

Satisfaction Needs of Children's Furniture: A Literature Review of Children's Psychological Needs, Functional Needs, and Aesthetic Needs

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Abstract

This study focuses on children's furniture design and emphasizes the key role of children's psychological needs in product development. Although children's physiological needs have received widespread attention, psychological needs have not been fully utilized, and there is a lack of a systematic framework in current design to guide their integration into product development. Literature research shows that children's needs are unique and require careful design to provide appropriate support and experience. Therefore, this study attempts to build an innovative framework to help furniture designers and product developers more effectively integrate children's psychological needs and enhance children's emotional connection and cognitive experience with furniture. In addition, this study explores the combination of functional and aesthetic design in children's furniture. The study found that children's furniture should not only meet functional needs, but also stimulate interest through attractive aesthetic design, enhance children's interactive experience with furniture, and promote their growth and development. Building a systematic design framework will help to scientifically integrate psychological needs, improve product satisfaction, and provide theoretical support and practical guidance for the innovative design of children's furniture.

Keywords: Children's Furniture, Product Satisfaction, Functional Needs, Aesthetic Needs, Psychological Needs

Introduction

The furniture industry is a large and complex global industry, covering all aspects from design to manufacturing to sales. Its market value and development trend are jointly influenced by multiple stakeholders (Epede & Wang, 2022). As an important link in the entire wood industry chain, the furniture industry connects all links from raw materials to final products. In this process, furniture not only involves the combination of materials, technology, function, and aesthetics, but also needs to incorporate cultural elements. Therefore, functionality and aesthetics have become the core elements of furniture design. The development of the

furniture industry has not only promoted the prosperity of the wood industry, but also directly affected the quality of life of consumers and improved people's living standards.

Through international industrial transfer and global trade, the Chinese furniture industry has continuously promoted the progress of the wood industry, further promoted domestic consumption growth, boosted exports, met domestic investment needs, and become the pillar of the employment-oriented consumer industry. Children's furniture started late in my country, but since the late 1990s, after more than 20 years of development, it has gradually become a popular category in the furniture market. After several stages of development, the children's furniture industry has now formed a rich product form and a stable consumer group. At present, the children's furniture market is in the late stage of product innovation and design update. Many new designs and product categories continue to emerge, plagiarism is gradually decreasing, and original products are increasing.

Therefore, the design and development of children's furniture is not only a technical task, but also a profound understanding and thinking of children's physical and mental health and cognitive development. In the design and development process of children's furniture, due to the particularity of the children's group, its design must not only meet the conventional functional and aesthetic requirements, but also consider the children's psychological development needs and physiological needs during growth (Huang, 2022). Therefore, the main purpose of this study is to try to find out the design demand elements that make children's furniture products satisfactory. These demand elements include functional demand elements, children's psychological demand elements, and aesthetic demand elements.

Literature Review Method

The main research ideas of the literature review in this paper are as follows. First, define children's furniture design, review related children's furniture designs, and have a comprehensive understanding of children's furniture design. Secondly, discuss the elements of children's psychological needs, children's functional needs and children's aesthetics. Finally, a new framework is proposed to integrate children's psychological needs, functional needs and aesthetic needs. The new framework helps to improve user satisfaction with the product.

