

Article

# Research on Urban Community Elderly Care Facility Based on Quality of Life by SEM: Cases Study of Three Types of Communities in Shenzhen, China

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**Abstract:** Aging in place has been proposed in response to increasing aging worldwide. Recently, many community elderly care facilities (CECFs) in China have been built to meet the desire of the elderly to age in place and help them live better in familiar environments. This study instituted a correlation evaluation system between the elderly's quality of life (QOL) and their satisfaction with CECFs. It assessed the QOL of the elderly in urban communities in Shenzhen and identified the issues of CECFs that led to the elderly's low QOL. Firstly, a hypothesis of the relationship between QOL and CECF satisfaction was proposed on the basis of previous studies. The QOL–CECF model was verified and tested by structural equation modeling (SEM). It was found that the functional setting, planning layout, and operational management affect the QOL of the elderly. Secondly, this study investigated the issue of CECFs in three types of communities, namely, urbanized village communities, affordable housing communities, and commercial housing communities. A factor-based analysis revealed the intrinsic linkages between and extracted the composite factors of CECF indicators in the three types of communities, revealing the CECF issues that led to low QOL using a QOL–CECF satisfaction analysis. Lastly, this study proposed differentiated strategies for CECFs in urbanized village communities and affordable and commercial housing communities. This study can provide differentiated strategies for CECFs in various types of communities to effectively improve the QOL of the elderly and promote the sustainability of CECFs.

**Keywords:** community elderly care facility (CECF); quality of life (QOL); structural equation model (SEM); Shenzhen



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## 1. Introduction

How to deal with the aging population has become an essential issue for the whole world. With the development of the economy and technology, human beings are no longer satisfied with the increase in life expectancy; they are instead pursuing a high quality of life (QOL). Studies have shown that the elderly in centralized nursing facilities suffer from depression [1,2], high mortality rates [3], and low QOL [4]. “Aging in place” is proposed to help the elderly age better [5]. It refers to extending residence time and satisfying the preference of the elderly to age in a familiar environment, supported by the external environment of the community [6]. As an essential link to ensure aging in place, community elderly care facilities (CECFs) have been studied in terms of facility functional setting and service supply [7], facility spatial distribution and accessibility [8], and facility service and financial security [9,10]. However, there are fewer studies on identifying the factors of CECF and how each factor affects and enhances the QOL of the elderly.

In addition, the contradiction between the lagging development of CECFs and the diverse needs of elderly groups is particularly acute in cities, the area that struggles with population aging the most [11]. The tremendous political, economic, and social transition in cities has brought about a prominent socio-spatial differentiation and segregation in cities between urban locals and migrants [12]. Such segregation can act as a barrier,

particularly for the physically and economically disadvantaged elderly. The literature concludes that the residential segregation between elderly locals and elderly migrants has produced an evident inequality in wellbeing, making elderly migrants more disadvantaged in terms of opportunities to obtain elderly care resources [13]. Elderly groups have different needs and opportunities to obtain elderly care resources [14]. However, previous studies researched the sustainability, equity, and accessibility of CECFs and proposed general CECF construction measures with respect to elderly demands, elderly health, and the spatial distribution of facilities [15–18]. There has been less research discussing how to improve the quality of life of the elderly in community elderly service facilities from the perspective of the different characteristics and care needs of the elderly [19]. This study took Shenzhen, the third largest city in China, as the subject. According to the latest census and population projections, by 2040, the proportion of the elderly will be over 14%. The composition of Shenzhen's elderly population is complex, including local seniors, early-stage entrepreneurs, and seniors who moved in with their children. Significant differences exist in the composition of the elderly population and the senior care needs among Shenzhen's three types of communities, namely, urbanization village communities, affordable housing communities, and commercial housing communities. Currently, the development strategy of CECFs in Shenzhen is mainly aimed at meeting basic needs and does not correspond to the increasing demands for a higher QOL of the elderly. The undifferentiated processes of CECFs ignore the differences in the construction conditions of various communities, which are not conducive to the sustainable development of CECFs.

This paper took three types of communities in Shenzhen as study cases, namely, urbanized village communities, affordable housing communities, and commercial housing communities. A structural equation model (SEM) was selected to confirm the path and degree of influence of CECFs on QOL. Furthermore, the aspects of CECFs leading to low QOL of the elderly in the three types of communities were identified, and a basis for the differentiated strategies of CECFs in the three types of urban communities in Shenzhen was provided for the future.

## 2. Literature Review

### 2.1. Quality of Life (QOL)

#### 2.1.1. Concept and Theory of QOL

The concept of QOL originates from economics and is defined as an indicator of people's state of life and welfare [20]. It is the degree of superiority or inferiority of the population's living conditions at a particular stage of economic development. It is the combined level of all social and natural conditions that satisfy people's needs. Economists consider QOL as an objective concept describing the development of human society, while social psychologists believe it is a mixture of feelings of satisfaction of multiple needs. Combining subjective and objective perspectives, the World Health Organization (WHO) defines it as the experience of individuals with different cultures and values [21]. This definition reflects the development of material conditions in society. It emphasizes the subjective nature of QOL, which involves physical health, psychological behavior, social relationships, and the environment in which one lives, covering all aspects that affect QOL [22]. In addition, scholars believe that the QOL of the elderly is influenced by health status [23] and measured by life satisfaction, happiness, and social belonging [24–26]. In contrast, developing countries prefer measuring and defining it using objective indicators, such as material living standards, economic conditions, and medical and public services [27,28]. It is considered to be the sum of the objective state of the elderly in terms of material life, spiritual life, health status, and living environment, as well as self-perception.

On the basis of previous research, scholars have attempted to develop the theory of QOL. At first, using response transfer theory, Sprangers and Schwartz [29] constructed a model to reveal the influence of changes in physiological health status on the QOL of the elderly and to predict the changes in QOL. The meaning of health has subsequently expanded to include not only an absence of illness and pain, but also mental wellbeing and

good social status. Scholars have realized the importance of mental and social health for the elderly and have refined the QOL theoretical model of the elderly using Maslow's needs theory. Asadi-Lari, Hyde, and Wiggins et al. [30,31] adopted the need satisfaction model to discuss how physical health, psychological health, mobility, and social relationships affect the QOL of the elderly. Currently, the QOL model proposed by the World Health Organization (WHOQOL Model) in 2008 is the most widely used. This model draws on social ecology theory to decompose the factors and action mechanisms that influence QOL [21]. In addition to physical factors, other factors are examined in this model, such as psychological factors, the level of independence, social relationships, the environment, and spirituality factors. Therefore, it is applicable to QOL studies, because it not only concerns the individual dimension, but multiple dimensions, such as communities, cities, and society [32,33].

### 2.1.2. Influencing Factors of QOL

The WHOQOL Model highlights six factors affecting QOL: physiology, psychology, social relationships, level of independence, environment, and spirituality [21]. According to this model, the mechanisms and pathways of action of each factor affecting QOL and the interactions among the factors have been discussed extensively. Zikmund [34] found that, in addition to directly influencing QOL, psychological factors indirectly affect overall QOL through physical factors, social relationships, and the environment. Kiritz and Moos [35] argued that the environment is vital and affects physical QOL (Phys-QOL), psychological QOL (Psyc-QOL), and overall QOL. They also concluded that environmental factors have a high degree of influence on QOL. Fagerstrm et al. [36] confirmed these factors' direct and potential role in the degree of independence and in physiological, psychological, and social relationships.

