EXPLORING U.S. RETAILERS' MERCHANDISING STRATEGIES FOR ADAPTIVE CLOTHING: A BIG DATA ANALYSIS

by

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A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree in Master of Science in Fashion and Apparel Studies

Spring 2024

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ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my thesis advisor, Dr. Sheng Lu, for his unwavering support, mentorship, and overall dedication to my academic journey. His wealth of wisdom, knowledge, and expertise has been invaluable to me throughout my studies at the University of Delaware. The completion of this research would not have been possible without his guidance and support.

Thank you to my committee members, Dr. Martha Hall and Professor Brenda Shaffer for their exceptional support, insights, and feedback. Their time and assistance are greatly appreciated and made a meaningful contribution to this research.

In addition, thank you again Dr. Hall, as well Marjan Ashrafi, for enhancing my exposure to adaptive clothing design. My time spent at the Health Innovation Lab deepened my knowledge of adaptive clothing, furthering my appreciation, and reinforcing my dedication to the movement for a more inclusive apparel industry.

Finally, I would like to express my heartfelt gratitude to my family for their support, love, and encouragement throughout the past two years.

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ABSTRACT

With society's increasing call for a more inclusive fashion industry, adaptive clothing, specifically designed for people with disabilities (PWD), has rapidly emerged as a critical and high-potential product category for U.S. retailers. By analyzing thousands of clothing items for sale in the U.S. retail market from 2018 to 2022 at the Stock Keeping Unit level, this study examined U.S. retailers' merchandising strategies for adaptive clothing. The logistic regression revealed that statistically, adaptive clothing in the U.S. retail market looked more 'boring' or plain, and exhibited lower availability in several categories, including dresses, outerwear & suits, and underwear. Also, compared with nonadaptive clothing, adaptive clothing was statistically more likely to be priced higher than the market average. The findings generated critical new knowledge about the business aspect of adaptive clothing by adding a valuable retailers' perspective. The results also call for efforts to make adaptive clothing more diverse in product categories and financially affordable to PWD consumers.

Keywords: Adaptive clothing, People with Disabilities (PWD), Merchandising strategies, Product Assortment

Chapter 1

INTRODUCTION

1.1 Background

With society's increasing attention to people with disabilities (PWD), a growing number of retailers have started to address this consumer group's specific needs (Bahng & Kincade, 2023; Feng & Hui, 2022). For example, pioneering retailers like Tommy Hilfiger have launched dedicated adaptive clothing lines to make their product assortment more inclusive (PVH, 2021). Statistics also show that approximately one in four Americans reported experiencing at least one type of disability, indicating significant growth potential for the clothing market catering to PWD consumers (Keenan et al., 2021).

Adaptive clothing, designed specifically for PWD consumers, incorporates functional elements to meet PWD's physical needs and considers aesthetics to address their social and psychological desires (Grimmer et al., 2022; McBee-Black & Ha-Brookshire, 2022, p. 180). Functional features of adaptive clothing can increase PWD's independence, particularly for those with limited dexterity or mobility, by simplifying the process of dressing and undressing (McBee-Black, 2021). Adaptive clothing is often designed with ease of use in mind but may also include features such as sensory-friendly seams and tags for those who struggle with sensory processing. Ultimately, adaptive clothing is created to the needs and preferences of the wearer, enabling PWD consumers to complete daily tasks and feel comfortable in their clothing (Seram et al., 2021).

Adaptive clothing is also an emerging research topic of interest to various academic disciplines. For example, scholars from art and engineering explored adaptive clothing's unique design and product development process (Cakmak et al., 2022; Kidd, 2006; Lobo et al., 2019). Other researchers investigated consumers' demand for adaptive clothing and factors related to their purchasing behavior (Chae, 2022; Chang et al., 2014; Kabel et al., 2016). However, as a critical research gap, it remains unknown what adaptive clothing is typically available in the mainstream retail market and retailers' commonly adopted product assortment and pricing strategies for this product group.

1.2 Research question and significance

This study explores retailers' merchandising strategies for adaptive clothing in the United States, i.e. the planning of product assortment and pricing practices for such products (Roggeveen et al., 2021). Instead of relying on aggregated industry-level data, this study will leverage EDITED, a big data tool that captures information on hundreds of thousands of actual clothing products carried by nearly all retailers in the United States (EDITED, 2023). Based on EDITED's rich product-level data, the study will examine retailers' detailed product assortment, product features, and pricing strategies for adaptive clothing compared with nonadaptive clothing[1] in the United States (EDITED, 2023). Specifically, this study will explore the following:

- Do U.S. retailers adopt unique assortment strategies for adaptive clothing regarding product categories, patterns, and styles?
- Do U.S. retailers adopt unique pricing strategies for adaptive clothing, including the market segments and average selling price?

The findings of the study will address crucial research gaps and contribute to generating new insights into the merchandising strategies of U.S. retailers for adaptive clothing. Adding a perspective reflecting retailers' merchandising practices based on empirically rich data will significantly enhance our understanding of the business aspects of adaptive clothing beyond existing studies, which mainly focused on consumers and designers. Additionally, the study's findings could offer valuable input to thousands of apparel retailers and designers interested in entering the growing adaptive clothing market or expanding their offerings to fill product gaps and better serve PWD consumers' clothing needs.

