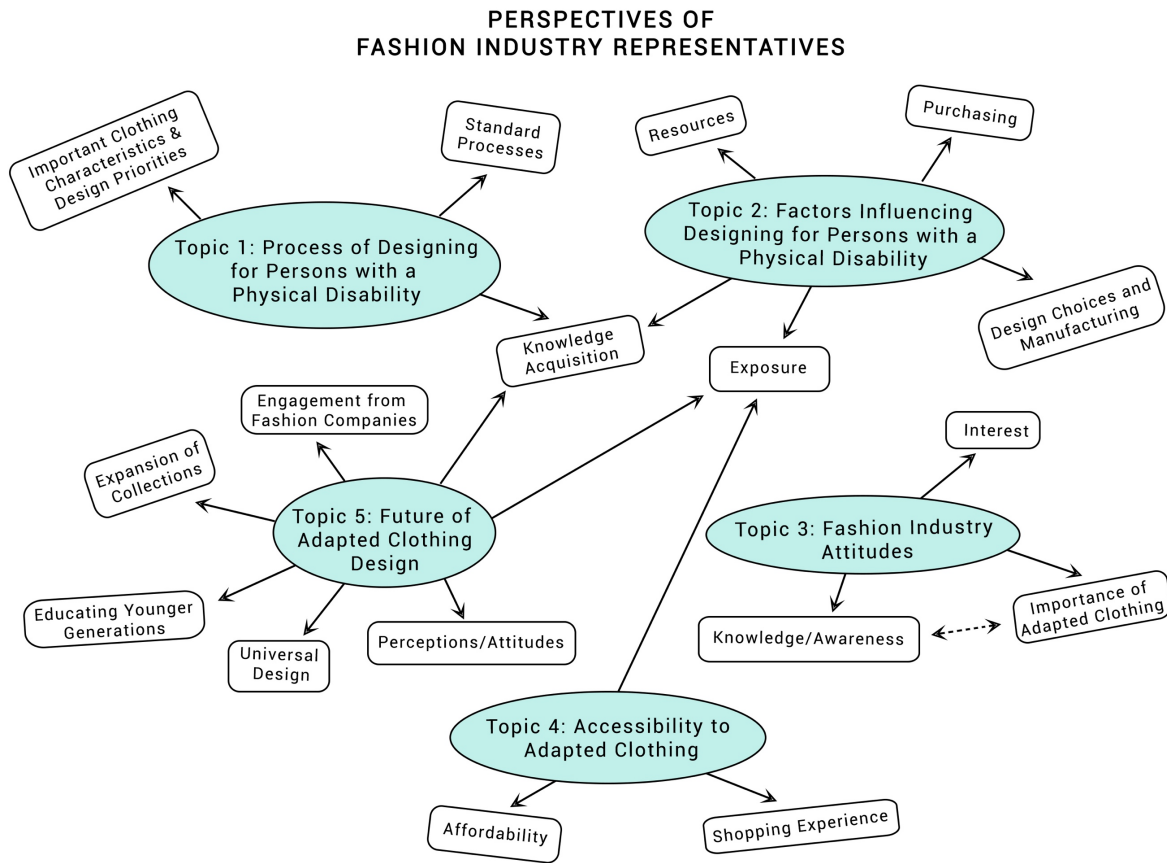


Figure 4. Interview Topics and Themes

Topic 1: Process of Designing for Persons with a Physical Disability

All participants followed similar processes for creating their adapted clothing products. The process often began with a *knowledge acquisition* phase, which highlighted *important clothing characteristics and design priorities* that adapted clothing designers focus on. Finally, these considerations, determined during the knowledge acquisition phase, were integrated into *standard processes* used when designing typical (i.e. mass-market) clothing.

Knowledge Acquisition

In general, the knowledge acquisition phase consisted of informal research performed by designers themselves. All participants emphasized the importance of speaking directly to

persons with disabilities or individuals who interact regularly with these people (i.e. health professionals and caregivers) as well as actively involving persons with disabilities in the design process to continue an ongoing knowledge exchange with designers. Established research methodologies, such as focus groups and surveys, proved to be useful and were also conducted informally by designers or companies they partner with as a means of gathering preliminary information along with continually seeking consumer feedback with prototyped or final garments.

“So, I went to umm schools and hospitals and facilities. I met with PTs and with OTs, I did focus groups, I did surveys. I did absolutely every type of research I could possibly think. [...] I would stalk people in the streets that clearly had a disability and just ask them. If they had clothing challenges, how did they dress today? Did they struggle with it? It’s just, I needed to completely be as knowledgeable as I possibly could be to be able to represent this population” (participant 1).

This research was also helpful to better understand that each person may not have identical clothing needs.

“I ended up asking her if we can do a little focus group with some of her friends that were wheelchair users so that...’cause she was the only person at that time that I was exposed to. So, umm she a put a little event, in her home, there was 3 other women besides herself, so there was 4. And the 4 of them just talked freely about their likes, dislikes, challenges, and by the end of the night I was so confused because none of them...none of them said the same things” (participant 4).

These strategies for acquiring knowledge on clothing needs of persons with a physical disability were often supplemented by online research, using social media (e.g. Facebook groups) to gain a larger reach, and personal tests (e.g. placing oneself in a wheelchair for a day).

Important Clothing Characteristics and Design Priorities

The knowledge acquisition phase gave way to important clothing characteristics to consider when designing adapted clothing for persons with various disabilities. Similar key clothing characteristics were repeated in each of the five interviews. These included paying attention to closures, openings, and the fabric used, and the need for clothing to be adjustable. In addition,

two reoccurring design priorities also emerged. Participants often spoke of the importance of the mobility of the person wearing the garment and the ability to dress and undress easily (whether promoting independent donning and doffing or facilitating caregiver assistance). Some participants shared tangible and functional solutions that can be used to address some of these key considerations. For example,

“Replacing [closures] with magnets or Velcro or other closures that make it easier was an easy solve. [...] You know there’s a very big part of the population that is never gonna be able to dress themselves, that will always have to be dressed and when you are dressing somebody that has either hyper muscle tone or, which is very rigid muscles or very low muscle tone [...] putting something over their head and manipulating their arms through the armholes is a very difficult task. So, having those be tucked open up from the back and you go in arms first and it closes from the back while maintaining again the look, the original look of the garment, then only saves time in the caregiver’s life but it also saves time and effort and anxiety and exhaustion in the person with a disability. And that is something that you can’t put a price tag on, you just can’t” (participant 1).

Or,

"There is a choice of fabric to take into account, we will avoid using fabrics that are too rigid or...or too thick or that are...very chemically treated. We try to favor materials uh natural materials and uh also flowing materials because they are soft tissues that are soft enough so there is less risk that the person is injured uh injured by the seams for example...uh...and then also on a visual level for example, for a person in...in a wheelchair uh as soon as the fabric is going to be fluid then it will bring uh uh well a lightness and make, well give something very airy compared to uh rigid fabrics." (participant 3).

Finally, ‘simpler is better’ and keeping designs looking classic and modern seemed to be the ultimate motto among participants when considering the aesthetics of adapted clothing.

Standard Processes

No major differences were reported between a standard design process and the process used to design adapted clothing. In fact, in one scenario, the participant stressed that indeed, the goal was for there to be no differences between the two.

“The modifications were developed with the mindset that I did not want to re-create the wheel. That they HAD to be able to be folded into the already existing design process” (participant 1).

Furthermore, one participant explained that regular team meetings and prototyping were at the heart of their process.

“We have a weekly meeting where we meet to, you know, discuss any deadlines we have, just kind of like a regular design process [...] And then there were, there were a few of us that have umm you know more of like a prototyping experience where we can either sew something up quick or modify something so that we can get the point across ‘cause not everybody can really see the...the whole picture when you’re talking about like moving a zipper and like, you know, tapering it in here for whatever need it is so umm a few of us would get together and do some like I call it rapid prototyping and then bring it back to the group and so that’s how it started” (participant 5).

Another participant who started with customized designs also underlined that it was eventually possible to streamline her process and grade her patterns to match the sizing of typical clothing on the market.

Overall, from these interviews we can understand that the process of designing clothes for persons with a physical disability included acquiring knowledge, identifying important clothing characteristics and design priorities, and integrating them into a standard design process. This seemed to be quite similar across participants and was not reported to be overtly different from a standard design process.

Topic 2: Factors Influencing Designing for Persons with a Physical Disability

Barriers and facilitators for designing for persons with a physical disability were two different topics in the interview guide but were combined here as many themes overlapped depending on the context in which they were discussed. Reoccurring factors were first and foremost, *resources*, and *exposure*. Otherwise, participants experienced other facilitators and barriers at

other stages of the idea to market process, such as, *knowledge* on consumers' clothing needs, specific *design choices and manufacturing* considerations, or even around consumers *purchasing* garments.

Resources

Financial, material, and human resources were all mentioned as important factors affecting the field of designing clothes for persons with a physical disability. Financial resources were mentioned as a barrier from various angles, such as operational costs, cost of fabrics, manufacturing costs, marketing costs, and the price point of the final products, which are largely described in the other themes below. However, we can see with one participant's experience that access to funds and material resources, like technology, helped the process immensely.

“They also are really putting money behind this to make the products the best that they can possibly be. With new technologies and...and...everything that...and that really was the crux of why I wanted to get them started. I...you know...with these global brands, they have access to do something way better than I could have ever done in my wildest dreams” (participant 1).

In another participant's experience, a lack of other material or human resources, such as models and mannequins with various disabilities or diagnoses, was a major barrier in their design process.

“You know one of the biggest things for me is I umm...and I think for everyone is, you know, we fit on live models and we don't have fit models that have disabilities so one of my main obstacles is really I have a wheelchair that I keep in my office and umm I have you know, the kids that are our models right now are just so willing to sit in the wheelchair, you know, pretend like they're wheeling around, put their legs up umm it even for a time I had a a young child that wasn't in diapers anymore, put a diaper on for me because we do fit a lot of our items with diapers. So, I think the...the biggest obstacle for me is...having a fit model that, that represents what I'm trying to do.” (participant 5).

This same participant experienced a lack of time and the absence of a dedicated team consisting of experts in design, inventory management, and marketing as a barrier for fully supporting adapted clothing within their company.

“Our whole collection is [online] and so we have limited you know buyers buying the products and limited planners planning the uh inventory and that kinda thing so I think other companies we...won’t run into this issue or even if you’re like a small company creating just you know, a small collection of things we just don’t have the support, not that [our company] doesn’t wanna support it, it’s just it’s just not there yet” (participant 5).

Exposure

All participants relied on media (e.g. newspaper articles, video capsules) as an effective marketing strategy. However, one participant in particular had numerous challenges in determining effective ways to market her products to persons with a physical disability as it was not as straightforward from what she was used to.

“And umm...it was just really hard and really expensive also to market and advertise because it was a lot of umm at that time it was more print than online and print advertising is expensive and then it’s like, where do you, you know, I’m a clothing line so where do I advertise? And there are a lot of magazines out there that are geared to people with physical disabilities umm...but they’re all very umm...medical or you know, our ad would be next to van conversions and...like this...it just really felt...out of place...in a way. I mean it wasn’t because it was...it was the right market, but it just wasn’t like advertising in a fashion magazine or like, you know, focused on fashion” (participant 4).

This was re-iterated by another participant who noticed their sales were largely influenced by specific media appearances.

“Okay...ya...ya and that’s like if we had a... we had a lotta increase in our sales and a lotta increase in people knowing that we had the adapted apparel but then as soon as that kinda dies down it’s like, sales are kinda, you know they go back to normal and stuff so it really...marketing is...is the biggest thing that umm I think is helping most companies that do have adaptive apparel that people catch wind of it somewhere” (participant 5).

Although marketing was seen largely as an obstacle, increasing the general exposure of the field of adapted clothing was perceived as something that could be a facilitator for designing clothes for persons with a physical disability. Some examples of this exposure included effective marketing of existing collections but also included showing the need for adapted clothing, demonstrating the success of companies who have entered into the realm of adapted clothing,

and having models with physical disabilities in ad campaigns, on runways, and acting as spokespeople. In order to achieve this, in addition to each companies' marketing strategies, media outlets (social media and traditional media) and word of mouth were mentioned as powerful mediums for bringing more of a global awareness to the issue of clothing for persons with a physical disability. One participant also emphasized the power that mainstream fashion companies in the field can have.

“I think umm, it’s a combination of you know...organizations like ours really being very vocal umm...being incredibly immersive and that’s why I...I speak to any brand that I can get into, or speaking arrangements or anything like that so that I can really share this awareness. But on the industry side I think you know with leaders now like Tommy Hilfiger and Target and Nike and Zappos who are all in the now in this world and focusing on people with disabilities it will be equally as important to share the success of this and why they are doing it and how this IS a business opportunity” (participant 1).

Knowledge Acquisition

The adapted clothing design process, as described in Topic 1, is mainly comprised of a knowledge acquisition phase, identifying important clothing characteristics and design priorities, and integrating these into a standard design process. Within this design process, the knowledge acquisition phase and figuring out effective ways to devise clothing patterns that could cater to people with various diagnoses and preferences was reported to be difficult and very time-consuming. A few participants mentioned that it is common practice in the fashion industry for companies to copy one another, but this became a barrier to designing adapted clothing since there are not many companies currently designing for persons with a physical disability. However, when prompted, four of five participants imagined that scientific research could help their process in some way. One participant specifically spoke of how it could have accelerated her knowledge acquisition phase.

“If I had had research like this you know four years ago, I could have probably expedited my process because I would have had solid research from researchers rather than me trying to you know kind of do this on my own and trying to figure it out and what not but even you know, on a bigger level, it’s information like this that could be shared with brands to have them understand this population and how that designers could help design around that, for that, with them” (participant 1).

Participants were then asked how scientific research can be more widely disseminated in order to reach their design teams and be mobilized within the fashion industry at large. Two participants recounted that the most effective ways for engaging individuals in their work of adapted clothing were by sharing the stories and testimonials of people living with physical disabilities. Therefore, research results formulated in similar ways may help increase uptake of scientific research.

“I think it’s first hand umm uh videos, from those that are affected and what this...and that...for me...was the most powerful part of any presentation I did I either had a video with me or I brought in somebody with a disability in my meeting because it’s one thing for me to talk about and it’s another to hear it directly from the source. And! To speak on behalf of the fact that they do care about fashion and they would love nothing more than to you know wear the appropriate...everything affects everything else right, so, you know, I...I...have...I did a panel discussion one time primarily on the fact that the panel participants one of the main struggles for finding jobs was that they could not wear the appropriate attire to even go on an interview” (participant 1).

Along the lines of research, having guidance was another form of knowledge acquisition that was reported to potentially assist design teams in designing for persons with a physical disability. For example, working with one or multiple consultants to help educate and exchange with designers on the needs and issues of persons with a physical disability was seen as something that would make the initial designing stages less daunting.

Design Choices and Manufacturing

After obtaining the required knowledge around clothing needs of persons with a physical disability and creating initial patterns, compromises around the fabric, colours, and aesthetic embellishments were also mentioned as sometimes being a challenging.

“I have to choose from existing fabrics and colours and that kinda thing but then if you look at like you know the more things you have on a garment the more sometimes more uncomfortable it is? Umm, and then also like if you’ve got like graphic prints that are rough or scratchy you know we kind of stay away from the sequin trend and that kinda thing in the adaptive t-shirts and adaptive shirts. Umm so there’s a couple compromises that we make but umm you know ultimately...ultimately simple is better in this, in this area” (participant 5).

However, it is important to note that one participant highlighted that these difficult design choices are not exclusive to designing for persons with a physical disability. For example, in any situation,

“depending on the market you’re targeting you’re gonna be uh forced to use the fabrics that you can afford for the price point that you want to achieve. Umm, if you’re developing a new pattern umm, you know it can be complicated or not depending on the design and whether it’s for someone with a disability or not. Like, I think all the challenges are the same it’s just applied to a different customer” (participant 4).

Although the above barriers and compromises exist within the design process, one participant expressed that perfection of the designs was not a priority and that facilitating the life of persons with a physical disability is the actual goal.

