

## Adaptive Pant Designs for Empty-Nest Elderly Women in China

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From 1980, China had the one-child policy, which was a population plan that limited most families to having one child only (Andrew, 2021). Due to this population control policy, China had 100 million empty-nest elderlies now, and those populations have been continuously growing since 2013 (Zhou et al, 2015). Most of the empty-nest elderlies would like to travel to different cities or walk in their community to stay active. But these activities affect 500,000 elderly people who go missing in China every year because most of them have Alzheimer's, dementia, or suffered some memory impairment (James & Serenitie, 2016).

As evidenced by this phenomenon, many studies have shown that empty-nest elderly people are more likely to have mental symptoms such as depression, loneliness, dementia, and Alzheimer's disease. Honghe. et al. (2020) also reported that elderly empty-nesters are more likely to suffer from depression than non-empty-nest elderly in China. Naibao et al. (2022) reported that the rate of depression among the empty-nest elderly was higher than that of the non-empty-nest elderly. The mental issues of the empty-nest elderly can influence the risk of older brain white matter lesion (WML) related to cognitive impairment and dementia (Dandan et al., 2017). Seniors have a high risk of falling due to decreased vision, mobility, and other functions. In the data, the incidence of fall injuries among empty nesters is three times that of non-empty nesters (Naibao et al., 2022). To support empty nest elderly's lives, comfortable adaptive clothing should be provided. However, unfortunately, there is no clothing suitable for the empty-nest elderly on the market. Therefore, this study aims to develop adoptive pants that can effectively improve mobility, fitness, and independence for the empty nest elderly women in China.

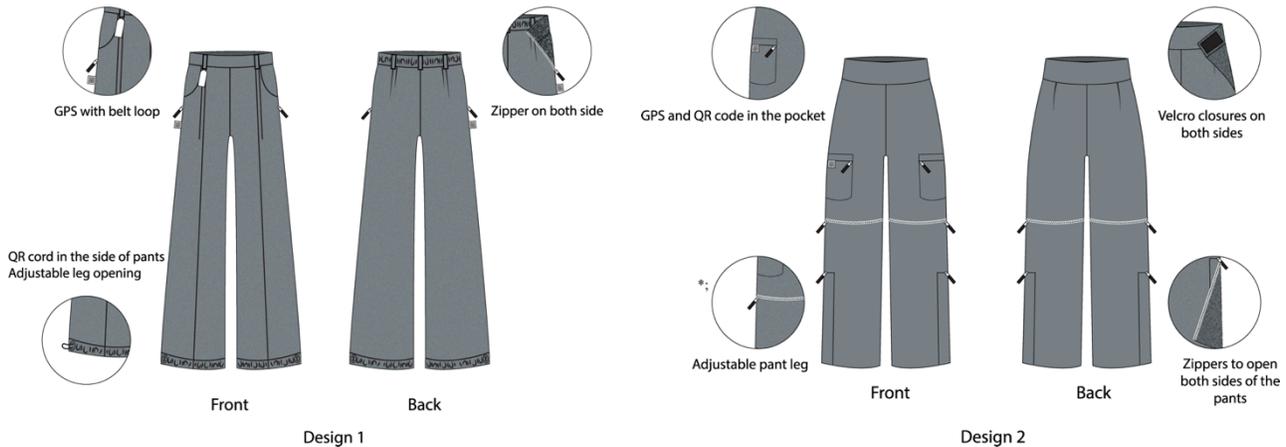
Following the Functional, Expressive, Aesthetic (FEA) design model proposed by Lamb & Kallal (1992), it was used to develop the garment for the empty-nest elderly women to help reduce the inconvenience of daily life. Among the several types of clothing, casual pants were selected as the targeted product because most elderly Chinese women prefer to wear casual trousers in all seasons (Fangyi, 2016).

**Functional:** For the empty-nest elderly, functionality is a top priority of designing the garment. Because the elderly's skin is sensitive, all the designs are made with fleece fabric. It is highly breathable, soft, comfortable, easy to take care of, has good thermal performance, and is exceptionally stylish as older people need. Also, the elderly in China like to go outside to travel, exercise, and grocery shop. Thus, the prototypes are supposed to design for all seasons and improve the comfort of mobility. For example, the pants have an elastic band, adjustable clasp, and zippers in the waist and legging part. In addition, the pants will work with objects that can help the family and hospitals track the medical information and the out-of-home activity.

**Expressive:** The empty-nest elderly does not want anyone to notice that they wear the adoptive clothing for elderly. The normal pant designs were applied with the trendy details. The easy

don and doff details were not noticeable. With customized colors options, the wearer can be express their preferred personality too.

**Aesthetic:** As women get older, they gain more fat on their belly and waist. These changes can impact the self-esteem negatively. Thus, to support the wearer's body shape, specifically belly and waist, the special waistband pants were adopted.



**Design 1** is the pants for special occasions. This pant was designed with an adjustable waistband on the back of pants, which can make the waist smaller visually; it also improves the comfort of the blood circulation and breathing of the wearer. The wide and long culotte pants make the wearer look like they have longer legs than they actually do. These design elements make the elderly women have better satisfaction with their body shape. Invisible zippers on both sides of pants increase the comfort level of easy to wear. The adjustable wideness of the pants on the hem can improve the freedom of leg movement. The label-adopted QR code system will be attached to the side of the pants. This QR code provides the wearer's location in an emergency situation. It can be stuffed into the pocket at ordinary times, and empty-nest elderly wearer can take it out when they need it. In fact, there are various GPS for elderly people in the Chinese market, they look like a car key that can hang it in the belt loop of the pants for easy to carry.

**Design 2** is convertible pants that can be transferred from the long pants to the short pants for all seasons. For easy to transfer, the zipper closures are applied into the knee level of pant. For improving mobility and comfort, the pant has the adjustable Velcro opening on both sides of waist and two long zippers are attached in both sides of out seams on pants. It also has two front pockets and one of them can attach with a QR code or carry a GPS tracking for preventing emergencies when wearers go outside.

In this study, two prototype pants were designed for the empty-nest elderly women in China. Design 1 is designed for casual occasions. Design 2 is designed for all seasons for everyday life. Both prototypes were adopted easy to on/off details with zippers and Velcro, applied the adjustable waistband and length of pants, and attached the GPS and QR code for their tracking. All of these details will help an empty-nest elderly woman in improving mobility, self-esteem, comfort, position tracking, and thermal performance. In phase 2, the research will be developed in making actual prototypes and evaluating these two designs.

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