In the rest of the paper, Chapter 2 reviews the existing literature on adaptive clothing's supply and demand and proposes the study's conceptual framework. Chapter 3 explains the detailed research method and data sources. The analysis results are presented in Chapter 4. Finally, Chapter 5 discusses the implications of the findings and future research agenda.

Chapter 2

REVIEW OF LITURATURE

This section provides an overview of the current literature on adaptive clothing, including its supply and demand patterns in the retail market. Then, a theoretical framework is proposed to elaborate the primary factors influencing U.S. retailers' merchandising strategy for such products.

2.1 Brief history of adaptive clothing in retail

In the twentieth century, clothing designed for people with disabilities (PWD) began to emerge, but such clothing was mainly homemade and primarily viewed as a 'medical device' with limited supply and accessibility (Wu et al., 2023). However, commercializing adaptive clothing for the mass retail market did not happen until the 2010s (Grimmer et al., 2022). In 2016, Mindy Scheier, the founder of the non-profit Runway of Dreams (RoD), launched one of the first mainstream commercial adaptive clothing lines in partnership with Tommy Hilfiger (McBee-Black, 2021). The Tommy Adaptive® line was specifically designed to fill a unique market niche, combining adaptive function with fashion (Nelson & Cook, 2022). Since then, an increasing number of apparel retailers, such as Kohls, Target, and Zappos, joined the movement and launched adaptive clothing lines in hopes of making their products more inclusive to PWD consumers (Hall, 2019; McBee-Black & Ha-Brookshire, 2020). As a reflection of the enormous growth potential of the adaptive clothing business, industry sources estimated that the annual adaptive clothing retail sales could exceed $350 billion globally by 2024 (Statista, 2022).

2.2 Design and supply of adaptive clothing

Existing studies show that the design and supply of adaptive clothing in the retail market have several features different from nonadaptive clothing.

First, designing adaptive clothing requires a unique, delicate balance of functions and aesthetics. On the one hand, adaptive clothing should be designed to meet the specific needs of PWDs, incorporating innovative design elements and features to maximize usability (Na, 2007). For example, individuals with mobility or dexterity issues may require adaptive clothing with easy-to-use closures (Singh, 2019). Similarly, people with sensory problems may benefit from adaptive clothing that features flat seams[2] (Kabel et al., 2017; Seram & Cabon, 2013).

Balancing functional requirements with aesthetics presents a particular challenge for designers of adaptive clothing. Studies based on interviews with caregivers and medical professionals indicate that functionality typically accounted for nearly half of the requirements for adaptive clothing design, whereas aesthetics comprised less than 10% (Sadretdinova et al., 2022). However, for PWDs, aesthetics remain crucial when purchasing adaptive clothing (McAndrews & Brooks, 2022). Notably, adaptive clothing has increasingly focused on meeting PWDs' social and lifestyle needs, some studies consistently show that adaptive clothing must closely resemble conventional garments to prevent PWD from feeling uncomfortable or stigmatized in social settings (Chae, 2020; Seram et al., 2021).

Second, adaptive clothing could be more costly to design and produce than similar-looking or equivalent nonadaptive garments. Adaptive clothing may incur higher production costs due to several factors. One is the more complex product development process, resulting in extra design time and labor costs. For example, PWD consumers have diverse functional needs for adaptive clothing (Chang et al., 2009). Thus, designing adaptive clothing requires additional procedures, such as the direct involvement of end users, to determine the clothing's most appropriate and essential functions (Li et al., 2023; Moon et al., 2019). Studies also found that designing adaptive clothing involves conducting additional tests for technical quality, product reliability, and several other months of modification than creating nonadaptive garments (McBee-Black, 2021). Moreover, adaptive clothing often needs specialized textile materials and accessories, such as flexible magnetic fasteners, which can increase production costs (Imran et al., 2021). For example, Keenan et al. (2021) estimated that producing adaptive clothing could be 25–30% more costly than equivalent or similar nonadaptive garments due to the more expensive materials required. Additionally, since adaptive clothing is typically produced in much smaller quantities than nonadaptive clothing, its average production costs could be comparatively higher (Carroll & Gross, 2010). Garment factories usually charge higher prices for production orders with small quantities or below a certain minimum threshold (Heinen & Hoberg, 2019; Shen et al., 2019).

However, studies like McBee-Black (2021) contend that retailers such as Tommy Hilfiger were dedicating extra resources to streamline their production processes for adaptive clothing, which could potentially allow them to manufacture adaptive lines without significantly increasing production costs.

Third, adaptive clothing in the retail market can be more limited in variety than nonadaptive garments. For instance, due to insufficient design capacity, designers seldom create adaptive clothing for particular categories, such as formal wear and sportswear (Bairagia & Bhuyan, 2021; Kidd, 2006). Other studies found that brands and retailers often prioritize children and adolescents over adults in developing adaptive clothing because of the perceived more significant lifelong impact and influence of social environments on the younger generation (Stanberry et al., 2018; Stokes & Black, 2012).

2.3 Maslow's theory and consumer demand for adaptive clothing

Consumers' demand and purchasing behaviors are critical factors influencing apparel retailers' merchandising strategies (Wu et al., 2022). Numerous studies found that PWD consumers have unique needs and considerations when shopping for adaptive clothing.