“Well I think that there’s a definite line between umm finding modifications that are going to make life easier vs. modifications or absolute changes that will be you know...for lack of a better word...perfect. So, these, this, the products that this stands now, in our mainstream with Tommy Adaptive or Cat and Jack Adaptive, all to make life easier, to make this population understand that they have been included and thought of. Is it going to be perfect for every disability out there? No. Is it going to make life easier for every disability out there? Absolutely” (participant 1).

Furthermore, time and cost constraints with respect to the manufacturing process also affected the feasibility of bringing an initial design idea to become a marketable product.

“Well it really comes down to cost in a lotta cases umm. You know and sometimes it’s not the cost, sometimes it’s like is it manufacturable on a large scale? You know like if we add side zippers or side Velcro or something to the side of a garment instead of the vendor or the manufacturer being able to make tens of thousands of those, now it slows down their production so much that it drives up your cost and it...it really kinda clogs up their production facilities so I think in that... a big obstacle for adaptive clothing could be the actual manufacturing process” (participant 5).

Purchasing

On the flip side of marketing, a lack of consumer purchasing was also seen as a barrier to one participant who had challenges maintaining her company as an independent designer. More than one participant emphasized the importance of a two-way street effort (i.e. both the industry and

consumer embracing adapted clothing) in order for the field to be successful. The theme of purchasing is also intertwined with Topic 4: Accessibility to Adapted Clothing discussed below.

Overall, factors influencing designing for persons with a physical disability mainly relied on having resources (financial, material, and human) for adapted clothing initiatives and the level of general exposure of the field. Participants also focused on the process of acquiring knowledge of consumer clothing needs, making specific design choices while taking into consideration manufacturing limitations, and purchasing as important areas that may require more attention in order to resolve added challenges specific to adapted apparel and advance the field further into the mainstream market.

Topic 3: Fashion Industry Attitudes

Each participant spoke about attitudes they encountered in the fashion industry in regards to their work in adapted clothing. This topic could also be seen as a factor influencing designing for persons with a physical disability but is presented separately in order to adequately present some important themes that emerged under this topic. Participants' comments revolved around fashion companies' perceived level of *importance of adapted clothing*. This was often connected to one's *knowledge/awareness* of the needs and size of the population with a physical disability. However, at the end of the day, a real *interest* to embark into the realm of adapted clothing is needed regardless of the importance of designing adapted clothing or a perceived business opportunity, or having the necessary knowledge/awareness of the situation at hand.

Importance of Adapted Clothing

The overall impression seemed to be that companies not designing with consideration for persons with physical disabilities do not see why it is important to do so. Importance can emerge in the form of a financial opportunity as described by one participant who, in her experience with the fashion industry, had to pitch adapted clothing as a business opportunity and dispel the idea that persons with disabilities are a niche population.

“I was constantly challenged with the notions that it was believed that people with disabilities are a niche population, very small, umm they do not they don’t spend money on clothing and they don’t care about how they look. All of which are exactly incorrect. There’s almost 60 million people in the U.S. alone that have disabilities. One, over a billion people globally. And that’s...that’s documented disabilities, that doesn’t even include those that don’t report to the census or whatever the tracking mechanisms are in other countries and that does not include temporary disabilities. [...] And then really reeled in by telling them that people with disabilities are the largest minority on our planet. The largest minority! That’s it not being considered by the fashion industry and even bigger than that, that even more got their attention is that it is estimated that over a trillion dollars is being left on the table every year by not including them” (participant 1).

However, four of five participants supported importance from a more humanitarian perspective, meaning that persons with a physical disability are people like everyone else and should also have the ability to wear appropriate clothing for different contexts.

“And as soon as we were able to kind of get our, like our teams...you know as...you can imagine in large company you kinda have to convince people that you know, not necessarily in this case that it was a good business decision but that it, it’s just the right thing to do” (participant 5).

Another humanitarian perspective addressed societies’ inaccurate views of the lives of persons with disabilities, which may also lend a lack of support for designing adapted clothing.

“You know, I think people...able-bodied folks seeing people with disabilities as people... I think that’s the number one thing. Often times, I have these...the most ridiculous conversations that you can imagine umm like people who don’t see me as a whole person. So, they don’t...they assume that I don’t have a job, that I don’t have a boyfriend, that I don’t have a life or have hobbies or friends or a social life, nothing. And when you de-humanize someone you take away their entire personality and their entire life” (participant 2).

Furthermore, this participant attributed this same lack of importance when attempting to get a grant to start her business to a lack of seeing clothing as a primary issue for this population.

“If it doesn’t seem like a massive life or death issue, people don’t think that it’s important. And from my perspective like...I’m not trying to flash anybody when I leave my house. So, it is life or death for me to get dressed and be able to leave my house and be comfortable and presentable for where I’m going” (participant 2).

Knowledge/Awareness

Each of the five participants' journeys into adapted clothing was a result of personally knowing or being around persons with physical disabilities in their immediate surroundings or having a disability themselves. Once individuals had this knowledge/awareness of clothing-related issues for this population they had a greater understanding for the importance of adapted clothing. Recalling back to her state of mind before being introduced to someone with a physical disability, one participant stressed her frustration when being unaware of the needs of persons with a disability and that this was misinterpreted for ignorance.

“This is a conversation and kind of question that gets brought up all the time or when I, I read articles that say you know ‘the fashion industry is ignoring people with disabilities’ and things like that. And I actually...I hate when I read that, and the reason is because umm, they are not ignoring, they just wanna...are not aware. Just like I wasn't” (participant 4).

Another participant mentioned that a lack of know-how could also be contributing to fewer companies designing adapted clothing.

“I think a lot of people are intimidated by it because you know they...they don't know how to talk to people with disabilities, they don't even know what to say like when their speaking about it” (participant 5).

With that being said, all participants mentioned they have seen an increase in exposure of people with disabilities in advertisements and on runways (as seen in Topic 2) that will further sensitize the fashion industry towards adapted clothing and contribute to an increased knowledge/awareness.

Interest

Understanding that persons with physical disabilities exist, that it could be a fruitful business opportunity to design for them, that there is social importance in designing in consideration for them, and knowing how to approach adapted clothing design, all seem to contribute to fashion industry attitudes towards adapted clothing. However, two participants stressed that a key

ingredient for a designer or a company to pass from ‘knowing’ to ‘doing’ was their interest in doing so. For example, one participant described that her work was viewed positively by larger companies but their interest stopped there.

“See, they admired what I was doing. They were quite receptive, but, it’s true that...yea, they weren’t really inspired by...by...by...by it to uh put it in their collections. This...uhh they were, see...they were interested, they asked me questions but it wasn’t more than that. They did not integrate them uh in their fashion collections” (participant 3).

Another participant spoke more generally to the right of each company to make their own decision and determine if designing for persons with disabilities aligns with the company’s direction.

“Maybe now so there is more exposure and it’s really up to each individual company to decide what they wanna do or not do. If they want to include clothing that’s gonna be easier for somebody to get on great! But it is their choice, just like...you know, uh, anybody that’s designing anything, it’s their choice to target whatever market they wanna target. And, and it’s great if they wanna be inclusive! But it is a choice. And. Umm. It’s also not something you can just turn a switch on either. Like you need to, you need to really understand what you’re doing, ‘cause you can also hurt someone” (participant 4).

Overall, participants perceived that attitudes in the fashion industry around adapted clothing have changed greatly over recent years and will continue to change with increased exposure and education making attitudes a facilitator to seeing more mainstream adapted clothing lines. However, it appears that regardless of understanding the importance of designing adapted apparel or having the knowledge/awareness of this population’s clothing needs, final decision makers may still choose not to add adapted apparel in their collections.

Topic 4: Accessibility to Adapted Clothing

When asked about how consumers access their adapted clothing products, all participants spoke of the online vs. in-store *shopping experience*, *affordability*, and once again *exposure*.

Shopping Experience

As of the time of the interview, all participants' adapted clothing collections were solely available online. This was seen as an ideal scenario for some participants because it could reach a global audience if they were able to manage shipping costs. Furthermore, it was generally understood among participants that shopping in-store could be a barrier for persons with a physical disability thus, shopping online would provide an easier option for them. However, one participant highlighted that the online shopping experience still needs to be improved in order to find products easier. On the other hand, other participants recognized that shopping online may be a barrier for persons with a physical disability and psychologically-speaking the experience of shopping in-store should be able to be experienced by everyone. One participant, who was in the midst of opening a boutique at the time of the interview, spoke of associated challenges (e.g. cost, insurance, accessibility in the design of the space) to having an in-store space and hypothesized that this could be one of the reasons why other independent designers do not have 'physical' boutiques.

Affordability

The affordability of products on the market was brought up as an important factor related to persons with a physical disability accessing (i.e. purchasing) adapted clothing. Mixed perspectives in regards to affordability were reported. For example, one participant stressed that initiatives presenting clothing at a price point that is out of reach for persons living with a disability without much disposable income is not helpful.

“I think they are I just don't know if all people with disabilities, who have a physical disability would be able to afford it. So, some of them...some of the clothes were kind of expensive ha. So... I don't think if someone happens to have disabilities is on a very fixed income and doesn't have extra money to spend on whatever clothes, you know Tommy Adaptive is putting out there like you know if they can't afford it then whose it for? It's for, you know, either really rich people with disabilities or just mannequins in stores. You know...like it's just for show. And it doesn't help anyone. I mean it...it...the idea might help people but the idea doesn't get people dressed. The idea doesn't put the clothes in people's possession and it doesn't you know help the community as a as a whole in the you know the short term. It helps in the long term to get the conversations going and to change perspectives and ideas and umm hopefully processes in terms of getting it in place

but in the short term to like get people dressed and...and help people feel you know beautiful and powerful within their clothing” (participant 2).

However, affordability was another issue that was not seen as exclusive to persons living with a physical disability (similar to the challenge of making design choices, see Topic 2, page 72).

“You know a lot of it can come down to affordability, umm but again just like, just like able bodied people there’s people that are on a fixed income and there’s people that you know have money to spend and umm so it’s all relative in that regard” (participant 4).

A third participant expressed that with time and increased awareness, the concept of adapted clothing will seep into other companies and varying price points.

“Umm...I...I...think it will be umm...similar to I’m gunna use the word trend...only because it’s a good example of how you know things trickle from you know the couture level to Target and Walmart. It’s...it’s...it’s a trickle-down theory so to speak, and sometimes trickle up. You know, there’s definitely been some trends that happen you know, more from the lower levels up to the higher levels within the world of design and I think that this is going to have the same life in terms of...as Tommy becomes, because they are uhh currently the highest in you know the...the price point, uh level brands that have taken this on, I think that others are going to follow suit” (participant 1).

Exposure

Once again exposure was mentioned as an important theme, this time affecting the accessibility of adapted clothing for persons with a physical disability (i.e. reaching consumers that would ultimately purchase the clothes).

“I think again there’s a very umm...when you ...when you have lived your life under the knowledge that the fashion industry hasn’t thought of you, you constantly aren’t going to check on it to see if today’s the day...that they’re thinking about you” (participant 1).

All participants reported that media, word-of-mouth, and referrals (e.g. through associations or health professionals) were mostly used as a means to reach consumers with a physical disability. The challenge of marketing as seen in Topic 2: Factors Influencing Designing for Persons with a Physical Disability, was mentioned again by one participant that determining an effective marketing strategy was not always clear.

“And then also, you know again, like just because you have a disability doesn’t mean you’re gonna be reading these magazines because, you know, you just might not be picking them up. And so, again, because you have a disability doesn’t mean you’re all into the same thing. You can be into fashion, you can be into fishing, you can be into cooking, you know, like, so you’re gonna be, you know, looking...umm...in those kinds of magazines!” (participant 4).

Overall, from the perspective of these fashion industry representatives, there were mixed opinions on the use of online vs. in-store methods for distributing adapted clothing. Independent designers and companies need persons with a physical disability to purchase their clothes in order to continue offering these products, however, finding ways to reach intended consumers and providing a shopping experience and price point that works for them so they can ultimately access adapted clothing is not evident.

Topic 5: Future of Adapted Clothing Design

All participants stressed the importance of overcoming barriers and highlighted facilitators mentioned in Topic 2 when speaking about what they see for the future of adapted clothing design. For a third time, *exposure* was mentioned as a crucial component for future success of the field. In other respects, active *engagement from fashion companies*, a desire for *expansion of collections*, the need for *educating younger generations*, finding ways to increase designers’ *knowledge* on how to design adapted clothing, a change in *perceptions/attitudes* within the fashion industry but also of society at large, and last but not least, some thoughts around integrating *universal design* were all discussed in the context of the future of designing for persons with a physical disability.

Exposure

All participants wanted to continue seeing models with disabilities in ad campaigns, on runways, in commercials, and in every part of our pop culture and believed that it will help the momentum for other brands to join. One participant shared her desire for one day being able to have a trade show bringing together all companies working in adapted clothing.

“At some point we’d love to have, umm, you know a...an entire like what do you call it? Like a trade show or whatever for all companies to come together and share their products. It’s almost like you know, I got to Outdoor Retailer in Denver for all of outdoor apparel. I think we, we really, it’s so exciting because we knew other people were working on it but we just didn’t know what they were doing” (participant 5).

Another participant also highlighted the desire to work more and more with various disability organizations to break down silos between them, while other participants mentioned that these organizations could also be used more for sharing information and knowledge, whether coming from scientific research or consumers themselves.

Engagement from Fashion Companies

Two participants spoke of the need for increased engagement from the fashion industry around adapted clothing and a structure where companies can commit to being inclusive of persons with disabilities in all areas of fashion and be held accountable. One of the two participants explicitly mentioned that moments of exposure are not enough and having fashion companies involving persons with disabilities more throughout the process is needed.

“I mean I think that a good start is these fashion shows that have been going on. I see more and more various disabilities in fashion week and I think that’s awesome and amazing but honestly, in those instances it’s just like a blip on the screen of inspiration porn and then after someone’s done being inspiring on the runway, the rest of them are just thrown away and once again de-humanized. And I think that if we do more than just have those momentary inspirations or a person with disability is simply used to only be an inspiration and make it more than that so that we have conversations after the fashion show we have those people in the fashion show being part of the fashion process. We have people with disabilities doing internships around fashion. We have them...umm competing in like America’s Next Top Model or something like that... like it’s things like that that it...like including and incorporating us into everything because we are people too who are involved in things in our communities but we want to be involved in general and global communities” (participant 2).

Expansion of Collections

A couple participants touched on the desire to expand their adapted clothing collections and play more with the aesthetic components of fashion once the basic functionality of the garments

was in place. One participant also explained her drive for exploring more and more untouched areas.

“But umm, you know, I think for me, I’d like to be able to offer more and more products, go into more categories. Like go into footwear and more accessories and umm just making the experience umm more and more exciting and, and umm being able to offer uh you know even just going into more niche areas where you know that 20% that we aren’t serving right now, find a way to be able to serve them! Umm streamlining custom to see if you know that’s something that that’s possible” (participant 4).

Educating Younger Generations

For more of a longer-term vision, the importance of education, particularly of the younger generation who will drive the future of adapted clothing to see persons with disabilities as the same as everyone else was highlighted.

“To me it’s kinda like umm when you know back in like the 80s when the no-smoking ship started happening you know and you really have to get down to that elementary education level of planting the seed with these young kids of what can happen to their lungs if they keep smoking. I think this is the same thing that at that impressionable age you know in elementary school to kinda start teaching them about kids with disabilities so that they’re not afraid to talk to them, they’re not afraid to be friends with them, they don’t think it’s gross, they don’t make fun of them and it really like plants this empathetic piece to their life that they didn’t have before” (participant 5).

Knowledge Acquisition

One participant returned to the knowledge acquisition phase of the design process and her aspiration for having documentation that could help introduce designers to the ‘how-to’ of designing adapted clothing so that it would be less intimidating. Moreover, by having some basic information of what needs to appear in a garment for it to work with a specific disability then designers could get more creative rather than simply copying one another.

Perceptions/Attitudes

Ultimately, the perceptions/attitudes of people within the fashion industry and society at large were a concern for all participants. Participants hope that the future will consist of a world where

every brand, regardless of the size of the company, includes adaptive clothing lines just like the inclusion of plus-sizes, petite, maternity, etc. Along these lines, it is clear that having a more favourable perception of persons with disabilities still has a long way to go.

