

# The Design of Ergonomics-based Baby Care Functional Travel Clothing

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## ABSTRACT

With the continuous improvement of modern people's quality of life, the requirements for functional design of clothing are increasing. Functional clothing has become one of the heated topics of design in recent years. To solve the inconvenience of females traveling with babies, this paper focuses on the design of baby care travel clothing in clothing ergonomics as the research subject and analyzes the application status of modern baby care travel aids, as well as the disadvantages and causes of female baby care travel aids currently in the market. This paper puts forward the innovative design of functional clothing for baby care travel from the perspective of clothing ergonomics. The special structural design of baby care travel clothing aims to facilitate women's out-of-home wear and to meet the needs of women in the baby-caring stage for comfortable, aesthetic, and stylish clothing.

**Keywords:** ergonomics, baby care travel clothing, functional design.

## 1. INTRODUCTION

With China's family planning policy for the last 30 years, the development of children has become the focus of attention of every family. It brings all aspects of mental pressure to women who are in charge of caring for the children, especially with many inconveniences of traveling alone with the babies. The consumers then set up higher expectation for travel clothing and travel aids. Therefore, the concept of "functional clothing design" draws more and more attention of the people, aiming to follow the principles of convenience, safety, fashion, and to facilitate women's daily needs to travel with babies. The design and development of baby care travel clothing provide women with convenience when traveling with infants; the functional and innovative design reflects the integration of fashion design and modern lifestyle.

## 2. ERGONOMICS AND FASHION DESIGN

Ergonomics design is based on anthropometry, physiology, psychology, and so on as a research method. It is a comprehensive research science on human structure, function, psychology, and mechanics. Its areas of research include two aspects, physiological and psychological perspectives. From the physiological

perspective, ergonomics on clothing research is mainly based on the structure of the human body scale, focused on finding out the appropriate proportional relationship of clothing, according to the basic physiological data and parameters. The purpose is to meet the physiological needs of human motor function, comfortable wearing, etc [1]. From the psychological aspect, ergonomics meets people's psychological needs through the design of clothing, researching color, line, space, texture, and other factors that impact on human emotions, will, behavior, etc. More scientifically and reasonably, the designs will meet people's spiritual needs. In the "people-clothing-environment" system, to achieve a high degree of unity of "wear" and "beauty", to achieve the perfect combination of clothing and people, using the ergonomic theory of clothing in the design can make the structure of clothing design more scientific and reasonable and contribute to physical movement; the material used also meets the requirements of human body and skin, in line with the physiological and psychological indicators of people[2], bringing convenience to people's lives. Currently, the functional clothing design for females in the baby-caring stage has not been reported. To fill the gap in this field of clothing design, this paper proposes the innovative design of female baby care travel clothing under the premise of focusing on the physiological function and psychological function of females in the baby-caring stage.

### **3. ANALYSIS OF THE CURRENT SITUATION OF TRAVELING FOR FEMALES IN BABY-CARING STAGE**

As a result of social development, people pay more attention to the development of children, especially in the infant stage. To improve the development of the child's brain, people will often take the babies out, give them access to the surrounding environment, let them feel the world, to help the healthy development of the babies' mind, physiology, interpersonal communication, and feelings. Due to the fast-paced lifestyle, men are more engaged in career and social work, often leaving the women to take the babies out alone. When putting the babies in a stroller to travel, women also need a backpack to carry the babies' various daily necessities, which is extremely inconvenient. Also, when traveling, the women in the baby-caring stage also have no time to pay attention to the beauty and styles of their own clothing.

#### **3.1. Females' choice of travel aids and tools**

When taking a baby out, some women will choose a stroller. But to have intimate contact with the baby, keep emotional communication and give him or her a sense of security, other women will choose to carry the baby out. Holding the baby for a long time can cause pains in the waist, back, wrist, and other parts of the adult's body, so baby carrying aids appear in the market. The carrying aids differ based on the size of the baby. For newborn babes, the common carrying aids are baby carrying wraps, which need the adults to wrap the baby in the front, making the baby feel like being in the mother's womb, therefore increases the baby's sense of security. For slightly older babies, many people will choose the strap to carry the baby in the front, to facilitate communication with the baby and give the baby a broader view. For babies more than six months old, most people will choose a waist stool, which looks like a waist bag. The stool is connected to the belt, so the baby can sit in the front like sitting on an actual stool. The purpose of this tool is mainly to reduce the burden on the adults' waist, back, wrist, and other parts of the body. However, for a strapless waist stool, to prevent the baby from leaning forward and tilting, the adult must hold the baby by hand. Except for strollers, the other three types of embrace-type baby travel aids seem to have strong baby carrying functionality, and the requirements for the environment are not very high. The adults carrying the baby can easily move around and unload the tools, therefore have a certain degree of convenience while carrying a baby (Figure1).