First, PWD consumers often look to purchase adaptive clothing that can accommodate their physical and functional needs. Maslow's hierarchy theory identifies protection, warmth, and modesty as fundamental human needs (Maslow, 1943). Drawing from Maslow's theory, adaptive clothing serves as a natural extension of the basic human needs of PWD (Carroll & Gross, 2010). For example, studies showed that PWD consumers desire adaptive clothing designed with specific features that allow them to dress independently (Sadretdinova et al., 2022; Stokes & Black, 2012). Qualitative studies based on in-depth interviews with adaptive clothing designers also found that PWD consumers highly value adaptive clothing that accommodates their primary human needs, such as comfort and physical movement (Azher et al., 2012; Esmail et al., 2020; Feng & Hui, 2021).

Second, PWD consumers want to purchase adaptive clothing products that look indistinguishable from nonadaptive ones to support everyday social and professional lives. According to Maslow's hierarchy of needs theory, humans have a fundamental desire for belongingness, love, and self-esteem once basic physiological needs are met (Maslow, 1943). When engaged in these work and social activities, PWD look for adaptive clothing options to support their societal participation and provide confidence and comfort while avoiding stigmatization, which is consistent with Maslow's theory (Chae, 2022). In other words, PWD consumers want adaptive clothing choices that provide functional needs without sacrificing aesthetics, such as color, texture, and style (Azher et al., 2012; Kabel et al., 2016; Li et al., 2023).

Third, PWD consumers care about the pricing of adaptive clothing. Consumers' sensitivity to clothing pricing is often associated with their income level. Generally, lower-income individuals are more price sensitive and prioritize affordability in purchasing clothing (O'Cass & Lim, 2002; Wakefield & Inman, 2003). Furthermore, studies consistently found that PWD generally had more limited purchasing power and were more likely to struggle financially than those without disabilities in the United States (McGarity et al., 2020). For example, full-time workers between the ages of 16 and 64 with disabilities living in the United States earned approximately $8,500 less than their counterparts without disabilities in 2022 (U.S. Department of Labor, DOL, 2023). Similarly, the labor force participation rate was as low as 37.8% for working-age American adults with disability, much lower than 77.1% for those without disabilities (U.S. Department of Labor, DOL, 2023). Additionally, studies found that people with disability tend to incur higher living expenses, particularly more burdensome healthcare costs, which further restrict their discretionary spending on clothing (Burns et al., 2021). Given the potential for lower incomes and increased living expenses among some PWD consumers, the issue of adaptive clothing's affordability deserves attention and could be explored further.

Table 2.1 Economic Conditions of U.S. Consumers: PWD vs. Non-PWD in 2022

Indicators	Persons with a Disability	Persons without a disability
Labor force participation rate	37.8%	77.1%
Median household earnings	$41,716	$50,264

Note: U.S. consumers refer to ages 16-64. Data source: BLS (2023)

Additionally, PWD consumers actively look for substitutes for adaptive clothing for various reasons. While it is not uncommon for people without disabilities to also modify their clothing to expand their range of options in terms of colors, styles, and product categories, studies such as Otieno et al. (2005), Stankevich (2017) and Wilkinson and Wilkinson (2019) suggest that, for PWD, this behavior could be more prevalent due to the limited availability of clothing that meets their needs and preferences on a broader scale. On the other hand, studies showed that it was not uncommon for PWD consumers to modify nonadaptive clothing to address their needs, especially when doing so could provide a broader range of options regarding colors, styles, and product categories (Wilkinson & Wilkinson, 2019).

2.4 U.S. Retailers' merchandising strategies for adaptive clothing: a framework

In summary, as Figure 1 illustrates, this study proposes the following hypotheses regarding U.S. retailers' merchandising strategies for adaptive clothing:

H1. Adaptive clothing would be more boring or plain in style compared to nonadaptive clothing in U.S. retail stores.

In theory, adaptive clothing could look more 'boring' and lack variety in style compared to nonadaptive clothing, as adaptive designs prioritize functional concerns over aesthetic and expressive design details, such patterns (Venkatasubramanian &

Pragadheeswari, 2022). In other words, as meeting the functional requirements constitute a more significant challenge for adaptive clothing, designers often have to comprise the aesthetic appeal of the garments (Chae, 2022; Sadretdinova et al., 2022).

H2. U.S. retailers' product assortment for adaptive clothing would be more limited than nonadaptive ones.

Several factors may contribute to a more restricted availability of adaptive clothing than nonadaptive clothing, such as the more complex and time-consuming process of designing and making adaptive clothing and retailers' limited design capacity in offering adaptive clothing in more varieties (Bairagia & Bhuyan, 2021; Kidd, 2006). For example, adaptive clothing may likely concentrate on specific basic product categories deemed essential for PWD, such as tops and bottoms. In comparison, the availability of adaptive clothing for other 'nonessential' categories, such as dresses, could be more limited. Likewise, retailers may offer fewer color or size choices for adaptive clothing due to the challenges of balancing demand and supply in inventory management (Annett-Hitchcock & Xu, 2015; Li et al., 2023). Furthermore, the shortage of skilled professionals qualified to design adaptive clothing may negatively affect retailers' product offerings (Lamb & Kallal, 1992; Moon et al., 2019).

H3. U.S. retailers tend to prioritize adaptive clothing for children and adolescents over adults in terms of product availability.