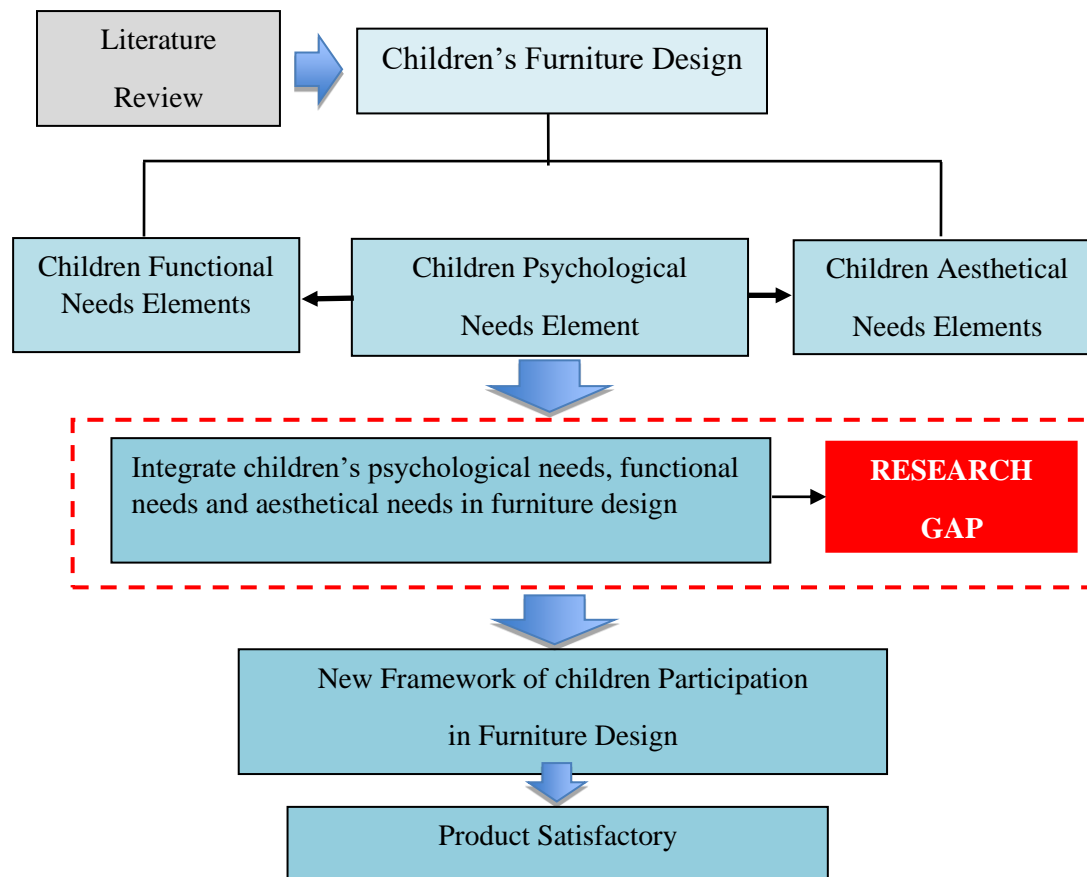


Figure 2.1: Literature review research framework

Children Furniture Design

As people pay more and more attention to children's growth and health, the design of children's furniture has also become an area of widespread concern (Tarmawan et al., 2021). Different scholars have conducted in-depth research on children's furniture from different perspectives, revealing the various key factors involved in its design.

From an ergonomic perspective, the design of children's furniture is crucial to the use habits and health of school-age children. Reasonable ergonomic design can not only improve children's comfort, but also effectively reduce health problems caused by long-term poor sitting posture (Liu & Erdil, 2023). Cardiah and Handoyo (2020) pointed out that the design of playroom furniture facilities should fully consider the physiological characteristics of children and incorporate anthropomorphic elements to ensure that the furniture is both ergonomic and comfortable and functional. This can not only optimize children's use experience, but also promote their social, interactive and recreational activities. Loredan (2022) emphasized that there is often a significant mismatch between students and furniture at all stages of education, so it is recommended to use ergonomically adjustable furniture that covers at least two size standards to improve the comfort of the learning environment and the happiness of students. In addition, Salvador (2019) designed a high chair that adapts to the physiological and psychological needs of children based on ergonomics and human factors analysis, which not only extends the product life cycle but also promotes sustainable development.

Based on the research results of the above scholars, it can be seen that ergonomics is of great importance in the design of children's furniture. Reasonable ergonomic design can not only effectively improve children's comfort, but also prevent health problems caused by long-term poor sitting posture or improper use of furniture. Therefore, in the design process of children's furniture, it is necessary to fully consider the physical development characteristics of children, including growth needs, sitting habits and activity patterns at different ages. By optimizing the ergonomic structure of furniture, such as adjustable height, support design that conforms to the human body curve, and soft material selection, it can ensure that the furniture provides scientific and reasonable support for children and creates a more comfortable and safe use experience.