Many influencing factors are involved in the WHOQOL Model, and scholars in various fields have presented different research perspectives. In medicine and public health, scholars have considered physical factors, psychological factors, social relationships, and spirituality in overall health and discussed their role in influencing QOL. Jalenques et al. [37] concluded that health, age, relationship, and material and economic factors negatively influence the QOL of the elderly. Man et al. [38] used Anderson's model to demonstrate that the health-related QOL (HRQOL) of the elderly is related to personal and social environmental factors, and that there is an interactive relationship among the factors. Studies have proven that the factors of age, literacy, income, and living ability significantly impact HRQOL in the elderly. In terms of geography and environmental behavior, scholars have interpreted the "degree of independence" as the purpose and ability of behaviors, and have also discussed the impact of aging behaviors on QOL. Using a regression analysis, Wang [39] confirmed that the behavioral purpose of the elderly directly affects the Phys-QOL, Psyc-QOL, and the social support of the elderly, subsequently having an impact on the overall QOL. Goulia and Ravulaparthi et al. [40] confirmed that the intensity of the elderly's behavior directly affects their life satisfaction and QOL, and that QOL is usually higher for the elderly who travel long hours and distances, have a fixed routine of behavior, and have a regular travel period. Scholars have generally agreed that the physical and social environments influence the QOL of the elderly. Veerle et al. [41] proposed that promoting and improving the physical environment for neighborhood physical activity, community safety management, community relationship networks, and cohesiveness can effectively enhance the QOL of the elderly. The social environment, such as economic level, leisure activity opportunities, and social relationships, has a more significant effect on the QOL of the elderly. Mahapatra [42] put forward differences in the demand for community livability among the elderly of different economic levels and argued that the planning of the community environment and facilities should consider the affordability and adaptability of the elderly to effectively enhance the QOL. Santos and Silva et al. [43] considered that the role and mechanism of action of economic level and leisure activity opportunities influence

the QOL of the elderly. In addition, good social relationships, such as those among spouses, children, relatives, and friends, significantly impact the QOL of the elderly.

### 2.1.3. Measurement Methods of QOL

There are two types of commonly used methods to measure QOL. Firstly, the multiscale combination measure evaluates QOL in terms of physical, psychological, life satisfaction, and environmental aspects. Typical scales include the Satisfaction with Illness Scale, the Life Satisfaction Scale, the Depression Self-Rating Scale, and the Social Support Scale [44–47]. Multiscale measures are mostly used in QOL and correlation studies on the influential factors. On the basis of the results of various scales, studies have explored the interactions among the factors through quantitative statistical methods. Secondly, the integrated measurement methods, including the SF-36 scale, WHOQOL-100 scale, and WHOQOL-BREF scale, cover all areas of QOL and can evaluate the overall QOL of residents. The WHOQOL-100 scale is universal and comprehensive, and it can be used in many applications after multiple empirical tests. The WHOQOL-100 scale includes six dimensions, 23 indicators, and 100 questions. The WHOQOL-BREF scale [48] is a streamlined version of the WHOQOL-100, using statistical methods to redivide the 23 indicators into four dimensions and refine 25 main questions from the original 100 questions (Table 1). The WHOQOL-BREF retains the key measurement capabilities of the WHOQOL-100 scale and reduces the difficulty of measurement; therefore, it is widely used.

**Table 1.** List of indicators of the WHOQOL-BREF Scale (Reprinted from [48]).

| Goal | Dimension            | Indicators                                                                                                                                                                                                                                                                                          |
|------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| QOL  | Physical             | Pain and discomfort<br>Energy and fatigue<br>Sleep and rest<br>Mobility<br>Activities of daily living<br>Dependence on medication or treatments<br>Work capacity                                                                                                                                    |
|      | Psychological        | Positive feelings<br>Thinking, learning, memory, and concentration<br>Self-esteem<br>Bodily image and appearance<br>Negative feelings<br>Spirituality                                                                                                                                               |
|      | Social relationships | Personal relationships<br>Social support<br>Sexual activity                                                                                                                                                                                                                                         |
|      | Environment          | Physical safety and security<br>Home environment<br>Financial resources<br>Health and social care: accessibility and quality<br>Participation in and opportunities for recreation leisure activities<br>Opportunities for acquiring new information and skills<br>Physical environment<br>Transport |

## 2.2. Community Elderly Care Facilities (CECFs)

### 2.2.1. Functional Setting

Most previous studies on the functional setting of facilities focused on the type of facilities, as well as the service and the scale of facilities. From the perspective of long-term care (LTC), Curtis and Kiyak et al. [49] classified CECFs into adult family homes (AFH), adult residential care (ARC), and assisted living (AL), and they proposed that

these three types of facilities mainly provide medical care, mental health, social support, and residential amenities for the elderly in the middle and late stages of aging with poor health conditions. Guihan et al. [50] studied the independence and privacy of the elderly in the three types of facilities. They found that better health conditions of the elderly and greater independence led to a higher demand for privacy. Since the privacy of the elderly is difficult to meet in all three types of care facilities, Guo [51] proposed new kinds of community retirement service facilities, such as daycares and senior centers in naturally occurring retirement communities. These facilities provide a place for activities and socialization for seniors in good health, meeting the need for privacy in their daily lives but excluding residential services. Nakanishi et al. [52] focused on the needs of the elderly in Japan and found that, except for the elderly with advanced age and poor health who require round-the-clock care, most of the elderly prefer daycare facilities and in-home senior care services due to the need for privacy and aging at home. Daycare centers mainly provide life care and social activity to help the elderly extend their stay in their original residence [53]. In addition, in Singapore, private clinics in and around the community often provide medical services for the elderly. Tan et al. [54] proposed building a CECF that integrates medical care and nursing care. Through the public healthcare system, CECFs are linked with community hospitals or large hospitals to provide professional care and medical services for the elderly. In addition, daycare facilities are built in the community to provide daytime activities for the elderly. Feng [55] suggested combining daycare centers and childcare facilities to promote intergenerational integration in the community. Feng et al. [56] encouraged community canteens to provide dining services for the elderly from an economic perspective. Community clinics and private general practices were also suggested to be embedded with elderly care service functions to provide in-home medical care services for the elderly.

In addition to the type of function of the facility, the scale of the CECF is also an essential element. Hannah Wehl [57] suggested through sample interviews that a larger facility would improve the wellbeing of the elderly, while Sikorska [58] indicated that the scale of the care facility should not be too large to take better care of the elderly. Shippee et al. [59] confirmed that the scale of the CECF has a significant intervention effect on the QOL of the elderly through a time-lapse study. It is difficult to determine a definite indicator of the scale of the CECF. Nevertheless, most scholars have agreed that the size of the facility has a significant relationship with the wellbeing and QOL of the elderly.

### 2.2.2. Planning and Layout

Planning and layout studies of CECFs have been carried out in two aspects. Firstly, through an analysis of the spatial distribution accessibility of CECFs, Yang et al. [60] analyzed the geographic accessibility between the elderly and healthcare facilities using GIS to make recommendations for policies regarding healthcare for the elderly. Grant [61] examined the effects of space and location on the elderly and their families, caregivers, and facilities and explored the spatial coupling of the elderly with facilities. Gibson et al. [62] explored the spatially equitable distribution of CECFs concerning the growth and distribution of the elderly by studying the distribution of facilities in four zones: capitals, other metropolitan areas, rural areas, and remote areas. Secondly, from the facility's location, You [63] proposed increasingly converting vacant kindergartens into daycare centers for the elderly or adding elderly care functions by considering the current situation of negative population growth in Japan. He set up an enhanced spatial equity measurement to evaluate the satisfaction of the elderly with the distribution of existing facilities. He also constructed a potential evaluation model to assess the potential of kindergartens in the study area to be converted into CECFs. In addition, scholars have conducted substantial research on facility network construction. In Taiwan, a CECF hierarchical network called A–B–C was constructed on the basis of the LTC system. The A-level facility was considered the center, connecting the B-level and C-level facilities, and the travel time between each facility was

within 30 min. The C-level facility provided in-home services within walking distance of users [64].

### 2.2.3. Operation and Management

Research on the operation and management of CECFs has mainly included measuring the service quality of the facility and developing policies to secure funding for the service. Xu [65] considered the quality of service in CECFs to be related to the number and professionalism of staff in the facilities. He also argued that strengthening staff training and standardizing the service charter could effectively improve the quality of elderly services in facilities. Chao [66] posited that service quality in facilities should be related to the perceptions of the elderly of their satisfaction with the facility's elderly care services. Bravo [67] found that the elderly who continually used the facility for a more extended period were more satisfied with the service quality. Regarding the cost of services, Beland et al. [68] suggested that facilities only provide services for a fee in the traditional LTC system. The amount and type of care services seniors receive depend on their needs. They are tied to the amount and quantity of private insurance, Medicare, or Medicaid that they have. This means the elderly in this system have difficulty accessing needed services [69]. Hsu et al. [64] proposed setting a usage line for senior services to solve the problem. If the usage amount of elderly services exceeds the usage line, the elderly would need to pay the corresponding fee, whereas those within the usage line could do so free of cost. In addition, low-income families would receive a government subsidy to ensure that the elderly in need could use the facilities. Although the correlation between the quality of elderly services and the cost of elderly services has not been discussed explicitly, Bravo [67] discussed the satisfaction of the elderly with the quality of services in facilities using nonprofit facilities and profit facilities as examples.

