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Stigma and the use of umbrellas, hiking poles, and walking sticks to aid walking in Hong Kong

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Abstract

Background: The use of walking aids is widely acknowledged as one of the most relied-on forms of assistive technology. Using stick-shaped devices, such as a cane, is often the entrance for many people to the world of assistive technologies, often accompanied by the negative stigma associated with ageing and disability.

Objectives: This study investigates the perception of disability and needs of the Hong Kong population using walking aids, aiming to inform device design and service provision.

Methods: We observed 391 individuals using cane-like devices in their natural environment and conducted semi-structured interviews with 28 participants to understand stigma, barriers to acquisition, training, and design requirements.

Results: Half of the interviewees (50%, n=14) did not feel disabled when using a walking stick, while 39% felt slightly disabled. 56% of the observed sample used non-medical-looking aids like hiking poles or umbrellas. Most interviewees (79%) purchased off-the-shelf devices, but less than half received seller support in choosing appropriate aids.

Conclusion: The feelings associated with using walking sticks and similar devices are mostly positive. There is a preference in Hong Kong for using devices without a medical appearance to aid walking, such as umbrellas and hiking poles. There is a clear need to raise awareness of the risks of using umbrellas to aid walking and empower the user to make informed decisions when purchasing walking aid devices. In addition, there is a need to support the supply chain of walking aids, including umbrellas and hiking poles, to provide more information on device use, misuse, training, and maintenance.

Keywords

Stigma, walking aids, umbrella, hiking pole, design requirements

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Introduction

The use of walking aids is widely acknowledged as one of the most relied-upon forms of assistive technology (AT), with the World Health Organization (WHO) including them on its Priority Assistive Products List (WHO, 2016). As we age, various body changes occur that can decrease our physical capabilities. Older persons generally experience a progressive loss of strength and muscle quality (Delmonico et al., 2008) and a decrease in limb maximum muscle force and power compared to young adults (Grimmer et al., 2019). Such changes are likely to impact physical performance and mobility, such as decreases in steps per day, maximum walking speed, and self-selected walking speed (Grimmer et al., 2019). Walking sticks and canes can help us maintain or improve balance and reduce weight bearing on one or both legs. As a consequence, such devices can mitigate pain caused by injury or pathology and compensate for weakness or poor leg motor control (Bateni & Maki, 2005). Beyond the clinical advantages they provide, research has found that the use of walking aids can heighten older adults' self-confidence and feelings of security, which then leads to increased autonomy and activity levels (Salminen et al., 2009). Using walking aids is often the entrance for many people to ATs, often accompanied by the negative stigma associated with ageing and disability (Mortenson et al., 2012; Brannstrom, Backman & Fischer, 2013; Resnik et al., 2009).

The International Organization for Standardization ISO 9999:2022 Assistive Products_ Classification and terminology classifies assistive products for walking, manipulated by one arm under ISO code 1203, and walking sticks and canes under ISO code 12.03.03. The last is described as "devices providing support when walking that have a handgrip without a forearm support, a single shaft, and one tip (ferrule)(ISO 9999:2022)." Whether having or not a handgrip or a ferrule, umbrellas and hiking poles are often used to support walking (Maximo & Lau, 2021).

Compared to its original medical necessity, eyeglasses have transformed due to the "eyewear revolution" that has embraced the fashion design culture (Pullin, 2009). Nonetheless, the design of most assistive technologies is often sourced from a medical or engineering perspective. Usually, it does not consider the ecosystem of usage, including the context, the users' intangible requirements, and the user experience (Pullin, 2009). Users of ATs consider them part of themselves; hence, ATs should also reflect their users' personalities. Seminal research shows that failing to include the user perspective in the design and selection of AT can lead to discontinuance of device use and the waste of resources (Phillips & Zhao, 1993; Pape et al., 2002; Galvin & Scherer, 1996). In addition, the development of AT devices is dominated by small and medium-sized enterprises-SMEs that are often highly competent in solving individual problems but have limited research and development strength and market capacity (Advancement of Assistive Technology in Europe [AAATE], 2003). Therefore, the variety of user needs and market opportunities are often underestimated.

