

Study of Adaptive Clothing in Hong Kong: Demands, Analysis and Future Direction

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Abstract

Aging population is substantively increased over last decade and they have specific clothing needs especially for the elderly with disabilities. Their clothing needs to cover functional and aesthetic requirements in order to improve their quality of life. Adaptive clothing is specially designed for the elderly and the disabled. However, there is no public policy to support such the elderly with disabilities in their clothing needs. In this paper, we aim to study the adaptive clothing and its significance, the problems encountered by the elderly with disabilities in adaptive clothing, analysis of public policy in Hong Kong for the elderly with disabilities in adaptive clothing over last decade, and implications and future directions for adaptive clothing in Hong Kong. In our findings, the demand of adaptive clothing in Hong Kong was substantially increased over last decade and the predicted demand will be twice of current demand after 50 years. However, the Government policy in Hong Kong has not yet fully supported their clothing needs, and the non-profit clothing services centre is set up to provide tailoring services to meet their needs. As the capacity of the centre is very limited, it is necessary to expand its capacity through assistive technology and to encourage non-government organizations (NGOs) to establish more social enterprises with Government's support. Such findings would be beneficial to the Government for strengthening such services for the elderly and the disabled as well as public awareness.

Keywords

Adaptive Clothing, Elderly with Disabilities, Public Policy

1. Data Sources Used in This Study

The primary search starts with the database of SAGE, Elsevier, Taylor & Francis, Ovid, Google Scholar, Wiley online Library, Nature, Oxford Academics, ICI

Journals master list, Scopus, Springer, Google and Yahoo. Relevant articles were systematically selected based on the key words and topics that have been published from the year 2000 until 2019. Key words of the primary search are listed as following sequence:

- 1) Adaptive Clothing.
- 2) Disabled/Elderly + garment.
- 3) Disabled/Elderly + apparel.
- 4) Disabled/Elderly + clothing.
- 5) Disabled/Elderly + government policy.
- 6) Disabled/Elderly + shopping.

2. What Is Adaptive Clothing and Its Significance?

Adaptive clothing consists of garments and footwear designed for the elderly and people with disabilities (PWD), and is designed to eliminate, or at least reduce, the impact of functional limitations of its wearer's body [1], enabling them to go about their everyday lives with nonrestrictive comfort. In addition, it also allows caregivers and nurses to more easily provide assistance to those in need.

That adaptive clothing increases the wearer's sense of autonomy and control over their body means that they can more meaningfully participate in their community [2], increasing their engagement in occupations, as well as prospects for education and employment—all of which have a great impact on their quality of life [3]. As a means of lowering the barriers to social participation that the elderly and PWD encounter, adaptive clothing enables them to be more socially involved; thus, it plays a role in reducing the negative consequences of physical and mental problems, such as higher rates of coronary heart disease, stroke, depression, and cognitive decline [4], that arise from social isolation.

Clothing is fundamental to identity and self-image; it influences how one thinks, feels, and is perceived [5]. Therefore, aesthetic considerations figure just as much as functional considerations when it comes to adaptive clothing. In a society that privileges the needs and interests of the able-bodied, it comes as no surprise that the clothing choices of people with physical impairments are based on a desire to meet the dominant socio-cultural standards of appearance, so as to increase social acceptance and minimize differences from non-disabled peers [6] [7]. As such, fashionable adaptive clothing that fulfills its wearers' pursuit for style and image can positively influence wearers' self-concept, self-esteem, and body image, which in turn bolster cognitive functioning, mental health, and physical health [6].

