



# Well-Being Design for an Aging Society

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**Abstract.** While population aging is an irreversible global challenge, this demo-graphic shift also brings a great opportunity to design innovation. For assisting older adults' healthy and active aging, products and services should be adapted to their social identities and diverse well-being needs in their daily activities. This study addressed the question of how the integration of Science, Arts and Design (SAD) can contribute to design for older adults' overall well-being. A case study of programs in Qiqihar University, Ming-Lab and Zhuhai of BIT was used to show how to transform design for older adults from SAD in design education to CHEER in design practices. Firstly, a review of the status of SAD was conducted. As multiple technology advances, many of aging problems can utilize SAD to cope with older adults' daily problems and promote their quality of lives. The analysis of SAD enables us to identify the strengths and weaknesses of the current education systems in China as well as to discover further design trends. Then, the "CHEER" framework for well-being design is introduced that includes five main components: Collaboration, Humanity, Empathy, Ecology and Renaissance (CHEER). Each component give insight into what students could do to realize older adults' well-being through their design proposals. Furthermore, this study presented several design proposals to outlines design features, merits and challenges of the "CHEER" framework. Together with the "CHEER" framework, this study is indented to offer inspiration for de-sign researchers and educationists to join forces in their endeavors to de-sign for older adults' well-being.

**Keywords:** Aging society · Older adults · Well-being design  
Design framework · Product and service design

## 1 Introduction

Population aging is one of the major challenges facing the present-day world. Taking active measures to tackle this problem is not only the responsibility of the government, but has also provided opportunities for researchers and practitioners in the design field to make service innovations and assume their social duties. In the initial stage of design for older adults, many developed countries had successively adopted some design paradigms such as "Universal Design", "Inclusive Design", "Accessible Design" to

enable older adults with physical and mental handicaps to maintain their independent living skills and integrate into the mainstream society [1–3]. In view of the physical, cognitive and behavioral decay that elderly users experience during their aging process, researchers and practitioners in the field of design for older adults have proposed a lot of effective solutions and displayed the humanistic concern of the design discipline itself [4].

The interesting thing about the product and service design for older adults is that it both needs to be closely linked to older adults' everyday life and culture, and needs to vary with the changes of the times and society, and this second part demonstrates its characteristic to keep up with the times. Hence, it's a challenging and constantly changing topic. In recent years, as the connection of Science, Art and Design (SAD) has become increasingly deepened, the service of and study on design for older adults in China's design education have continuously yielded good results. The products and services for older adults have become increasingly rich, but meanwhile, under the influence of SAD, the study on design for older adults on different levels has also encountered many problems. As some practical experience has shown, the design paradigms such as "Universal Design", "Inclusive Design" and so on have their limits when dealing with design for older adults' well-being, as they fail to assist designs to satisfy older adults' comprehensive needs for well-being in life. This calls for researchers and practitioners to rethink the problems that might exist in the current research framework of design for older adults. Therefore, this study mainly focuses on the research perspective and methodology in design for older adults' well-being, for they are the two core points in this filed. In view of these two points, the study takes creating well-being in life as the ultimate goal of design for older adults, and attempts to re-examine the merits and demerits that China's design education possesses in carrying out the SAD integration. Furthermore, based on the author's teaching experience over the past years, the study proposes the "CHEER" framework for well-being design and explores, by combing the author's teaching experience, whether the core concepts in the design framework could bring about crucial changes to the process of design for older adults.

## **2 Status of SAD in Chinese Design Education for Coping with Well-Being in Aging Society**

Since the 1980s, design education has been developing for more than three decades in China, and has achieved numerous accomplishments in different aspects. In view of its overall teaching model, the integration among science, art and design has become the principal approach most colleges and universities adopt to educate and cultivate students to make design innovation. The aim of SAD integration is to break education's one-dimensionality, and nurture design students' comprehensive and integrative knowledge of science and art. In today's age of big data and artificial intelligence in particular, design education, under the guidance of SAD, will focus more on cultivating the "coordinating" and "integrating" ability of design students, and mobilize social resources for design innovation through interdisciplinary research, exchanges and cooperation. As to the issue of design for older adults, the SAD teaching model has

brought about plenty of benefits to aging industry and the related service design. For example, for those problems such as poor mobility, memory loss, digital divide and so on, which are inevitably brought about by aging and which older adults often meet in daily life, SAD integration will encourage design students to conduct an interdisciplinary integration of resources, find out proper solutions to design problems, and promote the quality of life of the aged. And these are the positive effects that the SAD teaching model has brought to and will continue exerting on design for older adults.