Different people of different ages use walking aids. Extremes cases could be children with cerebral palsy and spinal cord injury or, in the other age spectrum, a senior person with reduced mobility. Thus, the context where mobility aid is used to ambulate can vary according to place (e.g., indoor and outdoor), region (e.g., urban and rural areas), and activities (e.g., sports and activities for daily living). Consequently, various people and contexts project different walking aid design requirements worth investigating. A report on the provision of assistive devices in Asia points to the need to develop devices and services for the local market and the specific needs of the Hong Kong and mainland China population (Joining Hands, 2013). The report mentions that ATs used in Hong Kong and China are often created to meet the needs of people from other countries, such as Japan and Europe (Purves & Shamay-Lahat, 2013).

People often purchase walking aids directly, without support for an informed decision or training to use and maintain the device (Liu et al., 2010; Tam et al., 2003), which may lead to

misuse or discontinuance of the device (Liu et al., 2010; Aminzadeh, & Edwards,1998; Pape, Louise-Bender, Weiner, 2002). Misusing walking aids may cause discomfort and pain, develop pathologies on the upper-extremity joints, and lead to improper posture, leading to an additional risk of falls (Bateni & Maki, 2005; Liu et al., 2010; Lee, Leung, & Lee, 2016). Although 'use of walking aid' is not a significant predictor for whether the older adults had at least one fall in the previous 12 months, there is a significant difference in the 'use of walking aid' between fallers (38.7%) and non-fallers (23.7%) in Hong Kong (Fong et al., 2011). Moreover, in Hong Kong, the Consumer Council assessed a sample of 30 walking sticks and 10 ‘cane umbrellas’ and reported that over 55% of walking sticks and 90% of ‘cane umbrellas’ failed at least one safety test, while none of the ‘cane umbrellas’ samples had an instruction manual (Consumer Council, 2018). Therefore, it is necessary to provide users with the ability to make well-informed and responsible decisions when purchasing ATs directly (Liu et al., 2010; Tam et al., 2003; Andrich et al.,2013).

The research investigated the use of cane-like devices to support walking and the perception of disability associated with using walking aids in Hong Kong. The study aimed to understand the Hong Kong population’s needs using walking sticks and similar can-like devices to provide insights into the design and service provision of devices obtained directly by end-users.

Methods

This study adopted a design ethnography approach to understand the use of walking aids in Hong Kong (see Clarkson et al., 2007; Eikhaug et al., 2010). Structured observations were conducted to observe the use patterns and associated behaviour when utilising the aid. Semi-structured interviews aimed at comprehending the stigmas and sentiments related to usage, the various barriers to acquisition and training for use, and the design requirements for can-like devices. There was no contact or connection between the observed participants and the interviewees. The Departmental Research Committee of The Hong Kong Polytechnic University, with reference number [HSEARS20190417003], approved this research. The preliminary results of the research were published in a conference proceeding (Maximo & Lau, 2021). All previously published results regarding the semi-structured interviews were revised for this publication as more participants were interviewed until an equal number of male and female participants were reached.

Structured ObservationsStructured observations employing the AEIOU observation framework were undertaken to facilitate data collection and categorisation. AEIOU is an acronym for Activities, Environments, Interactions, Objects, and Users (Wasson, 2000). The research team aimed to observe the people in their natural context without advertising their presence, thus acting as a complete observer (Saunders, 2007). Data were collated through notetaking and photographing people using walking aids in public spaces. Devices included in the observations were adjustable canes, folding canes, canes with fixed height, crafted wood sticks, quadri-pod sticks, hiking poles, umbrella canes with ferrules, and standard umbrellas without ferrules. White cane and crutches were excluded from the study. Sites of observation comprised streets, parks, playgrounds, malls, underground stations, and other public areas. A sample of 337 people using walking aids and canes in Hong Kong was calculated to achieve a 95% confidence level with a 5% margin of error, taking into consideration the Hong Kong population reporting restriction in body movement (Census and Statistics Department, 2021)

Semi Structure Interviews

Participants for a semi-structured interview were chosen based on the same criteria used to select participants for the structured observation: adults in Hong Kong using cane-like walking aid devices to support mobility. As an incentive for participation, interviewees were offered a shopping voucher.

The interview included questions concerning pre-existing health conditions, lifestyle and device use, AT service provision, feelings, and design requirements. A response card was given to participants containing multiple choice questions and answers with illustrations of walking aid types and an Emoji-Based Visual Analog Scale. Interviewees were given eight positive and eight negative adjectives to represent their feelings when using the walking aid device. To investigate the walking aid design requirements, participants were asked what aspects they consider when buying their device, asked to list different previous uses of the device (e.g., pressing the lift button, self-defense), asked to list three problems, if any, they experienced when using their device, and what would they improve in their device.