### 2.3. Application of Structural Equation Modeling to CECFs

The structural equation model (SEM) originates from sociology, in which scholars aimed to find effective ways to understand the structure and interactions of underlying phenomena. On the basis of two-factor theory, Spelman constructed a measurement model for analyzing latent factors. Spelman's [70] study is regarded as the origin of validated factor analysis in SEM, and numerous scholars have subsequently refined the study of measurement models of latent and observed variables in SEM. Wright [71] added path analysis to enhance the study of the causal structure between variables. He argued that, by constructing path diagrams, correlations among variables could be quickly decomposed into various causal sources to estimate the direct, indirect, and overall effects of one variable on another variable. SEM can be used to analyze multiple variables simultaneously and reveal the relationships between the effects of variables that are not directly measurable. Therefore, SEM is often applied in social sciences, such as sociology and psychology.

SEM is often used in studies related to QOL and aging to explore the intrinsic relationships of potential variables. Elosua [72] was the first to introduce SEM into QOL research. He proposed the Thurstonian model within the framework of SEM to assess the preferences of QOL dimensions in the elderly. On the one hand, he discussed the feasibility of SEM in QOL studies and concluded that housing conditions significantly impact the QOL of the elderly. Later on, Mu et al. [73] evaluated the relationship among architectural composition (AC), indoor environmental quality (IEQ), residential satisfaction (RS), and QOL in elderly housing using a large-scale questionnaire and SEM. They confirmed that IEQ and RS had the most significant effect on QOL and acted as mediating variables indirectly influencing the impact of AC on QOL. Dahlan [74] responded to the generally low QOL of the elderly in nursing homes and proposed using SEM that a comfortable physical environment and sufficient opportunities for activity participation are conducive to improving the QOL of the elderly. Since then, many scholars have also explored the influencing factors of QOL in terms of both physical and social environments. With the continuous development of SEM and the enrichment of relevant model assessment indicators, the role of SEM in

research has been highlighted. In addition, to explore the causal relationship between variables, SEM has been applied to the multilayer analysis of covariates and the indirect influence path analysis. Mahmoodi [75] used gender as a covariate and found that gender factors influence the path of standard variables, such as mental health, education level, and accessibility of facilities, on the wellbeing of the elderly. Zhang et al. [76] developed a multi-moderator model of neighborhood environment and QOL for the elderly dwelling in the community. Using the multiple mediating effects of Phys-QOL, Psyc-QOL, and SR, recommendations were made for modifying a friendly neighborhood environment to be beneficial to the elderly. Most studies discussed the influence relationship or causality between CECFs and QOL using SEM. The study results can be used to propose construction strategies for CECFs. Fewer studies further analyzed the reasons for the differences in QOL among different groups according to the results obtained and clarified the aspects of CECFs that led to differences in QOL.

### 3. Methodology

#### 3.1. Framework Creation

This study used a composite research method based on previous studies. According to the confirmation that the CECF affects the QOL, the differences in the intrinsic associations of CECF indicators in different types of communities are discussed. The study also analyzes the CECF issues that lead to differences in QOL on the basis of empirical cases and proposes CECF optimization strategies to enhance the QOL of the elderly. Accordingly, a complete research framework and process, including a causality analysis, difference analysis, and optimized application, are constructed.

In this study, SEM, a factor analysis, and a QOL–CECF satisfaction analysis were used to confirm whether CECFs impact the QOL of the elderly and to identify the causes of low QOL. First, a research hypothesis was proposed on the basis of theoretical and literature studies to construct a preliminary equation model, including the measurement models and structural models of QOL and CECF. Next, data related to the observed variables of CECF and QOL were collected by designing and distributing a questionnaire. This study took Shenzhen as the research subject. The elderly were randomly selected to complete the questionnaire, and information was collected from typical cases in three types of communities in Shenzhen. Third, the model was tested and fitted to clarify the pathways and extent of CECFs affecting QOL. AMOS was used to process and analyze the data, as well as to construct the model. Lastly, using factor analysis and QOL–CECF satisfaction analysis through SPSS analysis software, we determined the reasons for the low QOL of the elderly in three types of communities in terms of CECFs, subsequently proposing strategies corresponding to CECFs in these communities in Shenzhen (Figure 1).

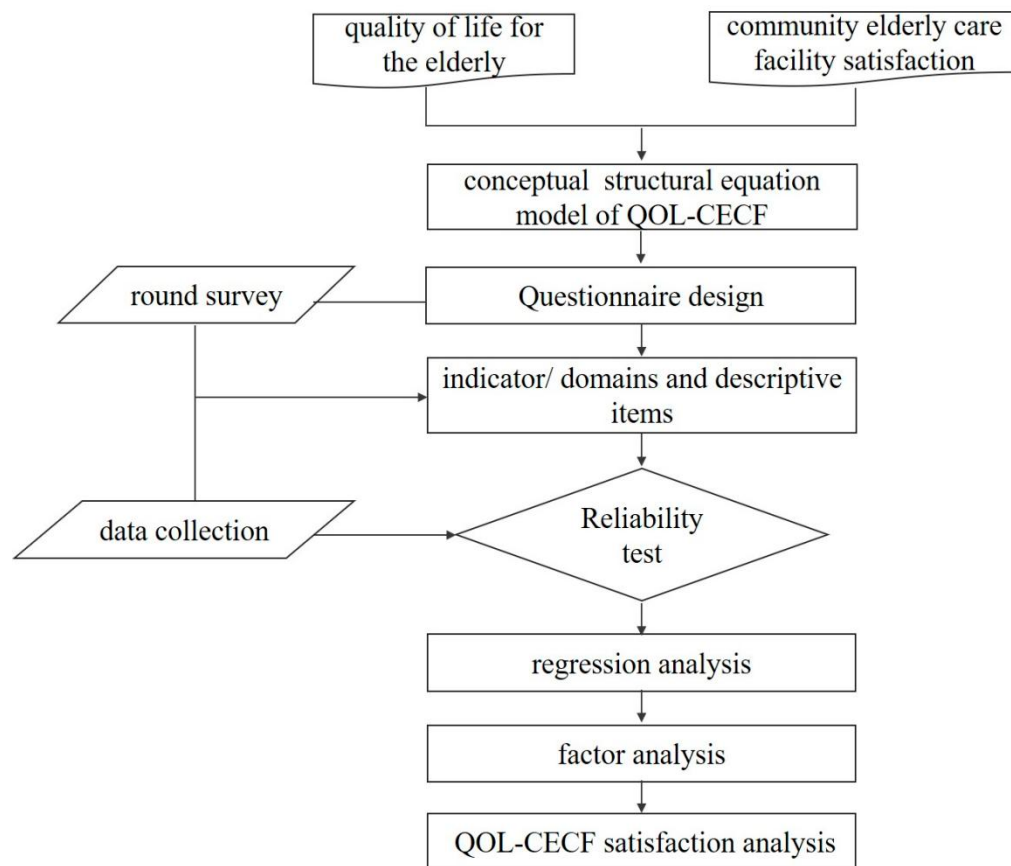
#### 3.2. Research Area Description

##### 3.2.1. Community Types

According to the Real Estate Registration Regulations of the Shenzhen Special Economic Zone, housing types can be divided into three categories: small property rights housing (housing in urbanized villages), affordable housing, and commercial housing. Affordable housing is the housing provided by the government for low- and middle-income families. Commercial housing is developed by real estate enterprises and circulated freely in the market. Residents' housing choices reflect their economic status, education level, and other social attributes. In summary, this study classified communities into three major categories according to housing type: urbanized village communities, affordable housing communities, and commercial housing communities.

The elderly in urbanized village communities include locals and migrant workers, primarily living in self-built houses. The density of buildings in the communities is high, and there are fewer public facilities and public open spaces. Older residents in affordable housing communities include government officials or the elderly who have come to move with their children. These communities are compactly planned and equipped

with necessary public facilities and public green spaces. Older residents in commercial housing communities include locals, entrepreneurs, and seniors who have migrated with their children. Commercial housing communities feature a high-quality built environment with well-equipped spaces.