In theory, retailers would be willing to prioritize their limited resources to develop and offer adaptive clothing targeting children and adolescents over adults due to the perceived more significant lifelong impact (Stanberry et al., 2018; Stokes & Black, 2012). Also, treating childrenswear as a priority for adaptive clothing could be a financially viable business strategy for U.S. retailers, as parents of children or adolescents with disabilities may be more willing to purchase adaptive clothing, or can more easily afford them financially than adults with disabilities (Kabel et al., 2017; Parrish et al., 2006).

H4. It is uncertain whether U.S. retailers would price adaptive clothing lower or higher than nonadaptive ones.

On the one hand, adaptive clothing could be more costly to produce than nonadaptive ones due to the lengthier and more complex product development process (Keenan et al., 2021). As a result, retailers may need to set higher prices for adaptive clothing to cover the additional purchasing costs. On the other hand, U.S. retailers may also consider placing a lower price for adaptive clothing than nonadaptive clothing to improve product accessibility for PWD consumers, particularly given PWD's generally more limited income (U.S. Department of Labor, DOL, 2023).

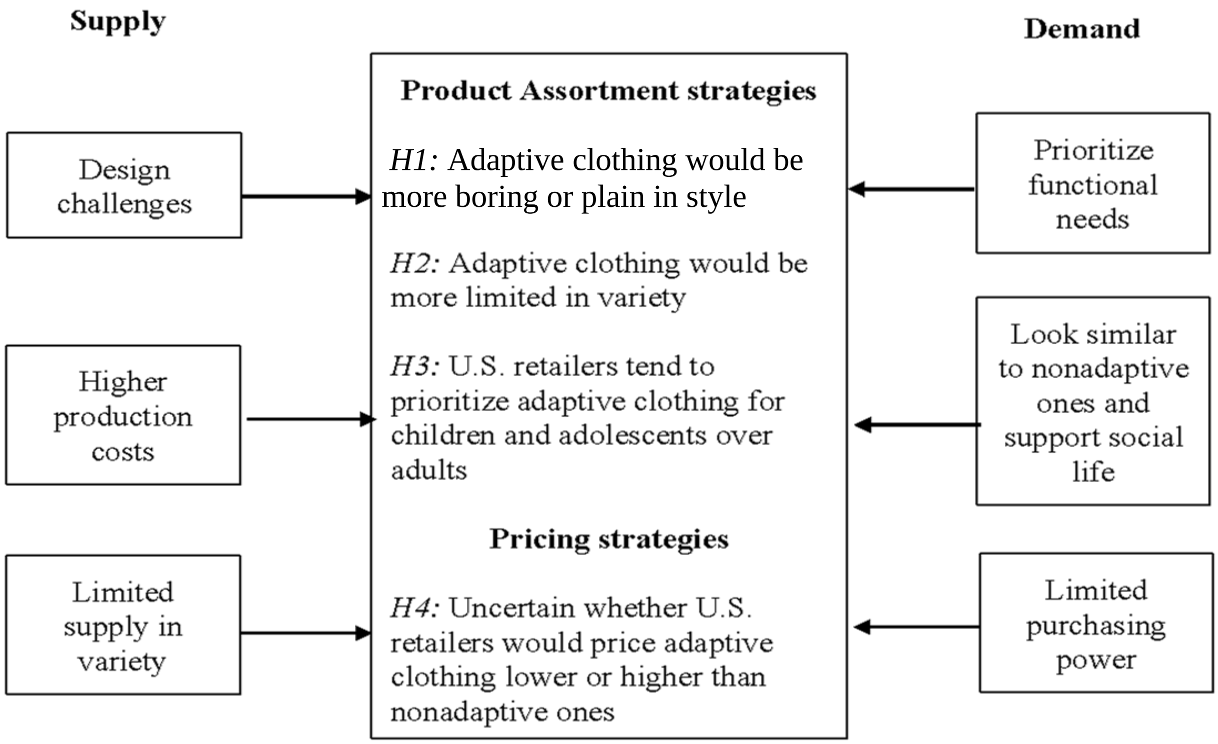

Figure 1 U.S. Retailers' Merchandising Strategies forAdaptive Clothing: A Conceptual Framework

Chapter 3

METHOD AND DATA

3.1 Data source

The study's data were collected from EDITED, one of the leading big data tools targeting apparel products (EDITED, 2023). Through a combination of web crawling and manual curation methods, EDITED was able to capture detailed product characteristics, label descriptions, and pricing information of hundreds of thousands of clothing items for sale in the U.S. retail market at the Stock-Keeping Unit (SKU) level (EDITED, 2023). Unlike aggregated industry-level statistics, EDITED's data offered unique insights into U.S. retailers' product assortment and pricing practices for adaptive clothing, allowing us to test whether they differ from nonadaptive ones.

Specifically, datasets collected from EDITED were used to assess the proposed hypotheses. First, 2,000 Stock Keeping Units (SKUs) of 'adaptive clothing' were randomly selected by EDITED. These 2,000 samples explicitly mentioned 'adaptive' and 'disability' in the product description, which aligned with the study's definition for such clothing. (Note: Although 'sensory,' 'ease of dressing,' and 'tagless' are important keywords associated with adaptive clothing, these terms are also commonly used in nonadaptive clothing, especially in the childrenswear, sportswear, and activewear categories. Thus, these words were not used to select adaptive clothing in this study.) EDITED randomly selected these 2,000 samples from the millions of products it had captured, reflecting items available in the U.S. retail market between September 2018 and

December 2022. (Please note: data from previous years was unavailable, and December 2022 represented the most recent data available).