Interviews were conducted either face-to-face or via face calls. Participants were given an information sheet and a consent form to review before participating. Participants read and signed the consent form in the face-to-face setting, whereas their agreement to the terms was verbally recorded in the face call setting. Interviews were conducted in English or Cantonese, according to the participant's preference. Audio recordings of all interviews were transcribed, and those conducted in Cantonese were translated to English by a research team member who is a native speaker of the language and holds two master's degrees in English studies.

Analysis

All data collected – including photos and notes from the observations, interview audio and transcripts, and the signed consent forms – were stored and analysed using the Qualitative Data Analysis Software NVivo Plus 12. Access to NVivo files was restricted to the research team, who signed a non-disclosure agreement. Data were analysed using thematic analysis with some grounded theory practices, including memoing and concurrent data generation and collection (Birks & Mills, 2015).

The analyses began from a deductive approach, for which categories were pre-determined before data collection. Pre-determined themes from observation data were established using the AEIOU framework (Wasson, 2000). The pre-determined observation themes were Activities, Environments, Interactions, Objects, and Users. In addition, a theme called the Walking Aid Type was created to gather participants' insights specific to a device type. Pre-determined themes for the interview data were derived from AT service delivery good practices (Andrich et al.,2013) and human-centred-design good practices (Wasson, 2000; Eikhaug et al., 2010). The interview's core pre-determined themes were AT Service, Device Use, Feelings and Stigma, and Health Condition. The categories created using the deductive approach had accompanying definitions and criteria to guide the research team.

As the analysis progressed, an inductive approach was employed, allowing for the emergence of new themes linked to the collected data. Memoing was used to track changes to the categories. Additionally, cases that had already been analysed were revisited and revolved around new themes. The research team held regular meetings to evaluate the themes and cases. After the research team concluded the analyses, the Principal Investigator (leading author) reviewed all the cases and themes.

Results

A cohort of 391 individuals was observed using cane-like mobility devices in their natural environment in Hong Kong. During the analysis phase, 83 cases that did not correspond to the

criteria were dismissed, meaning 308 cases were examined. An equal number of male participants (n=14) and female participants (n=14) were interviewed to evaluate gender differences in the use of walking aids, totaling 28 participants.

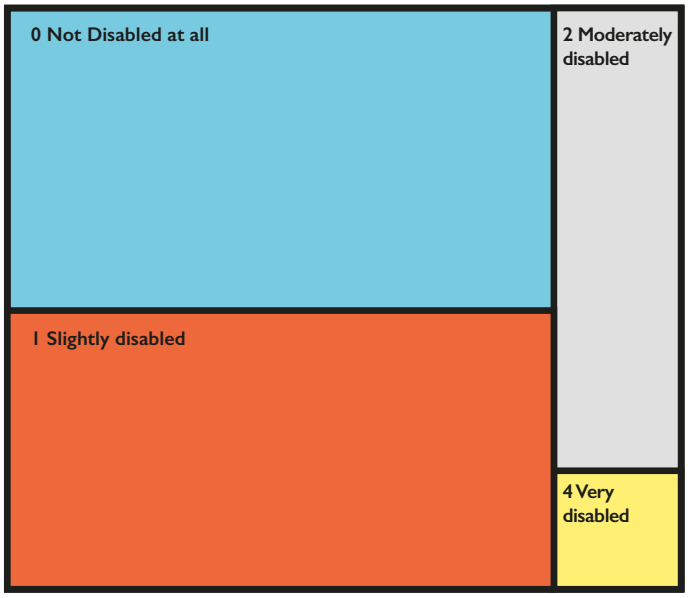

Figure 1 Hierarchy chart of the interviewees' perception of disability when using walking aids

Attitude towards walking aid use

The analysis of the interview data reveals a predominantly positive attitude concerning walking aid device use and its associated perception of disability. In response to the inquiry to rate how disabled they feel when using their walking aid devices, half of the interviewees (50%, n=14) reported they do not feel disabled, while 39% responded that they feel slightly disabled (n=11). A hierarchy chart of the responses above is depicted in Figure 1. Only three interviewees felt moderately disabled (11%), and one felt very disabled.