“Well, I think we can change by...by multiplying initiatives uh to show the beauty of persons with disabilities, to show that they are people and not sick people [...] when we talk of sexuality or mental health of persons with disabilities people are shocked and it's true actually I think there's still a lot of work, in fact, on uh everything that is taboo, on uh see, in fact...we need the, the French society to come to the point where persons with disabilities are seen as a full person and not as a sick person which is still often the case unfortunately” (participant 3).

Finally, another voiced concern related to the role of the consumer and their perceptions towards buying adapted clothing.

“Another point that also needs to be raised is that umm, like, it...it...the onus is not only on the...on companies like myself or Tommy Hilfiger or whatever other brand wants to step in. The consumer on the other end has to purchase. So, it's a two-way street and I have to pay my rent, I have to pay my employees, I have to pay for all my fabric and my inventory and I need to sell it. So, if the consumer is not embracing it then it's not gonna survive. And that's not like it's not the blame...it's not, you know...it's a two-way street” (participant 4).

Universal Design

Universal design can be defined as the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design (Burgstahler, 2015). Two participants leaned towards universal design being unlikely in future clothing design. More specifically, these principles were not seen as being useful for responding to the clothing needs of persons with a physical disability.

“I...think that they'll be great for the...for servicing a you know, an...or...you know...a vast vast vast population but it's, I think...the...the population of people with disabilities need to be you know, a smidge carved out of that. [...] I think that it would be incredible difficult to design somethi...I mean I think...we could circle back to what already exists to what did not work for people with disabilities. It just it didn't” (participant 1).

Nevertheless, two other participants saw that it could be possible to integrate in some way. Two participants spoke of initiatives already underway that could possibly count as universal design. Special attention to seams and tags on clothing was mentioned by one participant as something that could benefit everyone but manufacturing barriers would need to be addressed to increase actual feasibility. Another participant explained that universal design may already exist in certain products on the market.

“I think that it could be used because the Association I told you about [...], uh they have already assigned...partnerships with existing brands and uh actually with a lot of their products uh they realized that it’s already adapted to persons with disabilities. It’s just identifying, the work of identifying which ones that has to be done” (participant 3).

Overall, participants seemed very optimistic for the future of adapted clothing and shared an excitement for being part of a social movement towards inclusivity. There seems to be a shared desire for a shift in the way society perceives persons with disabilities which may unlock some doors for the future of adapted clothing in the mainstream market. Furthermore, through exposure and education participants believe that the uptake of adapted clothing lines among various brands will grow.

Chapter 6. Discussion

We conducted the first documented scoping review including both scientific and grey literature to examine the role of clothing on participation of persons with a physical disability (objective 1). The 57 scientific articles revealed that, as supported by the ICF, clothing has a multidimensional influence on participation. We can appreciate this by going back to our concrete example of a woman who is paralysed waist down following a spinal cord injury (body function) who does not go to her best friend's wedding (participation) because she does not have acceptable clothing, and it results in feelings of isolation (personal factors) and long-lasting negative repercussions on their relationship (environmental factors). The 88 URLs from the grey literature search highlighted numerous adapted clothing initiatives worldwide predominantly led by independent designers as opposed to mass market brands. These results caused our research team to question, among other things, the uptake of the scientific literature by the fashion industry (i.e. do they know it exists and do they use it?), why there are not more adapted clothing products in the mass market, and whether persons with a physical disability or their caregivers are aware of what is already on the market.

We thus believe it was important to explore perspectives of fashion industry representatives vis à vis the documented literature retrieved from the scoping review and potential factors influencing uptake of this knowledge (objective 2). Key messages from interviews with five fashion industry representatives currently involved in designing for persons with a physical disability included:

- The knowledge acquisition phase in the design process is extremely important but time-consuming and scientific literature is not consulted;
- Barriers to designing for persons with a physical disability span larger than just the design process and involve manufacturing, marketing, and purchasing challenges;
- Money, time, and personnel are needed to facilitate advancement of the field;

- Adapted clothing is in its infancy with mainstream brands but with the help of increased exposure, education, guidance, and engagement, societal perceptions towards persons with a physical disability may start to change and mainstream companies may increasingly see the importance of designing adapted clothing, as well as the added value as a business opportunity.

If we examine more in depth the interview results alongside the scoping review results, it is interesting that although scientific literature was not consulted in the designers' knowledge acquisition phase, designers reported using information that was similar to that which was gleaned from the literature. For example, in both instances mobility (ICF: d4-Mobility) and dressing/undressing (ICF: d5-Self Care) were seen as noteworthy design priorities to consider. Furthermore, some important clothing characteristics mentioned in the scientific literature, such as, attention to closures and fastenings on garments, and the importance of fabric choice (ICF: e1-Products and Technology) were also viewed as important to designers as evident in the repeated verbatim by fashion industry representatives. Moreover, accessibility issues when shopping in-store (e5-Services, Systems & Policies) were reported in the literature and by fashion industry representatives and neither data source provided tangible solutions.

These convergent results are not to say that scientific research in the domain of clothing, participation, and persons with a physical disability is not needed. In fact, the opposite could be argued. Information from the scoping review and future scientific research may provide designers with additional important information and allow them to make informed decisions when designing for persons with a physical disability. For example, scientific literature indicated the importance of fabric choice, specifically for reasons of temperature regulation (b550), which may not have emerged in the informal research performed by designers. In addition, continuing to pursue this line of research and sharing it with targeted knowledge users (i.e. fashion designers) could help support innovative initiatives in the field by adding a certain credibility to their work.

It is interesting to note that Workman (1996) found a favourable response towards models in wheelchairs from female consumers, as the appearance of these models reflected the diversity of society. This study asserted that “the sanctioned staring permitted through media presentation of models in wheelchairs and the value placed on the social role of fashion models can facilitate positive attitudes and reactions toward persons who use wheelchairs for mobility. Increased familiarity with models in wheelchairs, who vary from prescriptive norms and standards of appearance, may not only promote their acceptance into society but also lead to more positive attitudes toward persons with other types of physical disabilities” (p.251) (Workman, 1996). If fashion industry representatives had read and reacted to this paper over two decades ago when it was published, would it have made a difference in conversations and practices around inclusivity of the fashion industry today? Gauging by the emphasis interview participants placed on the need for more models with disabilities on runways and in fashion advertisements to positively change perceptions of society and the fashion industry, the principles behind some scientific research, such as Workman’s paper, are slowly seeping into practice. Although this is consistent with predictions that it takes approximately 17 years for research papers to feed practice (Grant, Cottrell, Cluzeau, & Fawcett, 2000), it is unclear whether that particular research had any effect on this change of attitude. Nevertheless, evidence-based support could also help in reinforcing the ‘business opportunity’ pitch to fashion companies to embark into the realm of adapted clothing and certainly, 17 years can be reduced by activating a stronger flow of knowledge between researchers and the fashion industry.

This opportunity for a mutually beneficial relationship between scientific research and the fashion industry sets the stage for questioning better practices of knowledge translation activities between the two sectors. Interview participants spoke of using the media and disability associations as effective avenues for researchers to circulate information into the right hands. One could also think of solidifying intersectoral collaborations between research groups and interested fashion companies to open a platform for knowledge exchange, valuing each other’s expertise and bridging the research-practice gap. Although participants who agreed to the interview seemed receptive to our research team’s inquiries and open to future collaborations,

it is unclear whether individuals who refused to participate would have the same level of openness.

This research also puts into question corporate social responsibility of big fashion brands. Recently, some attention has been brought to environmental sustainability practices of fashion companies (Kell, 2018; Somers, 2018) but as mentioned in Topic 5: Future of Adapted Clothing, we could also question inclusivity practices (i.e. engagement) of fashion companies towards persons with physical disabilities (e.g. hiring them, designing with and for them, advertising with them). Another article from the 1990s highlighted broader benefits of addressing design issues for people with specific difficulties (Benktzon, 1993), and in a recent editorial, Laitala and Borch (2019) continue to call to action the inclusion of people with disabilities and indicate they are overlooked consumers. If included, persons with a physical disability could facilitate a more inclusive society. Therefore, should fashion companies be held accountable for their inclusivity practices?

Overall, the interview results indicate that knowledge from research dating back since 1990 may not have been mobilized optimally unless it was highlighted in the media. However, if transferred effectively, scientific research has the potential to act as a facilitator for mainstream designers and companies to start (or continue) designing in consideration for consumers with physical disabilities, who are becoming an increasingly larger percentage of the population.

Clinical Implications of this Research

Given that occupational therapists focus on increasing independence in the activity of dressing/undressing in rehabilitation settings, they may play an important role in bridging the gap between persons with a physical disability and mainstream fashion companies. For example, they could act as consultants for interested designers. Equally important, they could be a resource for their clients with regards to sharing the findings of the scoping review grey literature (i.e. adapted clothing products that exist on the market).

Strengths and Limitations

This thesis is comprised of the first documented scoping review including scientific and grey literature on the topic of clothing and participation of persons with a physical disability. Strengths and limitations in relation to the scoping review were mentioned in Article 2. To our knowledge, this is also the first exploration of perspectives of fashion industry representatives regarding adapted clothing design from the lens of rehabilitation research. The use of the ICF gave us a common language to use across sectors and this research also helped sensitive researchers to the reality and language of the fashion industry. As with all qualitative research, an inherent bias in the interpretation of the interview data (e.g. layout and selection of extractions) exists and limits the generalization of results. Additionally, the coding of verbatim was only performed by one person and was not validated by a second independent reviewer. However, the flexible semi-structured qualitative methodology was useful for exploring unknown territory and collecting statements based on lived experiences. The small, female-only sample size, the non-attainment of saturation, and the focus on representatives already involved in designing for persons with a physical disability does not provide the complete picture of the fashion industry. Finally, interview results were regrouped and presented within five topics inspired by the scoping review results. A lot of overlap exists across topics and the presentation of results could continue to be refined. With that being said, this research is a preliminary exploration and provides a foundation for future research.

Future Directions

This research seemed to open up Pandora's box on fashion and disability. As a result of the complex multidimensional influence of clothing on participation, multiple avenues for future research are possible. In the short term, future studies could focus on areas that would help complete a global picture of the field of clothing for persons with a physical disability using the KTA cycle as a guide. Specific examples relating to each of our initial objectives are described below. In the long term, future directions may take a different form depending on the results of short term initiatives.

In the scoping review presented above, some literature was excluded that indeed, may assist in mapping other important aspects of the field of adapted clothing. This excluded literature primarily includes footwear, wearables, and studies involving children. Scoping reviews including both scientific and grey literature could be conducted for each of these three categories and once completed, interviews could be conducted with industry representatives working in each of those specific areas to explore their perceptions of facilitators and barriers related to designing with and for persons with a physical disability. Furthermore, future research could focus on accessibility to existing adapted products and inquire whether people with physical disabilities are informed about results from grey literature searches.

It is important to continue interviewing fashion industry representatives who are currently involved in designing for persons with a physical disability until data saturation is reached. Before doing so, the interview guide (see Appendix I) can be modified slightly based on our preliminary explorations. Question 6 (*What comes to mind when you think of a person with a physical disability?*) and its probe questions A and B (*What are their main characteristics? What do you know about their clothing needs?*) can be removed. Originally, these questions were thought to assist in gaining insight into the designers' understanding of a population with disabilities, however, these questions were never asked after realising the extent of their knowledge since participants were already involved in designing for persons with a physical disability. The following question should be added to the guide: *Why did you start designing adapted clothing?* Although the response to this question was retrieved informally in our preliminary explorations, our results in Topic 3: Fashion Industry Attitudes highlighted the importance of this information to better understand how designers became aware of the importance of clothing for persons with a physical disability; thus, it should not be missed in future interviews. Finally, question 20 (*Do you know if your products are meeting the needs of persons with a physical disability? If so, how?*) was found to fit more under Topic 1: The Process of Designing for Persons with a Physical Disability rather than Topic 4: Accessibility to Adapted Clothing and could be adjusted in the guide to improve the flow of future interviews. These minor modifications may help keep the interview focused and relevant to the participant's

expertise. In spite of everything, future interviews should remain semi-structured in nature to allow for flexibility in how the proposed topics are discussed.

Another crucial aspect for future research to consider are interviews with fashion industry representatives not currently involved in designing for persons with a physical disability. Since our exploration focused on individuals who were already open to the idea of adapted clothing, interviews with individuals who are not already involved in the field may highlight other important barriers or facilitators of the fashion industry to consider. The existing interview guide could be used as a basis and modified as necessary. For example, it would be pertinent to keep question 6 this time, however, question 7 (*Tell me about your design process for designing for persons with a physical disability...*) could be reframed into two questions: *Tell me about your standard design process...*, and *How do they think this process would change if you had to design specifically for persons with a physical disability?* This type of modification could be applied to the entirety of the interview guide to once again, help keep the interview focused and relevant to the participant's expertise. One could also consider doing a short pre-interview survey to acquire some preliminary background information about the interviewee to better prepare for the interview. For example, a pre-interview survey question could be: *Have you ever, informally or formally, had experience designing in consideration for persons with a disability?* These interviews should also be conducted until data saturation is reached.

In both cases (i.e. fashion industry representatives currently involved or not in designing for persons with a physical disability), future interviews could aim to recruit not only designers but also individuals involved at all levels of the process from the initial idea to having a final product (e.g. manufacturers, marketing specialists) to gather a more comprehensive understanding of the field.

As mentioned above, any pursuit of this research program using integrated knowledge translation (CIHR, 2016) will be essential, meaning continuing the KTA cycle with active involvement and exchanges between key stakeholders from multiple sectors (e.g. fashion

industry representatives, persons with a physical disability, caregivers, health professionals, researchers). Other knowledge translation activities, such as, adapted clothing forums, researchers presenting at various fashion events, and increasing the use of social media to report research results may also prove to be useful to facilitate the exchange of expertise. In these examples, following up with an evaluation of the success of knowledge translation is strongly encouraged (i.e. evaluating the integration of information shared at intersectoral events in daily practices). Future research should continue promoting the use of the ICF as a common language to facilitate communication across sectors

Chapter 7. Conclusion

In conclusion, it is crucial to determine ways to optimize participation of persons with a physical disability. This thesis is just the tip of the iceberg and underscored the complexity of how clothing can influence participation of persons with a physical disability. Results from the scoping review's scientific literature confirmed clothing is important in our everyday lives and it has a multidimensional influence on participation. Persons with a physical disability struggle with clothing and clothing-related issues in many ways and results from the scoping review's grey literature suggest that it is possible to design with and for them. Interview participants validated the feasibility of designing adapted clothing and enumerated important barriers and facilitators to consider for advancing the field, especially in the mainstream market. Future research should be intersectoral and continue to address/explore issues revolving around the relationship between clothing, participation, and persons with a physical disability with an emphasis on integrated knowledge translation. Ultimately, clothing can play a crucial role in optimizing participation of persons with a physical disability and addressing their clothing needs may unlock many doors to a more inclusive society.

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Appendix I. Interview Guide

Fashion Industry Representatives

(Currently involved in designing clothes for persons with a physical disability)

Introduction:

1. Goals of our research

To critically examine how clothing influences participation, meaning involvement in their involvement life situation, of persons with a physical disability and determine ways in which clothing and clothing-related issues (e.g. adaptation, design, access, etc.) can positively influence participation of these individuals.

Participation refers to the individual's "involvement in a life situation", which includes but is not limited to activities such as working, sports, dressing, cooking, etc. in one's natural environment (i.e. home, community) (ICF).

2. Your participation is important because it will help us better understand the perspective of some people in the fashion industry with regards to what is known about the needs of persons with a physical disability and what is happening in the fashion industry in regards to designing clothing for them.

3. Consent Received (Confidentiality and Anonymity explained):

4. Tell me a little bit about yourself:

Age: 18-24 25-34 35-49 50-59 60-69 70+

Gender: _____

Level of Education: _____

Area of Discipline: _____

5. What is your experience in the fashion industry? (data will be presented in a way to ensure anonymity)

Industry Name: _____

Type of Industry: _____

Position held at the Industry: _____

Years of experience: _____

6. What comes to mind when you think of a person with a physical disability?
 - a. What are their main characteristics?
 - b. What do you know about their needs (clothing)?