3. Demands of Adaptive Clothing in Hong Kong from the Elderly and PWD

The need and demand for adaptive clothing will undoubtedly increase in the future. After all, Hong Kong is in the midst of a demographic shift. According to the most recent survey that the Census and Statistics Department has conducted

in 2013, there are 320,500 people with restricted body movement. Aging in the population has increased the number of people with restricted body movement [8]. As the findings from the report show, 78.4% of people with restricted body movement are above 65 years old. This already-high proportion will increase in the coming years, as people aged 65 and above are estimated, according to Population Projections 2017-2066, to account for 27% of the population, which is almost twice as that in 2016 (16%) [9]. Given the projected increase in people aged 65, which also entails an increase in people with restricted body movement, the significance and need for accessible adaptive clothing ought to be considered just as much as other much-welcomed initiatives to improve the well-being of PWD and the elderly.

4. Current Government Policy for Supporting the Elderly and PWD in Hong Kong

Over the years, the Hong Kong government has demonstrated an awareness of the ways in which disabilities are very much social problems created and intensified by environmental barriers in society. In terms of policy, it has addressed the need to lower these environmental barriers, through measures such as the expansion of barrier-free and assistive transport and facilities [10]. And when it comes to policy that addresses disability as an individual, medical matter, there have been programs in place to reduce the impact of PWD's functional limitations of their body. Beyond disability allowances under the Social Security Allowance (SSA) and Comprehensive Social Security Assistance (CSSA) schemes, the Support Programme for Employees with Disabilities subsidizes employers to procure assistive technological devices and modify workplace environments to facilitate employees with disabilities, and the Innovation and Technology Fund for Application in Elderly and Rehabilitation Care subsidizes elderly and rehabilitation service units to procure products to improve PWD and the elderly's quality of life [11] [12]. The Rehabilitation Advisory Committee (RAC) that is tasked by the government to formulate a Rehabilitation Programme Plan has also proposed a Funding Scheme on Life-supporting and Assistive Devices, in order to provide financial support for persons with disabilities/rare diseases in purchase of the equipment and encourage them for employment [13].

5. Problems Encountered by the Elderly and PWD in Adaptive Clothing

Curiously, while there are measures to make the built environment more barrier-free, as well as to provide assistive technology to improve the elderly and PWD's ability to navigate the built environment, there is no consideration that adaptive clothing is just as helpful as assistive devices in diminishing disablement. A search through government websites, as well as the policy addresses from the past five years, yields no results regarding policy that explicitly aims to meet the elderly and PWD's need for adaptive clothing, suggesting that the rela-

tionship between the marginalization of people with disabilities and access to adaptive clothing remains unacknowledged in policy-making circles. Besides this, it is difficult for the elderly and PWD to buy their required adaptive clothing in the commercial market because their adaptive clothing is very difficult for standardization in mass production to reduce the production cost. Thus, commercial apparel retailers are reluctant to set up a product line of such adaptive clothing for the elderly and PWD.

6. How to Resolve the Problem for Adaptive Clothing in Hong Kong?

In Hong Kong, there are some non-government organizations (NGOs) to provide a tailoring service for the elderly and PWD in a case-by-case basis. Such tailoring services are provided by rehabilitation therapists because they know their clothing needs based on their degree of disabilities. However, rehabilitation therapists do not have full knowledge of clothing making with fabric materials. Thus, the textile and clothing professional services provided by the University are catering for such tailoring services for the elderly and PWD with support of rehabilitation therapists.

7. Setup of Non-Profit Servicing Centre and Social Enterprise for Adaptive Clothing

In the absence of policies to expand the provision of and access to adaptive clothing, only Hong Kong Polytechnic University's Troels H. Povlsen Care Apparel Center (CAC) and Home Care Apparel respectively, a small-scale non-profit and a social enterprise, set up to provide adaptive clothing for the elderly and PWD. The small-sized nature of these centers ensues that the provision of and access to adaptive clothing remains inadequate for the elderly and PWD population, and this undoubtedly contributes to the disablement process the population faces, in spite of a wide-ranging series of policies to address their needs.