Figure 2 presents the word cloud of the most common interviewee responses regarding positive and negative adjectives representing how they felt when using the walking aid device. In a word cloud, the word size increases with the number of mentions. The most common positive feelings associated with the device use were feeling safe (86%, n=24), feeling good (46%, n=13), and feeling accompanied (39%, n=11). The most common negative feelings associated with the device use were feeling embarrassed (25%, n=7), feeling disadvantaged (18%, n=5), and feeling disabled (14%, n=4).

Figure 2 Word cloud of feelings associated with walking aid use.

Gender differences in walking aid use

Examination of observational data unveiled a proximate ratio of the female population (52%, n=159) and the male population (48%, n=149) employing cane-like devices to facilitate walking in Hong Kong (Maximo & Lau, 2021). Walking aids without a medical appearance, such as hiking poles, umbrellas, and unconventional devices, constituted 56% of the sample (n=171). The use of umbrellas represented 33% (n=100) of the observed cases, equivalent to the observed frequency of adjustable walking sticks at 32% (n=98) (Maximo & Lau, 2021). Hiking poles were the third most frequent type of cane-like walking assistance device observed (19%, n=57), with 31 females and 26 males observed utilising this type of device. Walking sticks with fixed height constituted 10% of the observed cases (n=31) (Maximo & Lau, 2021). A minor proportion of individuals (5%, n=14) used unconventional devices to aid in walking, such as a baby stroller, a piece of PVC tube, or a wooden pole not specifically fabricated for walking assistance (Maximo & Lau, 2021). Figure 3 presents the types of cane-like devices observed according to gender.

Purchasing walking aids and the stigma of specific device use

The interviewees in the study had an average of 1.75 cane-like walking aid devices, and more than half of them (57%) had more than one device (see Figure 4). Most interviewees possess an umbrella (71%, n=20), and nearly half possess a hiking pole they use to aid walking (46%, n=13, see Figure 4), while 39% (n=11) own an adjustable walking stick. Of the 16 participants who have more than one device, seven have only non-traditional walking aid devices such as umbrellas or hiking poles, two have only traditional walking aid devices such as fixed height, adjustable and foldable walking stick, or walking stick with a stool, and seven have a mix of traditional and non-traditional walking aids. Of the seven participants having a mix of traditional and non-traditional walking aids, two stated that they felt less stigma using the non-traditional devices, one felt less stigma using a traditional device, and four stated they felt no difference in the stigma between traditional and non-traditional devices. Despite the preference

for non-traditional devices, the interview results show no apparent device-related differences in stigma among participants using both traditional and non-traditional walking aid devices.

Most interviewees (64%) mentioned that a healthcare professional prescribed the walking aid, while 36% self-prescribed the device. Additionally, 79% of the interviewees purchased off-the-shelf devices, with less than half (9 out of 22) receiving support from the seller to help with device selection.