**Figure 1** Three auxiliary tools: baby carrying wrap, strap, and waist stool

#### **3.2. The disadvantages and causes of baby care travel aids currently in the market**

The main function of baby care travel aids is to carry infants. The most popular aids are the three types of embrace-type infant travel aids: wraps, straps, and waist stool. The application of wrap and strap can free up the adult's hands during travel and does not reduce close contact with the child. These aids seem to be safe, but there are still some disadvantages in the process of using these aids. For example, the material of the strap is relatively thick, therefore the adults and children will feel hot and hard to unload the strap after a continuous use for more than 2 hours, and the adults' shoulders and waists will be very sore because hot air cannot go out. There are also multiple types of baby carrying wraps, but if not used properly, the wraps can cause muscle or bone injury to the young baby. According to research, about 81 percent of mothers in the U.S. are willing to use baby care travel aids, but the U.S. Consumer Product Safety Commission has warned that assistive travel tools such as straps or wraps can cause infants to suffocate and need to be carefully selected and used. In comparison, parents who use wrap or straps to travel in China are very few, because of the hot summer and poor heat dissipation effect of the wraps and straps. Therefore, South Koreans invented the unique travel aid - waist stool, and then it became popular in China. However, the waist stool will also have an impact on the health of the baby. Because the baby's spine lumbar curve has not yet formed, the unstable sitting gives too much pressure on the baby's cervical vertebrae and waist, so the excessive use of the waist stool is not healthy for the development of the baby's spine and lower limbs. In addition, the unprotecting design of the waist stool can't free up the adult's hands, which must hold the baby securely on the stool. Although these three baby care travel tools have auxiliary functions, none of them can conveniently carry the baby's necessities and supplies. The carrying function also impacts the choice of women's travel clothing, therefore the regular baby care clothing for woman lack a sense of fashion and design. Some women will choose strollers to travel, but the disadvantage is relatively high requirements for the travel environment, road leveling,

slope, traffic safety, etc. These will greatly impact the convenience of travel.

#### **4. INNOVATIVE DESIGN OF FUNCTIONAL BABY CARE TRAVEL CLOTHING**

The value of clothing is mainly reflected in the aesthetic and practical aspects. As the people's expectation level for clothing is getting higher and higher, besides the aesthetic aspect of clothing, the practical aspect of clothing also needs constant improvements, because more and more attention is drawn to the effective functions of clothing. The innovative design of baby care travel clothing will use convenience as the entry point to meet the needs of women traveling with babies and strengthen the functions of clothing. The design will maximize the effective functions of clothing, according to the human body function, body shape, convenience level, adaptability and meet the users' physiological and psychological needs.

##### ***4.1 Analysis of female body shape changes in baby-caring stage***

Due to pregnancy and childbirth, the female body shapes experience a series of significant changes, such as thicker limbs, loose abdominal skin, hips, and abdominal circumference increase, and these will cause women postpartum body curve changes to a certain extent [3]. Most women in the baby-caring stage are not satisfied with their size, so the comfort and fitting of baby care travel clothing become particularly important due to the changes in female body shape at this stage.

##### ***4.2 Analysis of the psychological functions of females in baby-caring stage***

As the role of the female changes after giving birth to the baby, there will be many psychological changes as well. Some females after childbirth tend to have a sense of inferiority due to the body shape changes, become unwilling to communicate with people, and suffer from mental stress and depression. Together with the postpartum body secretion changes, postpartum depression may appear and impact females' physical and mental health [3]. However, convenient living conditions and a good appearance can help women re-establish self-confidence. The design of functional baby care travel clothing can help women to go outdoors and meet their psychological needs through stylish patterns and colors weakening the body shape imperfection.

##### ***4.3 The principle of design for baby care travel clothing***

According to the physiological and psychological needs of females in the baby-caring stage, the design

principles of baby care travel clothing mainly include convenience, safety, and fashion. According to the post-partum female's body characteristics, the design can provide practical functions for the females traveling with infants and provide convenience to carry not only the baby but also the baby's various supplies, such as cushions, bottles, diapers, and other items, to facilitate the logistics of traveling. The front side of the clothing is designed with a strap-type structure to protect the baby from turning over and increase the safety of carrying a baby. From safety size, safety structure, safety materials, safety color, and other aspects, the design largely ensures the safety features of baby care travel clothing. Also, according to the characteristics of post-partum female body shape, the structure design of baby care travel clothing helps to rebuild a fashionable appearance for the females.