The significance of adaptive clothing for the elderly and PWD should not be understated. It is just like assistive devices, such as wheelchairs and catheter bags, in that it fulfills the elderly and PWD's utilitarian need to better meet the demands of everyday life. Additionally, adaptive clothing fulfills the elderly and PWD's hedonic need for self-expression [7], should it be designed to be aesthetically pleasing, which is something that assistive devices cannot fulfill. Accordingly, any attempt by the government and the RAC to formulate a comprehensive plan for the rehabilitation and habilitation of the elderly and PWD needs to take into account the role of adaptive clothing in diminishing disablement and improving mental and physical well-being.

8. Facts Findings of Adaptive Clothing in Hong Kong over Last Decade

This section examines the data that the CAC has collected from 2007 to 2017

with regards to the adaptive clothing it has sold to its customers (see **Table 1**).

Figure 1 illustrates the number of adaptive clothing items purchased from

Table 1. The number of institutional and individual purchases at CAC from 2007-2017.

Year	Individual purchases	Institutional purchases	Total items cumulatively purchased by year
2007	331	0	331
2008	700	0	1031
2009	503	0	1534
2010	615	71	2220
2011	735	62	3017
2012	1019	125	4161
2013	841	95	5097
2014	1058	2010	8165
2015	1273	435	9873
2016	1108	189	11,170
2017	1003	198	12,371
Total items purchased	9186	3185	12,371

