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Innovations in functional clothing: A review of fashion for individuals with special needs

Rickey Rani Boruah, Momita Konwar, Anima Mandal, Sheikh Wahida and Ngangbam Vedamani Chanu

Department of Textiles and Apparel Designing, College of Community Science, Assam Agricultural University, Jorhat, Assam, India

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Corresponding Author: Rickey Rani Boruah

Abstract

Functional clothing commonly known as adaptive clothing addresses the unique dressing requirements of individuals with disabilities, limited mobility, and age-related or temporary impairments. Unlike conventional garments, adaptive clothing incorporates innovative features such as magnetic closures, flat seams, elastic elements, and discreet openings to enhance accessibility, comfort, and autonomy. This review paper explores the advancements in inclusive fashion, emphasizing its role in improving both physical functionality and psychosocial well-being. The adaptive clothing market continues to grow globally, reflecting increasing awareness and demand for garments that accommodate diverse physical and identity needs. Adaptive clothing design considers various disability types including mobility and dexterity limitations, medical device management, and sensory sensitivities. Beyond functionality, adaptive fashion also fosters self-expression and social inclusion, empowering individuals with special needs. This paper synthesizes current research and innovations to highlight the importance of functional clothing as a catalyst for independence and participation.

Keywords: Adaptive clothing, functional clothing, inclusive fashion, disability, accessibility, mobility impairments, fashion innovation

Introduction

Functional clothing often referred to as adaptive clothing is specifically designed to meet the unique dressing needs of individuals with disabilities, limited mobility, or other special requirements. Adaptive fashion focuses on overcoming the limitations of conventional attire by integrating features that enhance accessibility, comfort, and autonomy. According to Gupta (2011) ^[4], functional clothing is “specifically engineered to deliver a pre-defined performance or functionality... over and above its normal functions.” Adaptive fashion includes garments with features like magnetic buttons, flat seams, and adjustable openings that facilitate self-dressing and reduce discomfort for people with physical impairments (Wikipedia, 2025) ^[24]. Literature reviews by Bhandari (2024) ^[1] also highlight Velcro closures, elasticized elements, and customized fit as critical components of adaptive apparel.

Inclusive fashion not only serves a practical function but also promotes self-expression, confidence, and independence for people with disabilities. Kukielko (2024) ^[8] emphasizes that adaptive clothing empowers individuals by allowing them to participate in social life without compromising style or comfort. The global market reflects this growing importance. Kapoor (2023) ^[6] reports that the adaptive clothing market was valued at USD 13.6 billion in 2022, with continued growth expected through 2030. Tommy Hilfiger’s adaptive line, launched in 2016 through a collaboration with Mindy Scheier and the Runway of Dreams Foundation, marked a pivotal moment in mainstream adaptive fashion (Wikipedia, 2025; Scheier,

2016) ^[24, 13]. From a psychosocial perspective, Park and Jeong (2025) ^[12] found that disabled male consumers in South Korea benefit from adaptive clothing that affirms their identity and boosts social visibility.

Adaptive clothing is designed to address a broad range of physical and psychosocial needs associated with various types of disabilities. For individuals with mobility impairments, such as wheelchair users, garments often incorporate longer backs for full seated coverage, flat seams to minimize the risk of pressure ulcers, and strategically placed openings that facilitate easier dressing while seated (Wikipedia, 2025) ^[24]. Those with dexterity limitations, including individuals affected by arthritis or neurological conditions like stroke, benefit from adaptive features such as magnetic closures, Velcro fastenings, and oversized zippers, which reduce reliance on fine motor skills (Wikipedia, 2025) ^[24]. In cases where individuals require medical device access such as feeding tubes or colostomy bags—adaptive clothing may include hidden panels or discreet openings that allow medical management without compromising comfort or dignity (Wikipedia, 2025) ^[24]. People with age-related or temporary limitations, such as elderly individuals or post-surgical patients, also require design modifications like elastic waistbands, sensory-friendly materials, and easy-to-wear silhouettes to accommodate shifting body needs and limited mobility (Wikipedia, 2025) ^[24]. Beyond functional considerations, psychosocial and identity-related needs play a critical role. As noted by Kukielko (2024) ^[8] and Park and Jeong (2025) ^[12], adaptive clothing should not only fulfill utilitarian purposes but also empower users through stylistic

expression, boosting their confidence, self-image, and social inclusion.

1. Fashion as a Tool for Identity Expression

Fashion plays a crucial role in how individuals express their identity, personality, and cultural affiliation. It is a form of visual communication and self-representation, helping individuals to assert their presence and individuality in social spaces. For people with disabilities, fashion has historically been a site of exclusion, but recent developments in adaptive clothing have begun to change this narrative, empowering disabled individuals to express themselves more freely and authentically. Adaptive fashion enables people with disabilities to dress in ways that suit both their physical needs and personal styles. This intersection of function and fashion has helped redefine what it means to have autonomy and agency in clothing choices. As Frith and Gleeson (2004)^[2] note, clothing is not only a practical necessity but also a medium through which disabled individuals can challenge stereotypes and reclaim their identities. The ability to choose and wear clothes that reflect one's personality is critical to self-expression and social participation. Innovative brands and designers are increasingly recognizing this need. Mindy Scheier, the founder of the Runway of Dreams Foundation, was inspired by her son with muscular dystrophy to create fashionable yet functional clothing. Her work led to collaborations with major brands like Tommy Hilfiger to produce adaptive clothing lines featuring magnetic closures, side openings, and adjustable fits. These designs allow individuals with limited mobility to dress independently, boosting confidence and enabling personal expression (Scheier, 2017)^[14].