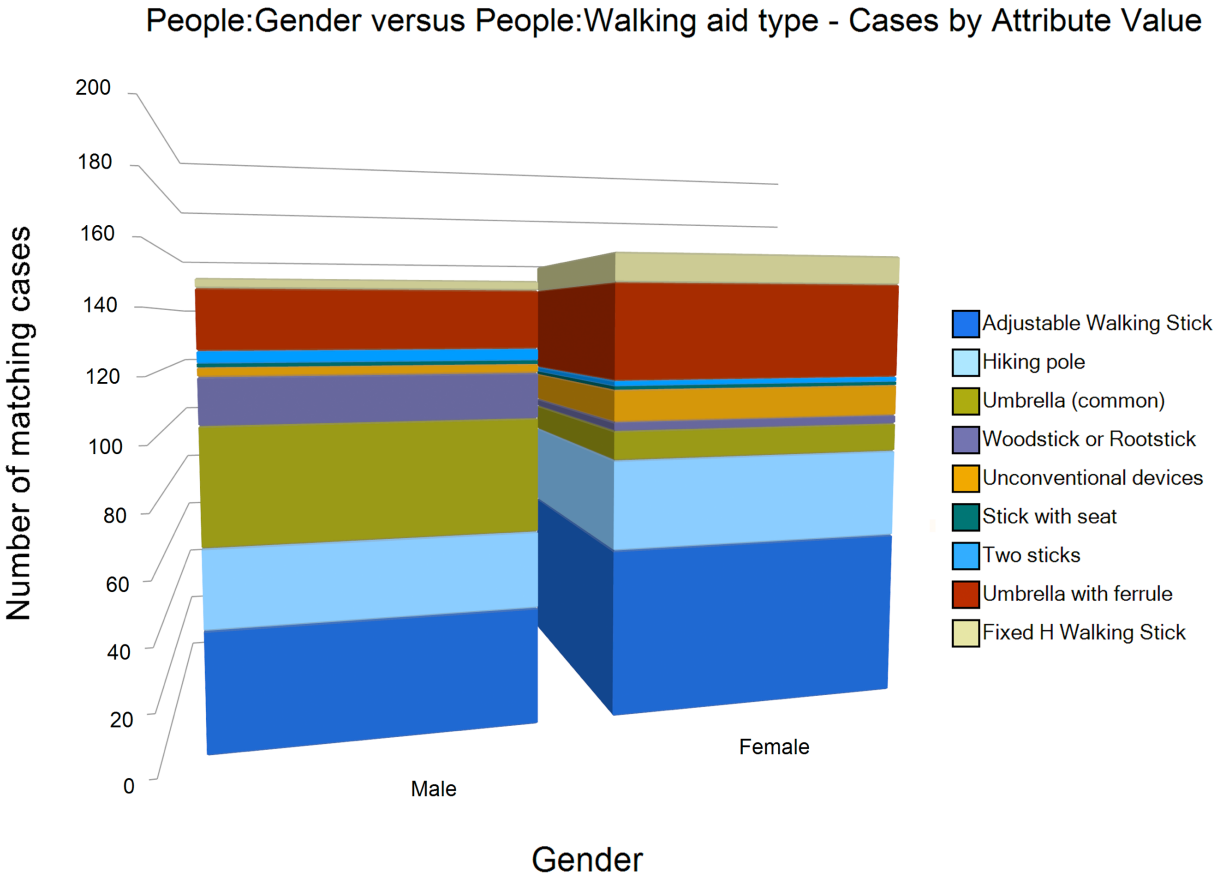

Figure 3 Walking aid use per gender.

Using walking aids

When the interview participants were asked the types of activity they could undertake while using their walking aid, most reported they could walk downstairs (n=27), climb upstairs (n=26), walk at a normal pace (n=19), and walk at a slow pace (n=18). A considerable portion of interviewees can walk fast (43%, n=12), a small proportion can jog (14%, n=4), and only two interviewees can jump obstacles the size of a tennis ball. When asked about the frequency of use, 39% of the interview participants reported using the device every day (n=11), 36% reported using it only in specific situations, 21% reported using it once or twice a week (n=6), and two reported using it most days of the week. The most common reasons for using the device only in specific situations were because their legs were paining (n=7) and when the weather was rainy (4).

Terrains surface on which walking aid is used

All interview participants mentioned using their walking sticks on asphalt terrain (100%, n=28), 86% mentioned using them on wet terrain (n=24), half of the interview participants mentioned using their walking sticks on sandy terrain (50%, n=14), 43% mentioned using it on terrain with grass (n=12), 29% mentioned using it on gravel terrain (n=8), 25% mentioned using it on a mud terrain (n=7), and 7% mentioned using it on snow or icy terrain surface (n=2).

Avoiding walking aid use

Some interview participants mentioned they avoid the use of walking sticks in specific situations, such as walking near home (21%, n=6), walking indoors (11%, n=3), places with accessibility (11%, n=), crowded places (7%, n=2), formal places (7%, n=2), and when using shopping trolleys (7%, n=2). Situations in which a single interviewee avoided using walking aids were wet grass, if going out with their family or friend by car, places with a seat, and when going to the toilet.

Atypical walking aid use

Some interviewees mentioned using walking sticks and umbrellas for purposes other than walking and protecting from the rain. Many participants mentioned using their walking sticks to remove obstacles from their way or bring objects closer (36%, n=10). Some participants mentioned they had used their walking sticks to sign people or animals not to get too close or for self-defence (21%, n=6). Less common atypical situations mentioned included inspecting the road surface (11%, n=3), calling the lift or stopping the lift door for closing (7%, n=2), and support transferring from sitting to standing position (7%, n=2).