Number of adaptive clothing items purchased from 2007-2017

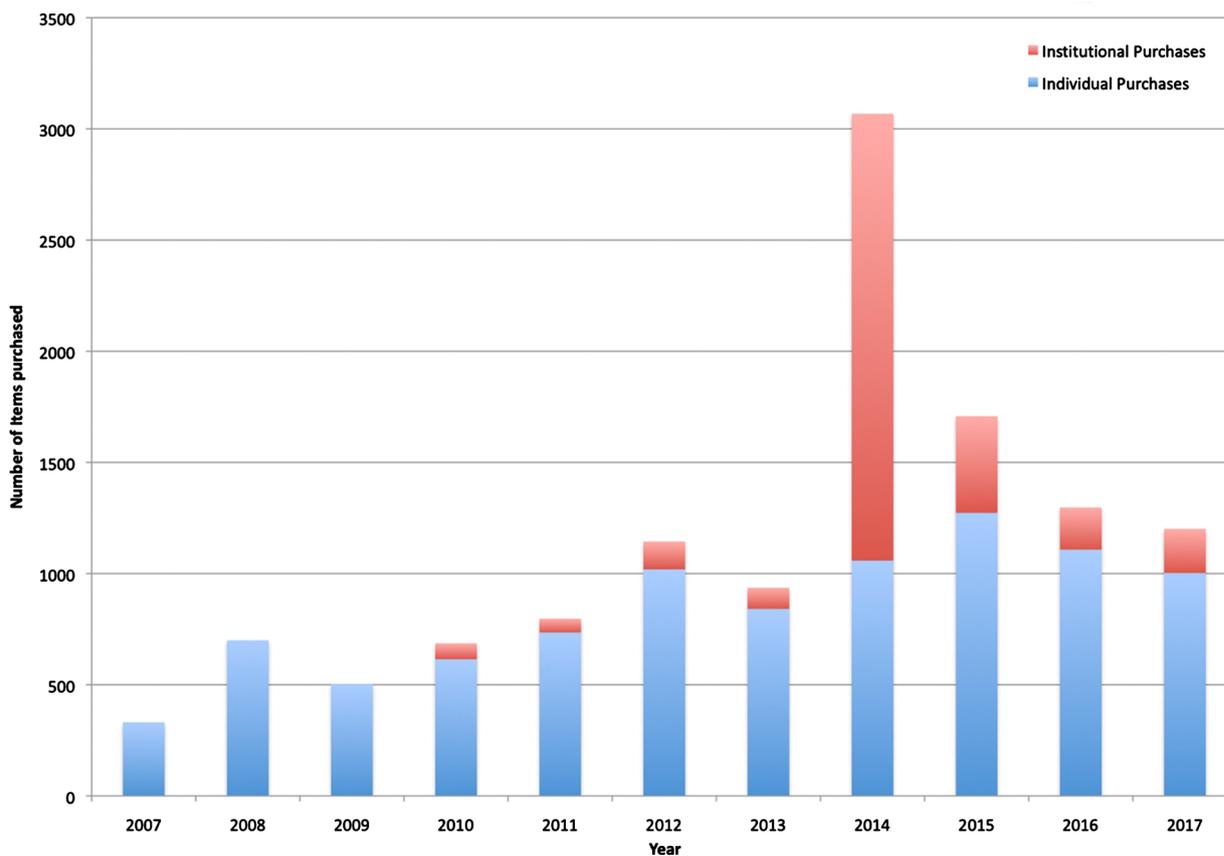


Figure 1. Number of adaptive clothing items purchased from 2007 to 2017 in Care Apparel Centre (CAC).

2007 to 2017. Purchases are split into two categories: institutional and individual, with the former consisting of purchases made by private and public institutions ranging from public hospitals to elderly centers run by NGOs (see **Table 2**), and the latter consisting of purchases made by individuals.

It can be seen that the individual purchases increase in a roughly linear manner from 2007 to 2013. From 2014 to 2017, the purchases stop increasing. They peak and hover around an average of 1111 purchases a year. Meanwhile, the institutional purchases do not increase and peak in the same way that individual purchases do. Setting aside the unusually high number of institutional purchases of 2010 and 435 items in 2014 and 2015 respectively, the average number of items purchased by institutions is 82.

There is no pattern to the institutional purchases throughout the decade, because these purchases are contingent upon whether institutions decide to purchase adaptive clothing items through Care Apparel Center. The purchase records show that all of the items that are usually purchased in bulk by these institutions are mass-produced ones that CAC sources from adaptive clothing suppliers. As such, institutions do not necessarily have to make their purchases through CAC, because there exist many suppliers in Hong Kong that offer mass-produced adaptive clothing items, such as non-slip socks and disability aid aprons, the top two most ordered items (see **Table 3**). This explains why no trend can be discerned from the bulk purchases throughout the decade.

On the other hand, individual purchases have increased from 2007-2013, and then peaked from 2014-2017 at an average of 1111 items purchased a year. While the increase in individual purchases from 2007-2013 can simply be attributed to an increased awareness among elderly and disabled consumers with regards to CAC, the fact that purchases have stayed more or less constant from 2014-2017 is a consequence of CAC's limited ability in meeting the demand of its customers.

The nature of the most purchased items from individual purchases generally differs from the items purchased by various institutions (see **Table 3**). All of the adaptive clothing items that CAC sells to various institutions are mass-produced items that the center sources from various suppliers. Some of the items that individuals purchase are also mass-produced, such as non-slip socks, constraint mittens, and disability aid aprons. Many more are custom-made adaptive clothing items that are modified, tailored and manufactured to fit the specifications that individual customers require. For instance, the most ordered item from non-bulk purchases is a protective shirt, and customers who order a protective shirt from CAC experience a variety of physical impairments, many of which a pre-made protective shirt cannot address. A customer may require a special pocket to conceal the urine bag they carry with them, an attached arm sling on which to rest their arm, an enlarged zipper tab for those with finger dexterity impairments, and so on. CAC's two full-time tailors would have to take the measurements of these customers in order to manufacture a customized protective shirt for them. It also has to be noted that **Table 3** only shows the most ordered

Table 2. Institutional purchases from 2007 to 2017.