From 2005 to 2016, we had been attempting to conduct an in-depth integration between the SAD teaching model and design project on the older adults' well-being in three different universities, which are Academy of Fine Arts and Artistic Design at Qiqihar University, the Ming-lab at Beijing Institute of Technology (BIT Ming-lab), and Beijing Institute of Technology, Zhuhai (BIT, Zhuhai). During this process, we have published more than 50 studies on the well-being culture, among which 36 studies are related to aging industry. These studies cover multiple research areas of the aging society, such as life and mobility aids to the older adults with disability, garment design, household goods, interactive interfaces and the Internet service platforms, etc. In addition, BIT Zhuhai has also signed a strategic cooperation agreement with Industrial Culture Development Center of China's Ministry of Industry and Information Technology on jointly promoting the development of "the Study on Well-being Culture and Industry Services" in China.

The rise of older adults' well-being design lies in the fact that, with the gradual improvement of people's living conditions, older adults' various needs for well-being have gradually emerged. Aside from their physical and spiritual needs, they have attached greater importance to building their social connections and realizing their personal value. The notion of well-being finally leads to the "FU (福)" concept, which is frequently mentioned in Chinese culture. In traditional Chinese culture, Confucianism considers that "FU" is "being active in forging ahead, and enthusiastic in pressing on", Buddhism deems that "one's fate (FU) is in one's own hands and one should do charitable deeds and accumulate virtue to improve one's lot", and Taoism holds that "FU" is to let things take their own course and comply with nature. When the notion of "FU" is reflected in older adults' well-being design, it stands for close attention to four "Jing" states from outside to inside in older adult's daily life: the first "Jing" state refers to Environment (环境) - the social environment older adults live in; the second "Jing" state refers to Context (情景) - the context that product and service design is in; the third "Jing" state refers to State of Mind (心境) - the relaxed and pleasant user experience and atmosphere that a product or service could provide for its users; the fourth "Jing" state refers to Purity of Heart (心净) - older adults' spiritual resonance with the designer which makes them achieve an ideal state. Older adults' well-being design thinks that the value of products and services not only lies in the satisfaction of elderly users' demands for functionality, but is more about the emotional injection in the products and services, and this has elevated the design from merely satisfying the practical functions to showing humanistic care on the spiritual level. Thus, I hope that I could rethink the value of design for older adults from the perspective of well-being design, so that product and service design for older adults could better assist them to pursue their ideals in life.

Our years of project teaching experience has proved that the SAD integration is the only way towards the development of design projects for older adults' well-being. Design students should, according to the specific requirements of design projects, strive to integrate new knowledge in different disciplines, including art, medicine, psychology, mechanics, ergonomics and so on, to form their design thinking. During this process, SAD will be able to provide many new perspectives and solutions. The greater value of SAD lies in the fact that it has put forward many demands and challenges for the study of design for older adults. In common design projects, the basic demand is to find out a common problem encountered by many older adults and then manage to solve it. While in an older adults' well-being design project, SAD will guide the project towards an in-depth exploration of the notion of "FU" and offer a vague space for design students to probe in. Several questions, for example, "what are the key issues of well-being for older adults?", "what is the most effective solution at present?", are the greatest concerns of design students in projects, as well as the key factors in the intensive study of projects.

Based on the feedback of the student teams who had participated in the design project, this study will rethink the problems and challenges confronted by the application of SAD in older adults' well-being design. First are about the research perspective of well-being design and the value judgement of the well-being issue. In social gerontology, aging is not just a biological process, but a process that will bring about plural changes, including changes in one's social participation and social behavior realization, and even changes in one's social duties [5]. Hence, the perspective of older adults' well-being design should not be confined to addressing the common problems brought by physiological changes and decay of body functions, which is exactly the limitation of universal design, inclusive design, and many other many current general design paradigms. It's also necessary for older adults' well-being design to actively create the sense of happiness, reconstruct the value of life for older adults, and bring forward better solutions to satisfy older adults' individual needs. Second is about the research methodology of well-being design, and about how to weigh up the related information and transform older adults' demands for well-being into soluble issues in design. At present, the current research methods in the field of older adults' well-being design are not flexible enough, with research methods related to "ergonomics" and "human factors" being the dominant methods. Both undergraduate and graduate design education haven't carried out a systematical instruction of those new research methods such as emotional design, user experience and service design, thus these methods haven't been widely applied in the field of design for older adults. This has led to severe homogenization among the practical design projects for older adults, and "functionality" has become the only connection between the design and older adults. For those who have been through the vicissitudes of life, although such function-oriented products could bring them convenience in life, the products can hardly satisfy their high-level demands and expectations, thus they might be easily rejected. What's more, long-term focus on the negative effects of aging will also exert some influence on design students' cognitive patterns of design for older adults, and may also hinder their positive and systematical design thinking when design for older adults.