Themes:

The Process of designing for persons with a physical disability

7. Tell me about your design process for designing for persons with a physical disability...
8. What resources do you use when designing clothing for persons with a physical disability?
 - a. Scientific literature? Examples= Academic journals and textbooks
 - b. Grey literature? Examples= Blogs, Magazines, Government websites
 - c. Tacit knowledge? Conferences? Consulting persons with a physical disability?
Other?
9. Do you see a need for consulting literature during the design process?
 - a. Do you want more people consulting this literature?
 - b. What could help facilitate its use?

Perceptions towards designing for persons with a physical disability

10. Tell me more about how you think the industry is meeting the clothing needs of people with a disability...
 - a. On a scale of 1 to 10, 10 being the most important, where would you place the importance of designing clothes for persons with a physical disability and why?
 - b. How would you describe the attitudes of the fashion industry towards designing for persons with a physical disability?

Barriers to designing for persons with a physical disability

11. Could you tell me about any obstacles or additional difficulties in the design process when designing for persons with a physical disability?
 - a. What are they? For example: costs? time?
12. Could you tell me about any compromises that you feel you have to make when designing for persons with a physical disability?

Facilitators to designing for persons with a physical disability

13. How do you feel the clothing design process for persons with a physical disability could be improved?
 - a. What do you think could help facilitate designing for persons with a physical disability?
 - b. What information would be useful or valuable for you to assist in producing clothing that meets the needs of persons with a physical disability? For example: development funds, tax credits
14. How do you think designing for persons with a physical disability could be successfully introduced to more of the fashion industry?

Accessibility to adapted clothing

15. How do persons with a physical disability access your products?
 - a. Does anyone else play a role in helping persons with a physical disability gain access to your products? Health professionals? Caregivers?
16. Can you tell me about any challenges there are in accessing your products?
17. What would help make it easier for you to reach consumers with a physical disability?
18. Do you know if your products are meeting the needs of persons with a physical disability? If so, how?
19. Are you aware of any financial incentives for purchasing specially designed clothing?

Universal Design

20. Are you aware of Universal Design principles? If so....

Universal Design = design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.
(<https://www.washington.edu/doit/universal-design-process-principles-and-applications>)

- a. Have you ever used Universal Design principles in your process?
21. What is your experience in trying to align with these principles?
22. I would like to hear you comment about any obstacles or facilitators you feel (or think) are influencing the integration of these principles...

Future of adapted clothing

23. In our research we saw a lot of independent designers online offering specially-designed clothing, but we did not see much in the mass market, can you help me understand that?
24. What would you like to see in regards to clothes for persons with a physical disability in the next 5, 10, 25 years?

- a. With whom would you be willing or comfortable collaborating with? For example: rehabilitation researchers, tax agencies, etc.

25. How can research help?

- a. How do you want the information that we have? Written? Videos? Etc...

26. Is there anything else that has not been discussed that you would like to share?

Appendix II. Research Ethics Board Approvals

Certificat d'éthique

Par la présente, le comité d'éthique de la recherche des établissements du CRIR (CÉR) atteste qu'il a évalué, lors de sa réunion du 6 mai 2017, le projet de recherche CRIR-1241-0417 intitulé :

« **Clothing as a determinant of social participation and inclusion among persons with a physical disability: Building a foundation for future innovation** ».

Présenté par: **Bonnie Swaine, Ph.D.**
Alida Esmail, étudiante à la maîtrise en science de la réadaptation

Le présent projet répond aux exigences éthiques de notre CÉR. Le Comité autorise donc sa mise en œuvre sur la foi des documents suivants :

- Lettre d'introduction datée du 13 avril 2017;
- Formulaire A;
- Formulaire d'évaluation du Centre de réadaptation Constance-Lethbridge du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal, daté du 9 mai 2017, mentionnant que le projet est acceptable sur le plan de la convenance institutionnelle;
- Formulaire d'évaluation du Centre de réadaptation Lucie-Bruneau du CIUSSS du Centre-Sud-de-l'Île-de-Montréal, daté du 17 mai 2017, mentionnant que le projet est acceptable sur le plan de la convenance institutionnelle;
- Formulaire d'évaluation du Centre de réadaptation MAB-Mackay du CISSS du Centre-Ouest-de-l'Île-de-Montréal, daté du 9 mai 2017, mentionnant que le projet est acceptable sur le plan de la convenance institutionnelle;
- Formulaire d'évaluation de l'Hôpital juif de réadaptation du CISSS de Laval, daté du 25 avril 2017, mentionnant que le projet est acceptable sur le plan de la convenance institutionnelle;
- Formulaire d'évaluation de l'Institut Nazareth et Louis-Braille du CISSS de la Montégérie-Centre, daté du 9 mai 2017, mentionnant que le projet est acceptable sur le plan de la convenance institutionnelle;
- Formulaire d'évaluation de l'Institut de réadaptation Gingras-Lindsay de Montréal du CIUSSS du Centre-Sud-de-l'Île-de-Montréal, daté du 17 mai 2017, mentionnant que le projet est acceptable sur le plan de la convenance institutionnelle;
- Formulaire d'évaluation du Centre de réadaptation en déficience physique Le Bouclier du CISSS des Laurentides, daté du 4 mai 2017, mentionnant que le projet est acceptable sous certaines conditions à cet établissement;
- Preuve d'octroi d'une subvention de 40 000 \$ du Partenariat OPHQ - REPAR;
- Budget;

- Résumé du projet;
- Protocole de recherche;
- Formulaire d'information et de consentement destiné à la personne ayant une déficience physique ou leur proche aidant (versions française et anglaise du 27 juin 2017);
- Formulaire d'information et de consentement destiné au clinicien œuvrant auprès des personnes ayant une déficience physique (versions française et anglaise du 27 juin 2017);
- Formulaire d'information et de consentement destiné au représentant de l'industrie de la mode (versions française et anglaise du 27 juin 2017).

Ce projet se déroulera dans les sites du CRIR suivants :

- Centre de réadaptation Constance-Lethbridge du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal
- Centre de réadaptation Lucie-Bruneau du CIUSSS du Centre-Sud-de-l'Île-de-Montréal
- Hôpital juif de réadaptation du CISSS de Laval
- Institut Nazareth et Louis-Braille du CISSS de la Montérégie-Centre
- Institut de réadaptation Gingras-Lindsay de Montréal du CIUSSS du Centre-Est-de-l'Île-de-Montréal
- Centre de réadaptation MAB-Mackay du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal
- Centre de réadaptation en déficience physique Le Bouclier du CISSS des Laurentides

Ce certificat est valable pour un an. En acceptant le présent certificat d'éthique, le chercheur s'engage à :

1. Informer, dès que possible, le CÉR de tout changement qui pourrait être apporté à la présente recherche ou aux documents qui en découlent (Formulaire M) ;
2. Notifier, dès que possible, le CÉR de tout incident ou accident lié à la procédure du projet ;
3. Notifier, dès que possible, le CÉR de tout nouveau renseignement susceptible d'affecter l'intégrité ou l'éthicité du projet de recherche, ou encore, d'influer sur la décision d'un sujet de recherche quant à sa participation au projet ;
4. Notifier, dès que possible, le CÉR de toute suspension ou annulation d'autorisation relative au projet qu'aura formulée un organisme de subvention ou de réglementation ;
5. Notifier, dès que possible, le CÉR de tout problème constaté par un tiers au cours d'une activité de surveillance ou de vérification, interne ou externe, qui est susceptible de remettre en question l'intégrité ou l'éthicité du projet ainsi que la décision du CÉR ;
6. Notifier, dès que possible, le CÉR de l'interruption prématurée, temporaire ou définitive du projet. Cette modification doit être accompagnée d'un rapport

faisant état des motifs à la base de cette interruption et des répercussions sur celles-ci sur les sujets de recherche ;

7. Fournir annuellement au CÉR un rapport d'étape l'informant de l'avancement des travaux de recherche (formulaire R) ;
8. Demander le renouvellement annuel de son certificat d'éthique ;
9. Tenir et conserver, selon la procédure prévue dans la *Politique portant sur la conservation d'une liste des sujets de recherche*, incluse dans le cadre réglementaire des établissements du CRIR, une liste des personnes qui ont accepté de prendre part à la présente étude ;
10. Envoyer au CÉR une copie de son rapport de fin de projet / publication ;
11. En vertu de l'article 19.2 de la *Loi sur les services de santé et les services sociaux*, obtenir l'autorisation du Directeur des services professionnels de l'établissement sollicité avant d'aller consulter les dossiers des usagers de cet établissement, le cas échéant.



Me Michel T. Giroux
Président du CÉR



Date d'émission
27 juin 2017

Composition du comité d'éthique de la recherche des établissements du CRIR

| | |
|---|--|
| Mme Agathe Frenette / Mme Coralie Mercerat (membre substitut) | Une personne possédant une vaste connaissance du domaine psychosocial en réadaptation |
| Dre Céline Lamarre / Mme Imen Khelia (membre substitut) | Une personne possédant une vaste connaissance du domaine biomédical en réadaptation |
| Mme Saïda El Haïli / Mme Isabelle Fournier (membre substitut) | Clinicien détenant une vaste connaissance des déficits sensoriel visuels ou auditifs |
| Mme Mariama Touré / M. Dany Gagnon (membre substitut) | Clinicienne détenant une vaste connaissance des déficits moteurs ou neurologiques |
| M. Yanick Farmer / Me Delphine Roigt (membre substitut)/ | Une personne spécialisée en éthique |
| Me Michel T. Giroux / Me Nathalie Lecoq (membre substitut) | Une personne spécialisée en droit |
| Mme Monique Provost / Mme Marie-Claude Lavigne (membre substitut) | Une personne non affiliée à l'établissement et provenant de la clientèle des personnes adultes et aptes |
| Mme Diane L. Gaumond / Mme Dominique Labrèche (membre substitut) | Une personne non affiliée à l'établissement et provenant de la clientèle des personnes mineures ou inaptes |
| M. Michel Sinotte / | Une personne siégeant à titre de représentante du public |
| Mme Suzette McMaster Clément | Une personne siégeant à titre de représentante du public |
| À déterminer | Représentant de l'Université du Québec à Montréal |
| A déterminer | Représentant de l'Université de Montréal |
| Mme Patricia McKinley | Représentante de l'Université McGill |
| Me Anik Nolet | Secrétaire du CÉR et membre non-votant |

Certificat d'éthique (Renouvellement)

Aux fins de renouvellement, le Comité d'éthique de la recherche des établissements du CRIR, selon la procédure d'évaluation accélérée en vigueur, a examiné le projet de **CRIR-1241-0417** intitulé :

« **Clothing as a determinant of social participation and inclusion among persons with a physical disability: Building a foundation for future innovation** ».

Présenté par: **Bonnie Swaine, Ph.D.**
Alida Esmail, étudiante à la maîtrise en science de la réadaptation

Le présent projet répond aux exigences éthiques de notre CÉR. Ce projet se déroule dans les sites du CRIR suivants :

- **Centre de réadaptation Constance-Lethbridge du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal**
- **Centre de réadaptation en déficience physique Le Bouclier du CISSS des Laurentides**
- **Centre de réadaptation MAB-Mackay du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal**
- **Hôpital juif de réadaptation du CISSS de Laval**
- **Institut Nazareth et Louis-Braille du CISSS de la Montérégie-Centre**
- **Institut universitaire sur la réadaptation en déficience physique de Montréal du CIUSSS du Centre-Est-de-l'Île-de-Montréal (installations Lucie-Bruneau et Gingras-Lindsay)**

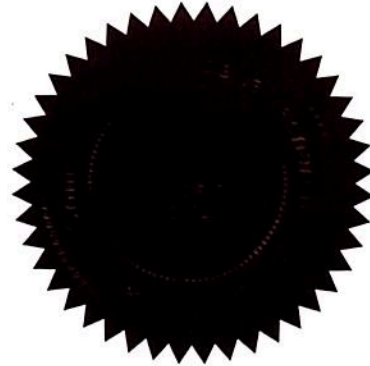
Ce certificat est valable pour un an. En acceptant le présent certificat d'éthique, le chercheur s'engage à :

1. Informer, dès que possible, le CÉR de tout changement qui pourrait être apporté à la présente recherche ou aux documents qui en découlent (Formulaire M) ;
2. Notifier, dès que possible, le CÉR de tout incident ou accident lié à la procédure du projet ;
3. Notifier, dès que possible, le CÉR de tout nouveau renseignement susceptible d'affecter l'intégrité ou l'éthicité du projet de recherche, ou encore, d'influer sur la décision d'un sujet de recherche quant à sa participation au projet ;
4. Notifier, dès que possible, le CÉR de toute suspension ou annulation d'autorisation relative au projet qu'aura formulée un organisme de subvention ou de réglementation ;
5. Notifier, dès que possible, le CÉR de tout problème constaté par un tiers au cours d'une activité de surveillance ou de vérification, interne ou externe, qui est susceptible de remettre en question l'intégrité ou l'éthicité du projet ainsi que la décision du CÉR ;

6. Notifier, dès que possible, le CÉR de l'interruption prématurée, temporaire ou définitive du projet. Cette modification doit être accompagnée d'un rapport faisant état des motifs à la base de cette interruption et des répercussions sur celles-ci sur les sujets de recherche ;
7. Fournir annuellement au CÉR un rapport d'étape l'informant de l'avancement des travaux de recherche (formulaire R) ;
8. Demander le renouvellement annuel de son certificat d'éthique ;
9. Tenir et conserver, selon la procédure prévue dans la *Politique portant sur la conservation d'une liste des sujets de recherche*, incluse dans le cadre réglementaire des établissements du CRIR, une liste des personnes qui ont accepté de prendre part à la présente étude ;
10. Envoyer au CÉR une copie de son rapport de fin de projet / publication.



Me Michel T. Giroux
Président du CÉR



Date d'émission
27 juin 2018

Montréal, le 18 février 2018

**Membres
institutionnels :**

- CISSS de Laval**
 - o Hôpital juif de réadaptation
- CISSS de la Montérégie-Centre**
 - o Institut Nazareth et Louis-Braille

- CIUSSS du Centre-Sud-de-l'Île-de-Montréal**
 - o Institut universitaire sur la réadaptation en déficience physique de Montréal
 - CRLB
 - IRD
 - IRGLM

- CIUSSS du Centre-Ouest-de-l'Île-de-Montréal**
 - o Centre de réadaptation Lethbridge-Layton-Mackay

Membres partenaires :

- CISSS de Lanaudière**
 - o Centre de réadaptation en déficience physique Le Bouclier
- CISSS des Laurentides**
 - o Centre de réadaptation en déficience physique Le Bouclier

Madame Bonnie Swaine, Ph.D.
CRIR
Pavillon Lindsay
Bureau 061
6363, chemin Hudson
Montréal (Québec) H3S 1M9

**Objet : Votre demande de modification pour le projet de recherche intitulé
« Clothing as a determinant of social participation and inclusion among persons with a physical disability: Building a foundation for future innovation »
Notre dossier : CRIR-1241-0417**

Madame,

À la suite de l'analyse de la demande de modification que vous nous avez soumise le 5 février dernier, le Comité d'éthique de la recherche des établissements du CRIR tient à vous informer qu'il vous autorise à poursuivre le projet cité en rubrique, tout en lui apportant les amendements suivants :

- Modification au devis de recherche relativement à la participation des représentants de l'industrie de la mode : ceux-ci ont maintenant le choix de participer à un groupe de discussion ou de prendre part à une entrevue individuelle;
- Mise à jour de l'échéancier établi pour la réalisation du projet.

La version du 18 février 2019 des documents suivants faisant des modifications ci-dessus mentionnées répondent aux exigences éthiques en vigueur :

- Protocole de recherche;
- Formulaire de consentement (versions anglaise et française)

Veuillez recevoir, Madame Swaine, mes cordiales salutations.