Children Furniture Design and Development

From the perspective of child psychology, children's furniture is not only a practical item in the family environment, but also an important medium to promote children's psychological health and growth (Dai & Xu, 2019). Children's needs for the environment during their growth are not only reflected in physical comfort, but also involve psychological security and pleasure. Reasonable furniture design can create a supportive and inspiring space for children, helping them grow in an environment full of creativity and exploration (Wang & Ye, 2023).

Zhang and Li (2022) pointed out that although furniture is one of the most durable items in children's growth process, there is still a large gap between children's rapidly changing physical and mental needs and traditional children's furniture. Therefore, the design of children's furniture should take into account both physiological and psychological needs to create products that are both interesting and multifunctional. Wang and Ye (2023) further proposed based on the theory of embodied cognition that the design of children's interactive furniture should comprehensively consider children's perception, behavior and environmental needs from the micro, macro and meso levels to enhance the interaction between children and furniture, improve psychological closeness, and optimize the functionality and value of furniture.

Cao and Yang (2021) emphasized that children are highly malleable during their growth process, so children's furniture should incorporate emotional design concepts to make it more in line with children's psychological needs and promote their physical and mental health development. Similarly, Zeng and Guang (2018) believe that the design of preschool children's furniture should be based on the three major theories of developmental psychology, preschool education and environmental psychology, systematically sorting out the laws of children's physiological, cognitive and social psychological development, and providing scientific guidance for the functional setting, design direction and innovation of furniture.

In addition, Jin (2017) studied the physiological and emotional needs of children aged 3-8 years old based on child development psychology and related theories, and verified through experiments the differentiated preferences of children of different ages and genders for color, shape, material, etc., providing a practical reference for the scientific design of children's furniture and related products.

In summary, children's furniture should not only meet basic practical functions, but also combine psychological theories to create a safe, comfortable and exploratory growth space

for children, so as to help them grow healthily and develop comprehensively. Children's furniture is not only an important item in children's daily life, but also a carrier for them to explore the world, cultivate creativity and establish a sense of security. Therefore, when designing children's furniture, we should fully consider the cognitive development, emotional needs and social interaction methods of children at different stages of growth, so as to ensure that the furniture not only provides a comfortable use experience, but also stimulates children's curiosity and autonomous learning ability.

From the perspective of sustainable design, the design of children's furniture is increasingly focusing on environmental protection and sustainability. Modern society's emphasis on green lifestyles has promoted the ecological transformation of the furniture industry, making the application of sustainable materials and environmentally friendly production processes the core considerations in children's furniture design (Zhu, 2021).

Research shows that consumers' price preferences for children's furniture are influenced by perceived product quality and the concept of healthy and sustainable lifestyles (LOHAS), which reflects the growth potential of China's children's furniture market in the high-end segment (Wana & Toppinen, 2016). At the same time, Bumgardner and Nicholls (2020) reviewed the strategies of sustainable design, use and disposal of wooden furniture, explored the impact of green practices and innovative designs on corporate competitiveness and market communication, and emphasized the key role of optimizing material utilization and extending product life cycle in sustainable development.

In addition, Xiong and Zhang (2020) analyzed the current situation and challenges of green furniture manufacturing in China and proposed a systematic green manufacturing concept and response strategy, aiming to promote the transformation of the furniture industry towards environmental protection and provide reference for global furniture companies. Zhu (2021) further pointed out that multifunctional and sustainable children's furniture is becoming an important trend in the development of the industry. By analyzing the growth characteristics of children and combining actual cases, the study verified the feasibility of sustainable design methods and emphasized its important value in promoting the coordinated development of society, economy and environment.

In summary, sustainable design has become an important development direction that cannot be ignored in the children's furniture industry. In the future, furniture design should pay more attention to the selection of environmentally friendly materials, the application of green manufacturing processes, and the optimization of product life cycles to meet market demand and promote the industry towards a more environmentally friendly, efficient and sustainable development model.

Functional Design of Children's Furniture

The functional design of children's furniture largely determines its shape and structure, and directly affects its use value and experience. The function of each piece of furniture should be carefully designed based on the actual needs, growth characteristics and usage scenarios of children (Phuahet et al., 2022). This design not only involves its appearance and technical implementation, but is also closely related to the physical and mental development of children during their growth. For example, the design of the seat should adapt to the dynamic

changes in children's body proportions, equipped with adjustable height and ergonomic backrest angle to provide a comfortable sitting posture, promote good learning habits, and contribute to spinal health (Zhu & Wu, 2020).