**Figure 1.** Research methodology process.

### 3.2.2. Research Area

Shenzhen is located in South China, part of Guangdong Province, adjacent to Hong Kong, and is one of China's megacities. According to the results of the seventh census in Shenzhen, the number of elderly people over 60 years old in Shenzhen was 940,716, accounting for 5.36% of the total population. Among them, the elderly aged 65 or older accounted 565,217, i.e., 3.22% of the total. In Luohu, Futian, Nanshan, and five other districts, the population over 60 exceeded 7%, while the population over 65 exceeded the city average (Table 2).

The degree of aging varies greatly among jurisdictions in Shenzhen. In order to recognize the care needs of the elderly and solve the issues of CECFs in Shenzhen, communities with a large proportion of the elderly and equipped with CECFs were selected for this study. First, the jurisdictions and streets with a high degree of aging in Shenzhen were selected. The research area did not include Dapeng New District and Yantian District because of the small number of residents and the low population density. Within the three districts of Luohu, Futian, and Nanshan, the 25 streets with more than 7% of the elderly aged 60 years or older included Guiyuan Street in Luohu District, Lianhua Street, Yuanling Street, and Xiangmi Lake Street in Futian District, and Shahe Street, Taoyuan Street, Nantou Street, and Nanshan Street in Nanshan District. A comparison can provide a better understanding of the differences in the QOL and CECF satisfaction of the elderly among urbanized village communities, affordable housing communities, and commercial housing communities in Shenzhen. Within these 25 streets, nine communities were finally selected as the study

sample according to four conditions: community type, number of elderly people in the community, community scale, and availability of CECFs (Table 3).

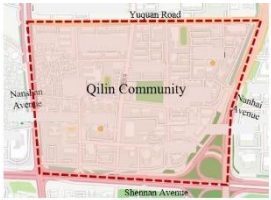
**Table 2.** The proportion of the elderly in each district of Shenzhen.

| Area                | Percentage of Total Population |                   |
|---------------------|--------------------------------|-------------------|
|                     | Over 60 Years Old              | Over 65 Years Old |
| City-wide           | 5.36%                          | 3.22%             |
| Luohu District      | 8.57%                          | 5.47%             |
| Futian District     | 8.43%                          | 5.47%             |
| Yantian District    | 7.59%                          | 4.66%             |
| Nanshan District    | 7.23%                          | 4.65%             |
| Baoan District      | 3.83%                          | 2.19%             |
| Longgang District   | 5.25%                          | 3.04%             |
| Longhua District    | 4.09%                          | 2.26%             |
| Pingshan District   | 4.44%                          | 2.49%             |
| Guangming District  | 3.43%                          | 1.93%             |
| Dapeng New District | 7.00%                          | 4.41%             |

**Table 3.** Overview of information on the empirical research community sample.

|                                      |              | Urbanized Village Community                                                         | Affordable Housing Community                                                         | Commercial Housing Community                                                          |
|--------------------------------------|--------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Luohu District                       | Location Map |  |  |  |
|                                      | Name         | Huangbeiling Community                                                              | Guimuyuan Community                                                                  | Cuizhu Community                                                                      |
|                                      | Street       | Huangbei Street                                                                     | Guiyuan Street                                                                       | Cuizhu Street                                                                         |
|                                      | Scale        | 1.27 km <sup>2</sup>                                                                | 1.65 km <sup>2</sup>                                                                 | 0.78 km <sup>2</sup>                                                                  |
| Proportion and number of the elderly |              | 10.1%; 3000                                                                         | 11.22%; 6800                                                                         | 10.34%; 2900                                                                          |
| Futian District                      | Location Map |  |  |  |
|                                      | Name         | Huanggang Community                                                                 | Xiaomeilin Community                                                                 | Xiangmihu Community                                                                   |
|                                      | Street       | Futian Street                                                                       | Meilin Street                                                                        | Xiangmihu Street                                                                      |
|                                      | Scale        | 1.22 km <sup>2</sup>                                                                | 1.0 km <sup>2</sup>                                                                  | 0.61 km <sup>2</sup>                                                                  |
| Proportion and number of the elderly |              | 7.84%; 2200                                                                         | 8.98%; 2100                                                                          | 11.89%; 1100                                                                          |

Table 3. Cont.

|                                      |              | Urbanized Village Community                                                       | Affordable Housing Community                                                       | Commercial Housing Community                                                        |
|--------------------------------------|--------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Nanshan District                     | Location Map |  |  |  |
|                                      | Name         | Nanshancun Community                                                              | Fuguang Community                                                                  | Qilin Community                                                                     |
|                                      | Street       | Nanshan Street                                                                    | Taoyuan Street                                                                     | Nantou Street                                                                       |
|                                      | Scale        | 1.14 km <sup>2</sup>                                                              | 1.52 km <sup>2</sup>                                                               | 0.62 km <sup>2</sup>                                                                |
| Proportion and number of the elderly |              | 7.01%; 1000                                                                       | 7.13%; 1000                                                                        | 7.97%; 3800                                                                         |

### 3.3. SEM for QOL–CECF

#### 3.3.1. Research Hypothesis of SEM

According to previous studies, environmental factors critically influence the QOL of the elderly, directly or indirectly, through the physical, psychological, and social relationships of the elderly. This study considered the CECF as an external environmental factor and explored the elements of the CECF that influence the QOL of the elderly.

Firstly, on the basis of previous studies on QOL and the WHOQOL-BREF scale, we summarized the indicators for QOL and constructed a measurement model of QOL. Secondly, according to the current literature, the measurement variables of CECF were categorized as functional setting, planning and layout, and operation and management. Then, the measurement model of CECF was formed. Lastly, according to the theoretical model of the QOL, the relationship and path of the CECF and QOL were assumed to lay the foundation for the subsequent model fitting (Figure 2).



Figure 2. Schematic representation of the relationship among the variables assumed by the model.

### 3.3.2. Questionnaires and Data Collection

On the basis of the literature review, this study designed a questionnaire to measure the QOL of the elderly and their satisfaction with CECFs. The collected data were used to identify the indicators of CECFs that affect QOL. A pre-survey questionnaire was designed according to the observed variables in the measurement models of QOL and CECF. The indicators and questions were modified to form the final questionnaire by collecting the opinions of the elderly in the three types of urban communities in Shenzhen and experts in the elderly care industry. The questionnaire contained three main parts: general information of the respondents, QOL assessment, and satisfaction evaluations of CECFs.

#### General Information of Respondents

The general information of respondents in the questionnaire included their age, gender, physical condition, economic condition, education level, and living situation. This study aimed to recognize the QOL and CECF satisfaction among the elderly in the community. The inclusion criteria of the respondents were as follows: experience with CECFs and aged >50 years old. This is because some older adults in inland China have retired at the age of 50 due to work restrictions. This study wanted to collect as many questionnaires from the elderly as possible; thus, no fewer than 70 questionnaires were released in each community. Finally, 700 older adults were randomly selected from nine communities in which questionnaires were distributed; 27 invalid questionnaires were screened out, leaving 673 valid questionnaires (sample efficiency rate of 96.14%). Among the screened questionnaires, 252 respondents were male, and 421 respondents were female. The age distribution was mainly 60–69 years old and 70–79 years old; the specific distribution statistics are shown in Table 4.

**Table 4.** The 673 respondents' basic information.

| Information            | Option                       | Number | Proportion (%) |
|------------------------|------------------------------|--------|----------------|
| Gender                 | Male                         | 252    | 37.4           |
|                        | Female                       | 421    | 62.6           |
| Age                    | 50–59                        | 160    | 23.8           |
|                        | 60–69                        | 269    | 40.0           |
|                        | 70–79                        | 166    | 24.7           |
|                        | 80–89                        | 71     | 10.5           |
|                        | Over 90                      | 7      | 1.0            |
| Education level        | Elementary school and below  | 199    | 29.6           |
|                        | Middle School to High School | 343    | 51.0           |
|                        | Bachelor's degree and above  | 131    | 19.4           |
| Physical condition     | Non self-care elderly        | 77     | 11.4           |
|                        | Self-care elderly            | 596    | 88.6           |
| Household registration | Non-household elderly        | 380    | 56.5           |
|                        | household elderly            | 293    | 43.5           |
| Economic conditions    | Low                          | 293    | 43.5           |
|                        | Medium                       | 334    | 49.6           |
|                        | High                         | 46     | 6.9            |

#### Assessment of QOL

According to the WHOQOL-BREF questionnaire, the QOL of the elderly in the communities was assessed from four aspects: overall QOL, physical QOL (Phys-QOL), psychological QOL (Psys-QOL), and social relationships (SR-QOL). Sixteen measurable items were used to describe the four dimensions of QOL in the elderly.