Mé Anik Nolet
Coordonnatrice à l'éthique de la recherche
des établissements du CRIR
☎ (514) 527-9565, poste 3795
✉ anolet.crir@ssss.gouv.qc.ca

AN/cl

p.j. : Documents approuvés

c.c. : Chantal Robillard, CRCL et CRMM du CIUSSS du Centre-Ouest-de-l'Île-de-Montréal
Manon Parisien, CRLB du Centre-Sud-de-l'Île-de-Montréal
Christine Alary Gauvreau, HJR du CISSS de Laval
Catherine Houtekier, INLB du CISSS de la Montérégie-Centre
Marie-Thérèse Laramée et Frédéric Messier, IRGLM du CIUSSS du Centre-Sud-de-l'Île-de-Montréal

Appendix III. Consent Forms

INFORMED CONSENT FORM
(REPRESENTATIVE FROM THE FASHION INDUSTRY)

1. STUDY TITLE

Clothing as a determinant of social participation and inclusion among persons with a physical disability: Building a foundation for future innovation (MODE project)

2. PRINCIPAL INVESTIGATORS

Principal Investigator

Bonnie Swaine

Full professor

École de réadaptation de l'Université de Montréal

CRIR Researcher: Institut universitaire sur la réadaptation en déficience physique du Montréal (IURDPM)

514-343-7361

bonnie.swaine@umontreal.ca

APPROUVÉ PAR LE CÉR
DES ÉTABLISSEMENTS DU CRIR

Project Coordinator

Alida Esmail

Masters student in Rehabilitation Sciences

Université de Montréal

alida.esmail@umontreal.ca

LE: 18 FÉVRIER 2019

3. FUNDING AGENCY

The study is funded by the Réseau provincial de recherche en adaptation-réadaptation (REPAR) and l'Office des personnes handicapées du Québec (OPHQ).

4. INTRODUCTION

We are inviting you to participate in a research project. Before agreeing to participate in this project, please take the time to read and carefully consider the following information.

This consent form explains the aim of this study, the procedures, advantages, risks and inconveniences, as well as the persons to contact, if necessary.

This consent form may contain words that you do not understand. We invite you to ask any question that you consider useful to the investigator and the other

MODE project

staff members assigned to the research project and ask them to explain any word or information that is not clear to you.

5. DESCRIPTION OF THE PROJECT AND ITS OBJECTIVES

The project aims to 1) understand how clothing can be a determinant of social participation and inclusion of persons (≥ 14 years) with a physical disability as reported in the literature, and as perceived by multiple key informants, and 2) determine ways in which clothing and clothing-related issues can positively influence social participation of persons with a physical disability.

The project targets 4 categories of participants aged 14 years and older*. Either individuals who:

- 1) present with a physical disability that results in clothing and/or dressing issues (10 to 15 participants),
- 2) are a caregiver of someone with a physical disability (2 to 3 participants),
- 3) work in the fashion industry (10 to 15 participants) or,
- 4) work as a health professional with people with a physical disability (10 to 15 participants).

Individual interviews or focus groups will take place with some or all types of participants listed above, depending on their respective availabilities.

*Participants aged 14 to <18 apply only to the category of persons with a physical disability.

6. NATURE OF PARTICIPATION

You are invited to participate in this research as a fashion industry representative.

If you are interested, we invite you to participate in a 2-hour interview and/or focus group organized at a time and place convenient to all participants. A facilitator will ask questions based on your perception of clothing as an influence on the capacity for persons with a physical disability to carry out daily roles and activities. Other discussion themes will focus on universal design, the challenges you face when working with textiles (ex. necessary compromises), and the information that you need to produce clothing that suits the needs of people with a physical disability. The interview (and/or focus group) will be audio recorded to minimize the need for us to take notes and for us to concentrate on the interview/discussion.

MODE project

7. PERSONAL BENEFITS OF PARTICIPATION IN THE STUDY

You will not benefit personally from taking part in this study. However, you might contribute to the advancement of science in the field of adapted clothing for persons with a physical disability.

8. RISKS AND INCONVENIENCES ASSOCIATED WITH PARTICIPATING IN THE STUDY

The duration of the interview/focus group (approximately 2 hours), possibly during work hours, and possibly the need to travel to the location where it is held may be inconvenient to some.

9. ACCESS TO THE RESULTS AT THE END OF THE RESEARCH

At the end of the study, you will have the possibility of access to the general results of this research project.

Yes email : _____

No

10. CONFIDENTIALITY

All personal information collected concerning you during the study will be coded to ensure its confidentiality. Only the members of the research team will have access to it. However, for research project control purposes, your research record could be consulted by a person mandated by the REB of the CRIR institutions or by the Direction de l'éthique et de la qualité du ministère de la Santé et des Services sociaux du Québec. This person adheres to a policy of strict confidentiality. The research data (notes and recordings) will be kept under lock and key on a computer and in a locked filing cabinet in Bonnie Swaine's research laboratory located at the Lindsay Pavillon of the *Institut universitaire sur la réadaptation en déficience physique du Montréal-CRIR* for a period of 7 years following the end of the project, after which it will be destroyed. In the event that the results of this study are presented or published, no information that can identify you will be included.

We request that you remain discreet regarding the identity of the focus group participants and the comments made there.

11. VOLUNTARY PARTICIPATION AND RIGHT OF WITHDRAWAL

MODE project

It is understood that your participation in this research project is completely voluntary and that you remain free to terminate your participation at any time without having to give a reason and without suffering any prejudice of any kind.

However, in the case of a focus group, total destruction of the recordings and transcriptions will be impossible. The dialogues will be kept to maintain the coherence of the discussion.

12. SUBSEQUENT STUDIES

It is possible that the results of this study will give rise to another research project. In this context, do you authorize the persons in charge of this project to contact you again and ask if you would like to participate in this new project?

- no
- yes, for one year *
- yes, for two years *
- yes, for three years *

* Note, if you check off one of these three options, your personal contact information will be kept by the Lead Investigator for the period which you have selected.

13. CLAUSE OF RESPONSIBILITY

By accepting to participate in this study, you do not renounce any of your rights nor do you release the investigators or the institution involved from their civil or professional responsibilities.

14. COMPENSATORY INDEMNITY

You will receive \$25 CAD in consideration of the constraints and inconveniences resulting from your participation in the research project

15. RESOURCE PERSONS

If you have any questions regarding the research project, if you wish to withdraw from this study or if you wish to inform the research team regarding an incident, you may contact: Bonnie Swaine, Ph.D. principal investigator, 514-343-7361, bonnie.swaine@umontreal.ca

If you have any questions regarding your rights and responsibilities or your participation in this research project, you may contact Me Anik Nolet, Research Ethics Coordinator for the CRIR's institutions, at 514-527-9565, extension 3795

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or by email at the following email address: anolet.crir@ssss.gouv.qc.ca For these same questions, you may also contact the local service quality and complaints commissioner from your institution (see appendix).

16. CONSENT

I declare that I have read and understood this project, the nature and the scope of my participation, as well as the risks and inconveniences to which I may be exposed, as presented in this document. I have had the opportunity to ask all my questions regarding the different aspects of the study and to receive answers to these questions. A signed copy of this information and consent form must be provided to me.

I, undersigned, voluntarily accept to participate in this study. I can withdraw my participation in this study at any time without prejudice of any kind. I certify that I was allowed all the time necessary to make my decision.

Participant's Name:

SIGNATURE

Signed at _____ on _____, 20_____

THE RESEARCHER MUST GIVE A SIGNED COPY OF THE CONSENT FORM TO THE PARTICIPANT AND KEEP ANOTHER ONE IN THE RECORD

MODE project

17. COMMITMENT OF THE INVESTIGATOR OR HER/HIS REPRESENTATIVE

I, undersigned, _____, certify:

- (a) that I have explained to the signatory the terms of the present form;
- (b) that I have answered any questions that she/he asked me in this regard;
- (c) that I have clearly indicated that she/he remains, at any time, free to terminate her/his participation in the research project described above;
- (d) that I will provide her/him a signed and dated copy of this form.

Signature of the Lead Investigator or his representative

Signed on _____ of _____, 20____

MODE project

ANNEXE

**COMMISSAIRES LOCAUX AUX PLAINTES ET À LA QUALITÉ DES SERVICES
DES ÉTABLISSEMENTS DU CRIR ET DE LEURS PARTENAIRES**

Centre de réadaptation Constance-Lethbridge

Centre de réadaptation MAB-Mackay

Rosemary Steinberg

CIUSSS du Centre-Ouest-de-l'Île-de-Montréal

Téléphone : (514) 340-8222, poste 5833

Centre de réadaptation Lucie-Bruneau

Institut de réadaptation Gingras-Lindsay de Montréal

Céline Roy

CIUSSS du Centre-Sud-de-l'Île-de-Montréal

Téléphone : (514) 593-3600

commissaireauxplaintes@cjm-iu.qc.ca

Hôpital juif de réadaptation

Hélène Bousquet

CISSS de Laval

Téléphone : (450) 668-1010, poste 23628

plaintes.csssl@ssss.gouv.qc.ca

Institut Nazareth et Louis-Braille

Louise Hardy

CISSS de la Montérégie-Centre

Téléphone : (450) 466-5434

Centre de réadaptation en déficience physique Le Bouclier

Gaétan Thibaudeau

CISSS de Lanaudière

Téléphone : (450) 759-5333, poste 2107 ou sans frais 1 800 229-1152

gaetan.thibaudeau@ssss.gouv.qc.ca

Dominique Demers

CISSS des Laurentides

Téléphone: (450) 473-6811, poste 44105

dominique.demers.lddm@ssss.gouv.qc.ca

FORMULAIRE D'INFORMATION ET DE CONSENTEMENT (REPRÉSENTANT DE L'INDUSTRIE DE LA MODE)

1. TITRE DU PROJET

Le vêtement en tant que déterminant de la participation sociale et de l'inclusion chez les personnes ayant une déficience physique : Construire les fondements de l'innovation future (projet MODE)

2. RESPONSABLE(S) DU PROJET

Chercheure principale

Bonnie Swaine

Professeur titulaire

École de réadaptation de l'Université de Montréal

Chercheure du CRIR: Institut universitaire sur la réadaptation en déficience physique du Montréal (IURDPM)

514-343-7361

bonnie.swaine@umontreal.ca

**APPROUVÉ PAR LE CÉR
DES ÉTABLISSEMENTS DU CRIR**

Coordonnatrice du projet

Alida Esmail

Étudiante à la maîtrise en sciences de la réadaptation

Université de Montréal

alida.esmail@umontreal.ca

LE: 18 FÉVRIER 2019

3. ORGANISME SUBVENTIONNAIRE

Ce projet de recherche est subventionné par des fonds octroyés par le Réseau provincial de recherche en adaptation-réadaptation (REPAR) et l'Office des personnes handicapées du Québec (OPHQ).

4. PRÉAMBULE

Nous vous invitons à participer à un projet de recherche qui implique de partager votre opinion. Avant d'accepter de participer à ce projet de recherche, veuillez prendre le temps de lire, de comprendre et de considérer attentivement les renseignements qui suivent.

Ce formulaire de consentement vous explique le but de cette étude, les procédures, les avantages, les risques et inconvénients, de même que les personnes avec qui communiquer au besoin.

Projet MODE

Le présent formulaire de consentement peut contenir des mots que vous ne comprenez pas. Nous vous invitons à poser toutes les questions que vous jugerez utiles au chercheur et aux autres membres du personnel affecté au projet de recherche et à leur demander de vous expliquer tout mot ou renseignement qui n'est pas clair.

5. DESCRIPTION DU PROJET ET DE SES OBJECTIFS

Le projet vise à 1) comprendre comment le vêtement pourrait être un facteur déterminant de la participation sociale et de l'inclusion des personnes (≥ 14 ans) ayant une déficience physique tel que rapporté dans la littérature et tel que le perçoivent de multiples informateurs clés, et 2) déterminer des façons dont le vêtement et les questions liées à l'habillement sont susceptibles d'influencer positivement la participation sociale de personnes ayant une déficience physique.

Le projet cible 4 catégories de personnes âgées de 14 ans et plus*. Soit des personnes qui :

- 1) présentent une déficience physique qui mène à des problématiques avec les vêtements et/ou l'habillement (entre 10 et 15 participants visés),
- 2) aident une personne ayant une déficience physique (proche aidant) (entre 2 et 3 participants visés),
- 3) œuvrent dans le domaine de l'industrie de la mode (entre 10 et 15 participants visés) ou,
- 4) œuvrent à titre de clinicien auprès des personnes ayant une déficience physique (entre 10 et 15 participants visés).

Des entrevues individuelles ou des groupes de discussion seront réalisés auprès de certains groupes de participants mentionnés ci-dessus, selon leurs disponibilités respectives.

*Seules les personnes provenant de la catégorie ayant une déficience physique pourraient avoir entre 14 et 18 ans.

6. NATURE DE LA PARTICIPATION

Vous êtes invité à participer à cette recherche en tant que représentant de l'industrie de la mode.

Si vous êtes intéressé, nous vous inviterons à participer à une entrevue et / ou un groupe de discussion de 2 heures qui sera tenu à l'heure et un endroit qui conviendront à tous les participants. Un animateur de groupe vous posera alors des questions sur votre perception quant à l'influence des vêtements sur la réalisation des activités et rôles des personnes présentant une déficience physique. D'autres thèmes de la discussion porteront sur la conception universelle, les défis auxquels ils font face en travaillant avec le textile (p. ex.

Projet MODE

les compromis nécessaires) et les informations dont vous aurez besoin pour produire des vêtements conformes aux besoins des personnes ayant une déficience physique. L'entrevue (et / ou le groupe de discussion) sera enregistrée sur bande audio afin de nous permettre de minimiser la prise de notes et de nous consacrer à l'échange.

7. AVANTAGES POUVANT DÉCOULER DE VOTRE PARTICIPATION

Vous ne retirerez personnellement pas d'avantages à participer à cette étude. Toutefois, vous pourriez contribuer à l'avancement de la science dans le domaine des vêtements adaptés pour les personnes présentant des déficiences physiques.

8. RISQUES ET INCONVÉNIENTS POUVANT DÉCOULER DE VOTRE PARTICIPATION

La durée de l'entrevue / groupe de discussion d'environ 2 heures (possiblement tenu durant les heures de travail) et l'obligation possible de se déplacer pour s'y rendre, peuvent représenter pour certaines personnes des inconvénients.

9. ACCÈS AUX RÉSULTATS À LA FIN DE LA RECHERCHE

À la fin de l'étude, vous aurez la possibilité d'avoir accès aux résultats généraux découlant de ce projet de recherche.

Oui courriel : _____

Non

10. CONFIDENTIALITÉ

Tous les renseignements personnels recueillis à votre sujet au cours de l'étude seront codifiés afin d'assurer leur confidentialité. Seuls les membres de l'équipe de recherche y auront accès. Cependant, à des fins de contrôle du projet de recherche, votre dossier de recherche pourrait être consulté par une personne mandatée par le CÉR des établissements du CRIR ou par la Direction de l'éthique et de la qualité du ministère de la Santé et des Services sociaux du Québec, qui adhère à une politique de stricte confidentialité. Les données de recherche (notes et enregistrements) seront conservées à l'ordinateur sous mot de passe (ainsi que dans une filière verrouillée) par le responsable de l'étude dans son laboratoire de recherche situé Pavillon Lindsay de l'Institut universitaire sur la réadaptation en déficience physique du Montréal-CRIR pour une période de 7 ans suivant la fin du projet, après quoi, elles seront détruites. En cas de présentation de résultats de cette recherche ou de publication, rien ne pourra permettre de vous identifier.

Projet MODE

Nous vous demandons de demeurer discret sur l'identité des participants au groupe de discussion ainsi que sur les propos qui y ont été tenus.

11. PARTICIPATION VOLONTAIRE ET DROIT DE RETRAIT

Il est entendu que votre participation à ce projet de recherche est tout à fait volontaire et que vous restez libre, à tout moment, de mettre fin à votre participation sans avoir à donner de raison ni à subir de préjudice de quelque nature que ce soit.

Cependant, dans le cas d'un groupe de discussion il sera impossible d'effectuer une destruction totale des enregistrements et des transcriptions. Les dialogues seront conservés pour garder la cohérence de la discussion.

12. ÉTUDES ULTÉRIEURES

Il se peut que les résultats obtenus à la suite de cette étude donnent lieu à plusieurs autres recherches. Dans cette éventualité, autorisez-vous les responsables de ce projet à vous contacter à nouveau et à vous demander si vous souhaitez participer à cette nouvelle recherche ?