Second, by following the same method, another 2000 SKUs of ‘nonadaptive clothing’ were randomly selected by EDITED from millions of apparel items available in the U.S. retail market between September 2018 and December 2022. These 2000 samples did not contain the keywords ‘adaptive’ and ‘disability’ in their product description, which met the study’s definition of ‘nonadaptive clothing.’

3.2 Data analysis

The study utilized logistic regression to examine the hypotheses and assess U.S. retailers' merchandising strategies for adaptive clothing in comparison to nonadaptive ones. Since most data used in the study was categorical, logistic regression is the preferred method to assess the quantitative relationship between variables (Field, 2013). Logistic regression was favored over ordinary multiple linear regression, as applying ordinary linear regression to categorical dependent variables can lead to biased estimations (Wooldridge, 2015, pp. 525). In addition, studies using categorical data commonly adopted the logistic regression method (e.g., Clottey et al., 2008; Keough & Lu, 2021).

$$\text{Log (Adaptive)} = \beta_1 \cdot \text{Pattern} + \beta_2 \cdot \text{Tops} + \beta_3 \cdot \text{Bottoms} + \beta_4 \cdot \text{Underwear} + \beta_5 \cdot \text{Dresses} + \beta_6 \cdot \text{Outerwear \& Suits} + \beta_7 \cdot \text{Swimwear} + \beta_8 \cdot \text{SKU} + \beta_9 \cdot \text{Age} + \beta_{10} \cdot \text{Market} + \beta_{11} \cdot \text{Price} + c \tag{1}$$

Specifically, as Equation 1 indicates, the logistic regression used *Adaptive* as the dependent variable, measuring whether a particular item in the samples was adaptive clothing (i.e., adaptive clothing=1; nonadaptive clothing=0). Corresponding to the hypotheses, the model included five sets of independent variables:

- One variable measuring a clothing item's design pattern: *Pattern* (if the clothing item adopted the plain pattern, i.e., not using graphics, stripes, spots, checks, floral, or other patterns=1; otherwise =0). The value of $\beta_1$would help us evaluate hypothesis 1.
- Six variables measuring product categories: *Tops* (if the clothing item was in the category of tops=1; otherwise=0), *Bottoms* (if the clothing item was in the category of bottoms=1; otherwise=0), *Underwear* (if the clothing item was in the category of underwear=1; otherwise=0), *Dresses* (if the clothing item was in the category of dresses=1; otherwise=0), *Outerwear & Suits* (if the clothing item was in the category of outerwear or suit=1; otherwise=0), *Swimwear* (if the clothing item was in the category of swimwear=1; otherwise=0. The results of β_2 to β_7 would help test hypothesis 2 regarding whether U.S. retailers give priority to adaptive clothing in specific product categories deemed essential for PWD, such as tops, bottoms, and underwear, compared to other "nonessential" products like dresses, outerwear & suits, and swimwear (Hur et al., 2022; Li et al., 2023).
- One variable measuring assortment diversity: *SKU* refers to the number of Stock Keeping Units available for the clothing item (e.g., *SKU*=5 means a clothing item has five different sizes or colors). A higher *SKU* value indicated that a clothing item's assortment was more diverse (Mantrala et al., 2009; Wang & Vakratsas, 2021). The results of β_8 would also help evaluate hypothesis 2 regarding whether adaptive clothing in the U.S. retail market has a more limited variety, with fewer color or size choices, than nonadaptive ones.
- One variable measuring whether a clothing item's targeted age group: *Age* (if the clothing item was for adults=1; otherwise=0). The result of β_9 would help test

hypothesis 3 regarding whether U.S. retailers prioritize adaptive clothing for children and adolescents over adults in terms of product availability.

- Two variables measuring pricing strategy: *Market* (If the apparel item fell under the market segment of luxury or premium=1; mass or value market=0). *Price* (if the clothing item was priced higher than the market average=1; otherwise=0). Table 3.1 shows the average clothing retail price in the U.S. market used to evaluate the variable *Price.* The results of β_{10} and β_{11} would help test hypothesis 4 regarding whether U.S. retailers tend to charge a price premium for adaptive clothing compared to nonadaptive ones.
- *c* is the constant.

Table 3.1 Average Clothing Retail Price in the U.S. Market (2018-2022)

Categories	Value	Mass	Premium	Luxury
Tops	$18.3	$32.0	$112.4	$289.7
Bottoms	$23.3	$40.0	$123.0	$329.9
Underwear	$19.3	$19.4	$42.0	$73.0
Dresses	$29.4	$47.6	$228.7	$544.3
Outerwear & Suits	$48.3	$90.1	$353.4	$972.0
Swimwear	$22.2	$27.7	$78.1	$130.0

Data source: EDITED (2023)

Further, the study adopted EDITED’s classification for a clothing item’s design pattern (i.e., variable Pattern), product category (i.e., variables Tops, Bottoms, Underwear, Dresses, Outerwear & Suits, and Swimwear), age group (i.e., variable Age), and market segment (i.e., variable Market).