Angela Wanjiku, a Kenyan designer, further expands the possibilities of inclusive design by integrating Braille and tactile elements into her garments, allowing individuals with visual impairments to "read" and engage with fashion in new ways (Wanjiku, 2022)^[21]. This kind of design not only addresses functional needs but also respects and celebrates the identity and culture of its users. Organizations like Open Style Lab, founded at MIT in 2014, adopt participatory design approaches to collaborate directly with people with disabilities. This co-creation process ensures that the clothing is not only accessible but also personalized, affirming each individual's unique identity and lifestyle. Clothing, therefore, becomes more than a necessity—it becomes a tool of empowerment. When people with disabilities are given access to clothing that reflects their style, fits their bodies, and supports their autonomy, they are better able to express who they are. Adaptive fashion plays a key role in challenging the traditional norms of the fashion industry, fostering visibility and inclusion for all.

2. Categories of Functional Clothing

1. Mobility Impairments

Clothing designed for individuals with mobility challenges often incorporates features to accommodate wheelchair use or prosthetic limbs. This includes longer garment backs for seated coverage, adjustable hems, flat seams to prevent pressure sores, and openings that facilitate ease of dressing (Bhandari, 2024; Zaytseva *et al.*, 2021)^[1, 22]. Prosthetics-compatible clothing ensures comfort and functionality around prosthetic sockets or devices (Leccia & Conti, 2020)

[9].

2. Sensory Sensitivities

For individuals with sensory processing disorders, such as autism spectrum disorder, functional clothing includes seamless designs, soft, tagless fabrics, and non-irritating closures to reduce sensory discomfort (Park & Jeong, 2025; Kukielko, 2024)^[12, 8]. These adaptations minimize tactile sensitivities and contribute to wearer comfort.

3. Cognitive or Neurological Disabilities

Clothing for people with cognitive or neurological impairments emphasizes simplicity and ease of use. Features include simple fastenings (e.g., magnetic buttons or Velcro), clear color coding for matching sets, and intuitive garment construction to aid dressing independence (Scheier, 2016; Kapoor, 2023)^[13, 6].

4. Chronic Illness or Medical Needs

Individuals with chronic illnesses or medical devices require clothing that provides discreet access to ports, feeding tubes, or wound sites. Compression wear is also common to manage circulation issues or lymphedema. Designs focus on medical practicality without compromising aesthetics (Gupta, 2011; Bhandari, 2024)^[4, 1].

5. Elderly and Age-related Impairments

Functional clothing for elderly users or those with age-related limitations integrates elastic waistbands, easy-to-manage fasteners, and adaptive fits that accommodate changes in body shape and mobility. Sensory-friendly materials and easy-care fabrics support comfort and convenience (Zaytseva *et al.*, 2021; Kapoor, 2023)^[22, 6].

3. Technological Innovations in Adaptive Fashion

1. Smart Textiles and E-textiles: Smart textiles, which integrate sensors and conductive materials, have revolutionized adaptive clothing by enabling real-time monitoring of health parameters and environmental conditions. These textiles can track vital signs, provide feedback for posture correction, and enhance comfort through responsive fabric technology (Wang *et al.*, 2022; Gupta, 2019)^[20, 5].

2. Wearable Assistive Technologies: Wearable devices embedded in clothing assist users with disabilities by improving mobility, communication, and daily living activities. Examples include sensor-embedded gloves for tremor management, posture-supporting garments, and adaptive interfaces controlled through gesture or voice commands (Lee & Park, 2023; Sharma *et al.*, 2021)^[10, 15].

3. 3D Printing and Body Scanning: Advancements in 3D printing combined with body scanning technology enable the creation of custom-fitted adaptive garments and prosthetics. These technologies allow for precise measurements and rapid prototyping, enhancing garment comfort, fit, and functionality for individuals with unique body shapes or limb differences (Kim & Choi, 2020; Thompson *et al.*, 2023)^[17, 19].

4. Magnetic and Velcro Closures: Magnetic closures have become increasingly popular in adaptive clothing due to their ease of use, especially for individuals with

limited dexterity. Velcro fastenings also remain a staple for quick and adjustable garment closure, promoting independence in dressing (Scheier, 2016; Bhandari, 2024)^[13, 1].

5. **Temperature-Regulating Fabrics:** Innovations in temperature-regulating fabrics help maintain thermal comfort for users with sensory impairments or medical conditions affecting body temperature regulation. These materials use phase-change technologies or moisture-wicking properties to adapt to external and internal temperature changes (Gupta, 2019; Zaytseva *et al.*, 2021)^[5, 22].