As children grow and their activity needs diversify, the functions of children's furniture are also evolving, showing a trend of multifunctional and high flexibility (Wang, 2022). In modern family environments, multifunctional furniture combines multiple uses such as storage, learning, and rest, which not only effectively optimizes space utilization, but also meets the needs of different scenarios. However, the superposition of functions should be balanced, and too much integration may weaken the core comfort and practicality of furniture. Therefore, while pursuing multifunctional, designers should ensure that the various functions are coordinated with each other rather than restricting each other. Table 3.1 is adapted from Hassan Alli (2015) to explain and illustrate the functional design elements.

Table 3.1
Functional Design Elements of Children Furniture
(Adaptation from Hassan Alli, 2015)

Functional Design Elements	Explanation
Technology	Technological innovation has opened up more possibilities for the functional design of children's furniture. Therefore, in the design process, the rationality and ease of use of technology should be ensured to avoid overly complex functions that increase the burden on children (Ye & Yang, 2021).
Durability	Durability is an important consideration in the design of children's furniture. Children's daily activities are characterized by high intensity and frequency, so furniture should not only be able to withstand daily wear and tear, but also have a certain degree of repair-ability to extend its service life. This is especially important for families with many children to ensure that the furniture can maintain its structural integrity during long-term intensive use (Haug, 2018).
Reliability	Reliability is reflected in the ability of furniture to function stably in a specific environment and over time, making it a reliable component of family life (Xu & Yu, 2022).
Usability	Usability requires intuitive design to reduce the difficulty of operation for children and parents. For example, storage cabinets can guide children to develop good habits of organizing and classifying items through simple opening and closing methods and color partitions (Sauer et al., 2020).
Safety	Safety requires that furniture design can effectively reduce potential risks, such as by adopting rounded corner design, anti-pinch structure and non-toxic and environmentally friendly materials to ensure the safety of children (Liu & Erdil, 2023).
Ergonomic	Ergonomics optimizes the comfort and practicality of furniture. For example, height-adjustable tables and chairs can adapt to children of different ages, provide ergonomic sitting support, and prevent health problems caused by poor sitting posture (Pheasant & Haslegrave, 2018).
Quality	Work reliably and perform all its functions and fulfil the user expectations (Boutilier & McNaughton, 2006; Bruch, 2007).

Performance	Performance emphasizes the performance of furniture in actual use, such as load-bearing capacity and mobility, to meet the needs of different home environments (Suwaidan & Zahra, 2024).
Lifetime	The lifetime design concept emphasizes the consideration of the entire life cycle from production to scrapping, including the selection of environmentally friendly and recyclable materials and the optimization of structural design to extend the service life of furniture. For example, detachable modular furniture can be adjusted or converted as children grow up, reducing resource waste (Jensen, 2021)
Effectiveness	Capability of a product to meet the user needs and preferences (Liu & Erdil, 2023).
Size	Specified quantity of product (Ottoson, 2006).
Maintenance	In terms of maintenance, furniture should be easy to clean and maintain to ensure durability and hygiene for long-term use (Gackowiec, 2019).

Aesthetic Design of Children's Furniture

Aesthetics plays a central role in industrial design. It is not only an external form of expression, but also an important bridge for interaction between products and consumers. As a creative activity, the core of industrial design is to define the external characteristics of the product through factors such as proportion, color, suitability, and ease of use, thereby establishing a harmonious relationship between structure and function. This design not only aims to meet practical needs, but also injects unique value into the product through aesthetic expression (Han & Schaefer, 2021). Aesthetic design directly affects consumers' perception and selection behavior of products (Mata et al., 2018). In a competitive market where functions and prices are not much different, aesthetic design often becomes the key to attracting consumers' attention. For example, visual harmony can significantly improve the attractiveness of a product and increase consumers' willingness to buy (Hoegg & Alba, 2011). Studies have shown that aesthetics provides consumers with additional value propositions and is a key factor in determining purchase decisions and customer satisfaction (Perez Mata et al., 2017; Guo et al., 2019; Liu & Zhou, 2022).