Chapter 4

RESULTS AND DISCUSSIONS

4.1 Descriptive analysis

Consistent with the hypotheses in the conceptual framework (Figure 1), U.S. retailers appeared to adopt unique product assortment strategies for adaptive clothing compared to nonadaptive ones. Specifically:

Table 4.1 Adaptive Clothing vs. Nonadaptive Clothing: Patterns

Category	Adaptive clothing (N=2,000)	Nonadaptive clothing (N=2,000)
Plain pattern (*Pattern*=1)	67.7%	61.3%
Non-plain pattern (*Pattern*=0)	32.4%	38.7%

First, U.S. retailers tend to carry adaptive clothing in more boring patterns. For example, of the collected samples, close to 70% of adaptive clothing ($n = 1353$) did not incorporate graphics, stripes, spots, checks, floral, or other non-plain designs. In contrast, nonadaptive clothing exhibited a wider variety of design choices. The results indicated that adaptive clothing overall looked more 'boring' and plain in the U.S. retail market, reflecting the priority placed by retailers and consumers on the functionality of adaptive clothing over its aesthetics (Chae, 2022).

On the other hand, the collected samples of adaptive clothing frequently featured specific keywords to highlight their functional benefits to consumers, including "magnet," "ease of dressing," "Velcro," and "snaps" (Tabel 4.2). This practice suggests that U.S. retailers could effectively communicate the function of their adaptive clothing as a priority (Wu et al., 2023).

Table 4.2 Keywords Used by Adaptive Clothing

Keywords	Frequency	%
Magnet	658	32.9%
Ease of dressing	649	32.5%
Velcro	239	12.0%
Snaps	234	11.7%
Tagless	67	3.4%
Extended zipper pull	52	2.6%
Wide neck line	48	2.4%
Seated wear	46	2.3%
Easy dressing	38	1.9%
Sensory	18	0.9%
Seamless	18	0.9%

Table 4.3 Adaptive Clothing vs. Nonadaptive Clothing: Product Categories

Product category	Adaptive clothing (N=2,000)	Nonadaptive clothing (N=2,000)
Tops (*Tops* =1)	64.8%	51.8%
Bottoms (*Bottoms* =1)	13.5%	14.7%
Underwear (*Underwear* =1)	1.7%	4.2%
Dresses (*Dresses* =1)	5.1%	10.1%
Outerwear & Suits (Outerwear & *Suits* =1)	8.7%	13.5%
Swimwear (*Swimwear* =1)	1.1%	1.0%
Other	5.3%	4.9%

Second, it appears that adaptive clothing was limited in available categories in the U.S. retail market. For example, Table 4.3 shows that of the collected samples, adaptive clothing concentrated on tops ($n = 1{,}296$, 64.8%) and bottoms ($n = 269$, 13.5%). However, compared to nonadaptive ones, there were notably fewer adaptive clothing items in categories such as underwear ($n = 84$, 4.2% vs. $n = 33$, 1.7%), dresses ($n = 201$, 10.1% vs. $n = 101$, 5.1%), and outerwear ($n = 270$, 13.5% vs. $n = 173$, 8.7%). The absence of adaptive clothing in dresses and outerwear highlights that PWD consumers still face limited choices for apparel items that can support their full participation in society and enable them to enjoy various social activities.

Table 4.4 Adaptive Clothing vs. Nonadaptive Clothing: Age Group

Category	Adaptive Clothing (N=2,000)	Nonadaptive Clothing(N=2,000)
Adult (*Age* =1)	85.9%	87.8%
Children or adolescents (*Age* =0)	14.2%	12.2%

Third, U.S. retailers consider children and adolescents an essential demographic for adaptive clothing. Due to a considerably larger population of adults over children and adolescents (i.e. under the age of 18) in the U.S., it was unsurprising to see more adaptive (n = 1717, 85.9%) and nonadaptive clothing (n = 1756, 87.8%) for adults in the collected samples (U.S. Census Bureau, 2023). However, Table 4.4 shows that compared with nonadaptive clothing, adaptive clothing includes a relatively higher percentage of childrenswear (i.e. 14.2% vs. 12.2%). Previous studies proposed that the perceived substantial benefits of providing adaptive clothing to children and adolescents with disabilities were among the crucial factors driving the availability of adaptive products for this demographic group (Stanberry et al., 2018; Stokes & Black, 2012).

Furthermore, the assortment depth of adaptive clothing seemed comparable to nonadaptive clothing in the U.S. retail market. For example, in the collected samples, adaptive and nonadaptive clothing had an average of 3.4 for the variable SKU (i.e. the number of Stock Keeping Units for a clothing item). In other words, no evidence shows that U.S. retailers purposefully increased or reduced the sizing choices for the adaptive clothing they offered.

Table 4.5 Adaptive Clothing vs. Nonadaptive Clothing: Retail Price and Market Segment

Category	Adaptive clothing (N=2,000)	Nonadaptive clothing (N=2,000)
Priced above the market average (*Price* =1)	78.9%	70.0%
Priced below the market average (*Price* =0)	21.2%	30.0%
Luxury or premium market (*Segment* =1)	6.9%	6.9%
Mass or value market (*Segment* =0)	93.1%	93.2%

Fourth, U.S. retailers appeared to set higher prices for adaptive clothing than nonadaptive ones. Table 4.5 shows that of the collected samples, nearly 80% of adaptive clothing (n = 1577) was priced above the market average in the same category, far more than nonadaptive clothing. The higher retail price for adaptive clothing could reflect its more complex production process and extra product cost (Keenan et al., 2021). Additionally, most adaptive clothing in the collected samples targets the mass and value market (n = 1862, 93.1%). This pattern suggests that while adaptive clothing may not be 'cheap' to purchase, it is not regarded as a 'luxury' product in the U.S. retail market.