### 3 CHEER Design Framework for Older Adults' Well-Being

Based on reflections upon the in-depth SAD integration in older adults' well-being design, this study proposes that design in this field should expand its research vision, update its research methodology, and re-judge its design framework in accordance with the related professional principles and the current national conditions, in order to explore how to apply SAD integration to making rational older adults' well-being design. Through summarizing the teaching cases in older adults' well-being education in Academy of Fine Arts and Artistic Design at Qiqihar University, BIT Ming-lab, and BIT, Zhuhai in recent years, this study believes that a systematical framework that can discover and solve problems is needed in student teams' learning of older adults' well-being design. In design, to simplify problems casually or to take some issues for granted is inadvisable, just as merely paying attention to solutions that can lead to actual production is wrong.

After conducting a careful literature review regarding the practical process of a series of completed older adults' well-being design projects, this study has found that student teams frequently encounter difficulties in the following five steps: "demand analysis", "concept generation", "experience design", "solution selection" and "prototype test". Thus, in view of the specific requirements of each step, the researcher of this paper has put forward five ingredients, namely, "collaboration", "humanity", "empathy", "ecology", and "renaissance", and they together form the "CHEER" design framework for older adults' well-being (see Fig. 1). The aim of this design framework is to guide the design for older adult to base itself on the concept of well-being, attach adequate importance to the inner connection between design and older adults, and strive to improve the well-being of the elderly through design. And this framework helps design students to figure out what older adults' well-being is truly about before they start working on it, assist them to seek out the critical factors in tackling related problems, and provide them with meaningful insights in their efforts to realize well-being for the elderly.

### 4 Five Ingredients for Older Adults' Well-Being Design

The core of the "CHEER" design framework includes five ingredients: Collaboration, Humanity, Empathy, Ecology, and Renaissance, and they together demonstrate the connotations and requirements of older adults' well-being design in each step under the guidance of the SAD. The five ingredients can be applied to many a research project, for example, projects of the products, environment and interactive interfaces related to older adults' lives. Although these five ingredients are common to many different design cases, they can help students to learn how to make their proposals come true, and how to effectively respond to users' individualized demands which are based on their own life experience. Next, the study will introduce these five ingredients one by one, and use some cases to illustrate how these ingredients can exert a positive impact on design students' proposals.

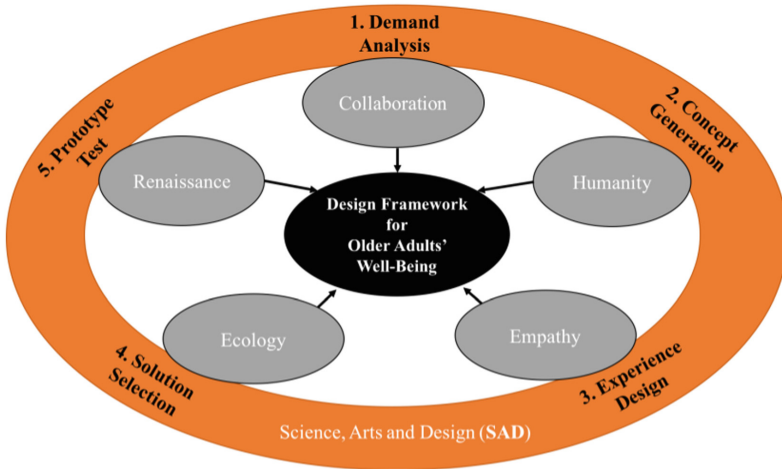


Fig. 1. “CHEER” design framework for older adults’ well-being.

#### 4.1 Collaboration for Analyzing Older Adults’ Everyday Needs

Collaboration constitutes the first ingredient in the framework, and it relates to how design student teams analyze older adults’ everyday needs in older adults’ well-being design projects. The goal of well-being design is to stimulate students’ divergent thinking, create ample flexibility in the design projects, and make design students experience difficulty in demand analysis. Thus, the concept of Collaboration has been put forward to guide design teams, in their exploring the life of older adults, to collaborate with elderly users as well as experts in other disciplines so as to draw on others’ diverse experience and make proper analysis of older adults’ well-being needs at different levels.