In order to avoid misunderstandings during the translation of the WHOQOL-BREF questionnaire, the study modified the translated original questionnaire according to the opinions of the elderly and experts. Firstly, the questions about religious beliefs were

deleted, as the researchers found that the religious beliefs of the elderly in China had less significance in supporting their lives. Secondly, memory metrics were applied instead of attention metrics, as older adults have commonly reported that memory is more critical for QOL. Thirdly, the question of happiness with other family members was introduced instead of satisfaction with sex life. The elderly are shy when it comes to talking about sex, whereas their relationships with their partners, children, and other family members are more critical to their QOL. In addition, the original scale questionnaire options were quantified to facilitate understanding by the elderly (Table 5). The modified questionnaire was validated for reliability and validity in a follow-up study, which confirmed its utility.

**Table 5.** QOL dimensions and questions for the elderly in urban communities in Shenzhen.

| QOL Dimension                | Number          | Question                                                                                |
|------------------------------|-----------------|-----------------------------------------------------------------------------------------|
| Q1. Overall QOL              | q <sub>1</sub>  | How do you rate your quality of life?                                                   |
|                              | q <sub>2</sub>  | How well you can move (walk)?                                                           |
| Q2. Physical QOL             | q <sub>3</sub>  | How often are you bothered by illness or physical pain?                                 |
|                              | q <sub>4</sub>  | How often do you need medical care?                                                     |
|                              | q <sub>5</sub>  | How well do you sleep?                                                                  |
|                              | q <sub>6</sub>  | How often do you feel tired?                                                            |
|                              | q <sub>7</sub>  | How well can you take care of yourself?                                                 |
|                              | q <sub>8</sub>  | How well do you work?                                                                   |
| Q3. Psychological QOL        | q <sub>9</sub>  | What is your attitude toward your future?                                               |
|                              | q <sub>10</sub> | How satisfied are you with your present appearance?                                     |
|                              | q <sub>11</sub> | How often do you have negative emotions, such as depression, loneliness, and pessimism? |
|                              | q <sub>12</sub> | How is your memory lately?                                                              |
|                              | q <sub>13</sub> | What level of respect do you get from others?                                           |
| Q4. Social Relationships QOL | q <sub>14</sub> | Do you get enough support from your friends?                                            |
|                              | q <sub>15</sub> | How is your relationship with your neighbors?                                           |
|                              | q <sub>16</sub> | How often do you have friction with other family members?                               |

#### CECF Satisfaction Evaluation

On the basis of the measurement model of CECFs, the questionnaire indicators were refined into 13 measurable indicators in terms of healthcare, life care, and social activity by combining the opinions of the elderly and experts. Respondents were asked to describe their satisfaction with each measurable item of the CECF. A five-point Likert scale was used to quantify satisfaction, with the final variable score being the mean of its quantifiable items (Table 6).

**Table 6.** Shenzhen CECF indicators.

| Content                     | Construction Factor                  | Number         | Indicator                                                   |
|-----------------------------|--------------------------------------|----------------|-------------------------------------------------------------|
| A. Functional setting       | A <sub>1</sub> Function type         | a <sub>1</sub> | Satisfaction with the diversity of medical care services    |
|                             |                                      | a <sub>2</sub> | Satisfaction with the diversity of life care services       |
|                             |                                      | a <sub>3</sub> | Satisfaction with the diversity of social activity services |
|                             | A <sub>2</sub> Function scale        | a <sub>4</sub> | Degree of crowding in medical care function rooms           |
|                             |                                      | a <sub>5</sub> | Degree of crowding in life care function rooms              |
|                             |                                      | a <sub>6</sub> | Degree of crowding in social activity function rooms        |
| B. Planning and layout      | B <sub>1</sub> Service radius        | b <sub>1</sub> | Distance from home to the medical care of CECF              |
|                             |                                      | b <sub>2</sub> | Distance from home to the life care of CECF                 |
|                             |                                      | b <sub>3</sub> | Distance from home to the social activity of CECF           |
|                             | B <sub>2</sub> Walkability           | b <sub>4</sub> | Satisfaction while walking to CECF                          |
| C. Operation and management | C <sub>1</sub> Service quality       | c <sub>1</sub> | Satisfaction with the quality of CECF                       |
|                             | C <sub>2</sub> Service affordability | c <sub>2</sub> | Satisfaction with the cost of services in CECF              |

### 3.3.3. Testing and Fitting of SEM

At the beginning of the analysis, the reliability of the questionnaire was checked. Cronbach's alpha value ( $\alpha$ -value) was chosen to determine reliability. Measurable items in the questionnaire can be accepted when the  $\alpha$ -value exceeds 0.6 or when the  $\alpha$ -value is lower than the original value after being removed. Otherwise, the item should be excluded. According to the reliability test results of the QOL index, the  $\alpha$ -values of all variables were greater than 0.8, indicating a high degree of internal consistency. The  $\alpha$ -values of all variables of the CECF were greater than 0.7, indicating that all items were suitable for this study. SEM confirmatory factor analysis (CFA) was designed to find clustered relationships among the variables.

Next, the CFA was performed with the help of the chi-square test. The commonly used model fit indices include the goodness-of-fit index (GFI), normed fit index (NFI), and root mean square error of approximation (RMSEA). A closer GFI value to 1 indicates a better fit. The NFI index reflects the difference between the hypothetical and independent models. A closer value to 1 indicates a better fit. The RMSEA demonstrates the differences among the theoretical, hypothetical, and perfectly fitted saturated models. The RMSEA is independent of the sample size, model complexity, and distribution of measured variables, and it is suitable for practical applications in social science research. A value less than 0.08 represents a good model fit. The indices are calculated as follows:

$$GFI = \frac{tr(\hat{\sigma}'W\sigma)}{tr(s'Ws)}, \quad (1)$$

where  $\sigma$  is the estimated covariance matrix vector, and  $s$  is the observed data vector.

$$NFI = \frac{\chi_{indep}^2 - \chi_{test}^2}{\chi_{indep}^2}, \quad (2)$$

where  $\chi_{indep}$  is the cardinality of the independent model, and  $\chi_{test}$  is the cardinality of the hypothetical model.

$$\text{RMSEA} = \sqrt{\frac{\hat{F}_0}{df_{test}}}, \quad (3)$$

$$\hat{F}_0 = \frac{\chi^2_{test} - df_{test}}{N}, \quad (4)$$

where  $\chi^2_{test}$  is the cardinality of the hypothetical model,  $df_{test}$  is the model degrees of freedom, and  $N$  is the number of samples.

According to the validation factor analysis, all the parameter indicators met the analysis requirements. The model had good structural validity (Table 7), and the observed indicators of community elderly QOL and the observed indicators of CECFs could effectively reflect the potential variables.

**Table 7.** Reliability test results of the indicators.

| Fitted Indicators | CECF    | QOL     | Reference Range |
|-------------------|---------|---------|-----------------|
| $\chi^2$          | 250.835 | 247.200 | -               |
| $df$              | 51      | 87      | -               |
| $\chi^2/df$       | 4.918   | 2.841   | <5              |
| RMSEA             | 0.076   | 0.052   | <0.08           |
| CFI               | 0.962   | 0.968   | >0.9            |
| TLI               | 0.951   | 0.962   | >0.9            |
| IFI               | 0.963   | 0.968   | >0.9            |
| RFI               | 0.940   | 0.942   | >0.9            |
| NFI               | 0.954   | 0.952   | >0.9            |
| GFI               | 0.942   | 0.954   | >0.9            |
| SRMR              | 0.036   | 0.035   | <0.08           |

Lastly, a path analysis was applied to explore the path and magnitude of the effect of CECF on QOL, where  $\beta$  and  $p$  are the effect coefficient and significance test indicators, respectively.  $\beta$  is a comparable standardized regression coefficient obtained after the data are eliminated according to differences in magnitude, order of magnitude, etc. This coefficient can indicate the extent of the impact of the independent variable on the dependent variable. A larger absolute value of the standardized regression coefficient indicates a greater effect of the independent variable on the dependent variable. In addition, the  $p$ -value is the result of the significance test. A  $p$ -value less than 0.05 indicates that the independent variable affects the dependent variable, while a  $p$ -value less than 0.01 indicates a significant effect.