- non
- oui pour une durée d'un an *
- oui pour une durée de deux ans *
- oui pour une durée de trois ans *

* Notez que si vous cochez l'une de ces trois cases, vos coordonnées personnelles seront conservées par le chercheur principal pour la période à laquelle vous avez consenti.

13. CLAUSE DE RESPONSABILITÉ

En acceptant de participer à cette étude, vous ne renoncez à aucun de vos droits ni ne libérez les chercheurs et des établissements prenant part à l'étude de leurs responsabilités civiles et professionnelles.

14. INDEMNITÉ COMPENSATOIRE

Vous recevrez 25 \$ CAD en contrepartie des contraintes et des inconvénients découlant de votre participation au projet de recherche.

Projet MODE

15. PERSONNES-RESSOURCES

Si vous avez des questions concernant le projet de recherche, si vous souhaitez vous retirer de l'étude ou si vous voulez faire part à l'équipe de recherche d'un incident, vous pouvez contacter : Bonnie Swaine, Ph.D. chercheure principale, 514-343-7361, bonnie.swaine@umontreal.ca .

Si vous avez des questions sur vos droits et recours ou sur votre participation à ce projet de recherche, vous pouvez communiquer avec Me Anik Nolet, coordonnatrice à l'éthique de la recherche des établissements du CRIR au (514) 527-9565 poste 3795 ou par courriel à l'adresse suivante : anolet.crir@sss.gouv.qc.ca. Pour ces mêmes questions, vous pouvez également contacter le commissaire local aux plaintes et à la qualité de votre établissement (voir l'annexe).

16. CONSENTEMENT

Je déclare avoir pris connaissance et compris le présent projet, la nature et l'ampleur de ma participation, ainsi que les risques et les inconvénients auxquels je m'expose tel que présenté dans le présent formulaire. J'ai eu l'occasion de poser toutes les questions concernant les différents aspects de l'étude et de recevoir des réponses à mes questions. Une copie signée de ce formulaire d'information et de consentement doit m'être remise.

Je, soussigné(e), accepte volontairement de participer à cette étude. Je peux me retirer en tout temps sans préjudice d'aucune sorte. Je certifie qu'on m'a laissé le temps voulu pour prendre ma décision.

NOM DU PARTICIPANT

SIGNATURE

Fait à _____, le _____, 20____

**LE CHERCHEUR REMET UNE COPIE SIGNÉE DU FORMULAIRE DE CONSENTEMENT
AU PARTICIPANT ET EN CONSERVE UNE AU DOSSIER**

Projet MODE

17. ENGAGEMENT DU CHERCHEUR OU DE SON REPRÉSENTANT

Je, soussigné (e), _____, certifie

- (a) avoir expliqué au signataire les termes du présent formulaire;
- (b) avoir répondu aux questions qu'il m'a posées à cet égard;
- (c) lui avoir clairement indiqué qu'il reste, à tout moment, libre de mettre un terme à sa participation au projet de recherche décrit ci-dessus;
- (d) que je lui remettrai une copie signée et datée du présent formulaire.

Signature du responsable du projet
ou de son représentant

Fait à _____, le _____ 20____

ANNEXE

**COMMISSAIRES LOCAUX AUX PLAINTES ET À LA QUALITÉ DES SERVICES
DES ÉTABLISSEMENTS DU CRIR ET DE LEURS PARTENAIRES**

Centre de réadaptation Constance-Lethbridge

Centre de réadaptation MAB-Mackay

Rosemary Steinberg

CIUSSS du Centre-Ouest-de-l'Île-de-Montréal

Téléphone : (514) 340-8222, poste 5833

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Louise Hardy

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Centre de réadaptation en déficience physique Le Bouclier

Gaétan Thibaudeau

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Dominique Demers

CISSS des Laurentides

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dominique.demers.lddm@ssss.gouv.qc.ca

Appendix IV. Grey Literature Resource List

| | Name | Purpose | Expertise | Location | URL |
|----|--|----------------|-----------------------------|-----------------------|---|
| 1 | Silvert's Adaptive Clothing & Footwear | Retailer | Elderly adapted clothing | Concord, ON, Canada | https://www.silverts.com/spinal-cord-injury-clothing/ |
| 2 | Addressing Needs | Retailer | Mobility and Medical Issues | Mission, BC, Canada | https://addressingneeds.com/ |
| 3 | Jline Fashions | Retailer | Disabled Adults | Concord, ON, Canada | http://www.jlinefashions.com/index.php/adaptive-clothing/ |
| 4 | Ovidis Adaptive Wear | Retailer | Adaptive | Canada | https://ovidis.com/ |
| 5 | Seniors Fashion by Sewlutions | Retailer | Elderly | SK, Canada | https://seniorsfashions.com/ |
| 6 | Koolway Sports | Retailer | Sports Outerwear | Whitby, ON, Canada | http://koolwaysports.com/ |
| 7 | Création Confort | Retailer | Elderly | Montreal, QC, Canada | https://www.creationconfort.com/ |
| 8 | Boutiques Chic Chez Vous | Retailer | Adapted | Montreal, QC, Canada | https://www.chicchezvous.com/ |
| 9 | Ézé plus | Retailer | Reduced Mobility | Montreal, QC, Canada | https://www.ezeplus.com/ |
| 10 | Style ta vie | Retailer | Elderly | St-Jérôme, QC, Canada | https://styletavie.ca/boutique/ |
| 11 | Créa Vie | Retailer | Adapted | Quebec, Canada | http://www.creavie.qc.ca/ |

| | | | | | |
|----|-----------------------------------|----------|-------------|------------------------------|--|
| 12 | IZ Adaptive | Retailer | Adapted | Toronto, Canada | http://izadaptive.com/ http://www.izzycamilleri.com/ |
| 13 | Super Fly Adaptive Apparel | Retailer | Adapted | Calgary, AB, Canada | https://www.super-fly.com/ |
| 14 | Geri Fashions | Retailer | Adapted | Oakville, ON, Canada | https://www.gerifashions.com/ |
| 15 | JBS Clothing | Retailer | Elderly | Caledon, ON, Canada | https://www.jbsclothing.com/ |
| 16 | Pasolo.com | Retailer | Paramedical | Paris, France | https://www.pasolo.com/ |
| 17 | Selfia | Retailer | Adapted | Le Longeron, France | http://www.selfia.com/ |
| 18 | Constant & Zoe | Retailer | Adapted | Paris, France | https://www.constantetzoe.com/ |
| 19 | Habicap | Retailer | Adapted | Tresques, France | https://www.habicap.fr/ |
| 20 | Les Belles Créations d'Anna | Retailer | Adapted | Chatelneuf, France | https://www.lesbellescreationsdana.com/ |
| 21 | Facil'en fil | Retailer | Elderly | Dardilly, France | https://www.facilenfil.fr/ |
| 22 | Maëlig Vêt | Retailer | Adapted | Hédé- Bazouges, France | https://maeligvet.cmonsite.fr/ |
| 23 | Zipsnap Créations | Retailer | Adapted | Orthez, France | https://www.zipsnap.fr/ |

| | | | | | |
|----|-------------------------|----------|-------------------------------|---|---|
| 24 | Les Loups Bleus | Retailer | Capes, Windbreakers and Coats | Vienne-en-Arthies, France | http://www.lesloupsbleus.net/ |
| 25 | Ma Mode | Retailer | Adapted | Saint-Barthélemy-d'Anjou (Angers), France | https://www.ma-mode.com/ |
| 26 | Endy & Co | Retailer | Handicapped Women | Paris, France | https://www.facebook.com/pg/ENDYandCo/about/?ref=internal |
| 27 | Bien à Porter | Retailer | | Le Havre, France | http://www.bienaporter.com/ |
| 28 | Insolite Fashion | Retailer | Adapted | Taissy, France | https://www.facebook.com/InsoliteAssociationetFashion?fref=ts |
| 29 | Fasilabi | Retailer | Adapted | Valbonne, France | www.fasilabi.com https://www.vivrefm.com/posts/2013/10/fasilabi-des-vetements-adaptes-aux-enfants-handicapes |
| 30 | Kiabi | Retailer | Adapted | Paris, France | https://www.kiabi.com/ |
| 31 | Créa Confort | Retailer | Adapted | Vitré, France | http://www.crea-confort.com/index.php |
| 32 | Mon Fauteuil Roulant | Retailer | Wheelchair Users | Bidart, France | https://monfauteuilroulant.com/Vetements-pour-Handicap |
| 33 | Sweet by AC Ratsimbason | Retailer | Orthopedic corsets | Nice, France | https://www.facebook.com/sweetbyacratsimbason/ |
| 34 | Handicap Incontinence | Retailer | Incontinence | Dax, France | http://www.handicapincontinence.fr/87-vetements-specialises |

| | | | | | |
|----|----------------------|------------------|-----------------------------|----------------------------|--|
| 35 | Textiles Services | Retailer | Medical garments | Château Salins, France | https://www.textiles-services.fr/125-vetements-medicalises |
| 36 | Csoukha | Retailer-Braille | Braille | Nimes, France | https://www.csoukha-boutique.com/blank-cee5 |
| 37 | Pauline & Manon | Retailer | Adapted | France | http://pauline.manon.pagesperso-orange.fr/ |
| 38 | Au Fil du Temps | Retailer | Adapted | France | http://pauline.manon.pagesperso-orange.fr/ |
| 39 | Garance | Retailer | Underwear and Bathing suits | Paris, France | https://www.garance-paris.com/ |
| 40 | Rackety's | Retailer | Adapted | Nottingham, United Kingdom | http://www.disabled-clothing.co.uk/ |
| 41 | Able2Wear | Retailer | Wheelchair Users | Cheltenham, UK | https://www.able2wear.co.uk/ |
| 42 | Brothers and Sisters | Retailer | Kids | Northhamptonshire, UK | https://www.brothersandsisterslondon.com/ |
| 43 | The Able Label | Retailer | Adapted | Maidstone, UK | https://www.theablelabel.com/ |
| 44 | Asos | Retailer | | UK | https://www.asos.com/about/who-we-are/ https://fashionunited.uk/news/fashion/asos-joins-brands-making-accessible-fashion-with-new-wheelchair-friendly-jumpsuit/2018070630614 |

| | | | | | |
|----|--|----------|---------------------|------------------------------|---|
| 45 | Amiamo | Retailer | Adapted | Münchenstein, Switzerland | http://kleidungamiamo.ch/en/home |
| 46 | Habits Plus | Retailer | Adapted | Boudry, Switzerland | http://www.habits-plus.ch/habits-plus-accueil |
| 47 | Reha-Mode | Retailer | Wheelchair Users | Allschwil, Switzerland | https://www.reha-mode.ch/fr/ |
| 48 | Magna Ready | Retailer | Magnetic Apparel | Lyons, Georgia, US | https://www.magnaready.com/ |
| 49 | AG Apparel | Retailer | Adaptive | Miami, FL, US | http://www.agapparel.com/index.php |
| 50 | ABL Denim | Retailer | Denim | Los Angeles, CA, US | https://abldenim.com/ |
| 51 | Tommy Adaptive (Tommy Hilfiger) | Retailer | Adapted | US | https://usa.tommy.com/en/tommy-adaptive |
| 52 | Alter Ur Ego | Retailer | Wheelchair Users | Kentucky, US | https://www.alterurego.co/ |
| 53 | iCare Clothing Solutions | Retailer | Adapted | Plainview, NY, US | http://www.clothingsolutions.com/ |
| 54 | Amped Up | Retailer | Amputees | New York City, US | http://ampedupclothing.com/ |

| | | | | | |
|----|---------------------|------------------|------------------|-----------------------|--|
| 55 | Nike | Retailer | | US | https://www.nike.com/ca/en_gb/c/innovation/flyease https://news.nike.com/news/the-flyease-journey |
| 56 | Target | Retailer | | US | https://intl.target.com/c/kids-adaptive-clothing/-/N-1laue#?lnk=snav_rd_adaptive_clothing |
| 57 | Iver Fashion | Retailer | Adapted | | https://www.facebook.com/iverfashion/ |
| 58 | Rollimoden | Retailer | Wheelchair Users | Flein, Germany | https://www.rollimoden.de/en/ |
| 59 | Adaptawear Clothing | Retailer | Elderly | Sydney, Australia | http://adaptawear.com.au/ |
| 60 | Able Clothing | Retailer | Kids | Australia | https://ableclothing.com.au/ |
| 61 | Connectra | Resource Hub | | Vancouver, BC, Canada | http://www.connectra.org/index.html |
| 62 | Kaylyn Mackenzie | Designer | Wheelchair Users | Vancouver, BC, Canada | https://sci-bc.ca/qa-designer-mackenzie/ |
| 63 | VestechPro | R&D collaborator | | Montreal, QC, Canada | https://vestechpro.com/en/ |
| 64 | Trend Innovations | Manufacturer | | Montreal, QC, Canada | http://plus.lapresse.ca/screens/97aff414-2cb4-4d6d-99d7-068888cbdf8a_7C_0.html?utm_medium=Email&utm_campaign=Internal+Share&utm_content=Screen https://www.trendinnovations.ca/ |

| | | | | | |
|----|--|--------------|-----------------|-----------------------------|---|
| 65 | Handicap.fr | Resource Hub | | Lyon, France | https://aides-techniques.handicap.fr/cat-vetements-adaptés-143.php |
| 66 | Les habilleuses | Tailor | Adapted | Fécamp, France | http://www.leshabilleuses.com/ |
| 67 | Mode H Europe | Association | | Ballan-Miré (Tours), France | http://modeh.fr/accueil-2017/ |
| 68 | Vêtifuté | Association | | Loches (Tours), France | http://www.vetifute.com/ |
| 69 | A&K Classics Mode & Handicap, C'est Possible | Association | | Paris, France | https://www.facebook.com/modedehandicap?lst=533730292%3A1177441475%3A1534879861 https://www.helloasso.com/associations/mode-et-handicap/collectes/Projet_Mode_et_Handicap http://www-aandk.france-artisanat.fr/ |
| 70 | Cover Dressing | Association | | Le Havre, France | www.coverdressing.com |
| 71 | Mode Estime | Association | | Paris, France | http://www.modeestime.fr/ |
| 72 | Camille Boillet Couture | Designer | Wedding Dresses | France | http://www.camilleboilletcouture.com/ https://www.facebook.com/camilleboilletcouture |

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|----|--|--------------------------------|---------|---------------------------|--|
| 73 | Adapt' Couture | Boutique, Tailor | Adapted | Carcassonne, France | http://adaptcouture.wifeo.com/ |
| 74 | Mlc Créa Couture | Designer | Dresses | Savennières , France | http://www.mlccreacouture.fr/ |
| 75 | Viviane Couture | Tailor | Adapted | Perpignan, France | http://www.vivianecouture.fr/vert/accueil/ |
| 76 | Open Style Lab | Research and Education | | New York City, US | https://www.openstylelab.org/ |
| 77 | Cooper Hewitt, Smithsonian Design Museum | Museum | | New York City, US | https://www.cooperhewitt.org/channel/access-ability/ http://www.lapresse.ca/vivre/modere/201802/16/01-5154170-les-stylistes-sinteressent-au-handicap.php |
| 78 | Cur8able | Blog | | Los Angeles, CA, US | https://www.cur8able.com/ |
| 79 | Runway of Dreams | Foundation | | New Jersey, US | http://runwayofdreams.org/home/ |
| 80 | Downs Designs Dreams | Not for Profit Organization | | Mentor, Ohio, US | https://downsdesignsdreams.org/ |
| 81 | Sew Much Comfort | Not for Profit Organization | | US | http://www.sewmuchcomfort.org/ |
| 82 | Billy Footwear | Manufacturer | | Seattle US | https://billyfootwear.com/ |
| 83 | Spinal Cord Injury Zone | Education and Awareness | | | https://spinalcordinjuryzone.com/ |

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|----|-----------------------|-------------------------------|---------|-------------|---|
| 84 | Livestrong | Education and Awareness | | | https://www.livestrong.com/article/218203-adaptive-equipment-for-spinal-cord-injury/ |
| 85 | Studio Ratsimbason | Tailor | Adapted | | https://www.facebook.com/Stylismemedical/ |
| 86 | Disabled World | Resource Hub | | | https://www.disabled-world.com/assistivedevices/adaptive-clothing.php |
| 87 | Iulia Barton | Model Agency | | Rome, Italy | https://www.facebook.com/iuliabarton/ |
| 88 | Fashion Freaks | Resource | | Sweden | https://en.fashionfreaks.se/ |