4.2 Statistical analysis

Table 4.6 Results of Logistic Regression

	Coefficient	S.E.	Wald	df	P-value	Exp(B)
Pattern	0.37	0.07	27.10	1	<.001**	1.45
Tops	0.09	0.15	0.34	1	0.559	1.09
Bottoms	-0.30	0.17	3.27	1	0.071	0.74
Underwear	-1.06	0.26	16.54	1	<.001**	0.35
Dresses	-0.83	0.19	19.10	1	<.001**	0.44
Outwear & suits	-0.64	0.17	13.49	1	<.001**	0.53
Swimwear	0.12	0.35	0.12	1	0.735	1.13
SKU	0.02	0.01	1.58	1	0.209	1.02
Age	-0.25	0.10	6.70	1	0.01**	0.78
Market	0.20	0.14	2.17	1	0.141	1.22
Price	0.37	0.08	19.40	1	<.001**	1.45
Constant	-0.21	0.18	1.45	1	0.229	0.81

*p< .05 ** p< .01.

The logistic regression analysis was conducted to evaluate whether U.S. retailers' merchandising strategies for adaptive clothing differ significantly from those for nonadaptive clothing. The logistic regression was statistically significant at the 99% confidence level (likelihood ratio (L.R.) statistics= 171.84, *p*=.00). The logistic model correctly classified 56.9% of the cases, indicating its high degree of consistency. Specifically as table 4.6 shows:

Consistent with Hypothesis 1, the results showed that adaptive clothing was statistically 1.45 times more likely ($\beta_1 = 0.37$) to adopt a plain style (i.e., *Pattern*=1) than nonadaptive clothing when holding other factors constant (Wald X^2=27.1, $p<.001$). The result indicated that adaptive clothing in the U.S. retail market appeared to be more plain with fewer design-pattern choices (e.g., graphics, stripes, spots, checks, floral) than nonadaptive ones. The findings aligned with previous research, indicating that the intricate process of designing and producing adaptive clothing may pose additional difficulties in achieving functional objectives while also maintaining aesthetic appeal (Sadretdinova et al., 2022).

Consistent with Hypothesis 2, the results suggested that U.S. retailers provided distinctive assortments for adaptive clothing, which differed from nonadaptive clothing regarding product categories. Compared with nonadaptive ones, adaptive clothing was statistically less visible in the U.S. retail market for several critical categories, such as 43.8% less likely for dresses ($\beta_5 = -0.83,$ Wald X^2=19.10, $p<.001$), and 52.8% less likely for outerwear & suits ($\beta_6 = -0.64$, Wald X^2=13.49, $p<.001$) and 34.6% less likely for underwear ($\beta_4 = -1.06, Wald\ X2 = 16.54, p < .001$). However, no statistical evidence suggested that U.S. retailers' product offers for adaptive clothing significantly differ from nonadaptive ones regarding tops, bottoms, and swimwear (i.e., $p>.05$). The results indicated that U.S. retailers, in general, prioritized offering 'essential' product categories for adaptive clothing given the resource restraints to develop such products (Bairagia & Bhuyan, 2021). It may also be likely that U.S. retailers' design knowledge and capacity for adaptive clothing for categories, such as outerwear and dresses, remain relatively limited.

On the other hand, the results revealed no statistical difference in the depth of assortment (i.e. variable *SKU*) for adaptive versus nonadaptive clothing in the U.S. retail market (i.e., $p>.05$). This suggests retailers generally provided comparable sizing or color choices for adaptive and nonadaptive clothing in the market. However, it is worth noting that previous studies suggest that adaptive clothing's fit and sizing concern PWD consumers (Chae, 2022). Thus, the availability of the same or similar size choices does not necessarily imply an adequate supply of adaptive clothing in the market that fully caters to the needs of PWD consumers.

Supporting Hypothesis 3, the results showed that U.S. retailers were statistically 77.9% less likely ($\beta_9 = -0.25$) to carry adaptive clothing for adults (Age=1), compared to nonadaptive clothing when holding other factors constant (Wald X^2=6.70, $p<.001$). The results revealed that demographics like children and adolescents (i.e., *Age=0*) were among U.S. retailers' critical target market for adaptive clothing (Stanberry et al., 2018).

Additionally, supporting hypothesis 4, the logistic regression indicated that U.S. retailers set a distinct pricing strategy for adaptive clothing. Specifically, when holding other factors constant, adaptive clothing was 44.8% more likely ($\beta_{11} = 0.37$) to be priced above the market average than nonadaptive clothing (Wald X^2=19.40, $p<.001$). The results implied that retailers may need a higher price to cover the additional costs associated with the complex process of developing, making, and sourcing adaptive clothing (Keenan et al., 2021). However, the results also indicated that adaptive clothing was primarily created for the mass and value market segments (i.e. 93.1%), which was statistically no different from nonadaptive clothing products.