### 3.3.4. API Analysis between QOL and CECF in Three Types of Community

This study further discusses the aspects of CECF leading to low QOL in the three types of communities. Factor analysis explained the differences in the intrinsic associations of the 12 CECF indicators in the three types of communities. Five integrated factors of CECFs in urbanized village communities, affordable housing communities, and commercial housing communities were extracted with characteristic roots greater than 0.7. The cumulative value of the percentage variance of the factors was more than 70%, indicating that the newly extracted integrated factors could represent most of the original data for subsequent analysis. The formula for extracting the integrated factors was as follows:

$$X_i = a_{i1} F_1 + a_{i2} F_2 + \dots + a_{im} F_m + \varepsilon_i, \quad (5)$$

where  $X_i$  is the original indicator,  $F_m$  is the  $m$ -th composite indicator,  $a_{i1}$  is the factor loadings, and  $\varepsilon_i$  is the special factor.

After extracting the integrated factors, the value of the composite indicator was recalculated on the basis of the original data. The formula was as follows:

$$F_i = \delta_{i1} Zx_1 + \delta_{i2} Zx_2 + \dots + \delta_{i12} Zx_{12}, \quad (6)$$

where  $F_i$  is the composite factor,  $\delta_{i1}$  is the corresponding original index coefficient in the  $i$ -th composite factor, and  $Zx_n$  is the  $n$ -th original indicator.

Lastly, a QOL–CECF quadrant chart was constructed using importance performance analysis (IPA). The results of each type of community were divided into four quadrants: high QOL/high CECF satisfaction, low QOL/high CECF satisfaction, high QOL/low CECF satisfaction, and low QOL/low CECF satisfaction. From the quadrant areas with low QOL/low CECF satisfaction, the CECF factors contributing to low QOL in each type of community were identified.

## 4. Results and Discussion

### 4.1. Results of Path Analysis of SEM

According to the path analysis results of SEM, it was found that all three aspects of CECFs, i.e., functional setting, planning and layout, and operation and management, had a significant effect on the overall QOL, Phys-QOL, Psyc-QOL, and SR-QOL. According to the regression coefficients, functional setting (0.571,  $p < 0.01$ ) had the most significant effect on overall QOL, compared to planning and layout (0.358,  $p < 0.01$ ), and operation and management (0.434,  $p < 0.01$ ). In terms of Phys-QOL, functional setting (0.413,  $p < 0.01$ ) had the most significant impact, followed by operation management (0.179,  $p < 0.01$ ). In terms of Psyc-QOL, functional setting (0.395,  $p < 0.01$ ) and planning and layout (0.204,  $p < 0.01$ ) had a more significant effect than operation and management (0.136,  $p < 0.05$ ). Lastly, regarding SR-QOL, the functional setting also had a significant effect (0.334,  $p < 0.01$ ), with similar effects seen for planning and layout (0.205,  $p < 0.01$ ) and operation and management (0.220,  $p < 0.01$ ) (Figure 3).

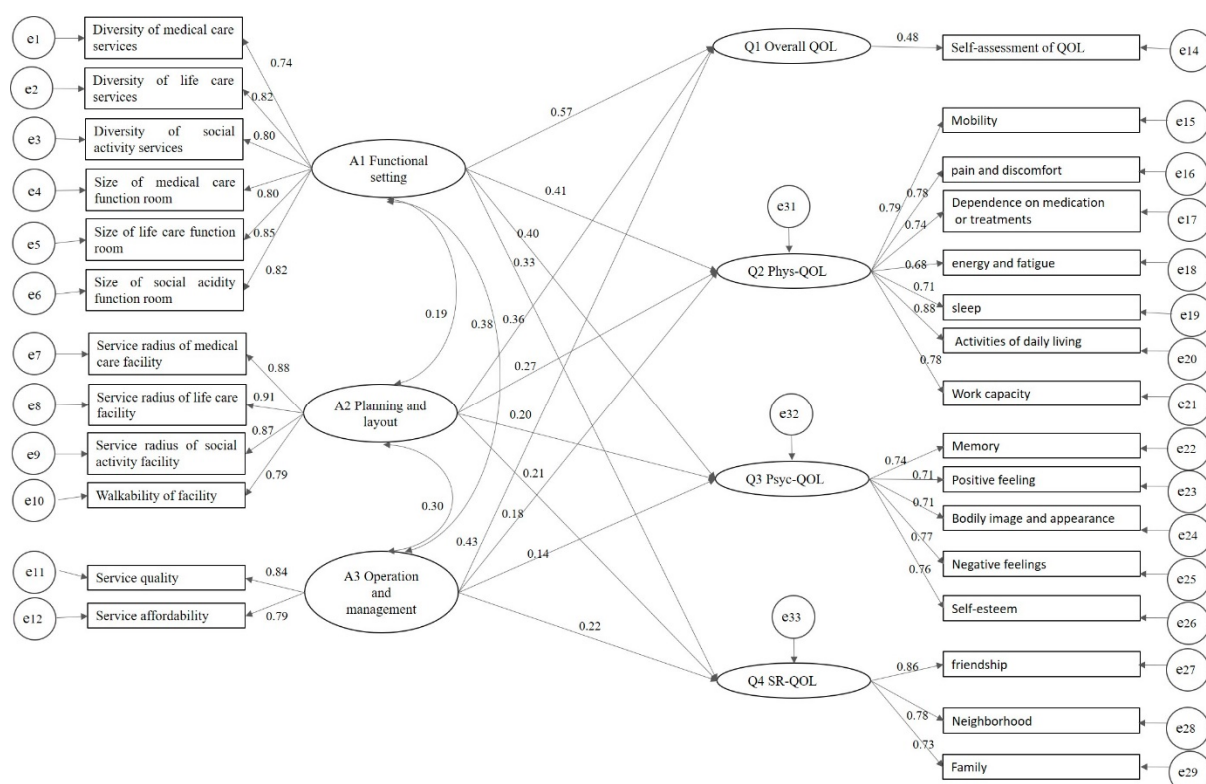


Figure 3. Results of the influence path analysis and the degree of influence of each variable.

According to the SEM results, the functional setting of the CECF had the most significant effect on the QOL of the elderly, whereby life care and social activity could improve the QOL by affecting the functional setting of the CECF. The positive effect of community medical care functions on the QOL was repeatedly mentioned in previous studies. A well-developed medical care function is believed to enhance the QOL of the elderly in

both physical and psychological aspects [77]. In contrast, the respondents in this study had a more significant need for life care and social activities because of their good health conditions. De Guzman [78] suggested that social activities could help the elderly resist depression and improve their QOL, while de Oliveira et al. [79] focused on exercise activities, suggesting that they could help the elderly not only relieve anxiety and improve their Psyc-QOL, but also improve their health and Phys-QOL. However, life care was more often neglected or combined with medical care in previous studies. Professional care is considered to have a positive effect on the QOL of the elderly [80]. However, researchers in developed countries rarely discussed the importance of meal services for the QOL of the elderly. This may be related to the country, whereby most older adults in China expect the community to have a well-established meal service [81]. Secondly, the findings suggested that the radius of the CECF has a significant effect on the planning layout and, subsequently, on the Phys-QOL and Psyc-QOL of older adults. This is consistent with the findings of previous studies, which indicated that the accessibility of CECF is effective in improving the QOL [82]. Lastly, service quality as an important indicator influences satisfaction with the CECF's operation and management and indirectly affects the QOL of the elderly. Kanoh and Challiner confirmed that improving the service quality could enhance the Psyc-QOL of the elderly [83,84]. Fewer studies were conducted on service affordability in developed countries, while a more significant correlation between finance and the QOL of the elderly was indicated in studies from less developed regions [85].