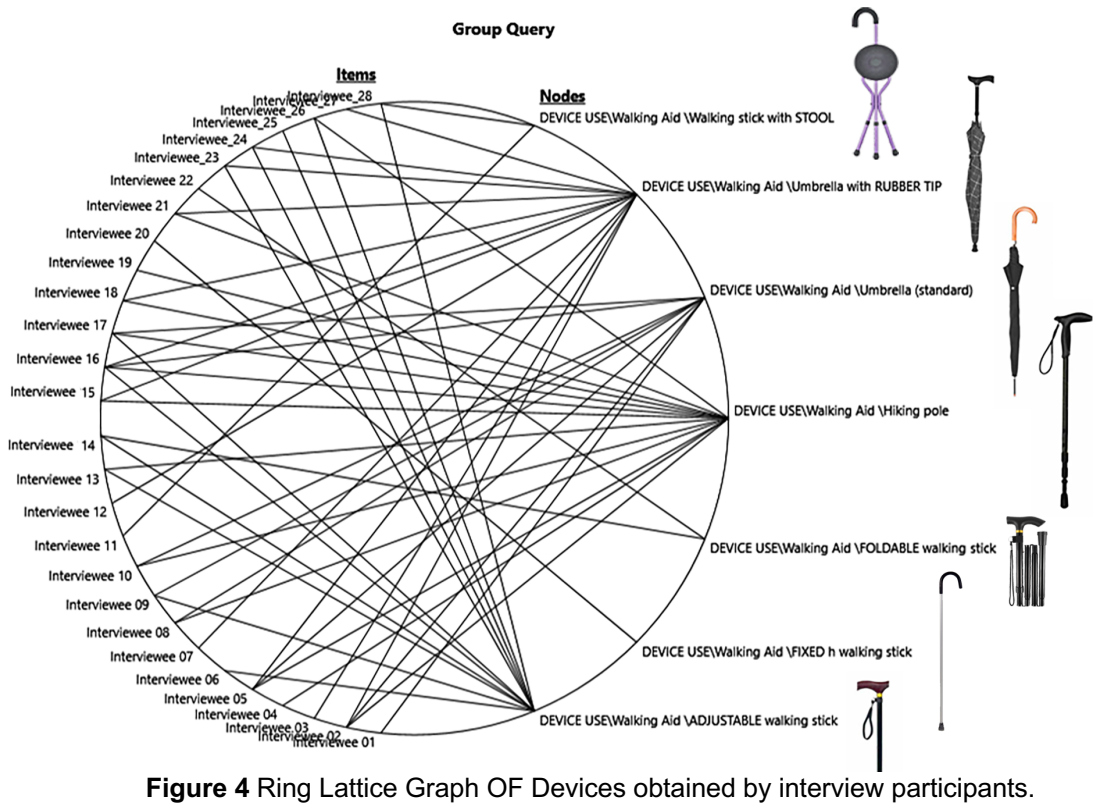

Figure 4 Ring Lattice Graph OF Devices obtained by interview participants.

Walking aid requirements

When enquired about walking aid requirements, the most important features the interviewee mentioned were the device's stability and reliability (71%, n=20), the device handle (50%, n=14), the device's lightweight (50%, n=14), easily adjustable height (50%, n=14), ease of carrying (46%, n=13), affordability (39%, n=11), and durability (36%, n=10). When talking about stability, the participants often mentioned the need for the device to be light but tough and reliable, especially umbrellas. Besides the need to be light and tough, they mentioned that the device should provide a sensation of stability. Participants who mentioned the handle as an essential feature described the need for a soft and comfortable handle (n=9) and the need for a handle to have different grip sizes and patterns (n=6). Six interviewees (21%) mentioned that the device should be styled to avoid the stigma of disability.

The comments made by Interview Participant 13 on walking aid design improvements reflect the aspects covered by many other participants:

> *"The endpoint of the stick should be tough; it is better to have a plastic or rubber cover to cover it up to prevent it from damaging the endpoint. The material made of the umbrella should be tough. It is better to use titanium. The price and the quality should have a sensible proportion. Since there are many umbrellas which their qualities are poor but the prices are high. It does not make sense to its quality-price proportion. The style of the umbrella should catch up with the fashion trend."*

Discussion

Previous studies in Hong Kong have examined walking aids and included non-cane-like devices such as walking frames and crutches, making it difficult to compare them with the results of the current study (Tam et al., 2003; Yip & Leung, 2015). However, there are some similarities. A survey with rehabilitation professionals (n=443) and AT end-users (n=787) in Hong Kong found that 50% of the AT end-user respondents had paid for their AT devices, with walking aids being the second most prescribed AT devices by rehabilitation professionals, referred by 74.8% of the respondents (Tam et al., 2003). This is consistent with the current study's findings that, although 64% of the interview participants had their devices prescribed by a healthcare professional, 79% purchased them themselves.