**Appendix V. Supplemental File- Literature Search
Strategies (Article 2)**

MEDLINE Research Strategy

Initial Search in February 2017

1. disabled persons/ or exp amputees/ or exp visually impaired persons/
2. exp Mobility Limitation/ or exp foot deformities/ or exp hand deformities/ or exp musculoskeletal abnormalities/ or exp rheumatic diseases/ or exp Amputation, traumatic/
3. paralysis/ or exp hemiplegia/ or exp paraplegia/ or exp quadriplegia/
4. exp Spinal Cord Injuries/
5. (amputee* or wheelchair* or paraly* or hemipleg* or parapleg* or quadripleg* or handicap* or disabled or blind or blindness or arthrit* or arthros*).ab,kf,kw,ti.
6. ((physical* or motor or visual* or musculoskelet*) adj1 (disab* or disord* or handicap* or impair* or disease*)).ab,kf,kw,ti.
7. exp Wheelchairs/
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. clothing/ or exp shoes/
10. (cloth* or shoe* or textil* or wearable* or glove* or dress).ab,kf,kw,ti.
11. exp Textiles/
12. 9 or 10 or 11
13. 8 and 12
14. limit 13 to (yr="1990 -Current" and ("all adult (19 plus years)" or "adolescent (13 to 18 years)")) and (english or french))

Update in May 2018

1. disabled persons/ or exp amputees/ or exp visually impaired persons/
2. exp Mobility Limitation/ or exp foot deformities/ or exp hand deformities/ or exp musculoskeletal abnormalities/ or exp rheumatic diseases/ or exp Amputation, traumatic/

3. paralysis/ or exp hemiplegia/ or exp paraplegia/ or exp quadriplegia/
4. exp Spinal Cord Injuries/
5. (amputee* or wheelchair* or paraly* or hemipleg* or parapleg* or quadripleg* or handicap* or disabled or blind or blindness or arthrit* or arthros*).ab,kf,kw,ti.
6. ((physical* or motor or visual* or musculoskelet*) adj1 (disab* or disord* or handicap* or impair* or disease*)).ab,kf,kw,ti.
7. exp Wheelchairs/
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. clothing/ or exp shoes/
10. (cloth* or shoe* or textil* or wearable* or glove* or dress).ab,kf,kw,ti.
11. exp Textiles/
12. 9 or 10 or 11
13. 8 and 12
14. limit 13 to (yr="1990 -Current" and ("all adult (19 plus years)" or "adolescent (13 to 18 years)")) and (english or french))
15. limit 14 to ed=20170201-20180522

Addition of the Keyword “Apparel”

1. disabled persons/ or exp amputees/ or exp visually impaired persons/
2. exp Mobility Limitation/ or exp foot deformities/ or exp hand deformities/ or exp musculoskeletal abnormalities/ or exp rheumatic diseases/ or exp Amputation, traumatic/
3. paralysis/ or exp hemiplegia/ or exp paraplegia/ or exp quadriplegia/
4. exp Spinal Cord Injuries/
5. (amputee* or wheelchair* or paraly* or hemipleg* or parapleg* or quadripleg* or handicap* or disabled or blind or blindness or arthrit* or arthros*).ab,kf,kw,ti.

6. ((physical* or motor or visual* or musculoskelet*) adj1 (disab* or disord* or handicap* or impair* or disease*)).ab,kf,kw,ti.
7. exp Wheelchairs/
8. 1 or 2 or 3 or 4 or 5 or 6 or 7
9. clothing/ or exp shoes/
10. (cloth* or shoe* or textil* or wearable* or glove* or dress).ab,kf,kw,ti.
11. exp Textiles/
12. 9 or 10 or 11
13. 8 and 12
14. limit 13 to (yr="1990 -Current" and ("all adult (19 plus years)" or "adolescent (13 to 18 years)")) and (english or french))
15. disabled persons/ or exp amputees/ or exp visually impaired persons/
16. exp Mobility Limitation/ or exp foot deformities/ or exp hand deformities/ or exp musculoskeletal abnormalities/ or exp rheumatic diseases/ or exp Amputation, traumatic/
17. paralysis/ or exp hemiplegia/ or exp paraplegia/ or exp quadriplegia/
18. exp Spinal Cord Injuries/
19. (amputee* or wheelchair* or paraly* or hemipleg* or parapleg* or quadripleg* or handicap* or disabled or blind or blindness or arthrit* or arthros*).ab,kf,kw,ti.
20. ((physical* or motor or visual* or musculoskelet*) adj1 (disab* or disord* or handicap* or impair* or disease*)).ab,kf,kw,ti.
21. exp Wheelchairs/
22. 15 or 16 or 17 or 18 or 19 or 20 or 21
23. clothing/ or exp shoes/
24. (cloth* or shoe* or textil* or wearable* or glove* or dress or apparel*).ab,kf,kw,ti.
25. exp Textiles/

26. 23 or 24 or 25

27. 22 and 26

28. limit 27 to (yr="1990 -Current" and ("all adult (19 plus years)" or "adolescent (13 to 18 years)")) and (english or french))

29. 28 not 14

Google Research Strategy

English

(clothing OR apparel OR garment OR wearable OR textile OR dress OR glove OR adaptive clothing) AND (physical disability OR handicap OR disabled OR impairment OR mobility limitation OR deformities OR wheelchair OR malformation OR spinal cord injury OR blind OR arthritis OR paraplegia OR amputation)

French

(habillement OR habillage OR habit OR vêtement OR vêtir OR tenue vestimentaire OR vêtement adapté OR gant OR textile) AND (handicap physique OR handicap OR invalidité OR déficience OR limitation)

**Appendix VI. Summary of Articles Retrieved from
Scientific Databases**

| | Authors | Year of Publication | Title | Study Design | Aim of Study | Type and Number of Participants | Type of Clothing |
|----|---|----------------------------|---|--|---|---|---|
| 1* | Abraham-Murali, L.; Kane, W.; Staples, C. | 2001 | Perceptual criteria and attributes used for evaluation of clothing by women using wheelchairs | Focus group interview (n=4) | To understand more fully disabled person's clothing needs, and encourage the users to discuss freely features of clothing that are of value to them. | 19 wheelchair users | Formal or business wear, casual or lounge wear, and undergarments |
| 2* | Carroll, K.; Kincade, D. | 2007 | Inclusive Design in Apparel Product Development for Working Women with Physical Disabilities | The study was exploratory in nature; therefore, qualitative methods were used to achieve the desired objectives. | The objectives of the study were to (a) obtain information about apparel needs and preferences from a group of working women with physical disabilities, (b) use this information together with the existing principles of inclusive design to develop an apparel product, (c) evaluate a prototype developed from this information, and (d) examine industry constraints involved in developing and manufacturing this inclusively designed product. | Working women with various disability (n=10), a second sample (n = 6) of working women, those without physical limitations (i.e., evaluators) and inclusive design manufacturers (n = 6). | Professional clothing |
| 3* | Carroll, K.; Gross, K. | 2010 | An examination of clothing issues and | Survey (online and mail) | The researchers intend to bridge the gap between customization and a mass market approach, | 117 working women with a | Professional clothing |

| | | | | | | | |
|---|---|------|--|---|---|--|--------------------------------------|
| | | | physical limitations in the product development process | | achieving a readily accessible solution for users and industry alike. | variety of disabilities. | |
| 4 | Chang, H.J.; Yurchisin, J.; Hodges, N.; Watchravesringkan, K.; Ackerman, T. | 2013 | An Investigation of Self-Concept, Clothing Selection Motivation, and Life Satisfaction among Disabled Consumers | Quantitative research design (survey method) | Shed light on the social/psychological factors influencing the clothing choices of disabled consumers and address a gap in the literature by considering clothing use among disabled consumers. | The respondents for this study were 350 adult disabled consumers | N/A |
| 5 | Chang, H.J.; Hodges, N.; Yurchisin, J. | 2014 | Consumers with disabilities: A qualitative exploration of clothing selection and use among female college students | A qualitative research design was used (in-depth interviews were the primary qualitative method). Semi-structured format. | The purpose of this study is to understand what clothing means to disabled consumers, regardless of disability type. | 9 disabled consumers | N/A |
| 6 | Christman, L.; Branson, D. | 1990 | Influence of physical disability and dress of female | 3x3x2 factorial design. Videotapes of a female applicant | The purpose of this research was to examine the influence of dress and physical condition on | Managerial personnel involved in making hiring | Professional clothing, business wear |

| | | | | | | | |
|----|---------------------------------------|------|--|--|--|--|-----|
| | | | job applicant on interviewers | in a simulated job interview. Subjects rated applicants on 22 employment characteristics. | employers' impressions of female job applicants. | decisions: 180 people who interview prospective employees as part of their job responsibilities. | |
| 7* | Frency, N.; Patrick, H.; May, C. | 2000 | Selecting and purchasing clothing: the experience of visually impaired people in Hong Kong | Personal interviews | To understand the selection criteria and buying process of visually impaired people (to help address their existing problems with the purchasing of clothing). | 81 visually impaired people living in Hong Kong | N/A |
| 8* | Kabel, A.; Dimka, J.; McBee-Black, K. | 2017 | Clothing-related barriers experienced by people with mobility disabilities and impairments | Online survey intended for persons living with disabilities and impairments and/ or parents or caretakers. (Parents and caretakers were included because some members of the priority population are | Identify clothing-related barriers people living with disabilities and their families are facing. | This sample comprised 81 participants with mobility disabilities or impairments, 9 caretakers, and 23 participants who are both caregivers and live with disabilities or impairments | N/A |

| | | | | | | | |
|---|-------------|------|--|--|---|---|-----|
| | | | | unable to fill out an electronic survey, or are underage.) | | themselves. (n=113) | |
| 9 | Kaufman, A. | 2000 | Clothing-selection habits of teenage girls who are sighted and blind | Two-group design (survey method). | Determine the differences in the two groups' selection processes and whether there is a need for special instruction in this area for adolescent girls who are blind. | (n=30) Experimental group consisted of 15 girls who indicated that they had no vision or had light perception only. Control group consisted of 15 sighted girls in same age group. | N/A |

| | | | | | | | |
|-----|--|------|---|---|---|---|---|
| 10* | Kiyak, E.; Akdemir, N.; Fesci, H. | 2009 | The evaluation of the impact of the use of wool in patients with fibromyalgia on life quality | The study was conducted in two stages with a single-group pre-test/post-test model (before trial test model). | To evaluate the impact of the use of wool on the quality of life of patients with fibromyalgia. | 36 patients diagnosed with fibromyalgia | Wool underwear (but also: wool bed covers, wool mattresses and wool cushions) |
| 11 | Kratz, G.; Soderback, I.; Guidetti, S.; Hultling, C.; Rykatkin, T.; Soderstrom, M. | 1997 | Wheelchair users' experience of non-adapted and adapted clothes during sailing, quad rugby or wheel-walking | A quasi-experimental post-test design was used in an investigation of wheelchair users' experience of their effort, comfort, physical condition, and involvement, affective and active mood states, immediately | To compare 32 wheelchair users' experience of wearing specially adapted clothes and non-adapted clothes for sailing, quad rugby or wheel-walking. | The sailing group: 14 wheelchair users. The walking group: 8 wheelchair users. Rugby players: 10 wheelchair (n=32). | Various adapted clothes |

after sailing,
walking or
playing quad-
rugby.

| | | | | | | | |
|----|--|------|--|--|--|--------------|-------------------|
| 12 | Laleh, L.; Latifi, S.; Koushki, D.; Matin, M.; Javidan, A. N.; Yekanineja d, M. S. | 2015 | Assessment of Attention to Clothing and Impact of Its Restrictive Factors in Iranian Patients with Traumatic Spinal Cord Injury (ACIRF- SCI): Introduction of a New Questionnaire | This was a cross-sectional study, and we used the ACIRF-SCI to obtain data. Questionnaires were filled out during face-to- face interviews. | Assess attention to clothing and impact of its restrictive factors among Iranian patients with SCI. | 100 subjects | N/A |
| 13 | Limoochi, S.; Le Clair, J. | 2011 | Reflections on the participation of Muslim women in disability sport: hijab, Burkini | Narrative | Reflects upon some of the issues for global disability sport organizations, and for Muslim women, in the context of diverse religious and cultural attitudes towards Islamic Dress (hijab), | N/A | Hijab, Burkini |

(TM), modesty and changing strategies

the presentation of the female self, and interactions with males.

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|----|---|------|--|---|--|-----------------------|--|
| 14 | Lou, C. W.; Shiu, B. C.; Lin, J. H.; Chang, Y. J. | 2015 | Development and characteristic study of woven fabrics for intelligent diapers | The woven fabric structure is observed with a stereomicroscope. | This study proposes eco-diapers containing metallic fibers, such that eco-diapers and sensors are combined to transmit a signal when changing is necessary | 7 samples | Intelligent diapers (eco-diapers with metallic fibers) |
| 15 | MacDonald, N. M.; Bua-Iam, P.; Majumder, R. K. | 1994 | Clothing purchase decisions and social participation: an empirical investigation of U.S. and U.K. rehabilitation clients | 1,730 questionnaires | To examine the importance of clothing purchase decision variables and to explore the relationship between clothing and socialization. | US: n= 596, UK: n= 95 | 8 clothing purchase decision variables |
| 16 | Meinander, H. | 1998 | Textiles for disabled and elderly people-- Easytex | N/A | Improved living conditions for disabled and elderly people | N/A | N/A |
| 17 | Nevala, N.; Holopainen, J.; | 2003 | Reducing the physical work load and strain | Intervention study, and the same | To assess the effects of clothing development on the physical workload, strain and work time | 5 women caretakers | Redesigned clothing |

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| | Kinnunen, O.; Hänninen, O. | | of personal helpers through clothing redesign | measurements were performed by the same researchers in a worksite situation before and after the clothes used had been redesigned. The same combination of client and helper was used in both measurements. The redesign of the outerwear included changes in patternmaking, materials and design | of personal helpers during the dressing and undressing of clients in their homes. | | Types: (a) full-time personal helper, (b) helper of a physically disabled client, (c) no cardiorespiratory or musculoskeletal disease, and (d) voluntary participation in the study. |
| 18 | Pruthi, N.; Seetharaman, C.; Seetharaman, P. | 2008 | Acceptance of Functional Garments for Paralytics | Functional garments were developed for Hemiplegics. Three consecutive trials took place | To help paralytics cope with their physical restrictions (through the design and construction of garments). | 10 hemiplegic respondents | Functional garments |

to access their suitability and acceptability.

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| 19* | Stancliff, B. L. | 1999 | Careers. A better fit: apparel for persons with disabilities | Narrative | 1. Determine the needs of disabled and elderly people, 2. Determine if their apparel needs are being satisfied | N/A | Adaptive clothing |
| 20* | Wang, Y.; Wu, D.; Zhao, M.; Li, J. | 2014 | Evaluation on an ergonomic design of functional clothing for wheelchair users | A set of normal functional clothing was employed as a comparison (Control). First, questionnaires to understand needs and preferences of clothing. Based on the results of the interview, a set of new functional clothing for the | It was hypothesized that the newly designed clothing could facilitate the wheelchair users' daily living activities. | 6 wheelchair users | Wheelchair user oriented functional clothing. |

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| | | | | wheelchair users was designed. | | | |
| 21 | Oosterveld, F. G.; Rasker, J. J. | 1990 | The effect of pressure gradient and thermolactyl control gloves in arthritic patients with swollen hands | The effect of the gloves was compared to control gloves (worn for 7 days) | To evaluate the effect of pressure gradient and control gloves on nocturnal pain and morning stiffness, on joint swelling, periarticular swelling and grip strength. | 8 participants with RA | Pressure gradient gloves |
| 22* | Shah, R. K. | 1993 | A pilot survey of the traditional use of the patuka round the waist for the prevention of back pain in Nepal | Individual based survey | To study the significance of the traditional use of a patuka around the waist as related to the prevention of back pain | 55 participants in eight different places in Nepal | Patuka |
| 23 | Burnham, R.; Chan, M.; Hazlett, C.; Laskin, J.; Steadward, R. | 1994 | Acute median nerve dysfunction from wheelchair propulsion: the development of a model and study of the effect of hand protection | Subjects propelled a roller-mounted wheelchair at a maximum rate of 2,000 hand strikes. Immediately after, factors | To determine if measurable median nerve dysfunction (conduction slowing or block) results from a single session of vigorous wheeling and, if so, if protection for the hand with a glove (padded over region of carpal tunnel) could minimize the dysfunction. | 35 subjects (16 wheelchair dependent; 19 able body) | Hand glove |

were measured.
(Experimental).