In well-being design case of the diet of older adults carried out by BIT Ming-lab, the student team hoped to use their design to assist older adults to make nutritious breakfast easily, but they had no idea how to make proper demand analysis. Then, the teacher encouraged them to conduct multiple negotiations with the enterprise so as to determine which kinds of resources could finally be integrated. At last, under the jointly efforts of the enterprise and the students, the team set urban empty-nesters as their target customers, and conducted further investigation and analysis of the empty-nesters’ demands for breakfast. In the end, the team found that older adults attach great importance to nutritionally balanced breakfast and have relatively fixed eating habit. The match of porridge and eggs, or the match of yogurt and fruit juice, is the most common breakfast match among the empty-nest elderly, and “warmth”, “convenience”, “multi-functionality” and “being easy to clean” constitute the greatest concern of older adults. Thus, the team ultimately devised the “Double” breakfast machine to elevate older adults’ sense of happiness when eating breakfast, and the product has gained recognition from both elderly users and the enterprise (see Fig. 2).

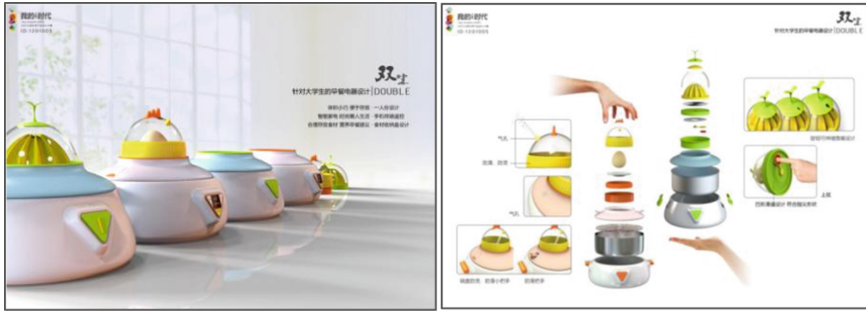


Fig. 2. “Double” breakfast maker design for empty-nest older adults.

## 4.2 Humanity for Generating Suitable Design Concepts

The second ingredient Humanity corresponds to the step “Concept Generation” in design. To solve the social problems related to the aging of the population calls for a re-examination of the living state of older adults. The concept generation in older adults’ well-being projects should abide by the fundamental concept of Humanity, and integrate science and art with older adults’ life, culture, and aesthetic values. Only in this way can the well-being value of design concept be improved.

In a well-being design case of older adults’ clothing conducted by Academy of Fine Arts and Artistic Design at Qiqihar University, the design team took “humanized design” of older adults’ clothing as the standard for its concept generation, and divided older adults into three types according to their physical conditions, namely, the healthy type, the sedentary type, and the recumbent type. Then, the team conducted a thorough and systematical analysis of the relationship between the physical and mental features of these three types of older adults and the humanized design of clothing, and analyzed the application of the humanized design of clothing. Specifically, based on the physical and mental features of older adults, the team carefully examined the characteristics and causes of the style, structure, fabric, color and decoration of older adults’ clothes made under the principle of humanized design. Guided by the Humanity concept, the design team has finally put forward a design proposal which both guarantees an elegant clothing style for all the three types of older adults and ensures that all clothes are easy to wear in daily life. Besides, their design proposal has also taken into account older adults’ self-esteem and their wish to be fashionable, so it has successfully enhanced older adults’ sense of happiness through improving their clothing (see Fig. 3).

## 4.3 Empathy for Understanding Deep User Experience

The third ingredient Empathy corresponds to design students’ in-depth understanding of user experience after the step of “Experience Design”. When it’s necessary for a design team without any elderly member to conduct experience design for older adults, the team should depend on empathy to make the right decision [7]. Therefore, to assist student design teams to understand older adults and their experience is an essential task in promoting the experience design for older adults’ well-being. The concept of