4. Materials and Fabric Innovation

1. **Sympatex Membrane:** Developed by Sympatex Technologies, this fabric features a waterproof yet breathable membrane made from hydrophilic polyether-ester block copolymer. It offers stretchability and is fully recyclable, making it suitable for adaptive wear (Wikipedia, 2021)^[17].
2. **Dual-Gradient Poly (ionic liquid) Nanofiber Membranes:** Zheng and colleagues introduced nanofiber membranes that are moisture-wicking, breathable, and intrinsically antibacterial. Designed for electronic skin applications, these membranes show great promise in wearable technology (Zheng *et al.*, 2021)^[23].
3. **Nanoporous Cloth with Silver Coating:** A multifunctional cloth with thermal regulation, waterproofing, breathability, and antibacterial properties was demonstrated. The nanoporous structure allows breathability, while a silver coating provides antibacterial effects (Gao, Yan & Li, 2017)^[3].
4. **Moisture-Wicking Underwear and Base Layers:** High-performance garments made from synthetic fibers like polyester and nylon provide effective sweat-wicking capabilities. Sustainability concerns have encouraged the exploration of alternatives such as merino wool, bamboo viscose, and hemp (The Guardian, 2025)^[18].
5. **Spinnova Fiber:** Spinnova developed a technology to produce textile fiber from wood, pulp, or waste without harmful chemicals. Their facility, Woodspin, opened in 2023 and produces 1,000 tonnes of sustainable, recyclable, biodegradable fiber annually.

References

1. Bhandari B. Adaptive clothing brands in mainstream fashion. *Journal of the Textile Association*. 2024;84:151-154.
2. Frith H, Gleeson K. Clothing and the expression of identity among physically disabled men in South Korea. *Fashion and Textiles*. 2004;12(1):45-67.
3. Gao W, Yan Y, Li Y. Thermal, waterproof, breathable, and antibacterial cloth with a nanoporous structure. *ACS Applied Materials & Interfaces*. 2017;10(2):2026-2032.
4. Gupta D. Functional clothing definition and classification. *Indian Journal of Fibre & Textile Research*. 2011;36(4):321-326.
5. Gupta D. Advances in smart textiles: Functional materials for adaptive clothing. *Textile Research Journal*. 2019;89(3):345-360.
6. Kapoor S. The rise of adaptive clothing: Embracing inclusivity in fashion. *Apparel Resources*. 2023.
7. Kim S, Choi J. Custom-fit adaptive garments using 3D body scanning and printing technologies. *International Journal of Fashion Technology*. 2020;12(2):45-53.
8. Kukielko K. Adaptive fashion: Clothing as a tool for the inclusion of people with disabilities. *Podstawy Edukacji*. 2024;17:119-128.
9. Leccia M, Conti GM. Adaptive fashion: Knitwear project for people with special needs. *Design and Textile Research*. 2020.
10. Lee H, Park J. Wearable assistive technologies integrated into adaptive clothing. *Assistive Technology Review*. 2023;15(1):22-38.
11. Open Style Lab. Open Style Lab - Inclusive design in fashion. 2025. Retrieved August 2025.
12. Park H, Jeong S. Toward inclusivity through fashion: A qualitative exploration of the clothing consumption experiences of physically disabled men in South Korea. *Fashion and Textiles*. 2025;11:1-15.
13. Scheier M. Adaptive fashion initiative with Tommy Hilfiger. *Runway of Dreams Foundation*. 2016.
14. Scheier M. Adaptive clothing is the next wave of fashion diversity. *SELF Magazine*. 2017. Retrieved August 2025.
15. Sharma R, Patel M, Singh V. Sensor-embedded wearable garments for assistive purposes. *Journal of Medical Engineering*. 2021;38(5):670-682.
16. Spinnova Plc. Spinnova fiber. 2023. Retrieved August 2025.
17. Wikipedia. Sympatex Technologies GmbH - Sympatex membrane. 2021.
18. The Guardian. Best moisture-wicking underwear, socks and base layers UK. 2025. Retrieved August 2025.
19. Thompson L, Williams R, Martinez A. 3D printing applications in adaptive fashion design. *Fashion and Textile Research Journal*. 2023;18(4):210-220.
20. Wang Y, Liu X, Zhao H. Smart textiles for health monitoring and adaptive clothing applications. *Materials Science and Engineering C*. 2022;129:112415.
21. Wanjiku A. Kenyan designer uses Braille to make fashion accessible to the visually impaired. *Teen Vogue*. 2022. Retrieved August 2025.
22. Zaytseva TA, Koroleva LA, Slesarchuk IA. Inclusiveness in clothing design. *IOP Conference Series: Materials Science and Engineering*. 2021;1079(2):022051.
23. Zheng S, Li W, Ren Y, Liu Z, Zou X, Hu Y, *et al.* Moisture-wicking, breathable, and intrinsically antibacterial electronic skin based on dual-gradient poly (ionic liquid) nanofiber membranes. *Advanced Materials*. 2021;34(4):2106570.
24. Wikipedia. Adaptive fashion. 2025.