Chapter 5

CONCLUSIONS AND FUTURE RESEARCH AGENDA

5.1 Findings

This study explored retailers' distinctive merchandising strategies for adaptive clothing in the United States. Specifically, the study examined (1) whether U.S. retailers adopt unique assortment strategies for adaptive clothing regarding product categories, patterns, and styles and (2) whether U.S. retailers adopt unique pricing strategies for adaptive clothing, including the market segments and average selling price. By analyzing detailed product features of thousands of adaptive clothing for sale in the U.S. retail market from September 2018 to December 2022, the study found that:

First, statistically, adaptive clothing for sale in the U.S. retail market looked more 'boring' and likely to be in a plain pattern (i.e. not using any graphics, stripes, spots, checks, floral, or other design patterns) than nonadaptive ones.

Second, compared with nonadaptive apparel, adaptive clothing statistically was less likely to be seen in several major categories, including dresses, outerwear & suits, and underwear in the U.S. retail market. However, the availability of adaptive clothing in tops, bottoms, and swimwear was statistically comparable to nonadaptive ones.

Third, statistically, children and adolescents were among the prioritized demographics for adaptive clothing in the U.S. retail market.

Fourth, while most adaptive clothing targeted the mass and value market segments, compared with nonadaptive ones, adaptive clothing was more likely to be priced higher than the market average by U.S. retailers.

5.2 Implications

The study's findings revealed how retailers manage assortment and price adaptive clothing in the United States and provided critical new knowledge contributing to our understanding of the business aspect of this vital product group for PWD consumers. The study's findings also have several other important implications:

First, the study's findings indicated an emerging commercial adaptive clothing market in the United States. It is encouraging that adaptive clothing is already available in the U.S. retail market, carried by some large-scale department stores or prominent brands (EDITED, 2023). More retailers could consider entering the adaptive clothing market to expand product availability and variety. On the other hand, given the substantial size of PWD and their legitimate dressing needs, it is essential that U.S. retailers make adaptive clothing an integral part of their primary product assortment instead of a 'niche' product offering.

Second, the study's findings identified several significant product gaps in the U.S. retail market for adaptive clothing. For example, improving the product offers of adaptive clothing in dresses and outerwear is critical, which could play a vital role in supporting PWD consumers' participation in social activities and engagement (Kabel et al., 2016; Li et al., 2023). Likewise, as the study's findings illustrated, U.S. retailers could offer more adaptive underwear, which was regarded as one of the essential apparel categories (Choi et al., 2023). Additionally, PWD could also be consulted on aesthetics as well as adaptive features during the design process of adaptive clothing to make the products more appealing and a better fit.

Third, the study's findings call for efforts to make adaptive clothing more financially affordable to PWD consumers. Adaptive clothing was found to be more likely to be priced higher than the market average compared to nonadaptive clothing, possibly due to higher production and sourcing costs (Imran et al., 2020; Keenan et al., 2021). Nevertheless, considering the typically lower income and higher living expenses of PWD, it is imperative for U.S. retailers to actively seek solutions that make adaptive clothing more financially attainable for this demographic (U.S. Census Bureau, 2023). For example, collaborating with suppliers or strategically leveraging sourcing strategies may help achieve this goal.

5.3 Future research agendas

Despite the interesting findings, future studies could delve deeper into various aspects:

First, due to data availability limitations, this study couldn’t evaluate how retailers’ sizes and business types (e.g. department stores and specialty stores) might affect their product assortment and pricing for adaptive clothing. Nor did the study evaluate the potential impact of COVID-19 on the availability of adaptive clothing in the market due to a lack of sufficient data. Surveys or interviews could help collect more detailed and comprehensive data about adaptive clothing available in the retail market. Likewise, surveys or interviews could gain new insights into U.S. retailers’ assortment and pricing decisions for adaptive clothing and their perceived obstacles to offering adaptive clothing to the market. For example, further exploring if embracing the concept of ‘universal design’ or ‘inclusive design’ (e.g. making the product usable to a wider range of people) could increase the offerings of adaptive clothing.

Second, as retailers are profit-driven, future studies could investigate the financial implications of carrying adaptive clothing. The results could deepen our understanding of retailers' pricing strategies for adaptive clothing and illustrate the opportunities and challenges of providing more such products to the market.

Third, while this study shed light on U.S. retailers' merchandising strategies for adaptive clothing, the supply chains of such products remain unknown. As retailers mostly source the products they sell, understanding their sourcing strategies for adaptive clothing, including the vendor selection criteria and the supplier base, could provide valuable information on the potential opportunities and challenges in expanding the availability of adaptive clothing in the market. Also, future research could investigate whether using solid colors and plain patterns in adaptive clothing was intentional to address some PWD's specific needs.

Additionally, while this study focused on the U.S. market only, with data availability, future studies can investigate retailers' merchandising strategies for adaptive clothing in other world markets. Particularly, not all countries are as economically and technologically advanced as the United States, especially the developing world. This implies that retailers' business strategies for adaptive clothing in these regions could exhibit distinctive patterns and approaches.

Note:

1. "Nonadaptive clothing" in this study refers to garments designed without any particular adaptive function.

2. "Flat seams" are enclosed seams that hide the fabric's edges, making for a smoother and cleaner finish (Seram & Cabon, 2013).

3. Although "sensory," "ease of dressing," and "tagless" are important keywords associated with adaptive clothing, these terms are also commonly used in nonadaptive clothing, especially in the childrenswear, sportswear, and activewear categories.

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