##### ***4.4 Baby care travel clothing style design***

According to the characteristics of post-partum female body shape, the style structural changes and added functional design details bring more convenience to the females. This baby care travel clothing is designed as an "A" shaped round-necked sleeveless dress to ensure that it fits the female body shape to the maximum extent for different female body shapes, so as not to lose carrying function due to inappropriate fitting while traveling with the baby. The portion of the dress below the waist consists of two layers of hem structure inside and outside. Each side of the dress has a pocket, so it can hold the baby's necessities and supplies. The outer short-waist skirt structure decorates the woman's waist and hip body curve. The middle part of the dress has a removable moving piece, and the two sides of the moving piece are connected to the outer skirt with zippers. The upper button is fixed, and the setting of zipping and buttons makes it convenient to remove the moving piece as a baby changing pad. The moving piece is placed in the front of the outer hem so that adults can take carry-on items from the pockets on both sides. Adding an embrace-type bag to the waist on the front of the dress brings convenience to carry the baby out. Shoulder straps are fixed with a snap attached to the back of the dress. And the embrace-type bag can be folded in the pocket on the waist, when not in use. The dress can be worn as a daily dress as shown in Figure 2. In the cutting perspective of baby care travel clothing, the use of three-dimensional cutting increases the smoothness of clothing lines, to increase the beauty of clothing [4], and better cover up the changes in female body shape.

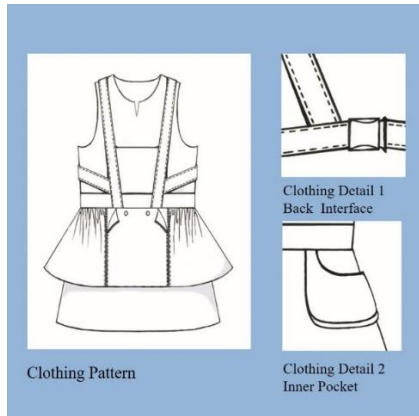


Figure 2 Pattern design of baby care travel clothing

#### 4.5 fabric materials selection and design of baby care travel clothing

For the design of baby care travel clothing, cotton and hemp fiber knitted fabrics are selected, due to their features of moisture-absorbing and sweating absorbing, antibacterial, soft and comfortable, anti-ultraviolet, and high temperature tolerance [5]. Some structures use TPU composite fabrics with good waterproof performance as the outer hem moving piece material These will greatly impact the convenience of travel as shown in Figure3.

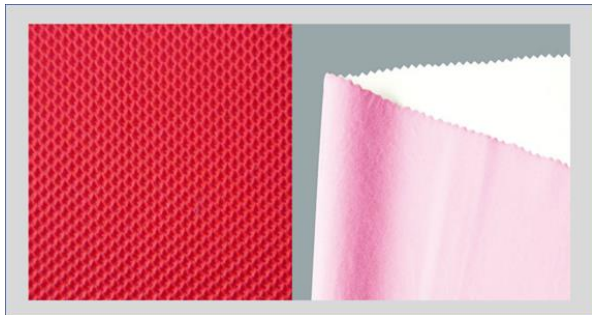


Figure 3 Knitting and composite TPU fabrics

#### 4.6 The color design of baby care travel clothing

For clothing design, color is the most infectious language in the vision. The appropriate color effect will not only change the original color characteristics and clothing style, create new visual effects, but also reflect the spirits of the people and even the characteristics of the times [6]. Color will not only give people a visual feeling but also have certain functions, such as cultural symbol function, environmental adaptation function, psychological intervention function, etc. Using people's association of color feelings and some optical illusion methods, designers can achieve the effect of modifying the aesthetic appearance of body shape, enhance the self-confidence of the females in the baby-caring stage. From the perspectives of physiological needs, colors, especially the relatively bright colors, also play the role of identification and implication. On the one hand, these

colors can help people adjust their moods; on the other hand, the eye-catching effect of colors can reduce the risk of the trip in some certain environment.

### 5. CONCLUSION

To sum up, in the design of female baby care travel clothing, the theory of clothing ergonomics is widely used to study the physical and psychological characteristics of females in the baby-caring stage. Following the principles of convenience, safety, and aesthetics, the design with the unity of functional and aesthetic features brings convenience and pleasure to women's lives. With the development of the times, people will pay more attention to the functional development of clothing, so that clothing design at the material and spiritual level can better serve the people, improve the quality of life, and create a better future.

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