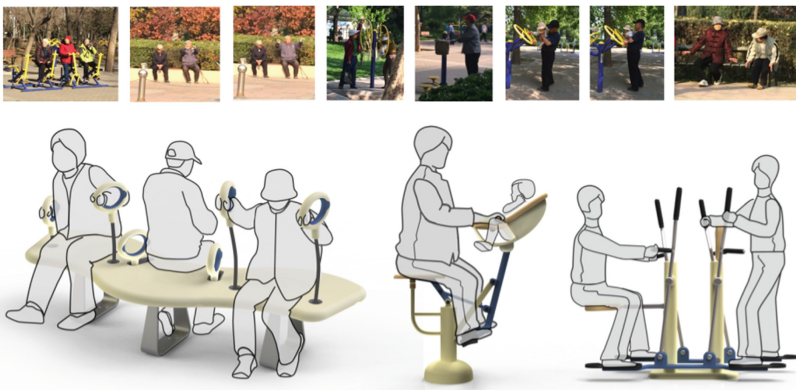




**Fig. 3.** Garment design for older adults with different physical conditions.

“empathy” in the “CHEER” design framework is aimed to help designers develop their empathy and get increasingly closer to older adults’ life and experience, and to increase the possibility that a certain product or service design can satisfy the needs of elderly users.

In a well-being design case about the community fitness facilities for older adults carried out by BIT Ming-lab, the design team has conducted a one-month investigation in communities to observe the exercise environment for older adults, and interviewed many older adults there, trying to figure out how to create better exercise experience for older adults living in cities. The students managed to learn more about the interpersonal interaction and man-machine interaction during older adults’ fitness process. This has helped them to properly understand the authentic exercise experience of older adults and find out the problems in their exercise process. At last, the design team found four typical exercise models among older adults, and has successfully developed a fitness program “Elder-Fitness”, which better meets the fitness requirements of older adults in communities (see Fig. 4).



**Fig. 4.** Fitness apparatus design for older adults in urban community.



#### 4.4 Ecology for Choosing Sustainable Design Solutions

The fourth ingredient Ecology corresponds to the step “Solution Selection” in design. Student teams usually put forward several solutions to a project, so how to select a proper solution among those many solutions becomes a problem to be considered. The concept of Ecology is aimed to encourage design teams to take into account the sustainability of a certain proposal so that the stable relationship between the product and its elderly users can be enhanced, resource consumption and waste can be reduced, and excellent design proposals both promoting economic and social development and protecting ecological environment can stand out [8].

In a well-being design case about lamps for older adults carried out by BIT Ming-lab, the design team put forward many different proposals with a view to the fact that older adults often get up in the night to use the toilet. But the team got stuck in choosing an ultimate proposal to carry the design forward. Thus, the teacher enlightened the students and asked them to think which design proposals conform to the concept of Ecology and possess sustainable value. In the end, the team chose the proposal using the natural material loofah to design lamps (see Fig. 5). This design concept highlights the power of dim light and brings warm lighting to older adults at night. Also, its design thinking featured by anti-functionality has made the design attach importance to the transmission of emotions. What’s more, the natural material loofah makes the product economical, durable, environmentally friendly, heat-insulated, and can be easily replaced if damaged. Thus, this design has given consideration to the overall interests of the product’s developers and users, and it also conforms to the target of well-being design.



Fig. 5. Loofah night lighting design for older adults’ bedroom.

#### 4.5 Renaissance for Promoting Older Adults’ Flourishing

The last ingredient Renaissance in the design framework is aimed at the problems in the prototype test of products and services. Renaissance means to promote the flourishing

of the user and help the user regain the vigor and vitality of life. For design for older adults centered on well-being, a good prototype test should be able to find out whether the design could promote the flourishing of older adults [9]. Renaissance can remind design student teams who conduct prototype tests to pay attention to whether a prototype could stimulate older adults' sanguine attitude and actively bring into full play their personal potential, and whether a prototype could assist older adults to become what they want to become or become their best selves.

In a well-being design about older adults' wheelchairs carried out by BIT Ming-lab, the design team found that there is no or no obvious difference between the older adults having difficulty getting about and other ordinary older adults in terms of both groups' cognitive processes, such as perception, attention, memory, thinking. And the design team also found that the older adults having difficulty getting about are not very much hindered in their general life and work. The team hoped that their design could stimulate the enthusiasm of the older adults having difficulty getting about to move around and complete the necessary actions in life without the help of nursing staff, and hoped that their design could boost the vitality and sense of achievement of these elderly users. Therefore, the design team took whether older adults are willing to independently use this wheelchair both indoors and outdoors as the criterion for their prototype test, and received positive feedback from most older adults having difficulty getting about. Then, they settled on this following design proposal (see Fig. 6).