Item name	Year purchased	Institution that made the purchase	Quantity	Total
Non-slip socks	2010	Jockey Club Cadenza Hub	24	2406
		Lei Tung Neighbourhood Elderly Centre	16	
	2011	Rhythm Garden Lutheran Centre for the Elderly	18	
		Hong Kong Phab Association	9	
	2012	Jockey Club Cadenza Hub	10	
	2013	Tung Wah Group of Hospitals	60	
		HKSKH Li Ka Shing Care and Attention Home for the Elderly	58	
	2014	Jockey Club Cadenza Hub	20	
		Po Leung Kuk	1500	
		Po Leung Kuk Lau Chan Siu Po District Elderly Community Centre	200	
		Po Leung Kuk Lau Chan Siu Po Neighbourhood Elderly Centre	150	
		Li Ka Shing Care and Attention Home for the Elderly	100	
		Po Leung Kuk Li Shiu Chung Memorial Rehabilitation Centre	10	
		2015	HK Spinocerebellar Ataxia Association	
	North District Hospital—Physiotherapy Service		44	
	2017	Christian Family Service Centre Yang Chen House	5	
	Disability aid apron	2010	Lei Tung Neighbourhood Elderly Centre	
Yee on Care and Attention Home			35	
2012		HK Young Women's Christian Association	100	
		Yan Chai Hospital	5	
2014		Tung Wah Group of Hospitals Chan Han Home for the Elderly	20	
2015		HK Christian Service Shun Lee Home for the Elderly	20	
2016		Tung Wah Group of Hospitals—Chiang Wai Fong Care & Attention Home	20	
		HK Society for the Blind	18	
Lok Sin Tong Chan Lai Jeong Kiu Neighbourhood Elderly Centre		3		
Constraint gloves	2010	HKSKH Cyril and Amy Cheung Aged Care Complex	30	105
		Tung Wah Group of Hospitals	10	
	2013	Tung Wah Group of Hospitals	10	
	2014	Cheshire Home	29	
	2015	Fu Hong Society Oi Wah Home	5	
		Kwun Tong Kwong Yum Home for the Aged	2	
	2016	Fu Hong Society	20	
		Wai Ji Christian Service	1	
	2017	Macau: Lar Ciudadados "Sol Nascente" da Areia Preta	7	
		Cheshire Home	1	
Wheelchair rain jacket	2015	St. James' Settlement Evergreen Day Care Centre for the Elderly	5	86

Continued

	2016	Kit Hong Home	8	
		Yee on Care and Attention Home	2	
		Ebenezer New Hope School	2	
		Sze Tian Rhenish Home for the Elderly	1	
	2017	Wong Chuk Hang Service for the Elderly	30	
		Hong Kong Young Women's Christian Association	30	
		St. James' Settlement	8	
Disability apron (Chinese style)	2016	HK Society for the Blind	40	61
		Tung Wah Group of Hospitals—Chiang Wai Fong Care & Attention Home	20	
		Zhongshan Yangfan Social Work Service Center	1	
Constraint mittens	2015	澳門菩提長者綜合服務中心	60	47
Secure-fix sleep belt	2015	澳門菩提長者綜合服務中心	30	
	2016	Macau: Lar de Cuidados "Sol Nascente" da Areia Preta	9	
	2017	Macau: Lar Ciudados "Sol Nascente" da Areia Preta	8	
Anti-strip jumpsuit	2015	澳門黑沙環護老療養院	7	53
	2016	HKSKH St. Paul's Home for the Elderly	2	
	2017	Macau: Lar Ciudados "Sol Nascente" da Areia Preta	38	
		Wong Chuk Hang Service for the Elderly	4	
		Christian Family Service Centre Yang Chen House	2	
Anti-strip pants	2016	Macau: Lar de Cuidados "Sol Nascente" da Areia Preta	18	36
	2017	Macau: Lar Ciudados "Sol Nascente" da Areia Preta	18	
Non-slip vest	2015	澳門菩提長者綜合服務中心	30	30
Constraint wrist strap	2015	澳門菩提長者綜合服務中心	30	30
Outfit: vest, undershirt and shirt	2017	New Territories East Cluster Procurement Centre	20	20
Non-slip belt	2015	Kwun Tong Kwong Yum Home for the Aged	20	20
Finger contracture cushion	2012	Kowloon Hospital	10	12
	2016	Neighbourhood Advice-Action Council	2	
Hand strap	2017	New Territories East Cluster Procurement Centre	10	10
Constraint vest	2017	Cheshire Home	7	7
Wheelchair arm rest cover	2016	HK Christian Service Pui Oi School	5	6
	2017	Neighbourhood Advice-Action Council	1	
Wheelchair back cushion	2016	HK Paralympic Committee & Sports Association for the Physically Disabled	5	5
Wheelchair protective cover	2017	St. James' Settlement	4	4
Wrist band	2016	Po Leung Kuk Li Shiu Chung Memorial Rehabilitation Centre	2	2
Urine bag	2016	Lei Tung Lutheran Day Activity Centre & Hostel	1	2
		Zhongshan Yangfan Social Work Service Center	1	