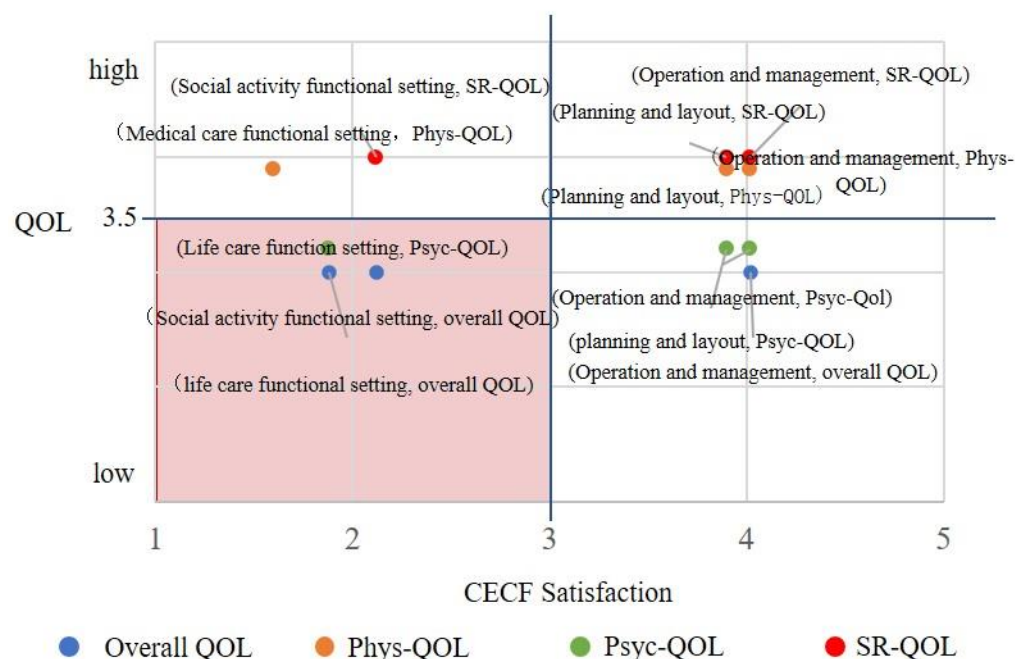
#### 4.2. Causes of Low QOL in CECF

In this study, the intrinsic relationships of the indicators of the CECFs in three types of communities were re-extracted using a factor analysis. The functional setting in urbanized village communities was split into three integrated factors according to elderly care needs. The functional setting of life care and social activity in both affordable and commercial housing communities showed significant intrinsic correlations. It was found that the affordable housing communities mostly combined the functions of life care and social activity because of the limited space and facilities. In contrast, life care and social activity services in commercial housing communities were closely linked because the elderly often engaged in social activities around mealtimes. On the other hand, the medical care functional setting in the three types of communities was independent. In addition, the service radius of medical care facilities in commercial housing communities was intrinsically related to the functional setting.

The QOL–CECF four-quadrant analysis chart was constructed with the results of the composite index of the CECFs in each community as the horizontal axis and the statistical results of the QOL in the three types of communities as the vertical axis. Firstly, the overall QOL, Phys-QOL, Psyc-QOL, and SR-QOL were unified on a five-point scale, with 3.5 used as the threshold for high and low QOL outcomes. The statistical results of the questionnaires in urbanized village communities, affordable housing communities, and commercial housing communities were plotted in the QOL–CECF four-quadrant diagram. The factors in the low QOL/low CECF quadrant area in each type of community were extracted to determine the main aspects influencing low QOL in each community.

##### 4.2.1. Causes of Low QOL in CECFs of Urbanized Village Communities

According to the QOL–CECF quadrant chart of urbanized village communities, it was found that the Phys-QOL and SR-QOL of the elderly were better, whereas the evaluation results of the overall QOL and Psyc-QOL were lower. The social activity functional setting and life care functional setting related to the overall QOL and Psyc-QOL scored lower (Figure 4).



**Figure 4.** QOL–CECF satisfaction in urbanized village communities.

In this study, the in-depth interviews with 30 randomly selected older residents in three urbanized village communities (Huangbei Ling community, Huanggang community, and Nanshan village community) revealed that there were fewer life care facilities in urbanized village communities. The interviewees' attitudes were polarized, with local seniors saying that, as they grew older, the demand for life care services, such as elderly canteens and daycares, became stronger. Most elderly were in good health and performed manual labor or household work daily. They lived with their families and had a low demand for life care facilities. According to the interviews with the relevant responsible personnel of the Nanshan District Civil Affairs Bureau, Nanshan District has closed several CECFs, such as daycare centers and elderly canteens, since 2020 because of the COVID-19 pandemic and the low utilization rate of CECFs. Regarding the functional setting of social activity, about half of the respondents believed they had to work during the day and have leisure activities in the evening. However, there were no facilities or places for nighttime social activities. The elderly activity rooms in the community were worn and small. The elderly generally reported that the activity rooms were too crowded for activities.

#### 4.2.2. Causes of Low QOL in CECFs of Affordable Housing Communities

According to the QOL–CECF quadrant chart of affordable housing communities, the elderly had low Phys-QOL, but high Psyc-QOL, SR-QOL, and overall QOL (Figure 5). The integrated factors affecting low Phys-QOL were the functional setting of life care and social activity, the functional setting of medical care, and the service affordability.

Thirty randomly selected older residents in three affordable housing communities revealed that most of the CECFs were small, and that most CECFs placed the life care function on the same site as the social activity function. This resulted in an overlap of the elderly who were resting and who were participating in activities. About half of the respondents pointed out they needed to take care of their grandchildren and had less time and opportunities to participate in activities in the CECF. In general, the demand of older adults in affordable housing communities for life care and social activity was high, while the satisfaction level was low. Moreover, about 70% of the seniors considered the medical care rooms in the CECFs to be small and the medical care equipment to be old. Some respondents with chronic diseases stated that the primary medical care services provided in the CECFs could not meet the particular needs of the elderly. Regarding the service affordability of CECF, most seniors had good health awareness and higher life care pursuits.

However, their financial conditions made it difficult for them to pay for the high-quality care services. The contradiction between the demand for high-quality care services and the low service affordability of the elderly in the affordable housing communities was prominent.

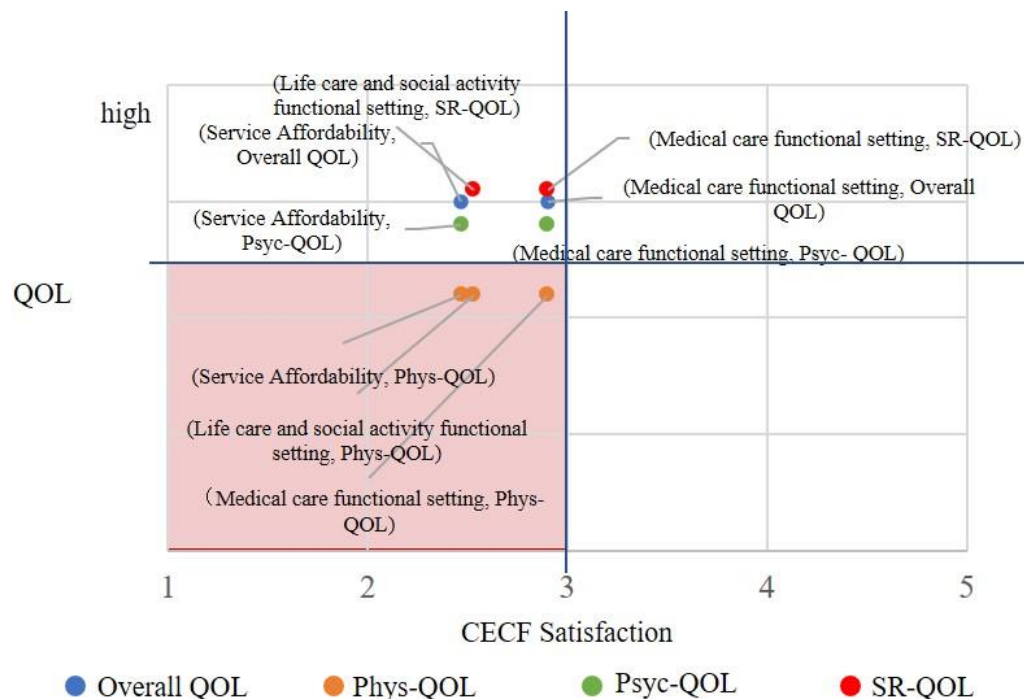


Figure 5. QOL–CECF satisfaction in affordable housing communities.