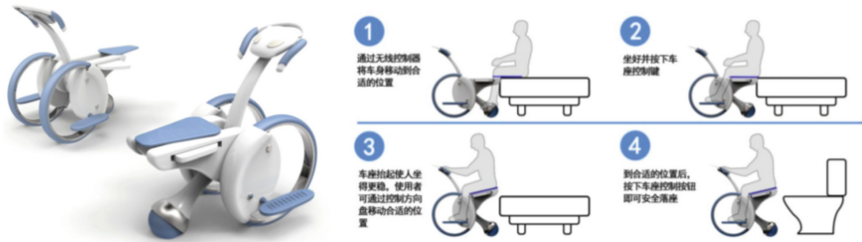


Fig. 6. Wheelchair design for older adults' with low-mobility.

## 5 Challenges and Suggestion in Realizing Older Adults' Well-Being in Design Practices

The project of older adults' well-being design has been conducted for many years in the Academy of Fine Arts and Artistic Design at Qiqihar University and the Ming-lab at Beijing Institute of Technology, and it's still in its initial stage in Beijing Institute of Technology, Zhuhai. Thanks to the endeavors of teachers and students in different universities, the older adults' well-being design framework based on SAD has been put forward and testified. The design framework includes five ingredients corresponding to each of the five steps in design projects, as problems may easily arise in these five steps. Under the guidance of the five ingredients, a group of good designs for the well-being of older adults have been made, covering many fields closely linked to older adults' lives, such as products, environmental improvement, clothing design and so on,

and these designs have received positive feedback from both students and older adults. Such experience has made the researcher of this study more convinced that because older adults differ from one another in many aspects, such as the decay of body function, life experience, behavioral motives, means to ameliorate the situation and so on, it's very difficult to study this user group as a subject with common character. On the contrary, older adults' well-being design should not only tackle the common problems on the surface, but should also try to find out solutions to those individualized problems by going deep into older adults' lives, so as to build up an effective link between the education of design for older adults and China's manufacturing industry. This is a principal challenge for older adults' well-being design, as well as the only way to its further development.

In addition, through detailed analyses of the living state of older adults, and by exploring the features of the sense of happiness aroused by products, the project of older adults' well-being design has found that products and services often play multiple roles in the life of older adults. For instance, instead of merely making up for the physical deficiency brought about by aging, the use of products and services can promote the communication among family members, friends and relatives, and can also help individuals to enhance their personal abilities. Therefore, products and services would appear in varied life situations, and serve as the medium for the sense of happiness. Based on the many cases of older adults' well-being design, the study continues to propose three suggestions on the development of older adults' well-being design. First, pay attention to how products and services exist in older adults' everyday life, so that these products and services could better satisfy the everyday needs of older adults and get integrated into their daily activities. Second, manage to help older adults experience happiness in using products and services. A certain design can not only bring about practical products and services to older adults, but can also encourage them to develop positive attitudes and habits in life and help them to re-construct their connections with society after they retired. Third, try to increase the attractiveness of products and services, as well as the customer loyalty, so that older adults can discover, experience and construct the true happiness in their lives, and lead a healthier, fuller and vigorous life under the guidance of the products.

## 6 Conclusion

Adopting the perspective of well-being design, this study has analyzed the development process of products and services for older adults, made the attempt to re-examine the merits and demerits that China's design education possesses in implementing SAD integration, and has put forward the "CHEER" framework for well-being design based on the researcher's teaching experience over the past years. The study has summarized the author's years of teaching experience at the Academy of Fine Arts and Artistic Design at Qiqihar University, the Ming-lab at Beijing Institute of Technology, and Beijing Institute of Technology, Zhuhai, and explored how the key concepts in the design framework can help to solve the difficulties and problems during the process of design for older adults. Employing the research method of case study, this study has found that the "CHEER" design framework can assist design student teams to gain a

thorough understanding of older adults' everyday needs and then satisfy these needs, so that student teams can have the opportunity to make their designs powerful enough to touch every aspect in older adults' well-being culture, such as the environment for one's old-age life, life services, the development of well-being products and so on. With the aid of the older adults' well-being design project, which is a design exploration and attempt full of humanistic care, this study is aimed to promote the more systematic and maturer development of older adults' well-being design under the joint endeavors of designers and researchers. The follow-up research of this project will expand its scope from Chinese culture to the global aging culture so as to seek more international cooperation opportunities in the field of older adults' well-being design, and bring well-being to older adults all over the world.

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