Continued

Waist strap	2016	Po Leung Kuk Li Shiu Chung Memorial Rehabilitation Centre	2	2
Knee strap	2016	Po Leung Kuk Li Shiu Chung Memorial Rehabilitation Centre	2	2
Wheelchair rain cover	2017	St. James' Settlement	2	2
Zipper	2017	Caritas Fu Heng Home	2	2
Protective shirt	2014	Cheshire Home	1	1
Fingerless gloves	2017	Salvation Army Po Lam Residence for Senior Citizens	1	1
Female top	2016	Zhongshan Yangfan Social Work Service Center	1	1
Undershirt	2016	Zhongshan Yangfan Social Work Service Center	1	1
Umbrella sling and waist bag	2016	Sze Tian Rhenish Home for the Elderly	1	1
Neck pillow	2016	Li Chan Yuk Sim Elderly Home	1	1

Table 3. Most purchased items made by institutions and individuals from 2007-2017.

Most purchased items by institutions (which CAC has sourced from various suppliers)	Number of items purchased	Most purchased items by individuals*	Number of items purchased
Non-slip socks	2406	Protective shirt	1659
Disability aid apron	222	Disability aid apron	574
Constraint gloves	105	Constraint mittens	482
Wheelchair rain jacket	86	Non-slip socks	439
Disability aid apron (Chinese style)	61	Wheelchair rain jacket	365
Constraint mittens	60	U-pants	191
Secure-fix sleep belt	47	Drop front pants	165
Anti-strip jumpsuit	46	Safety shoes	141
Anti-strip pants	36	Protective pants	123
Non-slip vest	30	Pajamas	89

*Many of these most ordered items are either variously sourced from suppliers, upon which modifications are made on many occasions, or manufactured from scratch to meet the specifications that customers request.

items from individual purchases, leaving out a record of the remaining 4958 individual purchases. Many of less commonly purchased items also require the CAC's tailors to manufacture or modify. Due to CAC's small size and high workload, customers usually have to wait several months to pick up the customized adaptive clothing they have ordered.

Lastly, **Table 4** shows the number of individual customers who have made purchases from CAC throughout the decade. As expected, the number of customer increases over the years and peaks in the same way that the individual purchases depicted in graph 1 do, averaging at 397 customers between 2014 and 2017. A considerable number of CSSA recipients have purchased adaptive clothing from CAC throughout the decade, comprising an average of 31% of the customer base. That said, the percentage of customers who are CSSA recipients

Table 4. The number of individual customers, and the CSSA recipients among the individual customers, who purchased adaptive clothing items from 2007 to 2017.

Year	Number of individual customers	Number of CSSA recipients among individual customers	Percentage of CSSA recipients (%)
2007	202	75	37
2008	257	80	31
2009	209	92	44
2010	290	124	43
2011	297	128	43
2012	275	75	27
2013	300	43	14
2014	384	80	21
2015	413	102	25
2016	394	124	31
2017	398	98	25

is certainly higher than the data lets on. Representatives from institutions such as an elderly center or a hospital regularly purchase adaptive clothing items on behalf of the people they care for, perhaps making use of the subsidies obtained from the Innovation and Technology Fund for Application in Elderly and Rehabilitation Care. This results in purchases that are not registered as a purchase made by a CSSA recipient. In any case, the considerably high proportion of purchases made by CSSA recipients is indicative of the fact that a large number of PWD require social welfare allowances and services. Indeed, the government's 2013 poverty situation report reveals that around 80% of PWD are eligible for social security benefits, and that only 39.1% of the 180,000 PWD of working age are economically active [14] [15].