#### 4.2.3. Causes of Low QOL in CECFs of Commercial Housing Communities

According to the QOL–CECF analysis of commercial housing communities, the Phys-QOL of the elderly in commercial housing communities was slightly lower than other elements of QOL, which was influenced by two integrated factors, the operation and management of CECFs and the functional setting of social activity and life care (Figure 6).

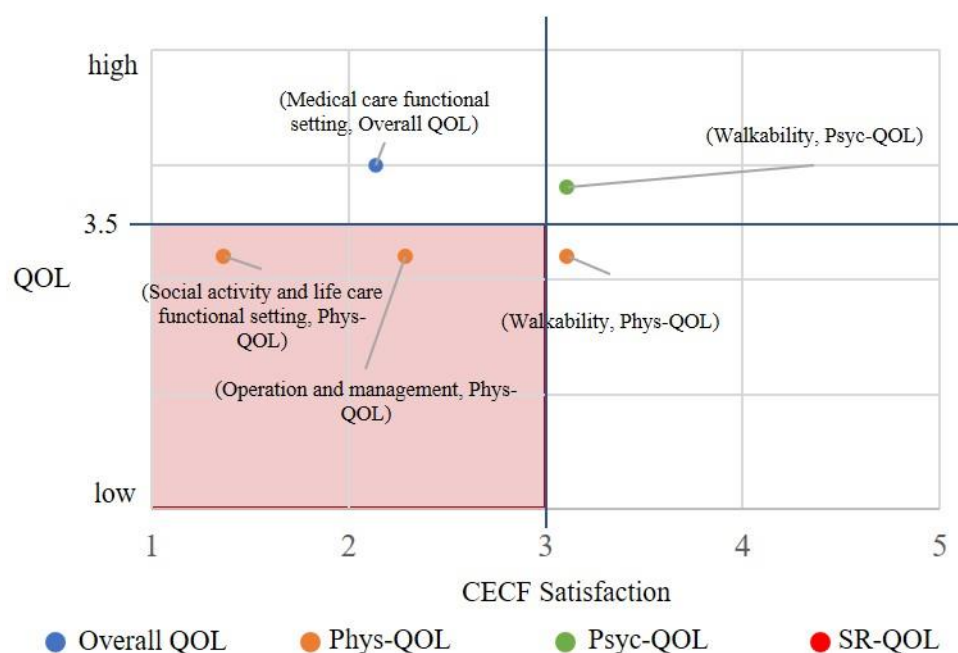


Figure 6. QOL–CECF satisfaction in commercial housing communities.

This study conducted in-depth interviews with 30 randomly selected older residents in three commercial housing communities and found that the elderly possessed good financial status and high-quality demand for care services. Regarding operation and management satisfaction in the CECFs, almost all of the interviewers expressed a willingness to pay higher fees to get more professional care services. About 33.3% of the respondents considered the staff to lack professional medical knowledge and to have a formulaic service attitude. The young staff lacked experience and empathy, resulting in lower service quality in CECFs. As for the functional setting for social activity and life care, most interviewees expressed a desire for home cleaning, maintenance, and meal delivery services. The elderly preferred to receive care at home due to the need for privacy. In addition, respondents indicated a lack of activity rooms and types of activities in the CECFs. In the commercial housing communities, most elderly had a wide range of interests and a willingness to learn new skills. The primary venues and types of social activity provided in the CECFs were not attractive to the elderly for active participation. The diverse social activity needs of the elderly were not satisfied.

## 5. Conclusions and Limitation

### 5.1. Policy Recommendations

This study was conducted in urbanized village communities, affordable housing communities, and commercial housing communities in Shenzhen. This study confirmed using SEM that the functional setting, planning and layout, and operation and management of CECFs affected the QOL of the elderly. Furthermore, different issues of CECFs were identified among the three types of communities using a QOL–CECF satisfaction analysis, which can provide a reference for CECF optimization strategies. According to the results of SEM, the functional setting of the CECF had the most significant impact on the QOL of the elderly, whereas the planning and layout as well as the operation and management had slightly different degrees of impact on the QOL. Further analysis revealed that the QOL assessment results and the CECF issues leading to low QOL among the three types of communities differed. The social activity functional setting and life care functional setting related to the overall QOL and Psys-QOL scored lower in urbanized village communities. The elderly in affordable housing communities had low Phys-QOL because of the functional setting of life care and social activity, the functional setting of medical care, and the service affordability. In commercial housing communities, the Phys-QOL of the elderly was slightly lower than other QOL elements, which was influenced by two integrated factors, the operation and management of CECFs and the functional setting of social activity and life care.

On the basis of the findings, this study concluded that the functional setting of CECFs is primary. In principle, in communities and facilities with sufficient space, all three types of functions (medical care, life care, and social activity) should be provided, and the area of each function room should be sufficient to carry out diverse activities. In communities and facilities where space is insufficient, the functional rooms for medical care should be independent, and the function rooms for social activity and life care can be combined. For the different CECF issues in the three types of communities, this study proposes targeted optimization recommendations.

#### 5.1.1. Strategies for CECF Construction in Urbanized Village Communities

The community's local stores and public service facilities can supplement the life care and social activity care services. Due to the land constraints in urbanized village communities, this study recommends that local stores should provide elderly services, such as restaurant stores acting as community canteens, laundromats providing laundry services, and appliance repair stores providing home repair services. Such measures are being piloted in cities, such as Shanghai and Guangzhou. At the same time, the community's educational facilities should be opened up to the elderly on weekends, providing a place for recreational

and sports activities. Public facilities, such as community police rooms, fire stations, and ancestral halls, can be supplied at night as a place for chess activities for the elderly.

#### 5.1.2. Strategies for CECF Construction in Affordable Housing Communities

- (1) This study suggests that life care and social activity functions should be combined to solve the small-scale issue of CECFs. At the same time, the CECFs should pay attention to static and dynamic partitions and set up a separate room for life care functions to ensure the quiet use needs of the elderly.
- (2) The study proposes three recommendations to solve the issue of low satisfaction with the medical care functional setting. First, CECFs should cooperate with health centers and tertiary hospitals around the community to obtain stable medical service support. Secondly, CECFs should be integrated with community health centers as much as possible. Thirdly, the number and scale of medical care function rooms of CECFs should meet the design standards. CECFs should be equipped with physical therapy instruments, massage chairs, and other equipment.

#### 5.1.3. Strategy for the CECF Construction in Commercial Housing Communities

- (1) The study suggests that increasing the number of life care and social activity CECFs using public areas can solve the lack of life care and social activity function rooms in commercial housing communities. It is recommended that CECFs, such as elderly activity rooms or canteens, should be combined with other public rooms in the community, such as property management rooms and community service stations. In addition, the outdoor space of CECFs in commercial housing communities can be flexibly increased. Shenzhen is a subtropical city, and most residential buildings are elevated on the ground floor to form a semi-outdoor space that can shelter from the wind and rain. Elderly activity rooms and canteens can be set up in these semi-outdoor areas.
- (2) CECFs should import specialized elderly care institutions to improve service quality. The elderly in commercial housing communities have high demands for the service quality of CECFs and high service affordability. The government should encourage professional elderly care institutions to operate CECFs and provide specialized and personalized assistance to the elderly. In addition, CECFs should strengthen staff training and standardize service quality.

#### 5.2. Limitations and Future Research Directions

There were two limitations of this study. The first was the questionnaire interview method, using the elderly who are healthy as the research subjects, which lacked an assessment of the QOL and CECF usage feelings of the elderly who are disabled or demented. The second was the lack of a follow-up study on QOL changes during CECF development. Many CECFs within the study area experienced opening, closing, and upgrading changes throughout the study period. Because of the COVID-19 pandemic and the mobility of interviewees, this study could not track the elderly QOL changes during CECF development. A further exploration of the mechanism of the impact of CECF on the QOL of the elderly is lacking.

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