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| 24 | Kerk, J.; Clifford, P.; Snyder, A.; Prieto, T.; O'Hagan, K.; Schot, P.; Myklebust, J.; Myklebust, B. | 1995 | Effect of an abdominal binder during wheelchair exercise | Each subject preformed two trials (one with binder & one without). Experimental design. | To determine whether use of an abdominal binder would affect oxygen uptake, trunk range of motion, and duration of the stroke phase during wheelchair propulsion | 6 paraplegic wheelchair athletes | Abdominal binder |
| 25* | Little, C. E.; Kirby, R. L.; Connors, M. | 1997 | Spandex shorts to assist stump shrinkage of lower-limb amputees: a pilot study | Structured interviews regarding their comfort, fit, ease of donning, and acceptability | To test hypothesis that the modification of spandex shorts (for the purpose of assisting stump shrinkage for patients with amputations at the AK level or higher, would be simple, inexpensive and well tolerated. | 10 participants who have undergone recent amputations | Adapted spandex shorts |
| 26* | Nicholson, J.; Morton, R.; Attfield, S.; Rennie, D. | 2001 | Assessment of upper-limb function and movement in children with cerebral palsy wearing lycra garments | Children were given two weeks of gradually increased exposure to the garment, then asked to wear for a minimum | To document: 1. changes in functional daily skills, 2. changes in posture and movement of the upper body, and 3. client/families assessment of their child's responses and function/behavioural changes when wearing the garment. | 12 children with various types of cerebral palsy (with significant impairment of upper-limb function) | Various lycra garments (each was individually made for the child according to |

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| | | | | of 6 hours per day for 6 weeks. Questionnaires were given to the carers of the children concerning the practicalities of using the garments. | | | their particular needs) |
| 27* | Kern, U.; Altkemper, B.; Kohl, M. | 2006 | Management of phantom pain with a textile, electromagnetically-acting stump liner: a randomized, double-blind, crossover study | Double-blind, randomized crossover trial over a six-week period. | Find out whether an electromagnetically shielding stump stocking interwoven with metal could have a positive effect on phantom pain | 30 leg amputees (27 of 30 patients completed the study, 22 documentations proved valid. N=22) | Electromagnetically-acting stump liner |
| 28 | Rathore, F. A.; New, P. W.; Waheed, A. | 2009 | Pressure ulcers in spinal cord injury: an unusual site and etiology | Case series | Cases presented patients with SCI who developed pressure ulcers secondary to prolonged and inappropriate application of GCS). To show effects of inappropriate application. | 3 | Compression stockings |

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| 29 | Dennis, M.; Sandercock, P.; Reid, J.; Graham, C.; Murray, G.; Venables, G.; Rudd, A.; Bowler, G. | 2013 | The effect of graduated compression stockings on long-term outcomes after stroke: the CLOTS trials 1 and 2 | RCT. Trials adopted an international multicenter, parallel group design, with central randomization. | To estimate the effects of graduated compression stockings on venous thromboembolism events, survival, and functional status at 6 months after stroke. | Trial 1: 2518 immobile stroke patients. Trial 2: 3014 | Compression stockings |
| 30 | Güzelküçük, Ü.; Skempes, D.; Kumnerdde, W. | 2014 | Common Peroneal Nerve Palsy Caused by Compression Stockings After Surgery | Case study | To emphasize the importance of the size and length of the compression stockings and regular skin control in avoiding the risk for peroneal nerve palsy. | 1, who was operated on for post auricular squamous cell carcinoma of the skin | Compression stockings |
| 31 | Trbovich, M.; Ortega, C.; Schroeder, J.; Fredrickson, M. | 2014 | Effect of a cooling vest on core temperature in athletes with and without spinal cord injury | 60-minute intermittent sprinting exercise comparing with and without a cooling vest | To evaluate the extend of EIH in persons with and without SCI, and to examine the ability of a cooling vest to attenuate the rise in temperature of SCI and AB athletes during intermittent sprinting exercise. | 41 well-trained athletes (5 did not complete study) n=36 | Cooling vest |
| 32* | Bongers, C.; Eijvogels, | 2016 | Effects of Cooling During Exercise on | Randomized crossover study (3 study visits) | To examine the effects of a cooling vest on the core body temperature response of people | 10 participants with a thoracic lesion | Cooling vest |

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| | T.; van Nes, U.; Hopman, M.; Thijssen, D.. | | Thermoregulatory Responses of Men with Paraplegia | | with a thoracic SCI during submaximal exercise. | | |
| 33 | Rice, I.; Dysterheft, J.; Bleakney, A.; Cooper, R. | 2016 | The Influence of Glove Type on Simulated Wheelchair Racing Propulsion: A Pilot Study | Experimental design (2 sets of tests) | To examine the influence of glove type on kinetic and spatiotemporal parameters at the hand rim in elite wheelchair racers. | 9 wheelchair racers | Glove |
| 34 | Vaile, J.; Stefanovic, B.; Askew, C. | 2016 | Effect of lower limb compression on blood flow and performance in elite wheelchair rugby athletes | Non-blinded randomized crossover design (2 exercise trials) | To investigate the effects of compression socks worn during exercise on performance and physiological responses in elite wheelchair rugby athletes | 10 national representative rugby athletes (volunteers) | Compression socks |
| 35* | Braganca, S.; Castellucci, I., Gill, S.; Matthias, P.; Carvalho, | 2018 | Insights on the apparel needs and limitations for athletes with disabilities: The design of wheelchair | Focus group and a questionnaire (see Figure 1) | Identify the problems that wheelchair rugby players face with the sports-wear they use for playing the game. | 61 wheelchair rugby players | Tops, bottoms and gloves (sportswear) |

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| | M.; Arezes, P. | | rugby sports-wear | | | | |
| 36* | Garner, M.; Douglas, V. | 1991 | Apparel Needs of Aging and/or Disabled Women | Focus group | Identify problem areas of clothing and possible solutions for aging, disabled, and rehabilitative patients. | 5 direct service providers to older adults + 3 additional participants were researchers from local educational institutions (n=8) | Adaptive clothing |
| 37 | Beguín, A-M.; Malaquin-Pavan, E.; Guihaire, C.; Hallet-Lezy, A-M.; Souchon, S.; Homann, V.; Zöllner, P.; Swerev, M.; Kesselmeier, R.; Hornung, | 2010 | Improving diaper design to address incontinence associated dermatitis | Case reports (documented for 3 weeks). A range of non-invasive skin measurements such as surface pH measurements on products and corneometry on the skin of volunteers. | To construct a diaper which better accommodates the special requirements of the epidermal barrier. (To test how the modified design (of briefs) affects parameters of the epidermal barrier). | 12 patients (suffering from IAD) | Diapers |

F.; Smola,
H.

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| 38* | Curteza, A.; Cretu, V.; Macovei, L.; Poboroniuc, M. | 2014 | Designing Functional Clothes for Persons with Locomotor Disabilities | Narrative | The study presents the main aspects involved in designing and developing textile products for physical disabilities that require wheelchair use. | N/A | Functional clothes |
| 39* | Azher, N.; Saeed, M.; Kalsoom, S. | 2012 | Adaptive Clothing for Females with Arthritis Impairment | Exploratory (qualitative methods were used to achieve the objectives of the research. The researcher explores case studies on adaptive clothing) in- depth interviews and observations were used for data collection of the study. | To design suitable clothing for adult females of Pakistan suffering from Rheumatoid arthritis. | 3 adult female patients with rheumatoid arthritis impairment. | Adaptive clothing |
| 40* | Bahadir, S.K.; Koncar, V.; | 2012 | Wearable obstacle detection system fully integrated | Developed an innovative wearable obstacle | The proposed smart clothing system could become united part of visually impaired people's lifestyle, and it could help them | N/A | Wearable obstacle detection system fully |

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| | Kalaoglu, F. | | to textile structures for visually impaired people | detection system fully integrated to textile structures, which enables detection of obstacles for visually impaired people. | overcome navigation concerns seamlessly, without imposing upon them any physical or cognitive load. | | integrated to textile structures (Smart garment) |
| 41* | Chang, W-M.; Zhao, Y-X.; Guo, R-P.; Wang, Q.; Gu, X-D. | 2009 | Design and Study of Clothing Structure for People with Limb Disabilities | Narrative | To allow people with a disability a life of self-respect and facility, and enable them to mingle with family and society to a greater extent. | N/A | Adaptable clothing |
| 42 | Civitci, A. | 2004 | An ergonomic garment design for elderly Turkish men | Questionnaires & Literature review | To determine elderly men's demands, needs and problems in regard to clothing and to design an ergonomic garment in the light of this knowledge. | 120 elderly volunteers | Adaptable clothing for the elderly |
| 43* | de, Klerk Helena M.; Lucy, A. | 2002 | The physically disabled South African female consumer's problems in purchasing clothing | Interviews according to a structured interview schedule and structured shop observations | To identify the major problems women have: (i) with style and fit of fashionable clothes; (ii) with dressing and undressing; (iii) with the caring for their clothes; and (iv) when buying clothes. | (n = 40) physically disabled women | Clothing in general |

were chosen as data collection methods.

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| 44* | Eggleston, John M.; Bentrem, David J.; Bromberg, William J.; London, Scott D.; Biesecker, Jessica E.; Edlich, Richard F. | 1994 | Adaptive Clothing for Persons with Mobility Disorders After Burn Injury | Narrative | "These clothing adaptations are attractive and give the wearer and the observer the feeling that the person with the disability is not set apart by the clothing he or she wears". | N/A | Adaptive clothing for wheelchair users |
| 45* | Gonzalez, J.; Olaso, J., Gil, M.; Puigcerver, S.; DurÃ¡, J.; LÃ³pez, I. | 2012 | FASHION-ABLE: Needs and requirements for clothing, footwear and orthotics of consumers groups with highly individualized needs | Narrative | FASHION-ABLE project aims at providing the European innovative and customization-concerned SMEs with the technological means that will enable the agile and eco efficient production of personalized products in terms of health and performance, addressing the complex individualized needs of such growing market niches out of the scope of mass produced goods. | N/A | Clothing, footwear, orthotics |

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| 46 | Howe, I. | | Fashioning Identity: Inclusive Clothing Design and Spinal Cord Injury | Research in two parts: 1. A survey analysis of user needs - Online questionnaire (passive snowball sampling) 2. An analysis of clothing products marketed to wheelchair users | In order to adequately respond to user needs, a cohesive needs analysis is required. This would enable development of effective user-oriented design of clothing products for people with spinal cord injury that would combat issues of social exclusion. | 100 wheelchair users | Clothing in general |
| 47* | Kabel, A.; McBee-Black, K.; Dimka, J. | 2016 | Apparel-related participation barriers: ability, adaptation and engagement | Qualitative research (focus groups to interviews semi-structured, open ended questions) | To document apparel-related barriers faced by people with disabilities (PWD) and their families as they attempted to engage in various aspects of social participation, and explore the often invisible relationship between apparel-related barriers and disablement. | 20 participants: 8 Persons with disabilities, 7 Caregivers, 5 Health professionals | Clothing in general |
| 48* | Kidd, Laura K. | 2006 | A Case Study: Creating Special Occasion Garments for Young Women | Narrative | Documents the design and construction of the garments, as well as offers advice for designers interested in creating clothing for PWD | 4 volunteers | Custom-designed special occasion dresses |

with Special
Needs

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| 49 | Kratz, G.; Soderback, I. | 1990 | Individualized adaptation of clothes for impaired persons. A comparison of two groups with and without experience of adapted clothes | Questionnaire based study (group 1 received adapted clothes, group 2 did not) | To evaluate differences between a group who had received adapted garments and a group without this experience, to examine the need of adapted clothes, to describe individually adapted clothes in a group of individuals with impairments and to document how individuals with impairments obtain clothes and what demands on these garments are. | Impaired persons (Group 1: n= 36 had received adapted clothes and group 2 (n = 46) had not.) | Adapted garments |
| 50* | M. Carvalho; F. Duarte; D. Heinrich; A. Souto; S. Woltz | 2009 | WeAdapt- Inclusive Clothing Design | Narrative | WeAdapt Project: Products specifically aimed to benefit PWSMN and to help them achieve higher levels of self- esteem and a sense of participation in social life. | N/A | Inclusive design clothing |
| 51 | Park, S. and Jayaraman, S. | 2003 | Enhancing the Quality of Life Through Wearable Technology | Narrative (Smart Shirt Technology development and design process) | An overview of the key challenges facing the practice of medicine today is presented in this article along with the need for technological solutions that can “prevent” problems --> | N/A | Smart Shirt |

| | | | | Aimed at enhancing the quality of life for humans | | | |
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| 52* | Patterson, R. | | Design and disability: fashion for wheelchair users | Narrative (Designed clothing "The collection took several months to research" "Sample garments were tested by three models") | To research the contentious area of fashion, which is about desirability and status, and disability, which evokes feelings of unease and images of redundancy and deformity. | N/A | Adaptive clothing |
| 53 | Pruthi, N.,; Seetharaman, P.; Chanchal, P. | 2003 | Problems Encountered by Hemiplegics While Dressing/Undressing | Interview and observation methods were used | To identify the problems encountered by hemiplegics while dressing/undressing. | 200 handicapped persons, 62 were paralytics. Among paralytics, 37 were hemiplegics (n=37) | All |
| 54* | Reich, N. and Otten, P. | 1991 | Clothing and dressing needs of people with arthritis | Mailed survey to participants (A shortened and modified survey questionnaire was developed based on the Reich et al. | To determine the clothing and dressing needs of the arthritic population & to determine which type of arthritis was the most limiting and whether females experienced more problems with clothing and dressing than did males. | 78 % of 800 Arizona residents who answered the survey (who suffer from Rheumatoid arthritis or osteoarthritis) | All |

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| | | | (1980) questionnaire) | | | | |
| 55 | Rimaud, D., Calmels, P., Roche, F., Mongold, J. J., Trudeau, F. and Devillard, X. | 2007 | Effects of graduated compression stockings on cardiovascular and metabolic responses to exercise and exercise recovery in persons with spinal cord injury | Crossover trial (All subjects performed 2 maximal wheelchair exercise tests, using their personal wheelchairs. One test was done with graduated elastic stockings and the other without. The tests were as- signed in random order under a counter- balanced design and were conducted at the same time of the day, the same day of the week, | To investigate whether reporting blood redistribution by means of graduated elastic stockings affects exercise and post exercise responses in people with spinal cord injury (SCI). | 14 men with traumatic SCI, grouped according to their level of injury. | Compressio n stockings |

exactly 1 week
apart.)

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| 56* | Stokes, Bailey and Black, Catherine | 2012 | Application of the Functional, Expressive and Aesthetic Consumer Needs Model: assessing the clothing needs of adolescent girls with disabilities | Survey | To investigate clothing needs of adolescent girls with disabilities with the application of the Functional, Expressive and Aesthetic (FEA) Consumer Needs Model (Lamb) | 33 adolescent girls with disabilities | Clothing in general |
| 57 | Watson, A. F., Blanco, J., Hunt-Hurst, P. and Medvedev, K. | 2010 | Caregivers' perceptions of clothing for people with severe and profound intellectual disabilities | Exploratory study (semi-structured interviews) | To analyze how clothing, grooming, and overall appearance influence others' perceptions of people with severe and profound intellectual disabilities and how it may positively or negatively affect the normalization process | 10 caregivers of people with severe profound intellectual disabilities | Clothing |

* contains information relating to a specific design characteristic of a piece of clothing, coded as e115- products & technology for personal use in daily living