9. Implications and Further Actions for Adaptive Clothing in Hong Kong

Data from the CAC's records show that there is a high demand among the PWD and elderly for both mass-produced and customized adaptive clothing. The CAC does its best to meet this demand, but due to its small size, its ability to procure, manufacture, modify, and repair adaptive clothing items is limited. As a result, customers have to wait for several months to fulfill their requests for adaptive clothing, especially customized ones, due to the heavy workload of the tailors in the CAC.

In anticipation of Hong Kong's aging population, which correlates with an increase in PWD, measures have to be taken to expand access to and provision of adaptive clothing, especially for a PWD population that is disproportionately unemployed, underemployed, and requiring of welfare services. CAC's purchase records show that apparel products designed and marketed towards the mass

market cannot meet all the needs of the PWD and elderly population, due to the range of physical variations of consumers with physical impairments, which necessitate large quantities of customized adaptive clothing.

For this reason, the establishment of a government-funded, public rehabilitation equipment center may be one of the most appropriate ways to fulfill the growing demand for customized adaptive clothing, as the RAC's Rehabilitation Programme Plan recommends [16]. Such an equipment center can feature a much larger center than the existing CAC. It could train and hire PWD for tailoring services, and it could offer its PWD and elderly clients customized adaptive clothing at a subsidized price, or even for free, to honor the notion that PWD is entitled to habilitation services as a basic human right.

In contrast, establishing more social enterprises that provide tailoring services for customers who want to buy customized adaptive clothing is less preferable, because of their need to earn a profit in order to be sustainable. The Fullness of Social Enterprises Society Report published in 2015 paints a bleak picture of the social enterprises' ability to sustain themselves—23% of SEs closed within 5 years, and the non-survival rate increased 55% within 10 years [17]. Given the low socio-economic background that PWD disproportionately belongs to, it does not seem appropriate for PWD customers to purchase customized clothing at a social enterprise. After all, the lack of competitive markets for adaptive clothing entails that the tailoring services offered for PWD customers, as well as the production of customized adaptive clothing, will be quite costly. Moreover, social enterprises need to maximize their profits in order to maintain and expand their operations—to profit off a marginalized group's need for adaptive clothing is not ideal. That said, elderly and PWD customers may not have to worry about the potentially high costs of customized adaptive clothing, given that many are fully subsidized by the government initiatives that grant them disability allowances and vouchers for these purchases. Even so, the fundamental problem remains: social enterprises like Home Care Apparel and non-profits like Care Apparel Center are too small to fulfill the burgeoning demand for customized adaptive clothing.

Lastly, to craft policies that are responsive to existing and rising demand for adaptive clothing, it may do well for the RAC and the Hong Kong Government to expand their conception of assistive technology and devices, so as to bring adaptive clothing within its fold. Browsing the information pages of programmes such as the Innovation and Technology Fund for Application in Elderly and Rehabilitation Care [18], as well as RPP's proposals of a Funding Scheme on Life-supporting and Assistive Devices, and Community Care Service Voucher for the Elderly [19], one gets the impression that assistive technology is mainly conceived as electronic devices and equipment such as wheelchairs and urine drainage bags. If assistive technology was defined as devices and equipment that maintain, increase, or improve the abilities of individuals with disabilities [1], then adaptive clothing belongs to this category, and should be perceived

to be just as integral as the likes of wheelchairs, hearing aids, and prosthetic devices in diminishing PWD's disablement and improving their well-being. Accepting an expanded conception of assistive technology would make it likelier for policy-making bodies to consider the significance of adaptive clothing, and entertain the possibility of establishing a large, public Care Apparel servicing center that would expand tailoring services for customized adaptive clothing.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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