Interestingly, in Tam et al.'s (2003) study, walking aids were not among the devices not obtained due to a lack of financial support, as end-users claimed. In comparison, 39% of interviewees in our study (n=11) mentioned the need for the walking aid to be affordable. This difference from Tam et al.'s study can be attributed to the fact that walking stick devices are more affordable than other AT devices. The reasons the interviewees mentioned affordability could be related to the fact that a person needing ATs often requires more than one type and model of devices, as revealed in similar studies. Acquiring multiple types of ATs can burden its users financially, considering the aggregate price of required devices. Previous research and the current study suggest that cane-like walking aid devices such as umbrellas and hiking poles are often purchased in Hong Kong through a consumer model of AT service delivery. In this model, the user decides on the devices and buys them directly. However, this model works only if users are empowered to make informed and responsible choices and be accountable for the assistive technology's intended objectives, such as outcomes of a rehabilitation, care, or educational plan (Andrich et al., 2013).

A concerning fact is that many individuals in both study samples (33% of observed subjects and 75% of interviewee participants) utilise umbrellas to aid walking. Particularly troubling is that all 'cane umbrellas' tested by the Consumer Council in Hong Kong were found without

instruction manuals (Consumer Council, 2018). There is a clear need to raise awareness of the dangers of using umbrellas to aid walking and empower people to make informed decisions when purchasing walking aid devices.

Our study shows that most interviewees purchased their walking aids themselves (79%), and less than half sought support from the seller to help with device selection (9 out of 22 interviewees). The purchase of devices without height adjustments, user manual, or seller support may lead to purchasing inappropriate devices that can lead to discomfort and pain, develop pathologies in the upper-extremity joints, and lead to improper posture, thereby increasing the risk of falls (Bateni & Maki, 2005; Liu et al., 2010; Lee, Leung, & Lee, 2016). Hence, there is a need to support the walking aid and umbrella industry and its points of sale to provide more information on device use, misuse, training, and maintenance.

Regarding the pattern of use of stick-like devices and associated stigma, people in Hong Kong seem to use more than one device for different contexts of use and feel mostly positive about it. Umbrellas are used all year round in Hong Kong to gain protection from rain and support walking. Both observation and interview data show a preference among the Hong Kong population for non-traditional walking aid devices such as umbrellas and hiking poles. Overall, the stigma of disability associated with a cane-like device is low, and people feel mostly positive when using such devices, often feeling safer, supported, and accompanied. The positive attitude associated with using cane-like walking aids could be related to the preference for using devices without a medical appearance, such as umbrellas and hiking poles.

Nonetheless, despite the preference for non-traditional devices, the interview results show no apparent device-related differences in stigma among participants using both traditional and non-traditional walking aid devices. The interview participants mentioned the need for the walking aid to be stable and reliable; the device handle should be comfortable, accommodate different hand sizes, and provide enough grip; the device should be lightweight, easily adjustable height, easy to carry, affordable, and durable. The interviewees' priority for the device stability and handle grip could be associated with the fact that most participants use their devices on a variety of terrains, including wet asphalt and wet grass, and because of the high humidity level in Hong Kong, as it often leads to sweaty hands that can be slippery when holding walking aids.

Conclusions

The study results indicate a preference among the Hong Kong population for using cane-like devices without a medical appearance to aid walking, such as umbrellas and hiking poles. Further, the study shows that end-users often purchase such aids themselves without support from the seller. Notably, the feelings associated with the use of cane-like devices are mostly positive, and there is a low perception of disability related to the use of a walking aid, often linked to devices without medical appearances. Therefore, there is a clear need to raise awareness of the risks of using umbrellas to aid walking and empower the user to make informed decisions when purchasing walking aid devices. In addition, there is a need to support the supply chain of walking aids, including umbrellas and hiking poles, to provide more information on device use, misuse, training, and maintenance.

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