In children's furniture design, the role of aesthetics is not only reflected in the appearance, but also in whether the furniture can meet the daily needs of children. As consumers' aesthetic needs continue to increase, especially in the furniture market with relatively single functions, aesthetics has become an important factor in distinguishing different products (Mata et al., 2017; Kang, 2020). For children's furniture, designers must carefully select colors and materials so that the furniture can meet both the psychological and physiological needs of children and the aesthetic preferences of parents (Yazicioğlu et al., 2019). For example, using soft tones, cute patterns or creative shapes can attract children's attention, while the combination of colors can convey a sense of security and comfort, thereby better meeting children's emotional needs.

In children's furniture design, aesthetic elements play a vital role. They not only affect the appearance of the product, but also interact deeply with consumers at the cognitive and emotional levels (Zhu & Wu, 2020). When designing furniture for children, it is necessary to find a perfect balance between functionality and aesthetics to meet the unique needs of

children while stimulating their creativity and happiness. Such a balance is the key to a successful design. Table 3.2 is adapted from Hassan Alli (2015) to explain and illustrate the aesthetical design elements.

Table 3.2

Aesthetical Design Elements of Children Furniture

(Adaptation from Hassan Alli, 2015)

Aesthetical Design Elements	Explanation
Form	As one of the core elements of children's furniture aesthetical, form design enhances the visual appeal of furniture through changes in form. Designers often break the monotony of traditional furniture design through innovative appearance, making the product more attractive, thereby stimulating children's interest and emotional response (Lu & Hsiao, 2022).
Shape	The physical shape of a product plays a critical role in its market success (Wu & Zhang, 2018).
Colour	Colours not only affects the visual effect of children's furniture, but also conveys emotional information and creates a pleasant environment (Jiang et al., 2020).
Texture	Surface texture is a design factor that consists of physical attributes created by a variety of materials and surface finishes attributes such as roughness, glossiness, colour, and hardness (Zuo & Jones, 2016).
Brand	Expectation about company products (ideas or images of products), exceed them and bringing better products to the marketplace (Manavis & Kyratsis, 2021).
Style	In general, styles are explained as invariant (formal) elements that represent a brand both in individual products and across product ranges, but little is said about the origin of these elements or what they refer to (Xiong & Lu, 2021).
Appearance	The appearance of a component usually effects on the overall image of a product and consequently effects on buyers' preference and purchase intention for the product (Hsiao, 2013).
Identity	Moreover, product identity has a significant role in the marketing field and influences in its commercial success. Brand identity is one of the most important key factors of the product/ user relationship (Manavis et al., 2023).
Material	In product design, materials are considered the building blocks of physical products and contribute to the product's functionality and meaning (Veelaert, 2020).
Emotional	An emotional product design deals with the creation of positive emotions. It is important to note that emotional product design links with the theories of user experience and customer satisfaction to influence an end user's decision to purchase a product (Francalanza et al., 2019; Buker et al., 2022).

Semantic	Product semantics is the study of the symbolic qualities of artificial forms in products in their cognitive and social contexts. The basic aim and method of this theory is to consider the form of a designed object as a kind of information and to provide the possibility for designers to intervene in the modelling process (Tewari, 2016).
Semiotic	Symbols, icons, and other representation typologies are largely discussed in Semiotics, studying the relation between the things and the interpretation people have about them (Buxton, 2007).

Children's Psychological Needs in Furniture Design

Children's psychological needs play a vital role in their emotional well-being, cognitive development, and social growth. Meeting these needs not only promotes children's all-round growth, but also lays a solid foundation for their healthy and fulfilling lives. Since children's psychological needs are multi-level and multi-dimensional, a deep understanding of these needs from multiple perspectives is essential for designing furniture that meets the characteristics of children's development (Zhang, 2024).

According to Rigolon and Alloway (2011), children's psychological needs can be summarized into five key dimensions: physical development, self-development, cognitive development, social development, and moral development. This framework provides a systematic perspective for analyzing children's psychological needs, enabling designers to deeply understand children's psychological motivations when using furniture and scientifically integrate these needs into product design.

Saracho (2023) pointed out that physical development reflects the physiological needs of children at different stages of growth and directly determines the comfort and safety design of furniture. Self-development focuses on how children establish self-identity in the process of growth and enhance self-confidence and independence through the experience of using furniture. The cognitive development dimension emphasizes how furniture design promotes children's perception, learning and exploration abilities, ensuring that the appearance, function and interaction of furniture are in line with children's cognitive characteristics. The social development dimension focuses on the role of furniture in promoting children's social interaction and group awareness, such as how to encourage children's cooperation and communication through shared or interactive designs. Finally, the moral development dimension explores whether children can perceive moral responsibilities in the process of using furniture, and how to help children establish correct values through furniture design, such as cultivating children's environmental awareness through sustainable design concepts.

Through in-depth exploration of these five dimensions, designers can not only understand the practical application of children's psychological needs in furniture design in a more comprehensive and systematic way, but also effectively enhance the use value of furniture, making it truly an important medium to support the all-round development of children (Jiang & Miao, 2018).

Research Gaps and Strategies

According to the literature review, there are still some gaps in this research field that have not been fully explored, and these areas that have not been deeply studied are of great value for future research and practice. Research shows that a deep understanding of children's needs is essential, especially when designing products, services or environments that can support children's development, enhance their well-being and optimize the overall user experience. Children's needs are very different from those of adults. They are unique in terms of physiological, psychological and cognitive development. Therefore, they need to be given full attention in the design process to ensure that they receive appropriate support and positive experiences. Creating a safe, rich and supportive environment for children not only helps promote their physical and mental health development, but also enhances their exploration ability and self-confidence.

In the design of children's furniture, the combination of function and aesthetics is also crucial. Children's furniture must not only meet basic functional requirements such as comfort, durability and safety, but also attract children's attention and stimulate their interest through visual and tactile elements. The integration of functional and aesthetic design is reflected in the coordinated matching of furniture's form, color, material and other dimensions to create a visual effect that is both expressive and in line with children's psychological needs. At the same time, the safety, ergonomic design and overall performance of furniture must also be fully considered to ensure that children get the best experience during use. As mentioned earlier, the appearance characteristics of furniture should convey beauty through the coordination of proportions, the balance of colors and the appropriateness of form. This is not only one of the core elements of children's furniture design, but also can invisibly cultivate children's aesthetic awareness and cognitive ability. Overall, functional and aesthetic design has become a key link in modern children's furniture design. Its value is not only reflected in the appearance of the product, but also in establishing an emotional connection between children and furniture, enhancing their use experience, and enhancing the appeal and loyalty of the brand. Well-designed furniture can not only become a visual highlight in the home environment, but also promote children's independent use of furniture and cultivate their independence.

However, in the research of furniture design, the current children's furniture design mainly focuses on physiological needs, ergonomics and sustainability, while children's psychological needs have not received enough attention. Many product developers and furniture designers rarely take psychological needs into consideration in the design process of children's furniture. However, literature research shows that integrating children's psychological needs into furniture design has a profound impact on promoting children's emotional health, building a sense of security and supporting their psychological development. Good design can not only help children develop healthy self-cognition and enhance their emotional stability, but also promote them to establish positive social relationships with others and improve emotional resilience. Therefore, in the future development of children's furniture, designers and product developers should comprehensively consider children's psychological development and perceptual characteristics, and cleverly use visual elements such as color, pattern and form to enhance children's cognition and emotional connection with furniture, thereby increasing their interest and comfort in use. Such a design concept not only meets the growth needs of

children, but also can further enhance the market competitiveness and user satisfaction of products.

Furniture plays a vital role in shaping children's growth experience. It not only affects how children interact with the space, but also determines how they participate in activities and how they perceive themselves. By deeply understanding the psychological needs of children, product developers and furniture designers can create furniture designs that are safe and comfortable, but also inspire independence and creativity.

In order to achieve the research objectives, this study will further explore the key elements of children's psychological needs and integrate them into the early stages of children's furniture design and development to improve product user satisfaction. Figure 4.1 shows the integration framework of functional needs, aesthetic needs and children's psychological needs. This framework not only reveals the gaps in current research, but also proposes corresponding strategies to optimize children's furniture design. As a design guide for product developers or furniture designers, this framework will provide systematic support for the research and development of a new generation of children's furniture, ensuring that the products can promote children's mental health and emotional growth while meeting basic functions.

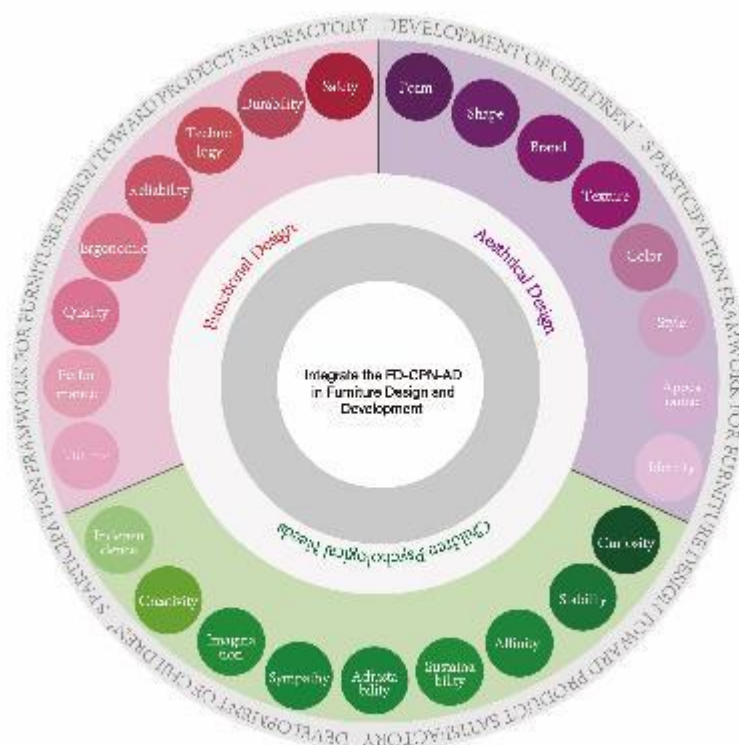


Figure 4.1 Gap and strategy for product satisfactory in children furniture design
(Source by author)

Conclusion

In the design of children's furniture, paying attention to children's physiological characteristics can help improve product satisfaction, but children's psychological needs have not been fully utilized. How to effectively integrate children's psychological needs into the design and development process of children's furniture has become a research gap that needs to be urgently addressed in this field.

Literature research shows that it is crucial to have a deep understanding of children's needs. Unlike adults, children's needs are more unique and require special attention and careful design to provide appropriate support and experience. By deeply analyzing children's psychological needs in the early stages of furniture design and development, it is possible to create products that better meet children's growth needs, thereby improving their happiness, development potential and life satisfaction. However, although some methods have been used in recent years to identify children's needs in furniture development, there is still a lack of a systematic framework to incorporate children's psychological needs into the design process. Therefore, there is an urgent need to build an innovative framework to guide product developers and furniture designers to fully integrate children's psychological needs and perceptual characteristics when designing children's furniture, so as to enhance children's cognitive and emotional connection with furniture.

In addition, this study also analyzes the application of functional and aesthetic design in children's furniture. The results show that the combination of functionality and aesthetics cannot be ignored. Children's furniture should not only meet basic functional needs, but also stimulate children's interest through attractive aesthetic design, so that they are more willing to interact with furniture. The organic integration of function and aesthetics makes children's furniture not only a visual highlight of the home space, but also enhances the intimacy between children and furniture, cultivates their ability to use furniture independently, and thus promotes their growth and development. Therefore, this study is of great significance to achieve the research objectives, that is, to deeply explore the impact of children's psychological needs in furniture design on product satisfaction, and to construct an innovative framework to scientifically and effectively integrate the psychological needs elements in children's furniture design.

The framework proposed in this study aims to integrate the functional, aesthetic and psychological needs of children, and provide systematic guidance for product developers and furniture designers, especially in the early stages of design and development. This framework not only helps to improve the user experience and emotional value of children's furniture, but also ensures that new products can more comprehensively meet the growth needs of children, thereby improving their overall satisfaction.

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